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Editorial

Welcome to your preview of SLEEP 2025, the 39th Annual Meeting of the Associated Professional Sleep Societies, which is scheduled to be held in Seattle, Washington on June 7-11, 2025.

This abstract supplement unites the journal *SLEEP*, and the science of SLEEP 2025. All abstracts presented at SLEEP 2025 are included in this supplement. This year more than 1600 abstracts will be presented at the meeting. 168 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 2025. The four-digit number in the abstract supplement matches the four-digit code published in the SLEEP 2025 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 Seattle, Washington in June.

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

Abstract citation ID: zsaf090.0001

0001

CIRCADIAN CHANGES IN GRAPH THEORY MEASURES OVER THE COURSE OF SLEEP DEPRIVATION

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Introduction: Circadian rhythms are known to modulate brain activity and connectivity, influencing neural network integration and cognitive performance. Graph theory measures, such as global efficiency (GE), can tell us about how the brain transfers information and may be used to explore how circadian regulation impacts the efficiency of information transmission across neural networks. The dynamics of how GE of the brain changes within a 24-hour period, and which regions show the most significant circadian pattern were investigated in this study. Given that cognitive demands change dynamically across a 24-hour period, we hypothesized that circadian oscillations in functional connectivity (GE) would be non-uniform across cortical and sub-cortical regions.
Methods: Twenty healthy subjects (9 females) were recruited from Tucson, AZ. After online screening, participants underwent a baseline overnight sleep study followed by 39 hours of total sleep deprivation. Functional MRI scans were collected at six-hour intervals along with assessments of cognitive status. We applied a cosine regression using a Levenberg Marquardt algorithm to analyze oscillatory changes in resting state GE calculated with the CONN toolbox (22.v2407).
Results: The right inferior temporal gyrus (rITG) and left thalamus demonstrated a significant circadian change in GE. Cosine regression of rITG yielded an oscillatory period: τ = 22.28 hours, acrophase =.13 radians, and mesor =.4944 (F = 9.72, P =.047, R^2 =.91). The left thalamus also yielded a significant circadian change in GE: τ = 24.87 hours, acrophase = -4.45 radians, and mesor =.46 (F = 16.0233, P = 0.02374, R^2 = 0.9413).
Conclusion: We found a significant circadian change in GE within the rITG and left thalamus, regions involved in visual processing, sensory integration, attention, and cognition. This suggests that global network connectivity in both regions changes rhythmically throughout the day. The differences in waveform properties between these regions, supports our hypothesis that circadian modulation affects certain parts of the brain heterogeneously. As such, cognitive functions like visual processing and sensory integration may exhibit corresponding fluctuations in efficiency and optimization.
Support (if any): Army Research Office award W911NF2210223 subaward SUBK00016417.

Abstract citation ID: zsaf090.0002

0002

24-HOUR VARIATION IN METABOLIC RESPONSES TO A 6.5-HOUR MEAL WINDOW IN HUMANS

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Introduction: Meal timing influences human health. For example, compared to eating during the day, eating identical meals at night acutely elevates levels of glucose and triglycerides. While most studies have compared single meals given at two distinct (often opposite) times of day, the timecourse of the 24-hour variation in metabolic responses to meals is unknown. The aim of this study was to examine systematically how the timing of meals across the 24-hour circadian cycle influences daily exposure to triglycerides, triglyceride-rich lipoproteins [remnant cholesterol (remnant-C)] and glucose.
Methods: Ten healthy adults (6 female) aged 22-35 years were randomized to a 16-hour intervention 'day' in dim light (< 3 lux) between two 8-h sleep episodes in darkness, with a 6.5-hour meal window in the center of the day scheduled at one of 16 stimulus times distributed every 90-minutes (~22.5 degrees) across the 24-hour day between participants. A 26–48.5-h constant routine (CR) with hourly identical meals preceded the intervention day. Blood samples collected every 20-60 minutes throughout the CR and intervention day were assayed for triglyceride, remnant-C and glucose. The 24-h area under the curve (AUC) of the intervention day was calculated and expressed relative to the first 24-h AUC of the CR to control for interindividual differences in metabolic analyte levels. Mealtime response curves were generated by analyzing the relative AUC by the clock time of meal onset using a single-harmonic sinusoidal regression.
Results: Significant mealtime response curves were generated for triglycerides ($p < 0.05$), remnant-C ($p < 0.01$) and glucose ($p < 0.001$). The fitted curve for the 24-h AUC showed that daily levels were lowest when eating during daytime hours for triglyceride and remnant -C, which were lowest when eating at ~7pm, and glucose, which was lowest at ~9am.
Conclusion: The timing of meals across the 24-hour day alters daily exposure to triglycerides, triglyceride-rich lipoproteins, and glucose, with generally worse metabolic responses when the eating window started at night compared to the day. These mealtime response curves can inform practical advice on timing diet-based interventions to reduce cardiometabolic health risks, particularly in shift workers and others who eat at night.
Support (if any): Sleep Research Society Career Development Award; R01HL159207

Abstract citation ID: zsaf090.0003

0003

COMMON AND RARE GENETIC VARIATIONS ASSOCIATION ANALYSIS WITH FIFTEEN 24-HOUR REST-ACTIVITY RHYTHM MEASURES

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Introduction: Rest-activity rhythm, as an indicator of circadian rhythm, is associated with multiple health outcomes. It is influenced by biological, behavioral, and social-environmental factors, but there is a limited understanding of its genetic basis.
Methods: High-quality accelerometry data, collected between 2006 and 2010 using triaxial devices (Axivity AX3), were used to derive eight parametric and seven non-parametric RAR variables from 85,784 UK Biobank participants of European ancestry (mean (SD) age 62.4 (7.83) years. 56% female). We

conducted genome-wide common variant and aggregated exome sequencing analyses separately on fifteen RAR variables using linear-mixed models adjusted for age, sex, number of valid wear days, and 10 genetic principal components. Genetic correlations between the RAR variables and with 232 phenotypes were evaluated using Spearman correlation and Linkage disequilibrium score regression (within RAR only). In addition, we performed pathway and gene-set-enrichment analysis to identify over-represented pathways and performed protein-protein interaction network analysis.

Results: Common variant analysis identified 21 unique genome-wide significant loci (p< 5e-8) associated with 8 different RAR variables. Notable associations were rs113851554 (MEIS1) with L5, L5 start-time (mean (standard error (SE): -0.14 (0.01), and -0.12 (0.01) respectively), rs757082192 (ART4) (-0.56 (0.10)) and rs183157147 (CENPJ) (0.98 (0.17)) with Down-Mesor. Exome-wide association analysis identified 8 significant genes (p< 2.8e-6) associated with 7 RAR variables. Notably, MICU3 and RAET1L/ULBP6 were significantly associated with M10 start time with an overall predicted missense and loss of function effect. Overall, the largest number of significant hits were related L5 (4 with L5 and 6 for L5 start time) followed by M10 (4 with M10 and 3 M10 start time) and relative amplitude (4 loci with positive effect estimates). Post-GWAS analyses of both genome- and exome-wide analyses identified overexpression and protein-protein interactions for gene sets related to neurological signaling, restless leg syndrome, chronotype, and mitochondrial functions.

Conclusion: These analyses revealed strong genetic associations with metrics of activity, rest, and overall rhythm stability. Our findings provide novel insight into the molecular pathways of rest-activity rhythms and their links to health conditions.

Support (if any): NHLBI R01HL153814 (to H.W.)

Abstract citation ID: zsaf090.0004

0004

MELATONIN–SLEEP PHASE ANGLE PREDICTS MORTALITY IN WOMEN WITH ADVANCED BREAST CANCER

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Introduction: Sleep disruptions are commonly observed in women with cancer. One of the hypothesized causes of such disruption is a diminished circadian clock amplitude. Imputation of circadian amplitude in women with cancer has been mainly through examination of diurnal salivary cortisol patterns. Flattened diurnal salivary cortisol slopes have also been associated with longevity in a variety of cancers. These slopes, however, are susceptible to masking effects, notably stress.

Methods: In both women with advanced breast cancer (n=56) and age-matched controls (n=16), we obtained 24-hour plasma melatonin profiles through the use of an indwelling forearm catheter. Lights were kept dim during waketime and off during sleep, which was scheduled for eight hours during the habitual sleep time determined during two weeks of at-home actigraphy. Plasma melatonin concentrations were determined through radioimmunoassay. Melatonin timing and duration, sleep timing, the time between sleep and melatonin phase markers (phase angle) and survival duration (n=50) were calculated.

Results: Clock time of both dim light melatonin onset (DLMO; p=0.40, t-test) and melatonin midpoint (p=0.73, t-test) were indistinguishable between the women with cancer and controls, as was the difference in the duration of melatonin (p=0.10, t-test). Phase angle between DLMO and habitual bedtime was also indistinguishable between the groups (p=0.10, t-test). The phase angle between melatonin and sleep midpoints was, however, different between the two groups (p< 0.05, t-test), being on average shorter in those with cancer. In those with cancer, this phase angle was related to survival (p< 0.05, HR=1.57; Cox Proportional Hazards Model), even after accounting for previous treatment (p< 0.05, HR=1.89) or previous treatment, age, and typical sleep duration (p< 0.01; HR=2.24). Survival curves separated within the first three years after study, with 96% women with short phase angles being still alive and only 64% of women with long phase angles being still alive. From three to 8 years after the study, there was a parallel change in mortality in the two groups.

Conclusion: A shorter phase angle between melatonin and sleep is associated with greater longevity in women with advanced breast cancer.

Support (if any): NCI grant R01CA118567

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0005

DURATION OF THE CIRCADIAN BIOLOGICAL NIGHT DIFFERS BETWEEN EIGHT AND NINE HOUR SLEEP OPPORTUNITIES

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Introduction: The duration between dim-light melatonin onset and offset represents the biological night, which tracks environmental darkness (i.e., scotoperiod). In humans, melatonin duration is longer after one week of exposure to natural winter (~9.33h light:14.67h dark) versus natural summer (~14.67h light:9.33h dark) light-dark cycles. Melatonin duration is also longer after one month of exposure to 14h versus habitual ~8h sleep opportunities; as well as in people who habitually sleep longer than 9h versus shorter than 6h. Our current aim was to determine whether a shorter difference in scotoperiod, 8h versus 9h sleep opportunities, impacts the duration of the biological night.

Methods: Archival data from 76 healthy adult participants (aged 26.1±6.8[Mean±SD]; 44 females) from five research protocols were examined. Depending on the study protocol, participants maintained consistent 8h (n=40) or 9h (n=36) sleep schedules for one or two weeks at home, verified with wrist-actigraphy and bed/waketime call-ins. 24-hour plasma or salivary melatonin samples were then collected in the laboratory under

dim-light conditions during wakefulness (< 10 lux max; ~1.9 lux, ~0.6 Watts/m2 in the angle of gaze) and darkness (0 lux) during sleep. Melatonin duration was calculated as the time between dim light melatonin onset (DLMO25%) and dim light melatonin offset (DLMOff25%).
Results: Melatonin duration was significantly longer in the 9h (11.1h±2.3) versus 8h (10.2h±1.2) (Mean±SD) sleep opportunity condition ($p < 0.05$).
Conclusion: The current findings demonstrate that as little as one hour difference in scotoperiod is associated with an ~0.9h difference in the duration of the biological night, suggesting that melatonin duration tracks even relatively minor changes in environmental light-dark exposure. These findings have important implications for circadian and sleep research, including understanding how the environment contributes to differences in biological night. In future studies, it will be important to determine the impact of the duration of the biological night on human physiology and behavior.
Support (if any): NIH HL085705, NIH HL109706, HL149646, DK111161, DK048520, TR000154, UL1TR002535 and TR001082; Sleep Research Society Foundation grant 011-JP-16; CurAegis Technologies Inc. (formerly Torvec, Inc); Office of Naval Research MURI N00014-15-1-2809; and Howard Hughes Medical Institute in collaboration with the Biological Sciences Initiative and Undergraduate Research Opportunities Grant University of Colorado Boulder

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0006
CIRCADIAN REGULATION OF EPITHELIAL VIRAL LOAD IN HEALTH AND IN ASTHMA

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Introduction: Molecular circadian rhythms regulate cellular processes underlying health including innate immune pathways. Prior studies have implicated circadian regulation of viral responses as contributing to airway inflammation in asthma, 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-time dependent regulation of viral replication of rhinovirus-16 (RV16) in airway epithelial cells.
Methods: Primary bronchial epithelial cells (BECs) from donors with pediatric asthma (n=5) or healthy donors (n=4) 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, RV16 was applied to the apical surface at a multiplicity of infection of 0.5. BEC were harvested for RNA isolation at 12, 24, 48 and 96 hours after infection for genome copy number assessment with qPCR.
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 both healthy AECs and AECs from donors with pediatric asthma. Circadian amplitude and period was similar between healthy BECs and BECs from donors with asthma by gene expression and BMAL:Luciferase recording. Infection at time zero during the circadian cycle as compared to infection occurring 12 hours later was associated with lower viral replication at 24, 48, and 96 hours after infection in healthy BECs.
Conclusion: The core circadian clock genes maintain rhythmicity in healthy and asthma airway epithelia. Circadian time regulates epithelial viral replication in healthy BECs. Future work will measure viral replication in BECs with genetic ablation of core circadian genes and in correlation with in vivo circadian rhythm measurements.
Support (if any): SRS (WTP), Parker B Francis Fellowship (WTP), NIH K24AI150991(JSD)

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0007
COMPARING POST-PRANDIAL GLYCEMIA AFTER LATE EATING VS LATE SLEEP: PRELIMINARY RESULTS FROM A RANDOMIZED CROSSOVER STUDY

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Introduction: Our previous work showed that a late dinner (22:00) compared to routine dinner (18:00) in healthy volunteers increased postprandial glucose and reduced dietary fat oxidation. However, it remains unclear whether these adverse metabolic effects are due to eating late in relation to endogenous circadian rhythm, or due to eating too close to sleep.
Methods: Dinner Time 2 Study compared the metabolic effects of dinner timing relative to dim-light melatonin onset (DLMO) and sleep timing in healthy volunteers. Participants completed three conditions in random order with a 3-4 week washout period: (1) early dinner (DLMO -3) + routine sleep (DLMO +2 to +10) = "early dinner" (ED); (2) late dinner (DLMO +1) + routine sleep = "late dinner" (LD); and (3) late dinner (DLMO +1) + late sleep (DLMO +6 to +14) = "late dinner + late sleep" (LD/LS). The main outcomes are differences in 4-h post-dinner area-under-the-curve glucose and insulin levels among the 3 conditions. We used Friedmans tests to compare outcomes among the 3 conditions and Wilcoxon signed rank tests to compare between each 2 conditions.
Results: 13 participants (7 female, 6 male, mean age 25 years, BMI 22.1 kg/m²) completed the study. Post-dinner glucose and insulin levels were different amongst the 3 conditions ($p=0.03$ and $p=0.002$ respectively). Compared to ED, LD increased 4-h post-prandial glucose by median of 11% ($p=0.008$) without changes in insulin levels (median difference -1.7%, $p=0.68$), while LD/LS increased post-prandial glucose by median of 15% ($p=0.004$) without significant change in insulin levels (median difference 13%, $p=0.17$). Compared to LD, delaying sleep after dinner did not significantly change post-prandial glucose (median difference 2.5%, $p=0.43$) or insulin levels (median difference 20.3%, $p=0.21$).
Conclusion: Late dinner in relation to melatonin onset increased post-prandial glucose, which was not mitigated by delaying sleep after late dinner. Our findings suggest that adverse glucose/insulin dynamics induced by late eating is primarily driven by circadian misalignment.

Support (if any): AASM 273-BS-22, DK133690-01, R01HL135483

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0008

DIURNAL VARIATIONS IN CEREBRAL BLOOD FLOW: EFFECTS OF TIME-OF-DAY ON TASK-RELATED BRAIN ACTIVITY

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Introduction: Human behavior and brain activity are influenced by circadian rhythms and homeostatic sleep pressure, leading to variations throughout the day. However, it remains unclear how task-induced brain activity changes with time-of-day, and whether these changes primarily arise from the task-state or the resting-state.
Methods: We assessed diurnal variations in cerebral blood flow (CBF) during resting-state and a simple psychomotor vigilance test (PVT) using arterial spin labeling (ASL) perfusion magnetic resonance imaging (MRI) at six fixed times (8:00, 10:00, 13:00, 15:00, 18:00, and 20:00) in 40 healthy participants (24 females, mean age 21.68 years). Behavioral outcomes were evaluated based on mean reaction time (RT), median RT, and lapses. Paired-sample t-tests were performed on whole-brain CBF at the voxel level for resting and task-states across the six time points, with Gaussian Random Field (GRF) correction.
Results: Behavioral results showed no significant effects of time-of-day on mean RT, median RT, or lapses (all $p > 0.05$), indicating that alertness remained stable throughout the day. Paired-sample t-tests revealed a trend of decreasing activation between resting and task-states as the day progressed, with 29,290 voxels activated during the first scan and 9,977 voxels activated during the last scan. ANOVA results revealed a significant main effect of time-of-day on task-induced CBF changes in the fronto-parietal network, ventral attention network, and salience network (all $p < 0.05$). Moreover, the modulation of task-induced CBF changes by time-of-day primarily originates from task-states. Specifically, CBF in the default mode network increased throughout the day during task-states, whereas CBF in the salience and fronto-parietal networks decreased from morning to night during task-states.
Conclusion: This study found no significant changes in diurnal vigilance at the behavioral level. However, task-induced activation decreased throughout the day, with the most notable changes occurring in task-states. The study highlights that time-of-day may influence the reproducibility of task-related functional MRI, suggesting future studies should account for this factor.
Support (if any): National Natural Science Foundation of China (32441108, 32200889) and Shanghai International Studies University Research Projects (2021114002, 2023DSYL030).

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0009

CHARACTERIZING DAILY 24-HOUR RHYTHMICITY IN CIRCULATING LIPIDS IN A MIXED CLINICAL INPATIENT POPULATION

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Introduction: Circulating lipids are under control of the ~24-hour circadian clock in healthy individuals. How these rhythms are expressed in clinical populations, and whether they are altered by lipid-lowering medications (i.e., statins), is unknown.
Methods: We assessed 24-hour rhythmicity in clinical lipid outcomes from ~187,000 samples collected as part of routine medical care of 27,706 hospitalized patients (45% female, mean [±SD] age 70.9 ± 15.1 years) with mixed medical diagnoses. Outcomes included total cholesterol, triglycerides, HDL-C and LDL-C. Blood samples were dichotomized as statin or no-statin use based on each patient's prescription data. Cosinor regression was applied to hourly binned group-average time series data. Group averages were calculated either using all samples or stratified based on statin use.
Results: Cholesterol, HDL-C, and LDL-C exhibited significant 24-hour rhythms with a single acrophase (i.e., time of fitted peak) in the late afternoon (~15:24–18:06 h). Triglycerides exhibited a principal acrophase in the early morning (~01:36 h) and a secondary peak in the afternoon (~13:36 h). The use of statins was associated with a significant reduction in amplitude for triglycerides (~300%), HDL-C (~40%) and LDL-C (~80%) but did not change cholesterol rhythm amplitude or the acrophase for any of the lipid rhythms. The timing of cholesterol, HDL-C and LDL-C rhythms in the clinical population were similar to the timing observed in young healthy individuals under controlled laboratory conditions, differing only by up to ~3 hours. Furthermore, the differing peaks observed in triglycerides under constant routine (morning peak) and ambulatory diurnal conditions (afternoon peak) were reflected in the dual peak observed in the clinical population, suggesting multiple mechanisms underlying clinical expression of triglyceride rhythms.
Conclusion: Circulating lipids in an inpatient clinical population exhibited robust 24-hour daily rhythms. Rhythm amplitude but not timing was altered by statin use. The clinical data may reflect endogenous circadian variation in lipid timing for some outcomes, but understanding the mechanisms underlying rhythmic expression is necessary to interpret the timing of clinical or real-world data.
Support (if any): NIA: R03AG071922 (PI: Rahman / St. Hilaire) NHLBI: R01HL159207 (PI: Rahman)

Abstract citation ID: zsaf090.0010

0010

THE DIURNAL RHYTHMICITY OF UNTARGETED METABOLOMIC PROFILES IN HUMANS

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Introduction: The circadian system plays a crucial role in metabolic processes including glucose tolerance, lipid control, and

hormone secretion. Despite its importance, understanding of the rhythmicity underlying metabolites remains incomplete, with only a few (e.g., cortisol and melatonin) having well-characterized patterns. Recent metabolome-wide association studies have begun to uncover metabolite associations with several sleep and circadian traits (e.g. duration, midpoint time). However, associations may be confounded by diurnal rhythms, as blood samples are often collected at varying times. Thus, to provide insights into the temporal oscillations of serum metabolites and underscore the critical importance of temporally-sensitive clinical assessments, we conducted metabolomics association analyses on assay timing collected during the day.

Methods: For 6180 individuals in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL), 853 metabolites were quantified (Metabolon, Inc) in two batches from overnight fasting serum samples. Multivariable linear regression was conducted for each metabolite, with time of blood draw (ranging from morning to afternoon) as the primary exposure, adjusting for age, sex, study center, Hispanic/Latino background, fasting duration, self-reported bed and wake times, and sampling design. Timing variables were circularly transformed. Analysis was performed separately for each batch, and results meta-analyzed. Additionally, unsupervised density-based clustering analysis was conducted to reveal temporal patterns across metabolites.

Results: Single metabolite association analyses identified 51 metabolites significantly associated with blood assay timing after multiple testing correction. These include 33 metabolites prior reported to exhibit diurnal rhythms in plasma, of which 10 are connected to melatonin and cortisol activity. Of note are circadian regulators DHA and palmitate, that influence BMAL1 gene expression and SIRT1 activity. Significant metabolites reflect connections to psychiatric and sleep disorders, omega oxidation, prostaglandin synthesis, dopamine levels, and GLP-1 agonist design. Unsupervised clustering analysis identified three distinct clusters. Strikingly 48 of the 51 significant metabolites group into the same cluster. This cluster exhibits a characteristic pattern of a morning dip (7 AM–8 AM) followed by an afternoon peak (12 PM–2 PM).

Conclusion: Our analysis reveals known and novel rhythmic serum metabolites. Results underscore the importance of accounting for time of assay, when investigating metabolite associations with health disorders.

Support (if any): NHLBI R01HL153814 (to H.W.), R01HL161012 (to T.S.)

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0011

IN VIVO CIRCADIAN GENE EXPRESSION IN PEDIATRIC ASTHMA

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Introduction: Altered circadian gene expression is hypothesized to underlie circadian dependent differences in airway resistance and risk for asthma exacerbation in pediatric asthma. Previously in ex vivo organotypic epithelial cell cultures we identified neutrophilic and IL-17 signaling genes as losing circadian rhythmicity in pediatric asthma. However, measuring circadian rhythms of gene expression in vivo is difficult due to the need for repeat sampling. Using bioinformatic approaches, circadian time can be inferred in single samples and rhythmic genes identified when sampling a larger number of individuals randomly over the course of the day. We analyzed circadian rhythmic gene expression using a publicly available data of gene expression in children with and without asthma at age 10 from the URECA study to identify genes with altered circadian rhythmicity in asthma.

Methods: Gene expression from nasal swabs obtained at age 10 in 352 children, 249 without asthma and 103 with asthma were analyzed using CYCLOPS to identify rhythmic genes. Circadian time was defined using a set of 100 rhythmic genes identified from ex vivo epithelial cell cultures. Differential rhythmicity was analyzed using CompareRhythms and phase set enrichment (PSEA) used to identify genes whose expression concentrated at specific circadian times.

Results: CYCLOPS analysis identified 3694 genes with rhythmic expression on nasal epithelial swabs. Genes for TGF-beta signaling, IL-6 signaling, and interferon-alpha responses had peak expression in the morning, whereas cell cycle and oxidative phosphorylation genes peaked in the evening. Differential rhythmicity identified 182 with altered rhythmicity in asthma, with genes for interferon and viral responses increasing rhythmicity in asthma and genes for granulocyte activation and neutrophil migration had reduced rhythmicity in asthma.

Conclusion: Circadian gene expression of neutrophil migration and granulocyte activation genes is decreased in pediatric asthma based on in vivo nasal swabs. Loss of circadian regulation may contribute to aberrant expression of airway inflammatory genes in pediatric asthma.

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0012

CIRCADIAN REST-ACTIVITY RHYTHMS AND EPIGENETIC AGE ACCELERATION IN OLDER ADULTS

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Introduction: Circadian alterations are implicated in poor aging-related health outcomes, such as neurodegenerative diseases, cardiovascular diseases and metabolic disorders; yet, links with biological aging remains underexplored. We examined the association of actigraphic circadian rest/activity rhythms (RARs) with epigenetic age acceleration (EAA) in older adults.

Methods: We studied 191 participants from the Baltimore Epidemiologic Catchment Area Study Follow-Up (mean age 68.6±7.7 years; 66% female, 59% white) who completed 7.1±1.2 nights of wrist actigraphy and had valid DNA methylation and covariate data. Actigraphic RAR metrics included cosinor (amplitude, mesor, acrophase) and non-parametric indices [relative amplitude (RA), interdaily stability (IS), intradaily variability (IV), lowest 5-hour activity level (L5), highest 10-hour activity level (M10), L5 start time, and M10 start time]. DNA

methylation data from the Illumina EPIC array were used to calculate several epigenetic clocks (GrimAge, PhenoAge, Horvath Clock and Hannum Clock). EAA was defined as the difference between epigenetic and chronological age, with the residual method for sensitivity analysis.
Results: In analyses adjusted for chronological age, sex, and race, lower amplitude, RA, IS, and M10, and higher IV were significantly associated (per 1-SD decrease) with accelerated GrimAge [amplitude β = 0.80 (0.22, 1.38); RA β = 0.69 (0.15, 1.24); IS β = 0.61 (0.03, 1.20); M10 β = 0.73 (0.15, 1.3); IV β = -0.90 (-1.45, -0.35); all p <.05] and PhenoAge [amplitude β = 1.07 (0.02, 2.13); IS β = 1.11 (0.05, 2.16); all p <.05]; with non-significant, but directionally consistent, associations with Horvath and Hannum clocks. Additionally, individuals with an L5 start time after 1:30 am, compared to those between 12:00 am and 1:30 am, were 1.17 (0.06, 2.27) years older per GrimAge.
Conclusion: Our findings suggest that, reduced strength, stability, regularity, and later activity timing of circadian rhythms, are associated with accelerated epigenetic age, notably GrimAge and PhenoAge. These results highlight the role of circadian regulation in aging and underscore the importance of maintaining strong, stable, and well-timed rhythms to mitigate age-related biological deterioration.
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0013
COMPARING SLEEP LOSS AND CIRCADIAN EFFECTS IN COGNITIVE PERFORMANCE

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Introduction: Extended wakefulness of up to 24 hours has been associated with severe impairments in performance and attention measures. The impairment may not be due solely to sleep loss since some recovery of function occurs the next day even with continued sleep loss. A circadian effect is likely to be a significant contributor to performance measures and has been apparent in many studies. Despite this recognition, few studies have directly compared the contributions of accumulated sleep loss and circadian rhythm on cognitive performance.
Methods: We analyzed the data from 38 healthy sleepers (Mean (SD) age = 32.6 (12.9) years) who performed the 10-minute Psycho-Vigilance Task (PVT) 10 times across a 29-hour period of total sleep deprivation in laboratory protocol. The number of lapses (Reaction Time>500msec) was analyzed from each testing time. Two curve-fitting approaches were applied: (1) a linear function using least squares method to model time awake effects, and (2) a 24-hour cosine curve to model the circadian component. For both group mean data and individual participant data, we compared the amplitudes and variance accounted for (R^2) between the circadian and linear components. Within-subject statistical comparisons were conducted using paired t-tests.
Results: The 24-hour amplitude of the mean lapses curve was 14.1 lapses in the circadian component and 12.5 in the linear component and the variances were 72.3% and 57% respectively. Individual participant analyses means were 15.0 lapses and 12.75 lapses and variances of 59.5% and 40.4% for the circadian and linear curve fits, respectively. Within subjects t-tests showed the circadian component has significantly larger amplitude (t(37) = 2.56, p< 0.02) and higher variance accounted for by the circadian curve fit (t(37) = 5.14, p< 0.001) than from the linear fit.
Conclusion: Across the 29-hour sleep deprivation protocol the circadian component contributes a greater amplitude and variance accounted for in lapses of attention than the linear time awake component. Campaigns to improve public safety should draw as much attention to the danger of the circadian time of operation as to the amount of prior wakefulness.
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0014
THE CIRCADIAN TIMING OF SLEEP AFFECTS THE RATE OF ACCUMULATION OF OBJECTIVE NEUROBEHAVIORAL IMPAIRMENT ACROSS DAYS OF SLEEP RESTRICTION

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Introduction: Chronic nighttime sleep restriction leads to the build-up of neurobehavioral impairment across days. Although it is known that the circadian timing of sleep mediates the effects of sleep loss, it is not known how the timing of restricted sleep influences the accumulation of neurobehavioral impairment over days. Here we investigated lapses on the psychomotor vigilance test (PVT) across days with restricted sleep placed in the late morning or late afternoon.
Methods: N=72 healthy young adults (ages 21-45y, 39% female) completed a 14-day in-laboratory study. After an 8h nighttime adaptation sleep opportunity (23:30–07:30) there was a baseline day with an 8h shifted sleep opportunity ending in late A) morning (11:30) or B) afternoon (19:30). Subjects were then randomized to 9 consecutive days of sleep restricted to 4h, 6h, or 8h time-in-bed (TIB) for late A) morning (11:30; n=19, 8, 8, respectively), or B) afternoon (19:30; n=13, 17, 7, respectively). Subjects were tested on a 10-minute PVT every ~2h during scheduled wakefulness. Daily averages for PVT lapses (RTs>500ms) observed 2-14h after scheduled awakening, expressed relative to average PVT lapses on theshifted baseline day, were analyzed with nonlinear mixed-effects regression to investigate differences in the build-up of neurobehavioral impairment between shifted sleep restriction doses.
Results: In the afternoon sleep conditions, PVT lapses showed a significant sleep dose-response effect (F=6.22, p=0.003), with the fastest accrual of impairment across days in the 4h condition (t=5.12, p< 0.001) and near-negligible impairment build-up in the 8h condition (t=1.00, p=0.32). However, in the morning sleep conditions, PVT lapses showed no sleep dose-response effect (F=0.01, p=0.99) with modest impairment growth across days overall (t=2.06, p=0.043) at just 43.7% the average rate observed in the afternoon sleep conditions.
Conclusion: In this sample of young adults, placing 6h and 4h daily sleep opportunities in the late morning appeared to

provide resilience against the accumulation of neurobehavioral impairment from sustained sleep restriction. Our results suggest that afternoon circadian promotion of wakefulness can sustain objective neurobehavioral functioning for at least 14h of wakefulness daily across multiple days of sleep restriction.

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0015

QUANTIFYING CIRCADIAN RESCUE OF COGNITIVE PERFORMANCE FOLLOWING TOTAL SLEEP DEPRIVATION: EXPERIMENTAL AND META-ANALYSIS EVIDENCE

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Introduction: With increasing work pressure and the accelerated pace of modern life, sleep deprivation has become a common phenomenon. While existing research has predominantly focused on the cognitive impairments caused by total sleep deprivation (TSD), its dynamic changes over time have received limited attention. Notably, cognitive performance often improves in the afternoon or evening following TSD, a phenomenon termed "circadian rescue." However, its magnitude and task-specific variability remain underexplored. To address this gap, our study combines strictly controlled constant routine (CR) experiments with meta-analytic approaches, providing the first systematic quantification of the circadian rescue effect and offering novel empirical evidence to reveal its task-specific characteristics and underlying mechanisms.

Methods: In Study 1, 54 healthy participants (mean age 33.35 ± 8.73 years, 32 males) underwent 35 hours of sustained wakefulness while performing the Psychomotor Vigilance Task (PVT), Digit Symbol Substitution Test (DSST), and Karolinska Sleepiness Scale (KSS). Circadian rescue effects were quantified using behavioral performance and the two-process model. Study 2 extends this by conducting a meta-analysis to examine the circadian rescue effect across multiple cognitive tasks.

Results: Study1 results indicated that the rescue rate for PVT ranged from 33.01% to 52.11%, 45.73% for DSST, and a comparatively low 23.45% for KSS. Further analysis showed that process S had a significantly greater effect on KSS than on PVT and DSST (all $p < 0.001$), with a higher process S coefficient for PVT compared to DSST ($p < 0.01$). No significant differences in process C were observed across tasks (all $p > 0.05$), indicating a consistent circadian influence. The meta-analysis results further confirmed that the rescue rate for KSS was significantly lower than for PVT and DSST.

Conclusion: This study indicated that the circadian rescue effect plays a critical role in mitigating the negative impacts of TSD, particularly during circadian peak periods, which can partially counteract the negative effects of sleep loss on cognitive performance. These findings advance understanding of circadian regulation in cognitive performance, with implications for fatigue management strategies.

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0016

THE CIRCADIAN TIMING OF SLEEP AFFECTS THE DYNAMICS OF SUBJECTIVE SLEEPINESS ACROSS DAYS OF SLEEP RESTRICTION

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Introduction: Chronically restricted nighttime sleep propagates an accumulation of objective performance deficits over days, but subjective sleepiness does not equivalently reflect this build-up of impairment. Here we studied the dynamics of subjective sleepiness over days with restricted sleep placed in the late morning or afternoon.

Methods: N=72 healthy young adults (ages 21-45y, 39% female) completed a 14-day in-laboratory study. After an 8h nighttime adaptation sleep opportunity (23:30–07:30) there was a baseline day with an 8h shifted sleep opportunity ending in late A) morning (11:30) or B) afternoon (19:30). Participants were then randomized to 9 consecutive days of restricted sleep with 4h, 6h, or 8h TIB ending in late A) morning (11:30; n=19, 8, 8, respectively), or B) afternoon (19:30 n=13, 17, 7, respectively). Participants rated their sleepiness on the Karolinska Sleepiness Scale (KSS) at ~2h intervals during scheduled wakefulness. Daily averages for sleepiness rated 2-14h after scheduled awakening, expressed relative to the shifted baseline, were analyzed with nonlinear mixed-effects regression to investigate the temporal dynamics of subjective sleepiness.

Results: In the late afternoon conditions, KSS sleepiness displayed a significant sleep dose-dependence ($F=3.44$, $p=0.038$). There was no significant change over the 9 days of sleep restriction for either the 4h or 6h sleep doses, but the 8h dose showed a modest decrease in KSS sleepiness over days ($t=-3.11$, $p=0.003$). In the late morning conditions, KSS sleepiness exhibited no sleep dose-dependence ($F=0.62$, $p=0.54$), and there were no significant changes over the 9 days of sleep restriction ($t=1.42$, $p=0.16$).

Conclusion: The dynamics of participants' subjective sleepiness across days of late afternoon sleep restriction were incongruent with their sleep dose-response accumulation of objective performance impairment (see companion abstract by Banks et al.). Rather, it seemed that subjective sleepiness stabilized in participants randomized to 6h or 4h restricted sleep opportunities, with some apparent adaptation to the shifted sleep timing over days for those randomized to the 8h sleep opportunities. However, across days of late morning sleep restriction, the afternoon circadian promotion of wakefulness appeared to mitigate participants' subjective sleepiness for at least 14h of wakefulness daily, as was also observed for their objective performance impairment.

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0017

TRAINING SCHEDULES AS A SYNCHRONISER OF ZEITGEBERS FOR ATHLETE CIRCADIAN CLOCKS

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Introduction: Circadian rhythms and sleep are essential for athletes' performance, recovery, and health. Disruption to these processes can result from mismatch between clock-regulated physiology and external time-givers (zeitgebers) such as light/dark cycles or feeding patterns. However, there is limited understanding of circadian biology in this population. This study investigates the impact of training schedules, particularly early morning trainings, on sleep and circadian biology in elite athletes.
Methods: This longitudinal study involved 52 elite male Australian Rules footballers (M-age = 24.38). Data were collected during a 2-week pre-season condition, which involved early morning trainings, and a 2-week in-season condition which did not have early morning trainings. The study was conducted during 2021 and 2022, resulting in two timepoints per condition. Participants wore wrist actigraphy devices to monitor sleep and light exposure and completed at-home circadian phase assessments. Circadian phase was assessed via salivary melatonin, collected hourly in controlled lighting conditions (< 10 lux) from four hours prior to habitual bedtime until one hour post habitual bedtime, and analysed using radioimmunoassay. Diurnal preference was collected using the reduced morningness-eveningness questionnaire (rMEQ). All timings were converted to standard time for analysis, controlling for year and age.
Results: Compared to in-season, pre-season periods (early morning training condition), were significantly associated with earlier first bright light exposure (-139 mins, p <.001), advanced circadian phase (-110 mins, p <.001), earlier sleep-wake timings (sleep onset: -84 mins, mid-sleep: -93mins, sleep offset: -103mins, all p <.001), and shorter total sleep time (-17 mins, p <.001). Diurnal preference did not moderate these relationships. The timing of first bright light exposure partially mediated the effect of condition (pre-season vs in-season) on mid-sleep time and circadian phase.
Conclusion: Early morning trainings can significantly disrupt sleep and advance circadian phase in elite athletes. The findings introduce the idea that training schedules could be acting as a synchroniser of zeitgebers for athlete clocks, influencing the timing of light exposure and exercise. Disruption to sleep and changes in circadian phase may impair performance and recovery, highlighting the need to consider optimised training schedules that align with individual circadian biology.
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0018

TIME ZONE CIRCADIAN MISALIGNMENT AND DEFENSIVE PERFORMANCE IN PROFESSIONAL HOCKEY

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Introduction: Research has highlighted the impact of circadian rhythm misalignment on athletic performance in sports involving travel across time zones. Teams traveling westward often face circadian disadvantages during evening competitions, as they play at a later circadian alignment than their opponent. While previous studies have primarily focused on outcomes such as wins and losses, few have explored the effects of circadian misalignment on specific game statistics. This study investigates the influence of teams adjustment to time zones travel on the number of shots allowed to opponents.
Methods: Data from NHL games played between 2009 and 2021 (n = 27,642), excluding the COVID-19 season, were collected from online sources (hockey-reference.com). Travel-adjusted time zone was computed for both teams as shown in Charest et al. (2022), from which a Direction of Misalignment (westward, none, eastward) between teams was computed for each game. A one-way ANOVA was used with the Direction of Misalignment on the number of shots allowed to opponents.
Results: A significant effect of Direction of Misalignment was observed, F(2, 27640) = 3.26, p =.04. Teams with a circadian misalignment later than their opponents (westward alignment) allowed significantly more shots (M = 30.71) compared to teams with an earlier one (eastward alignment) (M = 30.27, p =.05). No significant difference was found between teams with a later circadian alignment and those with no difference (M = 30.39, p =.06), nor between teams with no difference and those with an earlier alignment (p =.66).
Conclusion: These results suggest that teams playing at a later part of their circadian alignment than their opponents allow more shots to opposing teams. This could indicate a circadian-related disadvantage that impairs defensive effectiveness on ice. Future research should investigate mechanisms to mitigate the effects of circadian misalignment in professional sports, potentially informing scheduling strategies to optimize player performance.
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0019

CIRCADIAN EFFECT ON PENALTIES IN THE NHL

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Introduction: There is a growing recognition of the significant impact of circadian rhythms on professional athletic performance, where teams crossing multiple time zones for a game play at a different circadian alignment that their opponents. In the NHL, teams frequently travel and often don't return home between games. Few studies have explored which aspects of athletic performance and behavior are affected by circadian misalignment. The objective of this study was to investigate whether NHL teams show a circadian penalty disadvantage, controlling for the direction of team travel from the previous game.
Methods: Data from NHL games played between 2009 and 2021 (n=27,642), excluding those played during the COVID season, were extracted from online sources (hockey-reference.com). As described by Charest et al. (2022), a travel-adjusted time zone was computed for both teams, from which a Direction of Misalignment (westward, none, eastward) between teams was computed. A one-way ANOVA was used with the Direction of Misalignment on the number and the minutes of penalties.
Results: When there is a travel-adjusted time zone difference between the two teams, there is a significant difference in the penalty minutes, F(2,27640)=4.77, p<.008 and number of penalties received by the team, F(2,27640)=10.88, p<.001. Tukey post-hoc t-tests reveal that teams whose circadian alignment is

westward to their opponent had more penalty minutes (p=.006) and receive significantly more penalties (p<.001), than those who experienced no time zone difference with their opponents. Teams whose circadian alignment is westward to their opponent also received more penalties than those whose alignment is eastward to their opponent (p<.001).
Conclusion: These results suggest that teams playing at a later part of their circadian time than their opponents receive more penalties. This study offers insight on the necessity for members of professional organizations to better understand the potential impact of sleep and travels on behavior and overall performance outcomes during matches. Future studies should focus on strategies for optimizing athletes' circadian alignment, such as personalized travel schedules and light exposure protocols.
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0020
SLEEP SURVEY IN UNIVERSITY STUDENTS
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Introduction: Irregular sleep patterns, which are heavily influenced by the 24-hour demands of modern society, represent a prevalent issue among university students. This irregularity, particularly the marked discrepancy between weekday and weekend sleep-wake patterns, often referred to as social jet lag, has been shown to exert a negative impact on both mental health and academic performance. The objective of this study is to thoroughly investigate the sleep habits of university students and explore their complex relationships with excessive daytime sleepiness and depression symptoms.
Methods: A total of 182 university students (77 males, 105 females, age: 19.5 ± 1.0 years) at Chubu University were surveyed using a Google Forms questionnaire. Data collected included sleep and wake times, social jetlag, sleep duration on weekdays and weekends, and the Quick Inventory of Depressive Symptomatology (QIDS-J) score and daytime sleepiness using the Epworth Sleepiness Scale (ESS). After approval by the Chubu University Ethics Review Committee, consent was obtained from all participants.
Results: The weekends wake-up time was significantly later than weekday wake-up (9:32 ± 2:27 vs 6:55 ± 0:57, p < 0.001). The weekends bedtime was significantly later than weekday bedtime (0:56 ± 1:33 vs 0:22 ± 1:51, p < 0.001). The weekends sleep duration was significantly longer than weekday sleep duration (8.0 ± 1.4 vs 6.0 ± 1.0 hours, p < 0.001). Social jetlag in wake time was significantly correlated with QIDS-J score and ESS score (QIDS-J: r=0.27, p < 0.001, ESS score: r = 0.23, p=0.002). Sleep jetlag in sleep duration was also correlated with QIDS-J score and ESS score (QIDS-J: r=0.22, p=0.004, ESS score: r= 0.23, p=0.002) and ESS score was significantly correlated with QIDS-J score (r=0.48, p < 0.001).
Conclusion: Social jetlag was associated with daytime sleepiness and depression symptoms. Our findings suggest that regular sleep-wake patterns may be beneficial to help prevent daytime sleepiness and depression symptoms in university students.
Support (if any):

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0021
ASSOCIATION OF PHASE PREFERENCE TO CIRCADIAN PHASE AND SLEEP ONSET IN PRETEENS AND TEENAGERS
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Introduction: Phase preference (PP) measures include several questionnaires, the utility of which may vary with age. Here, we undertake a secondary analysis (Crowley et al., 2014) of PP questionnaires in preteens and teenagers to evaluate associations with circadian phase and sleep patterns.
Methods: The preteens comprised 44 adolescents (ages 9&10, 19F); teenage cohort includes 74 adolescents (ages 15&16, 34F). PP measures included: Carskadon et al. (1993, Owl), Smith et al. (1989, Smith), and Horne Östberg (1976, HOQ). Preteens completed all three PP measures (Owl, n=43; Smith, n=41; HOQ, n=35); teenagers completed HOQ (n=48) and Smith (n=73). Self-selected sleep-wake schedules at home were monitored via actigraphy for all participants. Sleep onset (SO) was estimated with standard scoring procedures (Acebo et al. 1999). At week's end, dim light melatonin onset (DLMO) phase was measured from saliva samples. Thirty-eight preteens and 56 teenagers completed questionnaires, actigraphy, and DLMO.
Results: Correlations among PP scores were strong in preteens (Owl vs. Smith r=.690, p<.001; Smith vs. HOQ r=.660, p<.001; Owl vs. HOQ r=.418, p=.012) and teenagers (Smith vs. HOQ r=.784, p<.001). PP scores were not correlated with DLMO phase for preteens or teenagers, though HOQ showed a trend (r= -.25, p=.090) with the teenagers. In preteens, PP was not correlated with SO, whereas both Smith (r= -.34, p=.012) and HOQ (r= -.46, p<.001) were correlated with SO in teenagers.
Conclusion: PP measures completed by preteens did not correlate with DLMO phase or SO; however, in teenagers, HOQ achieved near significant correlation with DLMO phase, and both PP measures were correlated with SO in the teens. These findings indicate that PP scores in teenagers may be more highly reflective of sleep pattern than circadian phase. Further, we conclude that age-related differences in PP ratings reflect different biobehavioral signals in preteens compared to teenagers. Finally, because of the stronger association of Owl to Smith than to HOQ, we suggest the Smith PP scale may be preferred for use in preteens.
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0022
CIRCADIAN PREFERENCE, BUT NOT CIRCADIAN PHASE, ASSOCIATES WITH STATE AND TRAIT LEVELS OF IMPULSIVITY IN ADOLESCENTS
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Introduction: Adolescents with evening preference are at risk for alcohol and substance use problems, which may be partially explained by a connection between later sleep/circadian timing and greater impulsivity (a well-established contributor to substance use). This connection has been demonstrated with self-report measures of circadian timing in adults, but not with biological measures of circadian timing or in adolescents. Here we tested in a sample of adolescents whether (1) biological circadian timing associates with trait-level multi-dimensional impulsivity and (2) sleep/circadian timing proximally associates with state-level impulsivity on a day-to-day basis.
Methods: 210 adolescents (60.5% female; M age = 17.4 years) across two studies completed self-report measures of trait impulsivity (UPPS-P) and circadian preference (Composite Scale of Morningness), as well as laboratory assessments of circadian phase (salivary dim light melatonin onset). During the week-long ambulatory protocol, participants wore wrist actigraphs (to determine sleep midpoint and duration) and completed bedtime diaries assessing state impulsivity (abbreviated UPPS-P). For between-person analyses, we ran linear regression models predicting trait and mean state impulsivity by circadian preference and phase. For within-person analyses, we ran mixed models to determine if prior night sleep midpoint (with and without circadian phase as a moderator) or duration predicted next-day impulsivity. We controlled for age, sex assigned at birth, racial identity, and socioeconomic status in all models.
Results: Evening preference was associated with greater negative urgency (β=-.035, p=.003) at trait level, as well as greater lack of perseverance at both trait (β=-.04, p=.003) and state (β=-.028, p=.02) levels. Circadian phase was not associated with trait or state impulsivity. Within-person results were insignificant, although there was a trend-level interaction between sleep midpoint and circadian phase on next-day negative urgency (β=.056, p=.07).
Conclusion: Extending prior findings in adults, adolescents with evening preference reported greater impulsivity across subdimensions—they were more likely to quit difficult tasks and act impulsively when experiencing negative emotions. Surprisingly, biological circadian phase did not associate with impulsivity, although there was suggestive evidence that sleep and circadian timing may interact to predict greater impulsivity. Circadian preference measures may inadvertently capture impulsivity-related constructs independent of biological circadian phase.
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0023

EXPLORING THE ROLE OF SOCIAL JETLAG AND PEERS IN ADOLESCENT AGGRESSION

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Introduction: Social jetlag, a misalignment between one's biological sleep-wake rhythms and socially imposed schedules is prevalent, is common among adolescents. This disruption in circadian rhythms may negatively impact the social cognition brain network, which is responsible for motivation and compassion, potentially contributing to difficulty connecting with peers and increased aggression towards others. Adolescents with healthy peer networks exhibit more prosocial behaviors, which may protect them from the negative impact of poor sleep. This study aims to investigate how social jetlag, deviant peer influence, and healthy peer networks interact to influence peer aggression in adolescents.
Methods: Data was analyzed from 10,414 adolescents participating in the Adolescent Brain Cognitive Development (ABCD) Study (M age = 12.00; 47.65% girls) who completed self-report measures, including the Munich Chronotype Questionnaire (MCTQ-C), Peer Behavior Profile, and Peer Network Health: Protective Scale.
Results: Multiple regression analyses revealed that increased social jet lag ($\beta = 0.02$, $p < 0.02$), shorter weekday sleep duration ($\beta = -0.058$, $p < 0.001$), and shorter free day sleep duration ($\beta = -0.045$, $p < 0.001$) were significantly associated with greater aggression perpetration. Additionally, having more deviant peers ($\beta = 0.236$, $p < 0.001$), better peer network health ($\beta = 0.026$, $p = 0.010$), and fewer positive peers ($\beta = -0.062$, $p < 0.001$) were linked to higher rates of aggression. Significant interactions emerged, with simple slope analyses indicating that the effect of social jet lag on aggression strengthened as the number of deviant peers increased.
Conclusion: This study highlights the adverse impact of social jetlag on adolescents' relational aggression perpetration, particularly in the presence of deviant peers. Social jetlag and lower sleep duration increase vulnerability to aggressive relational behaviors. Interventions aimed at regulating sleep schedules and promoting healthy peer relationships may mitigate the effects of social jetlag and reduce aggressive behaviors among adolescents.
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0024

SLEEP-WAKE STATE DISCREPANCY AND CIRCADIAN-RELATED CHARACTERISTICS IN YOUTH WITH INSOMNIA

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Introduction: Individuals with insomnia often perceive their sleep as poorer than objectively measured sleep (e.g., by actigraphy). This phenomenon is known as sleep-wake state discrepancy (SWSD). However, the factors associated with SWSD, particularly among the youth population, are not well understood. Youth represents a distinct developmental period characterized by increased evening preference, irregular sleep-wake pattern and social jetlag, which may potentially influence SWSD. This study aimed to explore the relationship between SWSD and insomnia in youths.
Methods: The study included 87 adolescents (mean age: 20.20±2.15, female: 64.1%) meeting the DSM-5 diagnostic

criteria for insomnia disorder. Participants completed a 7-day sleep diary and actigraphy assessment for the computation of SWSD indices in total sleep time (TST), sleep onset latency (SOL), and wake after sleep onset (WASO). SWSD indices were calculated by subtracting the data from actigraphy and sleep diary, with a positive value indicating a subjective underestimation. Participants also completed the Munich chronotype questionnaire (MCTQ) and the depression anxiety stress scale (DASS) to assess chronotype and social jetlag and mood symptoms, respectively. Sleep regularity, especially bedtime and rise time variability, was evaluated using 7-day actigraphy-derived intra-individual variability.

Results: SWSD-TST was negatively correlated with the MCTQ-derived midpoint of sleep on free-days (MSF) and social jetlag (both p<.01). SWSD-WASO was negatively associated with the MCTQ-derived MSF and midpoint of sleep on workdays (MSW) (p<.01). There was no other significant association among the variables. Controlling for age, sex, depressive and anxiety symptoms, SWSD-TST remained significantly associated with social jetlag (β=-0.39, p<.001) and SWSD-WASO was associated with MCTQ-derived MSW (β=0.34, p<.005).

Conclusion: The findings suggested that SWSD in youths with insomnia is linked to late chronotype and greater social jetlag, underscoring the influence of circadian rhythm and sleep regularity on subjective sleep perception. These results highlighted the importance of considering these factors when understanding sleep disturbances in youths with insomnia.

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0025

CIRCADIAN AND HOMEOSTATIC TRENDS IN MOOD AND ALERTNESS ACROSS A 36-HOUR ULTRADIAN PROTOCOL IN ADOLESCENTS

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Introduction: Circadian modulation of mood has been documented across several age groups and contexts but are less well documented in early/middle adolescents. We present novel findings on the trajectory of mood and alertness among early adolescents during a controlled 36-hour ultradian protocol.

Methods: Adolescents (N=55, ages 13–15.9 yrs) participated in a 36-hour ultradian protocol consisting of 2-hour cycles of 80-minutes of wakefulness followed by a 40-minute sleep opportunity beginning at 9:00 AM. Mood and alertness were assessed during each cycle using 100-point visual analog scales (higher scores: more positive mood, higher alertness). Participants were time isolated and in dim light conditions (< 10 lux) for the first 27.5 hours. Circadian and homeostatic trends were analyzed via Cosinor mixed effect modeling.

Results: Mood fluctuated significantly in a circadian pattern (B_cos=-2.21, [95% CI=-2.85, -1.56]; B_sin=2.43 [1.77, 3.10]; p < 0.001), with an amplitude of 3 units (95% CI: 2.6–3.9). The mean mood level (mesor) was 74.44 (95% CI: 70.9–77.7), with peaks (acrophase) occurring 8.81 hours into the protocol (5:49 PM; nadir at 5:49 AM). Mood declined slightly over the course of the 36-hour protocol at an average rate of 0.11 points per hour. Alertness also showed significant fluctuations (B_cos=-7.23, [95% CI=-8.41, -6.06]; B_sin=8.05 [6.83, 9.27]; p < 0.001), with an amplitude of 10.83 units (95% CI: 9.7–12.0) and a mean level (mesor) of 56 (CI: 51.5–60.0). Peaks occurred 8.79 hours into the protocol (5:47 PM; nadir at 5:47 AM), and alertness declined steadily at an average of 0.27 points per hour.

Conclusion: During an ultradian protocol, self-reported mood and alertness indicated a clear circadian pattern that declines across the night and increases the following day, though with some evidence of accrual of a sleep debt across the 36-hour protocol. Our finding of a ~5:48 PM peak in mood and alertness aligns with previous naturalistic studies of daily rhythms in positive mood that have reported peaks around in mid-afternoon/early evening. Thus, daily rhythms in mood may have an endogenous origin rather than being driven solely by sociocultural factors, such as the end of the school/work day.

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0026

CIRCADIAN RHYTHMS IN MELATONIN, CORE BODY TEMPERATURE, AND PERFORMANCE IN EARLY/MIDDLE ADOLESCENTS UNDERGOING A 36-HOUR ULTRADIAN PROTOCOL

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Introduction: Adolescence is thought to involve dramatic changes in circadian rhythms and homeostatic sleep drive, but data demonstrating such changes in carefully-controlled laboratory studies remain sparse. We used an ultradian sleep-wake protocol to examine circadian rhythmicity in melatonin, core body temperature (CBT), and task performance in relation to age among early/middle adolescents.

Methods: Participants (N=54, ages 13.0–15.9) completed 2 weeks of actigraphy followed by 60-hour lab visit including a baseline night of polysomnography (PSG), followed by a 36-hour ultradian protocol in dim light (2-hour cycles of 80 minutes awake and a 40-minute sleep opportunity with PSG), and a recovery PSG night. Core body temperature (CBT) was measured continuously and salivary melatonin was sampled every 30–60 minutes. During each ultradian cycle, participants completed the psychomotor vigilance task (PVT) to index sustained attention (outcome: lapses) and the reward anti-saccade (RAS) task to assess inhibition of a prepotent response (outcome: accuracy). Circadian trends in performance and total sleep time (TST) during 40-minute sleep opportunities were examined with mixed effects cosinor models. Peak melatonin time was estimated using spline models. Associations between age and acrophase across outcomes were examined with bivariate correlations; associations between sleep, physiologic, and performance rhythms were examined with age-adjusted partial correlations.

Results: Significant circadian trends (all p's< 0.001) were observed in TST and PVT/RAS performance. In bivariate correlations, age was significantly associated with habitual sleep duration (r=-0.24, p=0.05), DLMO (r=0.37, p=0.018), and peak melatonin time (r=0.33, p=0.05), but not with habitual midsleep timing, acrophase of performance rhythms, or TST acrophase. Age-adjusted partial correlations indicated that DLMO was associated with peak melatonin time (r=0.59, p< 0.001), and marginally associated with CBT nadir (r=0.36, p=0.065) and PVT acrophase (r=0.33, p=0.096). CBT nadir was associated with habitual midsleep (r=0.49, p=0.005), TST acrophase (r=0.73, p< 0.001), and peak melatonin time (r=0.38, p=0.045).
Conclusion: In this sample of adolescents, age was associated with some, but not all sleep and circadian rhythm measures. Although strong circadian rhythms were observed in physiological and performance measures, the timing of these rhythms were not consistently associated with each other. Changes in circadian rhythms during adolescence may vary among different domains.
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0027

SUCCESS OF AT-HOME DIM LIGHT MELATONIN ONSET ASSESSMENT IN EARLY ADOLESCENTS WITH ADHD SYMPTOMS

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Introduction: Circadian rhythms may be translationally relevant to adolescents with attention-deficit/hyperactivity-disorder (ADHD). Laboratory assessment of dim-light-melatonin-onset (DLMO) can be burdensome and prohibitive in youth with more severe ADHD presentations. Conversely, at-home protocols, while beneficial, may be impacted by the heterogeneity of ADHD. Here we examined the success of an at-home DLMO protocol in adolescents with lesser and greater ADHD severity.
Methods: Sixty adolescents (28M; age: 11.76±1.24 years, age-range: 10-15 years) in R01HD103665 ranging in ADHD presentation completed at least five nights of a fixed sleep schedule (10hr fixed to family-optimal rise time) followed by an evening DLMO assessment. Each was provided a collection kit including instructions, salivettes (Sarstedt AG & Co. KG), a 0.1-gram scale, log, ice pack, and light-blocking glasses. On the evening of assessment, staff described procedures over a video call and youth provided 10 saliva samples over 4.5hrs extending 1-hour past scheduled bedtime. Saliva was collected using salivettes and weighed by participants (targeting 9g; a second sample requested if weight< 8.7g). Staff called participants every 30 minutes to prompt sampling, and to log start and end-times and sample weight. Samples were stored in an insulated bag with an ice-pack and retrieved the next morning. Melatonin was measured by radioimmunoassay. DLMO phase was computed by interpolation (absolute threshold of 4 pg/ml). Indeterminate DLMO phases were resolved via consensus. We examined success of DLMO determination and whether it varied by ADHD symptoms (participants grouped by Conners-3-Parent ADHD Index Probability score as high (ADHDy; ≥50%ile; n=28) or low (ADHDn; < 50%ile n=32)).
Results: DLMO determination was successful in 92% of youth (n=55); five participants' data required adjudication (e.g., interpolation between two threshold crossings). We failed to identify DLMO in 5 participants (8%) for persistent suprathreshold melatonin values (n=3) or measurement error (n=2). ADHD status did not moderate measurement success ($\chi 2$=0.69, p=.44, Cramer's V=0.16). DLMO was identified in 96% of the ADHDy group (n=27) and 87% of the ADHDn group (n=28).
Conclusion: This work indicates the success of capturing at-home melatonin onset phase in our young sample on a fixed sleep schedule. ADHD status did not moderate the success of measurement.
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0028

ARE ADHD SYMPTOMS ASSOCIATED WITH CIRCADIAN PHASE PREFERENCE OR MELATONIN ONSET PHASE IN YOUTH ON A FIXED SLEEP SCHEDULE?

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Introduction: Research indicates that attention-deficit/hyperactivity disorder (ADHD) may be associated with later circadian rhythms, particularly an evening phase preference. It remains unclear whether biological circadian parameters index ADHD symptoms. Here we investigated preliminary associations of ADHD symptoms in early adolescents with circadian phase preference, dim-light-melatonin onset (DLMO) phase, and phase angle to sleep onset.
Methods: We analyzed data from 50 adolescents in R01HD103655 with complete data on all measures (28F; age: 12.3±1.2yrs, range: 10-15yrs). ADHD symptoms were assessed with the Conners-3 Parent and age/sex-adjusted t-scores revealed a range of inattention (59.29±14.75, range=40-90) and hyperactivity/impulsivity (61.83 ±16.82, range=41-90) symptoms. Participants were off psychostimulants or exogenous melatonin and completed at least five nights of sleep stabilization (10h time-in-bed aligned to family-optimal risetime) prior to at-home DLMO collection. Each wore light-blocking glasses and provided one sample every 30 minutes for 4.5 hours extending 1 hour past bedtime—10 samples in total. DLMO phase was determined by interpolation (4 pg/mL threshold), and phase angle to sleep onset was calculated as the average actigraphy-estimated sleep onset of the 5 nights before DLMO – DLMO phase. We measured child self-reported phase preference (eveningness[low]-morningness[high]; 29.16±5.08; range: 12-38) and puberty status (categories 1-5; mode=3, range=1-4) using measures previously established by our group.
Results: More mature pubertal category and older age were associated with greater self-reported eveningness (r(46)=-.38, p<.01; r(47)=-.41, p<.01). No associations were found between puberty category or age and DLMO phase (|r|'s≤.011, p's ≥.90,) or phase angle (|r|'s≤.02, p's>.88). Higher inattention t-scores were

marginally associated with eveningness (r(45)=-.27, p=.07) but did not index DLMO phase or phase angle (|r|'s≤.01, p's>.81). There were no associations of circadian variables and hyperactivity/impulsivity (|r|'s≤.06, p's≥.68).
Conclusion: Despite perceptions of later circadian rhythms in ADHD, we found weak evidence linking ADHD symptoms with delayed circadian rhythms. Higher inattention symptoms were associated with a trend towards self-reported eveningness, however, neither inattention nor hyperactivity/impulsivity, was linked to biological DLMO phase or the phase angle of melatonin to sleep onset. These results indicate that altered circadian timing may not be a stable phenotype of ADHD when youth are placed on a stabilized sleep schedule.
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0029

ASSOCIATIONS BETWEEN REAL-LIFE LIGHT EXPOSURE PATTERNS AND SLEEP BEHAVIOR IN ADOLESCENTS

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Introduction: One of the most striking changes in the regulation of sleep-wake behavior during adolescence is circadian phase delay. Light exposure synchronizes circadian rhythms, impacting sleep regulation, however, the influence of real-life light exposure on sleep variations remains less clear. We aimed to describe the sleep and light exposure patterns of high school students with comparable schedules and socio-economic backgrounds, and evaluate whether there was any association between them, considering chronotype.
Methods: We analyzed 5 school days and 2 free days of actigraphy records, from 35 adolescents (24 female, mean age: 16.23±0.60 years). The sample was described using the Sleep Regularity Index (SRI), chronotype (actigraphy MSFsc), and self-reported diurnal preference (Morning/Evening Scale). Regression models were constructed to: assess the impact of light exposure (daytime and nighttime) on subsequent sleep episodes; and confirm whether the associations could be an indirect consequence of chronotype.
Results: Despite following similar routines, the SRI varied considerably (48.25 to 88.28). There was compatibility between the actigraphy proxy for chronotype and the self-reported diurnal preference, extracted using the Circadian rhythm scale for adolescents. Less light exposure during the day was associated with later sleep onset and shorter sleep duration. An increase of 100 lux in average daytime light exposure advance of 8.08 minutes in sleep onset and 7.16 minutes in sleep offset. When the regressions were controlled for chronotype, these associations persisted.
Conclusion: These findings facilitate discussions regarding the behavioral aspect of real-life light exposure's impact on sleep and its potential as a target for interventions aiming to enhance adolescents' sleep quality.
Support (if any): Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq (Fellowships to ST, FML and VD'A); Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES; Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP (Scholarship to LCL) and Associação Fundo de Incentivo à Pesquisa (AFIP).

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0030

SLEEP REGULARITY INDEX AND LIGHT REGULARITY INDEX IN SIX-MONTH-OLD INFANTS

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Introduction: There is a bidirectional relationship between sleep patterns and light exposure patterns; in other words, sleep patterns influence light exposure patterns, and vice versa. Sleep regularity can be quantified using the Sleep Regularity Index (SRI), while the Light Regularity Index (LRI) has been recently proposed to measure the regularity of light exposure patterns. A positive correlation between SRI and LRI has been reported in adolescents (Hand et al., 2023). In this study, we tested whether the same correlation exists in six-month-old infants.
Methods: Mothers were recruited from two public hospitals in Ribeirão Preto, São Paulo, Brazil, resulting in a sample of 122 infants (mean age= 6,1 months). The babies wore actigraphs (ActLumus, Condor Instruments) on their ankles for one week. These devices have sensors to detect light exposure. Data were analyzed using pyActigraphy, an open-source Python package for actigraphy, with light exposure specifically processed using the pyLight module. Statistical analysis was conducted in RStudio. For each infant, the mean of the SRI and LRI, as well as the correlation between these variables, were calculated.
Results: As anticipated, a positive correlation of 0.77 ($p < 0.001$) was observed between SRI and LRI, indicating that higher LRI values were associated with higher SRI values. The means of LRI and SRI were 57.10 and 48.27, respectively.
Conclusion: The correlation between SRI and LRI in infants was significantly stronger than the one reported in adolescents (Hand et al., 2023). We attribute this difference primarily to the autonomy adolescents have in managing their time and schedules, a factor absent in infants. Studying the SRI/LRI relationship across different age groups may provide valuable insights into the synchronization processes of human circadian rhythms.
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0031

DELAYED OR DISPLACED: THE ROLE OF CIRCADIAN TIMING IN BEDTIME PROCRASTINATION

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Introduction: Introduction. Bedtime procrastination refers to the tendency to delay bedtime in the absence of external obligations. Bedtime procrastination undermines sleep health across

multiple dimensions, most notably delaying sleep and shortening sleep duration. To date, most research on mechanisms underlying bedtime procrastination focuses on cognitive or behavioral factors. However, sleep delays in bedtime procrastination may reflect delays in circadian phase. Accordingly, the present study sought to examine the role of circadian phase in bedtime procrastination. Further, we examined whether the associations between bedtime procrastination and sleep outcomes persisted when statistically adjusting for circadian phase.
Methods: Method. 102 adult participants (Mage = 35.8, SD = 9.8) with BMI 25-35 kg/m2 completed the bedtime procrastination scale and 7 days of sleep actigraphy monitoring three times over one year (baseline, 6 months, 12 months). Participants also completed the morningness-eveningness questionnaire at baseline. Circadian phase was assessed twice via in-lab dim light melatonin onset (DLMO) between baseline and 6 month time points, as well as at the 12 month time point. Multilevel models regressed bedtime procrastination onto DLMO, and sleep outcomes onto bedtime procrastination and DLMO.
Results: Results. Later average DLMO time across the two assessments was associated with higher average bedtime procrastination (B = 2.49, p < 0.001). This association remained significant when adjusting for age, sex, race, and average bedtime, but not for morningness-eveningness. For sleep outcomes, higher individual average bedtime procrastination was associated with later average bedtimes (B = 0.06, p < 0.001), remaining significant after adjusting for age, sex, race, and DLMO, but not for morningness-eveningness. In contrast, individual average bedtime procrastination was associated with shorter sleep duration only when adjusting for morningness-eveningness (B = -0.03, p = 0.014) and DLMO (B = -0.02, p = 0.035).
Conclusion: Discussion. This study demonstrated an association between bedtime procrastination and circadian timing. However, this association may be partially attributable to the shared association with morningness-eveningness. Furthermore, we demonstrate that the associations between bedtime procrastination and sleep timing and duration is not attributable to circadian timing. Together, these results support bedtime procrastination as a unique contributor to insufficient sleep.
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0032

INCIDENCE OF SOCIAL JETLAG IN THE CITY OF SÃO PAULO: A LONGITUDINAL STUDY FROM THE EPISONO COHORT

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Introduction: Social jetlag (SJL) is a measure that quantifies the difference in mid-sleep between work (or school) and free days. This phenomenon is associated with adverse health outcomes such as metabolic dysfunction and the development of sleep and mood disorders. The aim of the present work was to describe the prevalence and incidence of social jetlag in a representative sample of the population of the city of São Paulo.
Methods: A retrospective analysis using data from the 3rd edition of the population-based São Paulo Epidemiologic Sleep Study (EPISONO) and its follow-up, conducted in 2007 (N=1,042) and 2015 (N=695), respectively. Information on participants' bedtimes and wake-up times on work/school and free days was extracted from the UNIFESP Sleep Questionnaire, and SJL was calculated as the absolute difference between the mean mid-sleep time on work/school days and the mean mid-sleep time on free days. High SJL was defined as 2 hours or more.
Results: In 2007, 77.9% of volunteers had some amount of the discrepancy, with a prevalence of high SJL of 13.5%. In 2015, 72.2% of volunteers had some degree of the condition with a prevalence of high SJL of 11.5%. Over the 8 years of the EPISONO 3rd edition, 45.1% of subjects had an increase in SJL, 41.7% had a decrease, and 13.2% had no change. A total of 57 new cases of high SJL were found between 2007 and 2015 (incidence rate=8.2%). Of the 89 individuals who had high SJL in 2007 and were present at follow-up, 23 maintained the condition in 2015 (maintenance rate=3.3%). Conversely, 66 individuals transitioned to low SJL (remission rate=9.5%).
Conclusion: To our knowledge, this is the first longitudinal study describing these measures of the epidemiologic evolution of SJL in a Brazilian population-based sample. Given that its observed prevalence, as well as its health consequences, we raise the question of whether SJL should deserve attention as a public health issue.
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0033

A LONGITUDINAL OBSERVATIONAL STUDY ON MEAN AND DAILY VARIABILITY IN SLEEP MIDPOINT AND MENTAL HEALTH

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Introduction: Sleep timing (e.g. sleep midpoint) plays a significant role in mental health. Whereas person-level mean sleep midpoint has been linked to depression, anxiety, and stress, the impact of daily variability in sleep midpoint is underexplored. This study investigated whether within- and between-person variability in sleep timing predicted mental health outcomes among young adult college students.
Methods: Participants (N = 261, age M = 19.92 [4.79]) completed daily diaries over two weeks, providing data on sleep parameters and mental health symptoms (i.e., depression, anxiety, stress). Sleep midpoint was calculated as total sleep time [TST] + (sleep onset latency [SOL] + wake after sleep onset [WASO])/2 which was converted to hours centered on midnight. SAS PROC MIXED was used to run multilevel analyses with maximum likelihood estimation and Kenward-Roger degrees of freedom to model the effect of previous day sleep midpoint (level 1) and mean sleep midpoint (level 2) on mental health symptoms.
Results: Later mean sleep midpoint had worse depressive symptoms (β = 0.18, p<.001), anxiety symptoms (β = 0.20, p <.001), and stress (β = 0.36, p = 0.005). Within person analyses revealed later daily sleep midpoint predicted less anxiety the next day (β = -0.04, p = 0.02) but was not associated with depression or stress.

Gender explained some effects, with women showing stronger associations between mean sleep midpoint, anxiety and stress.
Conclusion: Young adult college students with later average sleep timing had poorer mental health symptoms. Daily anxiety was reduced on days following later sleep timing relative to a person's baseline, potentially reflecting adaptive behaviors like socializing or study-related activities. This suggests complex relationships between sleep timing and mental health. Further research is needed to determine whether these associations are influenced by chronotype or external factors, such as academic demands or conscientiousness. Moreover, studies promoting earlier and more consistent sleep timing should assess their potential benefits for mental health, particularly among young adults.
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0034

TIMING OF HABITUAL EXERCISE DIFFERENTIALLY IMPACTS 24H GLUCOSE VARIABILITY IN HEALTHY ADULTS

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Introduction: Glucose homeostasis fluctuates daily, driven by circadian rhythms and behaviors like sleep, eating, and physical activity. Exercise has also been recognized as a critical factor in the regulation of glucose homeostasis, and emerging evidence suggests that the circadian timing of exercise timing may play an important role in glucose regulation. Therefore, this study compared 24h glucose levels and variability among healthy, physically active adults who self-report as habitual morning versus evening exercisers.
Methods: Healthy, self-reported habitual morning and evening exercisers were recruited to participate in the study. Continuous glucose monitors (CGM) were utilized to measure 24h interstitial glucose for up to 14 days. Daily diaries verified the timing of exercise relative to sleep. 24h glucose area under the curve (AUC) and glucose variability, estimated by the mean amplitude of glucose excursions (MAGE), were compared between groups across the full CGM wear period using t-tests. Results are presented as mean±SD.
Results: Eligible participants reported ≥150 min/wk of moderate intensity exercise., with bouts performed during the morning (n=8; 6 females; Age: 28±2y, BMI: 24±1.25 kg/m²) or evening (n=6; 4 females Age: 29±3y, BMI: 23±0.63 kg/m²). Exercise occurred at 2:40±0:32 hours after waking in the morning group and 9:51±0:23 hours after waking in the evening group. The number of exercise days during the study was comparable between groups (morning: 6.5±2.1 days out of 9.6±0.5 days vs evening: 7.4±0.8 days out of 10.6±4.7 days). Self-reported sleep duration was between 7-9 hours/night. Mean glucose AUC over 24-hours was not significantly different between morning and evening exercisers (p=0.72). However, 24-hour MAGE was significantly lower in the morning group compared with the evening group (22.4±1.0 vs. 24.01±1.1 mg/dL, p< 0.001).
Conclusion: These findings suggest that the timing of habitual exercise influences daily glucose variability, with morning exercise associated with more stable glucose levels compared to evening exercise in healthy young adults. Future studies are needed to determine whether aligning exercise timing with circadian rhythms may offer a simple, behavior-based strategy to optimize glycemic control.
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0035

EFFECT OF A PREBIOTIC DIET ON 24-HOUR GLUCOSE LEVELS DURING COMBINED SLEEP RESTRICTION AND CIRCADIAN MISALIGNMENT

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Introduction: Insufficient sleep and circadian misalignment dysregulate glucose homeostasis. Interventions are needed for when insufficient sleep and circadian misalignment cannot be avoided (e.g., military operations, emergency responders, shift work). Prebiotics, defined as a substrate that is selectively utilized by host microorganisms conferring a health benefit, have been shown to beneficially affect glucose metabolism in non-human preclinical models and in humans. Here, we examined in a pilot study the effects of a combined Polydextrose (PDX) and Galacto-oligosaccharide (GOS) prebiotic supplement on 24-hour glucose levels during combined sleep restriction and circadian misalignment.
Methods: 5 healthy adults (aged 25.4±3.5, 2 females) completed a 39-day randomized, double-blind, placebo-controlled, cross-over study comparing a prebiotic–7.5g/day each of GOS [Frieslad Campina] and PDX [Dupont Nutrition & Biosciences] or placebo (maltodextrin [Grain Processing Corporation]) sachets dissolved in water with breakfast. Participants consumed 14 days of prebiotic or placebo at home while maintaining regular mealtimes and ~8h habitual sleep each night. Participants then completed an ~4-day in-laboratory study of combined sleep restriction and circadian misalignment with 3h sleep opportunities; the first at night and the second and third during the daytime. Prebiotic and placebo conditions continued in-laboratory. Timing and composition of food intake was identical during the in-laboratory segment for each condition and designed to maintain energy balance. Glucose levels were monitored every 15 min for ~60h using a continuous glucose monitor (FreeStyle Libre Pro [Abbott]). Participants had a 3-day washout period prior to repeating the protocol with the second condition. Mixed model ANOVA with condition and time as fixed factors were performed.
Results: Mean 24-hour glucose level over the ~60h of recording was significantly lower during prebiotic versus placebo treatment (p< 0.00001; Small effect size, Hedges' g bias corrected).
Conclusion: Preliminary findings from this pilot study suggest that a combination of prebiotic fibers taken prior to and during insufficient sleep and circadian misalignment may have some benefits for glucose metabolism.
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0036

EFFECTS OF TIME-RESTRICTED FEEDING ON SLEEP: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: Studies in the field of chrononutrition have increased in recent years due to the link between circadian system, food intake, and metabolic health, emerging as an important tool for dealing with metabolic disorders and circadian misalignment. To date, chrononutritional interventions, such as time-restricted feeding (TRF), have been extensively studied with an emphasis on metabolism. However, the evidence regarding the effects of TRF on sleep health remains fragmented and inconclusive. To add to the information in this area and given the potential connections between sleep and metabolic health and the diversity of TRF interventions, a meta-analysis of the effect of TRF on sleep, measured by subjective and objective methods, will help to increase the level of evidence available on this topic.
Methods: The search was conducted in the databases MEDLINE, Scopus, Web of Science, EMBASE, LILACS and Cochrane CENTRAL until March 2024. The article selection process was conducted in two stages: first, the titles and abstracts were screened, and then the full texts were analyzed. The outcomes evaluated were self-reported total sleep time (TST), global score of the Pittsburgh Sleep Quality Index (PSQI), and objective TST measured by polysomnography or actimetry. Effects size for each individual study was calculated using raw mean difference and meta-analyses were performed using a DerSimonian and Laird's random effects model.
Results: The final sample included 51 articles from 17 countries, published between 2001 and 2023. The results showed that TRF decreased self-reported TST and impaired subjective sleep quality, as evidenced by an increase in the global score of the PSQI. Sub-group analyses of the studies conducted during the Ramadan showed that fasting decreased TST, while in non-Ramadan studies showed an increase TST.
Conclusion: Our results suggest that TRF has an effect on self-reported sleep duration and quality, which depends on the timing, type and duration of intervention. Further studies in which the eating window is considered may provide new perspectives on chrononutrition and sleep, and may contribute to its appropriate use as a tool for weight control and metabolic disorders prevention
Support (if any): CNPq (Fellowships to ST, RVTS and VD'A; Scholarship to GSL); CAPES; and AFIP.

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0037

CONSISTENT PARENTING AND BEDTIME ROUTINES MODERATE THE LINK BETWEEN ENTRAINMENT SIGNAL REGULARITY INDEX AND BMI INCREASE IN ELEMENTARY CHILDREN

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Introduction: In summer, children gain weight more rapidly compared to the school year. Having a lower entrainment signal related to increased summer Body Mass Index (BMI). However, the potential moderators are understudied. This study examined factors that moderated the relationship between summer entrainment regularity and changes in summer BMI among elementary children.
Methods: This longitudinal observational study included 119 elementary children aged 5 to 8 years (57% female, 83% healthy weight). BMI was assessed at late school-year (spring) and beginning of the following school-year (fall) in Houston, Texas. During the summer, child activity and sleep patterns were assessed using wrist-actigraphy for 7 days and 8 nights, in which activity was used to compute the Entrainment Signal Regularity Index (ESRI, range:0-1) based on the Hannay Model, with higher scores indicating greater synchrony and regulation of entrainment signals that ensure stable entrainment of circadian phase. Parents reported Comprehensive General Parenting Questionnaire (CGPQ), including sub-construct Structure-Consistency (range:1-5) with higher scores indicating greater parental predictable behaviors by providing clear and consistent guidelines, and keeping their promises, Bedtime Routines Questionnaire (BRQ), including subscale Routine Consistency (range:10-50) with higher scores indicating greater bedtime routine consistency, Children's Behavior Questionnaire (CBQ), Parental Stress Scale (PSS), and Interpersonal Support Evaluation List (ISEL). Hierarchical regressions were conducted to examine the moderators interacting with ESRI in predicting summer BMI change.
Results: Summer BMI increased by 0.39±0.79. ESRI score was 0.63±0.11. Average CGPQ Structure – Consistency and BRQ Routine Consistency were 3.79±0.36 and 38.36±8.07, respectively. After controlling for child age, sex, baseline BMI (spring), sleep duration, sleep midpoint, and moderate to vigorous exercise intensity, findings indicated that lower ESRI predicted a greater summer BMI increase. Further, ESRI interacted with CGPQ Structure-Consistency (β=0.28, t=2.82, p=0.006) and BRQ Routine Consistency (β=0.21, t=2.19, p=0.031) in predicting summer BMI increase, explaining an additional 6.9% and 4.1% of the variance, respectively. Nonsignificant moderators included CBQ, PSS, and ISEL.
Conclusion: The relationship between less entrainment regularity and greater increases in BMI during the summer was especially evident for elementary children exposed to less consistent parenting behaviors and bedtime routines.
Support (if any): Texas Children's Hospital Pediatric Pilot Research Fund and USDA cooperative agreement 58-3092-0-001

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0038

CONSISTENCY OF INTERINDIVIDUAL DIFFERENCES IN THE AMPLITUDE OF DAILY ENERGY EXPENDITURE AND RESPIRATORY QUOTIENT RHYTHMS IN HEALTHY ADULTS

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Introduction: We have previously reported stable, trait-like interindividual differences for average 24-hour energy expenditure (EE) and respiratory quotient (RQ), and their average levels during scheduled wakefulness and sleep. However, interindividual differences in the daily amplitude of the EE and RQ rhythms remain to be explored. The amplitude of daily rhythms is of growing interest given that reduced amplitude (e.g., body temperature, physical activity) is associated with aging and disease.
Methods: 15 healthy adults (age 23.3±3.4 mean±SD, 7 females) completed a 4-day in-laboratory protocol consisting of one habituation night and three days of living in a whole room indirect calorimeter. Participants maintained consistent 8-hour sleep schedules at their habitual times for one week and consumed an outpatient energy-balanced diet for three days before in-laboratory testing. During calorimeter days, participants remained in constant bedrest, consumed the energy-balanced diet with meals 0.5h, 4.5h, 10.5h, and 14.5h after scheduled awakening, and were provided 8h sleep opportunities. EE and RQ were measured every minute. Daily amplitude of the EE and RQ rhythms was determined using non-orthogonal spectral analysis. Mixed-model ANOVA with participant as a random factor and day as a fixed factor was performed. Intraclass correlation coefficients (ICC) were calculated to examine the stability of individual differences.
Results: A significant main effect of participant was observed for EE and RQ amplitude (both $P < 0.01$), whereas the main effect of day was not significant for either ($P > 0.75$). The stability of individual differences in EE daily amplitude was almost perfect (ICC=0.90), whereas daily amplitude was moderate (ICC=0.43).
Conclusion: These findings indicate stable, trait-like interindividual differences in EE daily amplitude and less robust interindividual differences in RQ daily amplitude. Additional research is needed to understand the mechanisms contributing to these individual differences and why EE is more consistent than RQ, test for the stability of interindividual differences in other populations (e.g., aging, people with obesity), and determine their impact on physiological function.
Support (if any): National Institutes of Health (NIH/NCATS Colorado CTSA Grant Number UL1 TR001082, P30 DK048520), a Grant from Philips Incorporated, and the Undergraduate Research Opportunities Program in collaboration with the Howard Hughes Medical Institute and Biological Sciences Initiative.

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0039

ASSOCIATIONS BETWEEN REST-ACTIVITY RHYTHMS AND DIET QUALITY IN THE HISPANIC COMMUNITY HEALTH STUDY/STUDY OF LATINOS (HCHS/SOL)

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Introduction: Poor diet quality and circadian disruption contribute to increased cardiometabolic risk, but it is unknown if activity-based markers of circadian rhythms associate with diet quality in free-living samples. We evaluated these associations in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL).
Methods: This cross-sectional study used diet and actigraphy/sleep data collected approximately two years apart. Diet quality was measured with the Alternate Healthy Eating Index 2010 (AHEI; higher indicates healthier) from two 24-hour dietary recalls. A subset of participants completed 7-day actigraphy (Philips Spectrum) with validated scoring of sleep-wake epochs and main sleep periods. Markers of the strength, regularity, and timing of the 24-hour rest-activity rhythm (RAR) were estimated with nonparametric and parametric (extended-cosinor) metrics derived from epoch-level activity counts, sleep regularity metrics (SD sleep duration and SD sleep onset time) derived from the scored sleep data, and self-reported chronotype estimated from the reduced Morningness-Eveningness questionnaire. Linear regression models estimated associations between RAR measures with standardized AHEI z-scores adjusting for energy intake, age, sex, Hispanic background, study site, education, employment, smoking, and depressive symptoms, and sampling design using survey weights.
Results: Among 1635 participants (mean age 45±12; 64% female), stronger rhythms—characterized by high activity during active periods and low activity during rest—were associated with higher diet quality. Those in the highest quartile of nonparametric relative amplitude (RA) had AHEI-z score 0.16 higher (95% CI: 0.02, 0.31) than those in the lowest quartile and a similar pattern was seen with the parametric pseudo-F. Irregular sleep duration (SD sleep duration >60 minutes) and timing (SD sleep onset time >60 minutes) were associated with lower diet quality, with mean AHEI-z scores (compared to < 60 minutes SD sleep duration/timing) of -0.13 (95% CI: -0.22, -0.03) and -0.11 (95% CI: -0.21, -0.01), respectively. Late chronotype also related to lower diet quality. Definitely-evening types had AHEI-z scores -0.35 (95% CI: -0.60, -0.10) lower than definitely-morning types.
Conclusion: In this community-based Hispanic cohort, stronger RAR, more regular sleep, and earlier chronotype associated with higher diet quality, suggesting that disrupted RAR may co-occur with unhealthy dietary patterns, amplifying cardiometabolic risk.
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0040

ASSOCIATION BETWEEN REST-ACTIVITY CIRCADIAN RHYTHMS AND MEAL TIMING: NHANES 2013-2014

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Introduction: Time restricted eating (TRE) is a novel dietary pattern that limits food intake to a certain time of day (~8-10

hours) without necessarily restricting caloric intake. Meal timing aligned with the internal biological clock has beneficial effects on metabolic health. Rest-activity rhythm (RAR) is a marker of circadian rhythmicity, and the use of wearable devices, such as actigraphy, has made it possible to assess 24-hour RAR. This study examined the association between actigraphy-derived RAR in relation to meal timing. It also investigated whether race/ethnicity is an additional factor that could modify such associations.

Methods: We used data from the National Health and Nutrition Examination Survey 2012-2013 (n=2944). 24-hour rest-activity metrics (mean, amplitude, acrophase, robustness) were derived from actigraphy data applying cosinor analysis. Outcomes of interest were meal timing variables (first, last, and eating duration; derived from two 24-hour dietary recalls) and race/ethnicity. Multiple linear regression analyses examined the associations between RAR metrics and meal timing and race/ethnicity. Adjusted covariates included age, sex, education, body mass index, total energy intake, and poverty to income ratio.

Results: Higher mean activity levels were associated with earlier mealtimes (β= -0.17, p=0.001), but also later last mealtimes (β= 0.07, p=0.01) and longer eating duration (β= 0.10, p < 0.0001). Having an earlier acrophase was also associated with shorter eating duration (β=-0.09, p=0.009) and a later acrophase was associated with later first mealtimes. (β=0.27, p=0.0004). For all models accounting for meal timing variables, non-Hispanic Asians and Black adults had lower amplitude and robustness compared with White adults (all p< 0.05). Moreover, other Hispanic and Mexican Americans had higher mean activity levels compared with White adults for all models (all p< 0.05).

Conclusion: Our findings support possible associations between meal timing variables and disrupted or weakened RAR. Having a lower amplitude and less robust RAR among non-Hispanic Asian and Black adults have implications for metabolic health, particularly relevant to the incidence of diabetes. Future research should examine the combined impact of TRE on circadian rhythms and metabolic health.

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0041

GREATER DEPRESSION SEVERITY IS ASSOCIATED WITH LATER CIRCADIAN EATING TIME IN THOSE WITH SEASONAL DEPRESSION

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Introduction: Circadian misalignment is a transdiagnostic feature of depression and metabolic dysfunction. Timing of food intake can alter peripheral clocks creating internal circadian misalignment. The atypical symptoms of depression seen in seasonal affective disorder (SAD), such as over eating, can exacerbate circadian misalignment by delaying or prolonging the eating window. Greater atypical depression severity may have increased risk for metabolic dysfunction, possibly through pronounced misalignment. The current study tested the effects of depression severity on circadian eating behaviors in SAD. We hypothesized that greater depression severity would predict later circadian eating time and longer eating windows.

Methods: Participants age 18-65 included SAD (n=33), subsyndromal SAD (S-SAD; n=16), and controls (n=41; total N=90). Depression severity and circadian phase (dim light melatonin onset; DLMO) were measured in winter. Electronic diaries collected the timing of first and last meal to determine the daily eating window. Circadian eating time was calculated as the difference between DLMO and the midpoint between the first eating observation and last eating observation. Multi-level modeling with a random intercept of participant was used to examine the impact of depression severity on daily measures of circadian eating time and eating window length. Covariates included age, gender, weekday/weeknight, and number of diary assessments.

Results: Participants reported mealtimes over 4 to 19 days (M=8.88, SD=3.62). On average, eating midpoint occurred 7.24 hours before DLMO (SD=1.90). Average eating window length was 9.01 hours (SD=3.41). Greater depression severity was associated with later circadian eating time (i.e., shorter interval between eating midpoint and DLMO; b=-0.03, SE=0.01, p=0.03). Depression severity was not associated with eating window length (b=-0.02, SE=0.02, p=0.36).

Conclusion: In a sample of individuals with SAD greater depression severity was associated with later circadian eating time, suggesting that people with greater depression are eating closer to their biological night. Longitudinal data are needed to determine if mealtimes, circadian phase, or depression initiate a maladaptive cycle. In contrast to our hypothesis, no relationship was found between depression severity and length of eating window. Length of eating window is independent of timing of eating window, suggesting that timing may be more important than total hours of food consumption in depression.

Support (if any):

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0042

REST-ACTIVITY-PATTERNS AND DAYTIME NAPPING DIFFER ACROSS ALZHEIMER'S DISEASE PHENOTYPES

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Introduction: Sleep disruption in Alzheimer's disease (AD) is common, linked to cognitive decline, and a major cause of institutionalization. While AD is associated with increased daytime napping, nocturnal wakefulness, and disrupted rest-activity rhythms (RAR), differences between amnestic (amAD) and atypical (atypAD; non-amnestic presentation) phenotypes remain underexplored. Our goal is to assess daytime napping and RAR across AD phenotypes: amnestic AD (amAD) and atypical AD (atypAD; non-amnestic presentation). Since sleep disturbances in amAD involves increased nocturnal awakenings and a decrease in total sleep, we hypothesized that RAR disruption would be amAD>atypAD> cognitively healthy older adults (HC), and that amAD have more frequent naps than atypAD.

Methods: Philips Spectrum PRO actigraphy watch was used to assess RAR in 17 amAD (8 females, Age: 74.3±9.3), 10 atypAD (4 females, Age: 69.6±9.8) and 11 HC (9 females, Age: 80±7.9). Daytime naps were assessed using 8-hour daytime EEG recordings in an independent cohort of 8 atypAD (5 females, Age: 61.1±5.6)

and 9 amAD (5 females, Age: 64.4±10.7). Preliminary actigraphy daytime sleep bouts were assessed in n=21 amAD and n=7 atypAD.
Results: RAR interdaily stability (IS) was divided into tertiles. A higher proportion of the amAD group were in the lower IS group, while greater proportions of HC and atypAD were in the highest IS tertile. Similar findings were seen for relative amplitude and activity during consecutive 10-hr periods of maximum activity. Using daytime continuous EEG recordings, we determined that amAD had a greater number of 5-minute or longer daytime sleep bouts than atypAD (62.5% vs 22.2% individuals slept more than 5mins/hr, respectively). There were also more daytime sleep bouts (based on actigraphy) in amAD (25.11 ± 8.7 bouts) as compared to atypAD (18.1 ± 2.9 bouts, $p< 0.05$).
Conclusion: Overall, actigraphy data and independent daytime EEG data suggest a more destabilized RAR in amAD compared to atypAD, with more wake disruptions and daytime sleep intrusions. These findings highlight the importance of distinguishing variants of AD in characterizing sleep/wake phenotypes. Future work will examine if differing sleep/wake features across AD variants are driven by differences in underlying neuropathology.
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0043
SEX DIFFERENCES IN CIRCADIAN BEHAVIOR AND GFAP EXPRESSION IN COGNITIVELY UNIMPAIRED OLDER ADULTS

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Introduction: Glial fibrillary acidic protein (GFAP, marker of astrocyte activation) expression is associated with disrupted circadian rhythms and increased risk of cognitive impairment. The risk of cognitive impairment also increases with diminished rest-activity-rhythm (RAR) amplitude and robustness, advanced acrophase (time of peak activity) in men, and delayed acrophase in women. It is unclear if GFAP relates to circadian behaviors in a sex-dependent manner. We hypothesize that GFAP is increased in men with advanced acrophase and in women with delayed acrophase. Additionally, we expect that GFAP is linked with subjective reports of circadian type using the Circadian Type Inventory (CTI) in cognitively unimpaired (CU) older adults to assess sleep schedule preference (flexible or rigid) and daytime energy (languid or vigorous).
Methods: 31 males (M=74.6, SD=5.4 yrs) and 42 females (M=74.7, SD=5.6 yrs) completed the CTI and up to 10 days of actigraphy (Philips Spectrum Plus; AMI Motionlogger). In a subcohort (n=15), plasma GFAP was assessed. Data were analyzed with Pearson correlations, partial correlations, and ANOVAs where appropriate using SPSS.
Results: Acrophase time and CTI scores were significantly related (R2=0.146, beta=0.314, p=.02) with earlier acrophase linked to greater daytime vigor and more rigid sleep schedules in CU older adults. Males had less stable (interdaily stability: t(36)=-2.256, p=.03) and more fragmented RAR (interdaily variability: t(36)=3.514, p=.001) than females. Self-reported "vigorous" men had lower GFAP levels than "languid" men (t(5)=3.122, p=.03), but there were no differences between "flexible" and "rigid" men, or in women. Notably, delayed acrophase was associated with higher GFAP in men (R2=0.999, beta=1.257, p=.048) but not in women.
Conclusion: We identified sex differences in circadian behavior with CU men exhibiting less stable and more fragmented RAR than women. "Languid" men also had increased GFAP than "vigorous" men. The altered circadian behavior seen in CU males, particularly delayed acrophase, is associated with increased GFAP expression and indicates a potential link between circadian disruption, astrocyte activation, and dementia risk. This suggests circadian behaviors may be more conserved in older women and highlights the need for further investigation into sex-differences in RAR and neurodegenerative disease biomarkers.
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0044
FROM NORMAL VARIATION IN SLEEP TO CLINICAL SLEEP DISORDERS: GENETIC INSIGHTS FROM OVER ONE MILLION INDIVIDUALS

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Introduction: Sleep disorders affect over 30% of the population in the United States, making them among the most common yet underdiagnosed conditions with significant disease comorbidity and increase in mortality. Moreover, as occasional sleep problems are normal, clinical sleep disorders (CSDs) are often misinterpreted as normal variation in habitual sleep prior to seeing a physician. Furthermore, it is unknown if the biological mechanisms across sleep disorders are extremes of those that contribute to normal variation in sleep.
Methods: Here, we investigated the molecular mechanisms behind sleep disorders, habitual variation and objectively measured sleep traits and specific sleep medications using genetic and epidemiological data from the UK Biobank, Mass General Brigham Biobank, All of Us, Million Veteran Program and FinnGen, and meta-analyzing results from 1,630,075 individuals with up to 312,402 cases with a sleep disorder.
Results: We identified 573 separate loci with 695 independent signals for sleep disorders, 175 loci for habitual or objectively measured sleep traits and 124 loci with sleep medication use. We then replicated associations with CSD in the Estonian Biobank. Furthermore, genetic correlation analysis indicated genetic correlation between self-reported sleep problems and respective clinical disease for insomnia and clinical insomnia ($rg = 0.622$, $P = 2.49x10-08$), snoring and sleep apnea ($rg =0.679$, $P < 0.001$) but also excessive daytime sleepiness and narcolepsy ($rg = 0.411$, $P = 0.011$). However, individual genetic variants largely differed between the self-reported and clinically defined traits or medications used to treat sleep disorders.
Conclusion: Our findings suggest that habitual sleep traits have genetic basis similar to clinically significant sleep disorders whereas some of the key genetic susceptibility loci and their downstream mechanisms are likely separate between the CSDs and normal variation in sleep. Overall, our findings provide

insight into normal variation in sleep and highlight the trajectory of genetic variants that associate with clinical and pathological sleep disorders. Ultimately, our findings may provide insight into developing novel pharmaceutical targets for sleep disorders.
Support (if any):

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0045
A COMBINED FIELD/LABORATORY STUDY TO INVESTIGATE BIOMOLECULAR DISRUPTIONS IN ENDOGENOUS CIRCADIAN RHYTHMICITY AMONG REAL-WORLD NIGHT SHIFT WORKERS

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Introduction: Recent studies employing a laboratory study design with randomization to simulated night shift (NS) or day shift (DS) followed by a constant routine protocol exposed widespread NS-induced disruptions in endogenous biomolecular circadian rhythms. To investigate whether this generalizes to long-term NS workers in real-world shift schedules, we modified the design to a field/laboratory study combining participants' own real-world work shifts with a schedule-adapted laboratory constant routine.
Methods: As part of an ongoing study, 15 long-term DS workers and 7 long-term NS workers (ages 27-55y; 12f) participated in the combined field/laboratory study. After completing ≥3 consecutive DS or NS shifts, participants slept at home and then reported to the laboratory at 08:00 (DS) or 20:00 (NS) as if beginning another shift. After 2h laboratory acclimation they underwent a strictly controlled 24h constant routine with continuous wakefulness, fixed posture, and hourly isocaloric snacks. They completed the psychomotor vigilance test (PVT) and Karolinska Sleepiness Scale (KSS) every 3h. The two-process model was fitted to PVT lapses (RTs>500ms) and KSS sleepiness to compare the homeostatic and circadian processes between DS and NS workers.
Results: PVT lapses and KSS sleepiness increased steadily across the 24h constant routine in the DS workers, while peaking after both 14h and 24h in the NS workers as predicted by the two-process model ($\chi2$=270.2, p< 0.001). There was no difference in initial sleep homeostatic state between DS and NS workers (F=0.28, p=0.60), but the circadian process was delayed by 0.9±0.3h (mean±SE) in the NS workers (F=13.74, p=0.001).
Conclusion: In this combined field/laboratory study, the homeostatic and circadian processes produced expected neurobehavioral dynamics, even though the 24h constant routine started 12h later in the NS workers in accordance with their shifted prior work schedules. DS and NS workers did not differ in initial sleep homeostatic state, but there was a small delay in the endogenous circadian phase of the NS workers, as commonly observed in real-world shift operations. While awaiting confirmation with circulating melatonin, our results support the viability of this novel study design and its use for investigating the impact of real-world NS on biomolecular circadian rhythms.
Support (if any): CARE Fund FY22-POP-02; HSSA; WSU ESFCOM

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0046
IMPACT OF CIRCADIAN ADAPTATION ON SLEEP ARCHITECTURE IN SIMULATED SHIFTWORK

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Introduction: Shift workers commonly experience circadian misalignment, which disrupts sleep. We examined the impact of a dynamic lighting schedule on circadian adaptation and sleep architecture in a simulated shiftwork paradigm.
Methods: Healthy adults (n= 19, 10F, mean age [±SD] 36.20 ± 9.20 years) completed an 8-day inpatient protocol that included 4 consecutive nightshifts during which the sleep-wake schedule was delayed by 8 hours relative to each participant's habitual schedule. Participants were randomized to one of three dynamic lighting interventions during the four nightshifts that differed in illuminance, spectrum, and timing through the waking day and were expected to induce a phase delay. Circadian adaptation was assessed by comparing the plasma dim light melatonin onset (DLMO) measured before and after the nightshifts. Sleep during an 8-hour sleep opportunity was measured polysomnographically before the first nightshift (baseline) and after the fourth nightshift.
Results: The mean (±SEM) circadian phase-delay shift was -5.15±0.37 hours (range: -8.16 to -1.88 hours) of the targeted 8-hours. Sleep architecture did not differ across the three conditions, so data were combined for analyses. Compared to baseline, sleep after the fourth nightshift was associated with significantly reduced total sleep time (TST, 415.40±20.24 vs. 377.2±15.02 minutes, p < 0.01), stage 2 sleep (N2, 187.3±13.16 vs. 151.7±9.47 minutes, p< 0.01), and sleep efficiency (SlpEff, 86.05±4.19 vs. 78.52±3.11 %, p< 0.01), and increased wake after sleep onset (WASO, 52.92±19.15 vs. 84.79±15.10 mins, p< 0.05). Sleep onset latency (SOL) did not differ (18.02±5.32 v 14.68±2.45 mins, p=0.76). Greater circadian phase shifts, corresponding to more adaptation to the shifted sleep-wake schedule were correlated with increased TST (r2 = 0.49, p< 0.001), SlpEff (r2 = 0.49, p< 0.001), REM (r2 = 0.38, p< 0.01), and decreased WASO (r2 = 0.53, p< 0.001), but not SOL (r2 = 0.10, p=0.19).
Conclusion: The results show that greater circadian adaptation is associated with better sleep architecture. Additional studies are needed to optimize details of dynamic lighting schedules and lighting characteristics for preserving sleep quality in various shiftwork schedules.
Support (if any): National Space Biomedical Research Institute through NASA NCC 9–58 (HFP02801 [PI: Lockley], HFP02802 and HFP00006 [PI: Klerman]; NHLBI: R01HL159207 (PI: Rahman), R01HL162102 (PI: Rahman/St. Hilaire).

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0047
THE MODERATING EFFECT OF SHIFT WORK ON CIRCADIAN RHYTHM DISRUPTION AND HEART RATE VARIABILITY DURING SLEEP

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Introduction: It has been suggested that circadian rhythm disruption is closely associated with alterations in the autonomic nervous system, posing risks to both physical and mental health. Shift workers are particularly susceptible to circadian rhythm disruption. This study aimed to investigate the moderating effects of shift work on the association between circadian rhythm disruption and cardiac autonomic regulation during sleep.
Methods: Nocturnal polysomnography (PSG) and actigraphy data of 41 shift workers(mean age 34.0±8.6 years, 35 females) and 39 controls(mean age 35.9±9.5 years, 34 females) were analyzed. Time-domain, frequency-domain, and nonlinear heart rate variability (HRV) parameters were derived from 5-minute electrocardiogram (ECG) segments during sleep, and their averages were calculated for each sleep stage (W, N1, N2, N3, R). Cosinor analyses of actigraphy data were conducted to compute both parametric (e.g., amplitude, acrophase, F-statistics) and non-parametric parameters (e.g.,Interdaily Stability(IS), Intradaily Variability(IV)). Independent t-tests were conducted to compare group differences in HRV and cosinor analyses parameters. Moderation analyses were conducted to test the moderating effects of shift work on the relationship between circadian rhythm and autonomic regulation.
Results: Shift workers had higher Midline Estimating Statistic of Rhythm (MESOR) and Least active 5-hour period (L5) and lower IS, IV, Most active 10-hour period (M10) and Relative Amplitude (RA) (all Ps< 0.05). However, shift workers did not show significant differences in HRV parameters during sleep compared to controls. Shift work moderated the association between the mean HR during the N1 stage and F-statistics (F-statistics x shift work: b=0.002, SE=0.001, P=0.032), and between the mean HR during the N3 stage and RA (RA x shift work: b=20.064, SE=9.939, P=0.048). These associations were stronger in shift workers than controls.
Conclusion: Current study showed that circadian rhythm disruption was more pronounced in shift workers than controls. Even though shift workers showed no significant differences in HRV parameters compared to controls, the moderation results suggest that the influence of circadian rhythm disruption on cardiac autonomic regulation may be an important issue for shift workers.
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0048

CIRCADIAN TIMING AND INTENTION TO LEAVE DURING THE TRANSITION TO A SHIFT-WORK SCHEDULE

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Introduction: Working during nighttime hours (i.e., shiftwork) is associated with high rates of job turnover, yet it is unclear what mechanisms directly increase intention to leave in shift workers. We therefore utilized a natural experiment in which newly hired employees transitioned from a daywork schedule to an early-morning shiftwork schedule to uncover what behaviors (i.e., workload, supportive workplace) or physiology (i.e., circadian timing) may promote higher intention to leave.
Methods: Thirty volunteers (11 female; aged [average±SD] 36.3±9.1yr) participated in a seventeen-week study beginning with an ~8h evening in-laboratory stay in dim-lighting (< 5lux) to calculate circadian timing via salivary dim-light melatonin onset (DLMO) (3pg/ml threshold). Following the in-laboratory collection, weekly surveys on intention to leave were collected, asking "I am seriously thinking about quitting my job" with Likert-scale responses of 1-Strongly Disagree to 5-Strongly Agree, while the participants were transitioning into an early-morning shift-work schedule (start time before < 7am). Average daily work hours and the highest score of intention to leave were calculated for each participant. At the end of 17-weeks, participants rated their perceived support at work with the Likert-scale question: "I felt that there was help available to me (at work)". Multiple linear regression was used to determine associations between workload, supportive workplace, DLMO and the intention to leave.
Results: A positive correlation was found between DLMO timing and intention to leave, such that later DLMO timing was associated with higher intention to leave (r=0.37, p=0.04). A negative correlation was found between supportive workplace scores and intention to leave, such that higher perceived support was associated with lower intention to leave (r=-0.16, p=0.01). Lastly, there was no association between daily hours worked and intention to leave (r=0.0016, p=0.84).
Conclusion: While transitioning into an early-morning shiftwork schedule, having a later DLMO, and thereby potentially higher morning circadian misalignment, was associated with a higher intention to leave; conversely, having higher perceived support at work may be protective. Further understanding the connection between circadian timing and intention to leave could have implications for providing support to workers transitioning into early-morning shiftwork to lower risk of turnover.
Support (if any): OHSU School of Nursing PhD Student Scholarship Award

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0049

SEX DIFFERENCES AND SHIFT WORK HISTORY INFLUENCE INTERACTIONS BETWEEN SLOW WAVE SLEEP AND BODY TEMPERATURE

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Introduction: Pre- and post-menopausal females have greater slow wave sleep (SWS) and delta power compared with males. However, the mechanisms underlying this sex difference remain unknown. Sleep and temperature regulation are highly interdependent. We explored whether sex differences in thermoregulation

interact with sex differences in SWS as a potential mechanism. We also explored whether a prior history of shift work, known to disrupt circadian rhythms and sleep, moderated body temperature-SWS relationships.
Methods: We compared measures of SWS and core body temperature (Tc) simultaneously recorded during a 60h laboratory study in males (n=36, mean age 68.85 yr) and females (n=37, mean age 68.02 yr). The 3-night protocol included one night of nocturnal PSG; one night of total sleep deprivation under constant routine conditions (36–40h) and one recovery PSG sleep night. The sample included 40 retired day workers (RDW) and 33 retired shift workers (RSW). Tc analysis focused on the sleep-associated Tc decline (Tdrop), known to correlate with SWS, during the recovery night.
Results: Compared to males, females had substantially higher recovery %SWS (13.8±10.75 vs 4.9±5.29 %, p< 0.001), SWS min (57.12±45.53 vs 18.26±20.77 min p < 0.001), mean delta power (109.01±44.91 vs 66.97±27.75, p < 0.001) and greater Tdrop (0.96±0.20 vs 0.82±0.28 °C, p < 0.05). Tdrop weakly correlated with %SWS in females (r=0.34, p = 0.07), but not in males. Tdrop was not significantly associated with SWS min and delta power in either sex. However, RDW females (n=17) showed moderate–strong and significant correlations: greater Tdrop correlated with greater %SWS (r=0.67, p< 0.01), SWS min (r=0.59, p < 0.05), and delta power (r=0.54, p< 0.05). These correlations were not significant in female RSW (despite similar SWS and Tdrop), or in male RSW or RDW (p > 0.10) all comparisons.
Conclusion: The association between SWS and sleep-associated core body temperature decline varies by sex and a history of shift work. Further studies may determine whether sex differences in temperature and sleep regulation results from known sexual dimorphism in sleep-wake promoting and thermoregulatory nuclei, and how this pattern interacts with sex-differences in risk for sleep disorders or other health problems.
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0050

ACUTELY DELAYING SLEEP ONSET CAUSES DYNAMIC CHANGES IN SLEEP ARCHITECTURE: INSIGHTS FROM A RANDOMIZED CROSSOVER STUDY

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Introduction: The timing of meals may influence weight control and cardiovascular health. In a previous randomized crossover study ("Dinner Time"), we found that a late dinner (22:00) compared to a routine dinner (18:00) increased post prandial glucose and reduced dietary fat oxidation. However, it remains unclear whether late dinner metabolic dysfunction is driven by circadian misalignment or by eating close to sleep.
Methods: We conducted a follow-up study ("Dinner Time 2") to compare the effects of dinner timing relative to dim-light melatonin onset (DLMO) and sleep timing. Participants completed three conditions in random order with a 3-4 week washout period: (1) early dinner (DLMO -3) + routine sleep (DLMO +2 to +10) = "early dinner" (ED); (2) late dinner (DLMO +1) + routine sleep = "late dinner" (LD); and (3) late dinner (DLMO +1) + late sleep (DLMO +6 to +14) = "late dinner + late sleep" (LD/LS). The primary outcome of this study is glucose which is reported separately. Here, we focus on the secondary outcome of sleep architecture (total sleep time, sleep efficiency, and sleep stage percentages) under each of the 3 conditions. We compared whole night sleep stage distributions using Kruskal-Wallis tests. We also examined temporal changes in sleep architecture using stratification of each 8-hour sleep period into quartiles.
Results: Thirteen participants (7 female, 6 male, mean age 25 years, BMI 22.1 kg/m²) completed the study. Total sleep time, sleep efficiency, and proportions of NREM and REM sleep did not differ significantly between ED, LD, and LD/LS. However, the LD/LS condition showed dynamic changes in sleep architecture: an increased proportion of stage 3 sleep in the first half of the night, followed by higher wakefulness and reduced REM sleep in the latter quarter of the sleep period.
Conclusion: This study examines whether the metabolic effects of late dinner are related to circadian phase or sleep timing. Delaying sleep after late dinner did not alter overall sleep architecture but changed the temporal distribution of sleep stages. These findings illustrate effects of homeostatic sleep drive while controlling for circadian rhythm.
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0051

REDEFINING SLEEP DISRUPTION: IMPACT OF BRIEF AWAKENINGS ON SELF-REPORTED SLEEP QUALITY

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Introduction: Self-reported sleep quality is a key determinant of physical and mental health, yet the relationship between objective sleep parameters and self-reported assessments remains complex. Wake After Sleep Onset (WASO), particularly its duration and frequency, is thought to disrupt self-perceived sleep quality, with a National Sleep Foundation consensus panel proposing a minimum of 5 minutes of duration for a midsleep awakening to be clinically relevant. The empirical validity of this threshold has yet to be rigorously tested. This study evaluates the impact of thresholding WASO duration and frequency on self-reported measures of sleep depth and restfulness.
Methods: Using data from the Sleep Heart Health Study (n = 3165), durations of PSG-determined episodes of midsleep awakening were labeled based on thresholds ranging from 15 seconds to 10 minutes. Random Forest (RF) regression models were employed to predict self-reported sleep quality (self-reported sleep depth and restfulness, scored on 5-point Likert scales) based on multiple objective sleep metrics including stepwise thresholded WASO. Additional covariates included demographic, anthropometric, health, and pre-sleep behavior variables. Model performance was assessed using 5-fold cross-validation, and feature importance was extracted to quantify the contributions of WASO duration and frequency to self-reported sleep quality.
Results: RF models explained 26.0% to 30.6% of the variance in self-reported sleep restfulness and 26.4% to 30.4% in sleep depth, with the greatest explanatory power observed at lower WASO thresholds (15–45 seconds). The 5-minute threshold for

an individual episode of midsleep awakening to "count" did not yield improvements in model performance for sleep restfulness (28.6%) or depth (28.4%).

Conclusion: Contrary to the proposition from the expert panel, brief wake episodes shorter than five minutes appear to have a measurable impact on self-reported sleep quality. This implies that any duration of awakening of at least 15 seconds has the capacity to impact one's self-reported sleep quality. These findings challenge the reliance on a 5-minute WASO threshold and underscore the importance of including shorter wake episodes in assessments of sleep quality.

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0052

GENOME-WIDE PLEIOTROPY ANALYSIS OF CIRCADIAN PREFERENCE AND BMI REVEALS ADCY3'S RHYTHMICITY IN ADIPOSE TISSUE

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Introduction: Chronotype is the behavioral manifestation of our internal circadian clock, influencing whether individuals are early birds (morning people) or night owls (evening people). Chronotype significantly impacts complex diseases such as obesity. This study dissects the relationship between circadian preference and body mass index (BMI) using a genome-wide pleiotropy approach.
Methods: We conducted a genome-wide pleiotropy analysis to explore the associations between morning circadian preference and BMI, focusing on the tissue-specific expression and rhythmicity of key genes.
Results: We identified a lead locus, rs11676272 in ADCY3, associated with increased morning preference and decreased BMI. The rs11676272 (S107P) is a missense variant that destabilizes the ADCY3 protein structure, highlighting the gene's role in both circadian behavior and metabolic processes. In mouse models, Adcy3 expression was rhythmic in white and brown adipose tissues during constant darkness, and it oscillated anti-phase to the canonical circadian genes Clock and Bmal1. The presence of the Bmal1-specific E-box motif CACGTG on the Adcy3 gene suggests Bmal1 regulation of this rhythmicity, indicating a novel mechanism of circadian control within these tissues.
Conclusion: Findings from our genome-wide pleiotropy approach underscore a novel role of ADCY3 at the intersection of circadian regulation and metabolic health. This study offers new insights into the genetic architecture of these complex traits, highlighting the significance of tissue-specific rhythmicity in adipose tissue.
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0053

MULTI-OMICS STUDIES OF UPPER AIRWAY MUSCLES ADVANCE OBSTRUCTIVE SLEEP APNEA PATHOGENESIS INSIGHTS

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Introduction: Obstructive sleep apnea (OSA) is a common sleep disorder characterized by upper airway collapse during sleep, with unclear molecular mechanisms. This study represents the first multi-omics investigation of upper airway muscles (UAMs) from OSA patients, integrating transcriptomics, proteomics, phosphoproteomics, and N-glycoproteomics to uncover key pathways involved in OSA pathogenesis.
Methods: Palatopharyngeal (Pal) muscle tissues were collected from 56 treatment-naïve OSA patients and 4 controls, with clinical data including polysomnography and laboratory tests. Multi-omics analyses were performed, and missing values were imputed using a random forest approach. Data underwent rigorous quality control to ensure analytical robustness.
Results: Transcriptomic analysis revealed 561 genes positively and 200 negatively correlated with the apnea-hypopnea index (AHI), highlighting pathways such as N-glycosylation and muscle contraction regulation. Proteomics identified 63 proteins positively and 19 negatively correlated with AHI, including key regulators in NF-κB signaling. Phosphoproteomics analysis found 112 AHI-associated phosphosites enriched in pathways such as MAPK signaling and axon guidance. N-glycoproteomics identified 40 glycosylation sites correlated with AHI, linked to ECM proteoglycans and lipid metabolism. Integrative analysis across all omics levels highlighted lipid metabolism, inflammation, and synapse function as critical pathways in OSA pathogenesis.
Conclusion: As the first multi-omics study on UAMs in OSA patients, this research provides novel insights into dysregulated pathways underlying UAM dysfunction. These findings lay a foundation for understanding OSA pathogenesis and developing targeted therapies.
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0054

THE HUMAN PHENOTYPE PROJECT: METABOLOMIC SIGNATURES OF SLEEP CHARACTERISTICS REVEAL GENDER-SPECIFIC INSIGHTS

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Introduction: Obstructive sleep apnea (OSA) represents a significant global health challenge that can lead to substantial metabolic and cardiovascular complications. Despite extensive research, the underlying metabolic mechanisms and comprehensive biomarkers of sleep disorders remain incompletely understood. Metabolomic approaches offer unprecedented insights into the complex biochemical interactions associated with sleep pathophysiology, potentially bridging critical gaps in our understanding of OSA pathogenesis.
Methods: Utilizing the comprehensive Human Phenotype Project cohort, we conducted an extensive metabolomic analysis of sleep characteristics. The study encompassed 4,374 adults (2,122 males, 2,252 females) with 10,693 nights of WatchPAT-300 (ZOLL Itamar) wrist worn home sleep apnea test monitoring, in total 3,909,716 minutes of data collection and 457 sleep-related measurements. Employing nuclear magnetic resonance (NMR) spectroscopy, we identified levels of 171 metabolites in the participants' serum, and applied advanced machine-learning algorithms to explore bidirectional predictive relationships between sleep traits and metabolite profiles. Clinical OSA was defined based on peripheral Apnea-Hypopnea Index (pAHI) measurement and daytime sleepiness reporting.
Results: Key findings revealed 96 metabolites positively and 20 metabolites negatively correlated with pAHI, as adjusted for age, sex and body mass index with statistical significance maintained after false discovery rate correction ($P < 0.0001$). Sleep characteristics could contribute to the predictions of over 82% (141/171) of the serum metabolomics for males and 43% (75/171) for females, in a held-out set of individuals, outperforming age and BMI as predictors for these measurements. Notably, serum

metabolite analysis demonstrated gender-specific predictive power for clinical OSA symptoms in males but not in females. The metabolite profile surpassed traditional predictors like age and BMI in predicting daytime sleepiness and elevated pAHI ($P = 5\times10^{-9}$). Particularly, lower Albumin and higher Tyrosine levels emerged as significant predictors of clinical OSA symptoms in male participants.

Conclusion: Our study reveals significant gender-specific metabolic variations in obstructive sleep apnea, with sleep characteristics demonstrating strong predictive power for metabolite profiles, particularly in males. The demonstrated ability to predict OSA symptoms through metabolite analysis offers a novel perspective on personalized sleep disorder diagnostics and pathophysiological mechanism discoveries.

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0055

GENETIC VARIANTS ASSOCIATED WITH RESTLESS LEGS SYNDROME AND ITS COMORBIDITIES: AN ANALYSIS BY A PHENOME WIDE ASSOCIATION STUDY

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Introduction: Restless Legs Syndrome (RLS) is associated with health issues such as iron deficiency, kidney disease, and cardiovascular disease. Our research aims to identify genetic risk factors for RLS and its comorbid conditions. Phenome Wide Associations studies (PheWAS) are reverse genetic studies where a known genetic variant is tested against a population to look for a phenotype. This is opposed to Genome Wide Association Studies (GWAS) where a known phenotype is tested against a population to look for a genotype. PheWAS studies can also reveal other clinical conditions that are frequently associated with a population of interest such as RLS.

Methods: We searched the NHGRI-EBI GWAS Catalog for genetic variants significantly associated with RLS. We conducted PheWAS on these genetic variants in Vanderbilt University Medical Center's biobank, BioVU. The cohort included 72,642 individuals of European ancestry. We assessed whether the known association with each variant and RLS was replicated, and we determined whether phenotypes other than RLS were associated with these same RLS associated allelic variants.

Results: We identified 365 variants associated with RLS in a recent version of the GWAS catalog and completed PheWAS on 359 of them. We replicated the RLS association in 84 variants. Additionally, 52 of the 365 variants were significantly associated with other traits in the GWAS and PheWAS replicated 9 of these associations. These nine confirmations included conditions commonly linked to RLS such as hypertension, chronic kidney disease, hypercholesterolemia and insomnia. Furthermore, PheWAS identified phenotypes associated with 22 RLS alleles that were not reported in the GWAS catalog as being associated with these alleles. Many of these conditions such as thyroid disease, digestive diseases, rheumatoid arthritis and diabetes, are also commonly associated with RLS as determined by clinical and epidemiology studies.

Conclusion: Our findings highlight the complex genetics of RLS and its comorbid conditions. By identifying and replicating genetic variants associated with RLS and other traits, we provide evidence of shared genetic factors between RLS and other medical conditions or traits that may explain their frequent co-occurrence.

Support (if any): "Sleep Research in Neurology" internal Vanderbilt University Medical Center grant to Dr. Walters

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0056

PLEIOTROPIC EFFECTS OF GENETIC VARIANTS ON SUBSTANCE USE DISORDER AND SLEEP PATTERNS

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Introduction: Substance use disorder (SUD) is associated with several negative health outcomes, including sleep disorders. Although this correlation is well established, little is known about the genetic mechanisms underlying the comorbidity between sleep problems and SUD

Methods: We have conducted a phenome-wide association study (PheWAS) in the São Paulo Epidemiologic Sleep Study (EPISONO). The single nucleotide variants (SNV) rs4238213 and rs4727799 were selected from previous genome-wide association studies for SUD. The association of genotypes with the 460 phenotypes filtered from the EPISONO database was conducted, and the covariates of the model included age, age-squared (age^2), sex and principal components (PCs 1 to 10). To correct for multiple testing, we applied Bonferroni tests, treating each trait as a test, independently for each SNV. Non-parametric tests were applied to validate nominally significant associations identified in the PheWAS ($p< 0.05$).

Results: We showed possible SNVs' associations with 36 phenotypes in the EPISONO database. We validated the implication of these variants with substance use as they showed nominal association with SUD in our admixed cohort. In addition to the validation of previously reported results, suggestive associations were observed for phenotypes related to sleep-disordered breathing, sleepiness, and sleep patterns. The minor allele of the SNV rs4238213 was nominally associated with lower odds of Tobacco use (OR=0.78; p-value=0.02) and higher odds of being in the group of people who reported having used medication to stay awake (OR=2.88; p-value=6.95x10-4). The risk allele may also be linked to increase in REM sleep latency (REM latency) (β=0.10; p-value=0.03), and increased odds of having nighttime nasal obstruction (OR=1.37, p-value=0.02). The SNV rs4727799's minor allele was nominally associated with higher odds of tobacco use (OR=1.61; p-value=0.04), decreased chance of dozing off while reading (OR=1.37, p-value=0.01), presence of clinically relevant respiratory arousal index (OR=1.35; p-value =0.02) and increased RERA index (β=0.14; p=0.01).

Conclusion: Our results suggest a pleiotropic effect of both SNVs on SUD and sleep-related traits, highlighting the possibility of

an overlap between the genetic factors involved in the risk for SUD and sleep phenotypes.
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0057

PLEIOTROPIC EFFECTS OF APOE VARIANTS ON A SLEEP-BASED ADULT EPIDEMIOLOGICAL COHORT

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Introduction: APOE ε4 allele has been implicated in sleep or circadian disturbances in older adults and/or in the context of neurodegeneration. However, the effect of APOE variants on sleep patterns remain unexplored in general adult population. Phenome Wide Association study (PheWAS) approach was applied in a sleep-based adult epidemiological cohort to address pleiotropic effects of APOE variants.
Methods: PheWAS analysis was performed on the São Paulo Epidemiologic Sleep Study (EPISONO), an adult epidemiological sample (1,042 individuals, 20-80 years-old) submitted to objective and subjective sleep evaluations, laboratory tests, clinical scales, anthropomorphic measurements and sociodemographic inquiries (1,182 traits/individual). SNP-array and qPCR determined APOE alleles. PheWAS was performed with an additive genetic model for rs7412 variant, using age, sex, principal components, socioeconomic classification and body mass index as covariates. Validation analysis was performed for combinations of APOE full haplotypes (ε3ε3/ε2ε2/ε4ε4/ε2ε3/ε2ε4/ε3ε4). We then leveraged UKBiobank (UKBB, N=449,734) GWAS summary statistics from previous studies which addressed self-reported chronotype.
Results: Nominal associations (PheWAS p< 0.05) between the rs7412 genotype and 5 continuous traits were identified and confirmed by non-parametric tests: LDL and total cholesterol blood concentrations, Morningness-Eveningness Questionnaire (MEQ) score, power of gamma and beta electroencephalographic (EEG) frequency bands in N1 and N3, respectively. The association with LDL levels remained significant after Bonferroni correction. All these 5 traits were significantly associated with at least 1 APOE haplotype combination. Lower LDL and cholesterol levels were associated with ε2ε3, higher MEQ scores were observed in ε2ε2 individuals, higher power of gamma waves in N1 was associated with ε2ε2, ε2ε3 and ε4ε4 (with indication ε2 dosage effect), and higher power of beta waves in N3 was associated with the ε2ε3. In UKBB, nominal association between self-reported chronotype and rs7412 was observed.
Conclusion: Extensive APOE associations with lipid metabolism were replicated in an admixed cohort. Suggestive associations of APOE genotype with diurnal preference and variables derived from sleep EEG spectral analysis present preliminary evidence of the effect of these variants over sleep patterns and individual differences in circadian typology. The assessment of associations between APOE variants with MEQ scores polysomnography spectral analysis data in humans is unprecedent in literature.
Support (if any): AFIP/FAPESP/CNPq.

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0058

SHARED GENETIC VARIANTS OF RESTLESS LEGS SYNDROME WITH ADHD, BLOOD PRESSURE, INSOMNIA AND CIRCADIAN RHYTHMICITY: A COMPARISON OF GWAS STUDIES

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Introduction: Restless Legs Syndrome (RLS) disrupts sleep and in epidemiological and clinical studies is co-morbid with other conditions such as iron deficiency, kidney disease, and cardiovascular disease. Our research aims to identify genetic risk factors associated with RLS and its comorbid conditions.
Methods: We searched the NHGRI-EBI Genome Wide Association (GWAS) Catalog for genetic allelic variants significantly associated with RLS. We further searched the catalog and identified which RLS-associated variants were also associated with other traits or conditions. For these conditions, the allelic variants were found through studies that focused on the condition of interest, not RLS.
Results: Our analysis identified 365 allelic variants associated with RLS. Among these, 52 variants were associated with at least one other trait, many of which are known comorbidities of RLS. We found the most significant association between variants associated with both RLS and blood pressure measurements: 3 variants with diastolic and 4 variants with systolic blood pressure, supporting previous findings that connect RLS with cardiovascular disease (for systolic blood pressure alone, the corrected p-value = 8.30 x 10 - 53). This was followed closely by the association between variants of insomnia and RLS with 13 variants showing significant associations with both conditions (for insomnia alone, the corrected p-value =8.30 x 10-50). Additionally, several variants were associated with both RLS and attention deficit hyperactivity disorder (ADHD) (4 variants), as well as RLS and circadian rhythm disturbances (3 variants).
Conclusion: Our data suggest a strong genetic association between hypertension and RLS. Our data also suggest a significant association between RLS and insomnia, ADHD, and circadian rhythm disturbances. We cannot definitively say that conditions like ADHD and RLS are inherited together; rather, the same alleles could affect susceptibility to both disorders. It is also possible that the symptoms of conditions like ADHD and insomnia could be caused by the symptoms of RLS. Our approach, not previously applied to RLS, could identify new genetic allelic variants associated with traits not previously known to be associated with RLS.
Support (if any): "Sleep Research in Neurology" internal Vanderbilt University Medical Center grant to Dr. Walters.

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0059

FOXP1 GENE REGULATES THE CIRCADIAN CLOCK AND ITS LOSS OF FUNCTION IMPAIRS SLEEP PATTERNS

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Introduction: The haploinsufficiency of the FOXP1 protein is associated with a rare genetic disorder of neurodevelopment. Sleep disturbances have already been reported in 45% of patients with pathogenic variants in FOXP1. However, the biological pathways linking sleep traits to the FOXP1-associated syndrome remain unclear.
Methods: Benefited from recent large-scale genome wide association studies, was manually curated a set of genes associated with sleep traits, including a broad list of sleep disorders and circadian phenotypes. Subsequently, we generated a list of genes directly regulated by FOXP1 by mapping previously described FOXP1 genomic binding sites (data available at the ENCODE database) to gene promoters using Bedtools. We contrasted these 2 gene sets to generate an intersection gene list. A pathway enrichment analysis was performed using this latter gene list of overlapping genes as input. The Benjamini–Hochberg test was used to identify enriched pathways with a significance threshold of adjusted p-value< 0.01. Gene Ontology and Kyoto Encyclopedia of Genes and Genomes terms were considered in the over-representation analysis. Intersect gene lists were used as input on a protein–protein interaction (PPI) analysis via String database, a minimal interaction score of 0.7 enabling physical interactors in the network.
Results: There were 510 overlapping genes between the gene lists associated with sleep traits (1,062 genes total) and FOXP1 regulatory targets (8,596 genes total). The shared gene set between those two gene lists is greater than expected by chance (p-value=2.6x10-7; OR=1.4), indicating significant genetic overlap. Significantly enriched pathways among these 510 intersect genes are related to neuronal function (Axon Guidance (adjusted p-value=2.29x10-05; OR=5.76)), Circadian Rhythm (adjusted p-value=7.82x10-07; OR=18.5), and Regulation of Insulin Secretion (adjusted p-value=8.66x10-03; OR=5.63). PPI analysis using the sleep versus FOXP1 regulatory targets set as input generated a network with 15 nodes. The network encompasses 3 proteins related to Diabetes Mellitus and 9 proteins related to neurological diseases.
Conclusion: The set of overlapping genes and biological pathways highlighted by this study may serve as a starting point for new functional investigations of shared molecular mechanisms between sleep disturbances and rare developmental syndromes related to FOXP1 and its regulatory targets.
Support (if any): AFIP, FAPESP, CNPq.

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0060

EXPLORING THE BIDIRECTIONAL CAUSAL ASSOCIATIONS BETWEEN SLEEP TRAITS AND METABOLOMIC PROFILE IN HUMANS

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Introduction: Unhealthy sleep patterns are common phenomena which may lead to a spectrum of adverse cardiometabolic outcomes. Metabolites play pivotal roles in the relevant underlying mechanisms, yet the causal associations between sleep and metabolome in humans remain unclear.
Methods: This study applied one-sample Mendelian randomization (MR) to explore the relationship between sleep traits (sleep duration per day, short sleep duration (≤6 h), long sleep duration (≥9 h), and insomnia) and 249 metabolites among 166,436 participants from the UK Biobank. Single nucleotide polymorphisms identified in genome-wide association studies were used as instrumental variables. Initially, the two-stage least squares (2SLS) approach was performed to explore causality. Subsequently, inverse-variance weighted (IVW) and complemented methods were used as sensitivity analysis to further test the robustness of the results. Reverse MRs from each metabolites to sleep variables were also conducted.
Results: Genetically predicted insomnia was causally associated with level of most lipids and led to increased levels of acetoacetate (β2SLS [SE] = 0.173 [0.064]; βsensitivity-IVW [SE] = 0.039 [0.018]), glycoprotein acetyls (β2SLS [SE] = 0.768 [0.063]; βsensitivity-IVW [SE] = 0.111 [0.022]), and decreased levels of citrate (β2SLS [SE] = -0.155 [0.062]; βsensitivity-IVW [SE] = -0.058 [0.019]). Genetically predicted sleep duration was causally associated with increased average diameter for low density lipoprotein particles (β2SLS [SE] = 0.120 [0.032], βsensitivity-IVW [SE] = 0.106 [0.045]). Short sleep duration caused an increased the level of triglycerides in very low density lipoprotein subclass, apolipoprotein B to apolipoprotein A1 ratio and a decreased level of high density lipoprotein. We found no causal evidence for the effects of metabolites on any sleep variable.
Conclusion: Our study found that insomnia may lead to a wide range of metabolic disturbances, particularly in lipid metabolism, with short sleep similarly impacting lipid metabolic processes. This suggests that sleep traits may cause adverse outcomes through certain metabolic pathways.
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0061

TRANSCRIPTIONAL DYNAMICS OF SLEEP DEPRIVATION AND SUBSEQUENT RECOVERY SLEEP IN THE MALE MOUSE CORTEX

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Introduction: Sleep is a critical physiological process governed by circadian and homeostatic mechanisms. The circadian clock controls sleep timing, while the sleep homeostat regulates sleep need (sleep pressure), which increases with wakefulness. Acute sleep deprivation (SD) raises sleep pressure, as measured by frontal cortex polysomnography. This pressure maximizes after 5-6 hours of SD and is largely alleviated with 2-3 hours of recovery sleep (RS). While sleep pressure dynamics are well understood, the molecular mechanisms underlying sleep homeostasis remain largely unexplored despite the established effects of SD on gene transcription.
Methods: Novel bulk RNA-sequencing data was combined with open-access cortex datasets (n = 3-5) of adult male C57BL/6J

mice. Mice underwent SD (3 or 5-6 hours) followed by RS (2 or 6 hours). The remove unwanted variance method was used to normalize the data and correct for lab biases. The edgeR package was used to determine differentially expressed genes (DEGs) with a false discovery rate < 0.05. Functional annotation analysis occurred using the Database for Annotation, Visualization, and Integrated Discovery to understand the DEGs' functional implications.

Results: We report that 5-6 hours of SD had the largest effect on gene expression, altering 7,493 genes. SD predominantly repressed gene expression. DEGs associated with circadian rhythm and DNA damage/repair uniquely showed changes at 3 and 5-6 hours of SD but returned to baseline by 2 hours of RS. DEGs that took longer to become uniquely expressed at 5-6 hours and normalized quickly within 2 hours of RS were associated with RNA-binding, chromatin regulation, oxidative phosphorylation, and glutathione metabolism.

Conclusion: Our findings reveal that gene expression patterns closely track sleep pressure dynamics, potentially illuminating the molecular underpinnings of sleep homeostasis. Most notably, we identified a substantial group of genes that mirror the build-up of sleep pressure during SD and rapidly normalize with RS. These genes regulate critical cellular processes, including DNA repair mechanisms, epigenetic modifications, and oxidative stress responses - pathways that may represent novel therapeutic targets for sleep disorders. Future investigations will focus on manipulating these pathways to understand better how they contribute to the cellular regulation of sleep.

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0062

SLEEP COMPLAINTS IN INDIVIDUALS WITH SYNGAP1-ASSOCIATED SYNDROME

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Introduction: Neurodevelopmental disorders, which involve atypical brain development, often result in learning disabilities, developmental delays, intellectual disabilities, behavioral issues, epilepsy, and sleep disturbances. Among these, synaptopathies genetic neuropsychiatric conditions affecting synaptic function—lead to a wide range of neuropsychiatric symptoms. One such condition, SYNGAP1-associated syndrome, is primarily caused by loss-of-function mutations and is characterized by intellectual disability, global developmental delay, autism, and epilepsy.

Methods: This study focused on sleep behaviors in children with SYNGAP1-associated syndrome, using two standardized assessment tools: the Children's Sleep Habit Questionnaire and the Sleep Disturbance Scale for Children.

Results: The researchers compared the sleep patterns of 23 children with confirmed SYNGAP1 mutations to those of neurotypical children matched for age and sex. The results revealed that 78.3% of the children with SYNGAP1 mutations had epilepsy, often resistant to treatment. In terms of sleep, these children exhibited significantly higher levels of disturbance compared to their neurotypical peers. Key findings included increased bedtime resistance, longer sleep durations, more frequent night awakenings, and a greater reliance on parental presence to fall asleep. Additionally, children with SYNGAP1-associated syndrome had more difficulty sleeping away from home. Caregivers of these children reported poor sleep quality, reflecting the broader challenges associated with caregiving for children with neurodevelopmental disorders.

Conclusion: The findings highlight the critical link between neurodevelopmental conditions and sleep disturbances, underscoring the need for targeted interventions to improve sleep quality for both affected children and their caregivers. This study emphasizes the importance of addressing sleep issues in children with neurodevelopmental disorders as part of a comprehensive approach to their care and well-being.

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0063

SUBJECTIVE SLEEP ASSESSMENTS AND CLINICAL EVALUATIONS OF INDIVIDUALS HARBORING NOVEL PATHOGENIC DEAF1 VARIANTS

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Introduction: DEAF1-Associated Neurodevelopmental Disorders (DAND) are a spectrum of rare genetic conditions caused by pathogenic variants in the DEAF1 gene. Despite the high prevalence of sleep disturbances in those with DAND, the specific nature and mechanisms underlying these issues remain poorly understood. This study aims to assess patients' genetic and clinical data and evaluate the prevalence, severity, and types of sleep disturbances in DAND, as well as patient caregivers' sleep quality.

Methods: We recruited 12 Brazilian individuals with DAND and sex- and age- matched neurotypical controls for comparison. Patients' sleep patterns were assessed using the Sleep Disturbance Scale for Children and the Children's Sleep Habits Questionnaire, while Pittsburgh Sleep Quality Index was used to assess caregivers' sleep quality. Genetic data and clinical data were collected via patients' medical records and surveys applied

to caregivers. Statistical comparisons were made using the Mann-Whitney U-test.
Results: Genetic analyses revealed novel DEAF1 variants, including missense mutations located outside or flanking known protein domains, expanding the complexity of the DAND genotype. DAND patients exhibited significantly worse sleep patterns and habits than controls, particularly in subscales addressing parasomnias and insomnia. Caregivers' sleep quality was poor across both groups, however score differences did not reach statistical significance.
Conclusion: This study underscores the importance of addressing sleep disturbances in DAND, which may relieve comorbidities and improve caregiver sleep quality. Future studies with larger cohorts and objective sleep assessments are needed to confirm our findings and explore targeted therapeutic interventions.
Support (if any): AFIP, FAPESP, CNPq.

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0064
ABERRANT BILIRUBIN LEVELS IN INSOMNIA PATIENTS AND UGT1A1 GENE VARIANTS

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Introduction: Insomnia disorder is characterized by the difficulty in initiating or maintaining sleep and corresponding daytime dysfunction occurs in 10–20% of the population. Although the molecular underpinnings of sleep-onset insomnia remain unclear many large-scale genetic studies have been conducted pointing to UGT1A1 loci as some of the strongest risk variants. UGT1A1 codes for an enzyme that is responsible for glucuronidation of bilirubin and may a role in relationship between insomnia and bilirubin metabolism. In this study, we explored the association of bilirubin levels in insomnia patients as compared with controls and in association with UGT1A variants.
Methods: Blood samples were obtained from adults (ages 18-70) with a diagnosis of insomnia participating in a clinical trial of 322 patients with primary using polysomnography (PSG) measures of sleep. Bilirubin was measured at baseline in the serum of the patients.
Results: Insomnia patients (n=322) at baseline had significantly lower levels of serum bilirubin when compared to healthy sleeping cohort as controls (n=273, p-value=1.75e-14), with mean values 0.32 MG/DL in cases and 0.51 controls. This effect was consistent when using a different set of controls (n=2841, p-value=8.09e-17, mean=0.44) and upon correction for covariates. Furthermore, we have run a genome wide association analysis using linear model to study variants associated with bilirubin levels on variants with MAF ≥0.01. One of the top variants associated with bilirubin at baseline in the insomnia cases was rs4148325 with a MAF of 0.36, where minor allele was associated with higher bilirubin levels (rs4148325 (β = 0.2 mg/dl per T allele increase; p = 3.82e-11)). We expanded the analysis with single gene tests which showed that UGT1A1 gene is significant especially for MAF>0.05 variants (SKAT p=0.009). The variant with highest OR in terms of cases/controls was rs1042640 a UTR3 variant with a MAF of 0.20.
Conclusion: Hypobilirubinemia is most commonly seen in patients with metabolic dysfunction, which may lead to cardiovascular complications and possibly stroke. The circadian clock was shown to protect against the neurotoxic consequences of increased bilirubin by regulating bilirubin detoxification. Further studies are warranted in order the further understand the aberrant levels on bilirubin in insomnia patients, and fundamentally their cause of an effect aspects.
Support (if any):

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0065
DIFFERENTIAL EPITHELIAL GENE EXPRESSION AFTER VIRAL INFECTION IN AIRWAY EPITHELIAL CELLS IN PEDIATRIC OSA

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Introduction: Obstructive sleep apnea (OSA) in children is linked to early life viral infections and increased severity of viral respiratory illnesses. As respiratory viral infections occur in airway epithelial cells, we investigated differences in epithelial viral responses using an organotypic epithelial cell model in children with OSA as compared to children without. We hypothesized that gene expression in response to rhinovirus (RV16) infection would differ between healthy children and children with OSA.
Methods: Primary airway epithelial cells (AECs), from both healthy pediatric donors (n=5) and children diagnosed with OSA by polysomnography (n=4), cultured at an air-liquid interface were infected with RV16 on the apical surface at a multiplicity of infection of 0.5. RNA-sequencing quantified gene expression at baseline and after RV16 infection, and Limma was used to identify genes with differential expression in response to infection in healthy AECs as compared to AECs from donors with OSA. Weighted gene co-expression network analysis (WGCNA) was able to organize the identified genes into groups of interest. Using Enrichr, the primary biological functions of the gene groupings were analyzed.
Results: Following infection, 4724 genes in healthy and 3876 genes in OSA were differentially expressed as compared to pre-infection; 122 genes were found to have differing gene expression responses to RV16 in OSA when compared to healthy cell lines. WGCNA identified two modules of gene expression with opposite expression patterns following infection in OSA compared to healthy. One module consists of 23 genes enriched for DNA repair and replication which are upregulated in healthy but downregulated in OSA after RV16 infection. A second module consists of 43 genes enriched for glycogen metabolism which are downregulated in healthy but upregulated in OSA following RV16 infection.
Conclusion: Epithelial cell gene expression differs in response to RV16 in healthy AECs as compared to AECs from children with OSA. Given the small sample size, further studies are needed to investigate the relationship of OSA severity and

clinical phenotypes of OSA with epithelial responses to viral infection. Future work will relate in vivo expression to ex vivo gene expression.

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0066

CENTRAL AND PERIPHERAL NLRP3 INFLAMMASOME ACTIVATION AND SLEEP ARE MODULATED BY VAGAL AFFERENT AND EFFERENT NERVES

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Introduction: The NOD-like receptor (NLR) family, pyrin domain–containing protein 3 (NLRP3) inflammasome is a protein complex found in most nucleated cells that activates caspase-1 to convert the pro-forms of the somnogenic molecules IL-1 beta (IL-1β) and IL-18 into their active forms. Inflammatory stimuli, such as lipopolysaccharide (LPS), applied to the peritoneum increases IL-1β in the nucleus tractus solitarius (NTS) and cortex, in part, by stimulating the vagal afferents. Vagal efferent stimulation can function to attenuate peripheral inflammation, although findings are often mixed due to stimulation of both vagal afferents and efferents. Our goal was to determine the effects of vagal nerve afferent and efferent specific stimulation on sleep, slow-wave-activity (SWA), and central and peripheral NLRP3 inflammasome activation.

Methods: Two-month-old NLRP3 knockout and wildtype mice underwent surgery for polysomnography and were implanted with an electrical stimulating nerve cuff around the vagus nerve that was bilaterally severed superiorly or inferiorly or not at all to only stimulate the vagal afferents or efferents. Mouse vagal nerves were stimulated after vehicle or LPS was applied to the peritoneum. Separate groups of mice underwent identical treatments and liver, NTS, and somatosensory cortical tissues were taken for gene expression analysis by real-time polymerase chain reaction. Significance was set at $p < 0.05$.

Results: LPS significantly enhanced non-rapid-eye movement sleep (NREMS) and SWA in wildtype mice that had intact vagal nerves, but these responses were significantly attenuated in mice with vagal nerves severed. Vagal afferent stimulation significantly enhanced NREMS and SWA, although vagal efferent stimulation did not significantly alter sleep or SWA. NLRP3 mice exhibited significant attenuations in NREMS and SWA responses to LPS and vagal afferent nerve stimulation. Vagal afferent stimulation significantly increased NLRP3 and IL-1β expression in the NTS and somatosensory cortices and vagal efferent stimulation significantly attenuated increased liver but not NTS or somatosensory cortex NLRP3 and IL-1β gene expression levels from LPS.

Conclusion: These data suggest that vagal nerve afferents stimulate NLRP3 inflammasome activation in the NTS and somatosensory cortices to induce NREMS and SWA, but vagal afferent stimulation can attenuate peripheral inflammation.

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0067

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

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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 NT1onset. 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. We detected reactive CD4+ T cells to a B/Victoria PB1 epitope that is homologous to Pandemrix/pH1N1 PB1 segment. In addition, we built a TCR repertoire a) restricted by HCRT and Pandemrix/pH1N1at baseline peripheral blood mononuclear cells (PBMCs) (n>430) and b) from single-cell RNA sequencing cerebrospinal fluid(CSF) samples (n>2,000), and found the identical activated TCR clones in both baseline and cultured PBMCs.

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

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0068

BACTERIAL PEPTIDOGLYCAN RECEPTOR PGLYRP1 IS INVOLVED IN SLEEP LOSS RECOVERY AND SLEEP LOSS-INDUCED CHANGES IN BRAIN GENE EXPRESSION

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Introduction: Microbes and their products have profound influences on host physiology and pathology. Bacterial cell wall components, peptidoglycan, muropeptides, and their receptors are sleep-promoting and mediators of immune and inflammatory activity. Peptidoglycans circulate, reaching many host organs including brain where they are important for brain development and behavior. Peptidoglycan receptor Pglyrp1 is expressed in brain, upregulates with sleep loss, and increases in brain

alongside gut microbial colonization during early development. Sleep regulatory roles for peptidoglycan and its receptors remain unclear. We proposed involvement of brain peptidoglycan in host sleep-wake cycles. Thus, we sought to describe peptidoglycan in brain in the context of sleep and following sleep disruption and to identify candidate molecules involved in brain detection and consequent signaling events.
Methods: Using a Pglyrp1-/- mouse model we characterized brain peptidoglycan levels and sleep with the PiezoSleep system (Signal Solutions, Lexington, KY). NanoString nCounter technology (Brucker Spatial Biology, Seattle, WA) was used to profile brain gene expression of neuroinflammatory and peptidoglycan-linked genes in undisturbed and sleep deprived (ZT0-6) conditions.
Results: Undisturbed sleep did not differ in WT and Pglyrp1-/- mice. After sleep disruption, sleep rebound was altered including increased sleep for 16h (compared to baseline) for WT mice vs. full recovery at 6h post-SD for Pglyrp1-/- mice. Further, while sleep loss amount during sleep deprivation was similar for WT and Pglyrp1-/- mice, 223 vs. 239 minutes, recovery sleep (gain from baseline) was 114 minutes for WT mice vs. only 64 minutes for Pglyrp1-/- mice, i.e., for WT and Pglyrp1-/- mice, recovery sleep was decreased from sleep loss amounts by 49% and 73%, respectively. Changes in brain peptidoglycan levels and gene expression following sleep loss were unique to WT and Pglyrp1-/- mice. Inflammatory gene expression profiles were altered in Pglyrp1-/- mice including differential expression of prostaglandin-, Il1-, and TNF-linked genes for Pglyrp1-/- mice as compared to WT mice.
Conclusion: Our work supports a role for peptidoglycan and Pglyrp1 in regulating the response to sleep loss. Collectively, findings present an underappreciated aspect of sleep regulation, suggesting sleep physiology is tied to microbe-host evolution and the holobiont condition.
Support (if any): This work was supported by the W.M. Keck Foundation.

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0069
PROFILING INFECTIOUS ANTIBODY AND AUTO-ANTIBODIES OF TYPE-1 NARCOLEPSY

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Introduction: Genetic studies suggest autoimmunity as the cause of narcolepsy-cataplexy characterizing as orexin cell dysfunction, but as no autoantibodies have been conclusively identified, proof for autoimmunity is lacking. Autoreactive T cells directed against hypocretin have been found but differences between narcolepsy and controls are modest. Findings about increased anti-streptolysin O (ASO) antibody and TRIB2 autoantibodies in narcolepsy have been inconsistent. In this study, we extended our study of ASO and TRIB2 to more cases and tested for autoantibodies against 49 proteins enriched in hypocretin neurons.
Methods: Sera of 249 recent-onset (within 2.1years) type-1 narcolepsy patients and 449 controls recruited from 1999 to 2019 were tested for ASO using a latex slide agglutination assay. Autoantibodies of 49 enriched autoantigens of hypocretin neurons including TRIB2 were tested in sera of 223 patients and 314 controls using recombinant [35S]-labeled autoantigen radio-ligand assay. Association between narcolepsy and geometric mean of ASO titers and binary outcomes using ≥1:200 as a cutoff value were analyzed by multi-variable linear and logistic regression. Ranks were assigned to indexes calculated by counts of β particles divided by counts of background on the same assay. Ranks were compared between patients and controls by Kruskal-Wallis U test.
Results: Controls were matched with patients by sex, year and season of sample collection, but with older age [15.03±0.72 vs 19.86±0.52yrs]. 92.5% patients were HLA-DQB1*0602 positive whereas 50.6% in controls. ASO titers were positive in 121 of 249 (48.6%) patients compared to 168 of 449 (37.4%) controls. Increased ASO was thus associated with recent onset narcolepsy [OR=1.37(1.16, 1.63), p=0.01], and the significance [OR=1.40(1.09, 1.79), p=0.01; co-efficient=0.23(0.04,0.41), p=0.02] still presented after controlling for sex, age and season of collection. In contrast, no association were found between recent onset narcolepsy and any autoantibody tested. Percentage of subjects with positive TRIB2 antibody in patients was higher than controls only in 2004-2006 based on plot of percentage of positive between patients and control each year, explaining why initial results were positive.
Conclusion: ASO are increased in recent-onset narcolepsy cases across 20 years. Autoantibodies against 49 hypocretin-cell enriched proteins were not detected. TRIB2 autoantibodies were transiently associated with recent narcolepsy onset in 2004-2006.
Support (if any):

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0070
TOTAL SLEEP DEPRIVATION INDUCED TNF-A RESPONSE IS EXACERBATED IN MILD TRAUMATIC BRAIN INJURY

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Introduction: Total sleep deprivation (TSD) has been shown to cause an increase in circulating proinflammatory cytokines. This well-characterized proinflammatory cytokine response is associated with distinct changes in sleep physiology, cognitive impairment, and in instances of chronic exposure to sleep loss, impaired immune function and vulnerability to stressors. There are potential individual differences in immune response resulting from sleep loss. Mild traumatic brain injury (mTBI) is often associated with an increase in proinflammatory cytokines, which may lead to a neuroinflammatory cascade in the brain and exacerbate post-injury cognitive impairment. This cytokine elevation usually peaks shortly following an injury, and typically returns to baseline levels within a few weeks. Given that mTBI is associated with increased proinflammatory cytokine activation on its own, we investigated whether individuals with a history of mTBI may be more susceptible to TSD-induced proinflammatory cytokine activation.
Methods: Twenty-five adults (9 females, 16 males; 9 with a history of mTBI) underwent 38-hours of at-home TSD, followed

by an in-laboratory polysomnographically recorded recovery sleep period. Blood was drawn at roughly 38-hours of TSD, and again in the morning following recovery sleep. Whole blood was spun down for plasma and a multi-array electrochemiluminescence proinflammatory panel was performed on plasma samples in duplicate.
Results: A one-way ANOVA controlling for sex, age, and Body Mass Index showed that TNF-α concentration following TSD was significantly higher in mTBI, as compared to healthy controls ($P < 0.05$), with levels decreased following recovery sleep ($P > 0.05$).
Conclusion: Our results may suggest that mTBI is associated with vulnerability to proinflammatory cytokine activation, specifically TNF-α, following TSD. While our participants were not in the acute stages of injury, TSD may have exposed underlying immune-related vulnerability in mTBI. Future work will investigate if TNF-α activation mediates variability in TSD-induced cognitive impairment and in sleep physiology following TSD in participants with mTBI.
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0071

DETERMINING THE IMPORTANCE OF GAP JUNCTION PROTEIN CONNEXIN36 IN SLEEP-WAKEFULNESS AND TASK-EVOKED EEG ACTIVITY

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Introduction: Neuronal gap junctions, also termed electrical synapses consisting of connexin36 (Cx36) protein, are extensively expressed in the mammalian forebrain and are suggested to play a significant role in state regulation and thalamocortical network activity. Cx36 is predominantly expressed in GABAergic neurons in the adult brain and represents a common mechanism for electrical coupling between inhibitory neurons. Specifically, the intercellular communications between the GABAergic neurons in the thalamic reticular nucleus (TRN) occur predominantly via Cx36 containing electrical synapses. We have examined the effect of a Cx36 global gene knockout (KO) and TRN-specific localized CRISPR-Cas-mediated Cx36 gene knockdown (KD) on sleep/wake state and spontaneous and evoked EEG activity.
Methods: We examined the sleep/wake state, spontaneous and task-evoked EEG activity in auditory steady-state response (ASSR), mismatch negativity (MMN), and social interaction behavioral test in Cx36KO mice and in PV-Cre-Cas9 mice before and after localized Cx36 gene KD.
Results: While Cx36KO mice exhibited limited sleep/wake abnormalities, power spectral density analysis of spontaneous EEG activity revealed significant impairment in gamma and beta band activity. Interestingly, sigma band activity significantly decreased prior to NREM-REM transitions. While we observed no changes in sleep spindle density, the amplitude and duration of spindles showed statistically significant decreases in Cx36KO mice. Additionally, Cx36KO mice exhibited a blunted gamma band response to acute ketamine (15 mg/kg; IP), impaired 40 Hz ASSR, and an abnormal response in the mismatch negativity task (decreased ERP peak amplitude & evoked-power). Finally, Cx36KO mice exhibit significant impairment in social investigation-induced low-frequency gamma band activity. Preliminary observations in TRN-Cx36 KD mice showed similar impairment in ASSR and social investigation-induced gamma band activity.
Conclusion: Our data suggests that Cx36 is involved in regulating thalamocortical network activity. Further, impairments in Cx36KO mice are consistent with abnormalities observed in neuropsychiatric disorders, including schizophrenia, suggesting Cx36 containing gap junctions as a novel therapeutic target.
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0072

SICK AND TIRED OF COVID-19 - GENETIC RISK FACTORS, FATIGUE AND SLEEP DISTURBANCES IN LONG COVID

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Introduction: SARS-CoV-2 infection can lead to prolonged symptoms including fatigue, breathing difficulties, brain fog, and sleep disturbances. The global Long COVID Host Genetics Initiative aims to elucidate genetic factors and mechanisms undermining post-acute sequelae of COVID-19.
Methods: Long COVID was defined using questionnaire information on symptoms and recovery from COVID-19, or electronic health record data with post COVID-19 conditions diagnoses. Genome-wide association studies (GWAS) were used to identify genetic risk loci, and linkage disequilibrium score regression (LDSC) to study wider genetic correlations between traits.
Results: With mixed-ancestry meta-analysis of 24 GWAS comparing Long COVID cases (N=3,018) to population controls (N=1,093,995), we identified variants in chromosome 6 associated with Long COVID (chr6:41,515,652G>C, rs9367106; P=1.8E-10). The signal replicated in 9,500 independent Long COVID cases (vs 798,835 population controls; P< 0.05). Long COVID risk variants in this region have been shown to increase FOXP4 gene expression in the lung (P=5.3E-9, normalized effect size (NES) = 0.56) and in the hypothalamus (P=2.6E-6, NES=1.4) (expressed quantitative loci (eQTL) in GTEx data). Using GWAS summary statistics and LDSC, we found Long COVID after test-verified SARS-CoV-2 infection (vs those recovered from the infection within 3 months, N=46,208) genetically correlated with insomnia symptoms (P=0.002). Diagnoses for fatigue (OR=2.8, P=1E-174) and sleep disorders (ICD-10 F51; OR=2.2, P=1E-23) were enriched in electronic health records of Long COVID cases (N=3,684) compared to age- and sex-matched controls (N=64,783) in the FinnGen biobank dataset.
Conclusion: Long COVID and other post-viral conditions cause a burden for the health and economy of individuals, families, and societies. Debilitating fatigue, cognitive dysfunction, and

sleep disturbances contribute to the multifaceted pathology and should be carefully assessed and treated.

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0073

GLOBAL AND LOCAL CHEMOGENETIC DELETION OF THE NOP RECEPTOR DISRUPTS BOTH SPONTANEOUS AND NOP AGONIST-INDUCED SLEEP

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Introduction: We have previously shown that NOPR agonism induced sleep and increased EEG delta power in rats, mice and non-human primates, suggesting that the N/OFQ-NOPR system may have an unrecognized role in sleep/wake regulation. In the present studies, we tested the hypothesis that the N/OFQ-NOPR system is a component of the endogenous sleep/wake regulatory system by deleting NOPRs globally. We then determined whether interruption of NOPR transmission specifically in the lateral hypothalamic area (LHA) contributed to the effects observed after global NOPR deletion.
Methods: Homozygous floxed NOPR mice were bred with B6.Cg-Ndor1Tg(UBCcre/ERT2)1Ejb/1J mice (JAX 070001) to produce a strain (iNOPR mice) in which deletion of NOPRs could be induced by tamoxifen (TMX). In the local deletion study, AAV2-CMV-Cre-eGFP or AAV10-CMV-hrGFP was injected into the LHA of floxed NOPR mice. EEG, EMG, activity and Tb were measured by telemetry.
Results: TMX administration to homozygous Cre+ iNOPR mice resulted in a massive knockdown of NOPR expression as determined by Western blotting. Whereas administration of the NOPR agonist Ro64-6198 (3 mg/kg, i.p.) suppressed activity, reduced Tb and increased NREM sleep in Cre+ iNOPR mice before TMX administration and in Cre- mice both before and after TMX administration, these effects were abolished following TMX treatment in the Cre+ iNOPR mice, providing pharmacological confirmation of NOPR deletion. Within-animal comparisons of pre vs. post TMX-treated Cre+ iNOPR mice revealed that NOPR deletion produced partial insomnia with 5.3±1.4% more Wake time over 24-h ($p = 0.028$) and 11.5±1.4% more Wake during the light phase ($p < 0.001$), the major sleep period in mice. Conversely, NREM sleep decreased by 4.7±1.4% ($p = 0.04$) over 24-h and 10.4±1.4% ($p < 0.001$) during the light phase. Following treatment with Ro64-6198 (3mg/kg, i.p.), activity and Tb increased in LHA NOPR deletion mice whereas both measures decreased in control mice. Local LHA NOPR deletion also eliminated the NREM-promoting effect of Ro64-6198, indicating LHA NOPR neurons mediating the NREM-promoting effect.
Conclusion: These results support the hypothesis that loss of endogenous NOPR tone increases wake and reduces sleep amounts. We identified the LHA as a region mediating Ro64-6198 induced promotion of NREM sleep.
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0074

THE RELATIONSHIP OF SLEEP DISORDER HISTORY WITH GRAY MATTER BOLD-CSF COUPLING AMONG PERSONS AT RISK FOR AND WITH ALZHEIMER'S DISEASE

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Introduction: The glymphatic system has been proposed to remove metabolic waste from the brain through CSF movement and its exchange with interstitial fluid. It has been hypothesized to mediate the impact of sleep deficiency on Alzheimer's disease [AD] pathogenesis. gBOLD-CSF is the coupling of slow (i.e., < 0.1 Hz) gray matter blood-oxygen-level-dependent-signals and slow cerebrospinal fluid flow, and a proposed proxy measure of glymphatic transport. However, its association with sleep disorder history in persons along the AD spectrum remains unknown.
Methods: This study included twenty-seven participants who completed medical interview and MRI at the Yale's Alzheimer's Disease Research Center (3 AD, 1 mild cognitive impairment, and 23 cognitively normal). Sleep disorder history was based on reporting active management for a diagnosis of insomnia or apnea. gBOLD-CSF coupling was quantified based on resting-state fMRI (repetition time=1000ms), using a previously published approach. Briefly, timeseries of gBOLD were extracted by aligning the fMRI and Harvard-Oxford atlas to each participant's native space. CSF-signal timeseries were extracted from the bottom slice with a manually drawn CSF mask. For each participant, cross-correlation function between gBOLD and CSF timeseries was calculated. The negative peak correlation coefficient occurring within a 2-6 second time lag was used to quantify maximum gBOLD-CSF coupling. T-tests were used to compare gBOLD-CSF coupling by sleep disorder history.
Results: Mean age was 65.4 (SD=8.6), 59.3% were women, 44% carried ≥1 ApoE4 allele (1 missing), and mean educational attainment was 17 (SD=2.6) years. Mean gBOLD-CSF coupling in individuals who had insomnia was -0.16, which was weaker than that of individuals without insomnia (absolute difference=0.12, [95%CI=-0.15,0.40];p=0.19). Mean gBOLD-CSF coupling in individuals with apnea was -0.16, which was weaker than that among people without apnea (0.13, [-0.07,0.33];p=0.09).
Conclusion: Among individuals at risk of/with AD, there was a trend for reduced gBOLD-CSF coupling associated with insomnia and apnea. These findings provide preliminary evidence that glymphatic-related fluid transport among persons with a sleep disorder may be disrupted. This finding supports the hypothesis that glymphatic transport is associated with sleep. Future work should validate these findings in larger samples.
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0075

CHEMOGENETIC ACTIVATION OF LATERAL HYPOTHALAMIC CAMKIIA NEURONS IN PARTIALLY AND FULLY HCRT NEURON-DEGENERATED MICE

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Introduction: Degeneration of the hypothalamic hypocretin/orexin (Hcrt) neurons underlies the sleep disorder Narcolepsy Type 1 (NT1), leading to excessive daytime sleepiness (EDS), cataplexy and other sleep disturbances. The lateral hypothalamus (LH) plays a critical role in sleep-wake regulation. We recently showed that LH CaMKIIα neurons are wake-active and that chemogenetic activation of these cells prolongs wakefulness for as long as 6 hours (Heiss et al., 2024, PNAS). We hypothesized that LH CaMKIIα neuron activation might compensate for the loss or dysfunction of Hcrt neurons and counteract EDS

in narcolepsy, thereby serving as a potential therapy for individuals suffering from hypoarousal disorders. We present here preliminary data on the efficacy of LH CaMKIIα neuron activation to promote wakefulness in both partially and fully Hcrt neuron-degenerated mice and to reduce cataplexy in fully Hcrt degenerated mice.
Methods: Orexin-tTA; TetO-DTA mice (n = 8) mice were bilaterally injected with AAV2-CaMKIIα-hM3D(Gq)-mCherry into the LH and implanted with telemetry transmitters for EEG/EMG recording. Hcrt neurons were ablated by substituting doxycycline-containing chow with normal rodent chow (Dox (-) condition) for 6 weeks. When the Hcrt neurons were either partially-degenerated (2 weeks Dox (-)) or fully degenerated (6 weeks Dox (-)), LH CaMKIIα neurons were chemogenetically activated by injection of deschloroclozapine (DCZ, 0.3 mg/kg, i.p.) at ZT18. As a control, each mouse also received a saline injection on a different day.
Results: Activation of LH CaMKIIα neurons profoundly increased Wakefulness and reduced NREM sleep in both partially and fully (Wakefulness: $p < 0.001$; NREM: $p < 0.001$) Hcrt neuron-degenerated mice. Furthermore, DCZ treatment significantly reduced both the number of cataplexy bouts ($p = 0.048$) and bout duration ($p = 0.035$) in fully Hcrt neuron-degenerated mice.
Conclusion: Activation of LH CaMKIIα neurons has profound wake-promoting effects even in the absence of Hcrt neurons, indicating that the wake-promoting effects of LH CaMKIIα neurons are independent of the Hcrt system. Consequently, LH CaMKIIα neuron activation may have therapeutic effects on the primary symptoms of narcolepsy: EDS and cataplexy.
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0076

CHRONIC ADRENERGIC BLOCKADE WITH PRAZOSIN ENHANCES GLYMPHATIC FUNCTION IN A MURINE MODEL

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Introduction: The glymphatic system involves the AQP4-facilitated movement of cerebrospinal fluid (CSF) through perivascular channels into the brain parenchyma where it exchanges with interstitial fluid to facilitate clearance of solutes, such as amyloid beta and tau protein. The glymphatic system has been characterized as the brain's waste clearance system and its dysfunction has been implicated as a clinical, non-genetic factor in several neurodegenerative diseases such as Alzheimer's disease and Parkinson's disease. The glymphatic system is primarily active during sleep, thus, our group aimed to evaluate the influence of factors that affect sleep, and thereby, glymphatic function. Norepinephrine (NE) signaling from the locus coeruleus (LC) is involved in inducing and coordinating states of alertness. Wakefulness is driven and sustained by LC-NE signaling (and other monoamines), while sleep is achieved through the inhibition of this circuit. Thus, we hypothesized that inhibiting NE signaling could enhance sleep and thereby glymphatic function.
Methods: To evaluate the influence of NE on the glymphatic system, we treated C57BL/6 mice with a chronic, 7-day treatment of the alpha-1 adrenergic receptor antagonist, prazosin. Utilizing intracisternal injection of infrared and fluorescent tracers, we labeled, tracked, and quantified CSF tracer distribution in vivo with a newly validated dynamic, live imaging technique and ex vivo through whole-slice fluorescence imaging.
Results: Measurement of in vivo, dynamic CSF tracer movement revealed higher levels of mean fluorescence intensity over time (20-42 minutes post-intracisternal injection) in prazosin-treated mice when compared to control, vehicle-treated mice. In addition, ex vivo, slice-based histology showed higher levels of CSF tracer in the dorsal cortex of female, prazosin-treated mice vs. control.
Conclusion: Prazosin-treated mice exhibited significantly higher levels of mean glymphatic enhancement compared to controls, indicating that inhibition of NE signaling can improve glymphatic function. Given the contribution of dysfunctional NE signaling and impaired glymphatic clearance in a multitude of neurological diseases, our study is a promising example of the potential benefit of prazosin treatment. As a next step, we are currently exploring if chronic prazosin administration can improve disease outcomes in a mouse model of tau pathology, P301S/PS19 mice, where we will evaluate sleep, cognitive impairment, glymphatic function, and tau deposition/pathology.
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0077

SEX- AND SUBREGION-SPECIFIC VULNERABILITY OF HIPPOCAMPUS AND AMYGDALA TO INTERMITTENT HYPOXIA OF INFANT RATS

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Introduction: Obstructive sleep apnea (OSA) in early childhood results in neurodevelopmental deficits due to nocturnal intermittent hypoxia (IH). Hypoxemia during infancy induces structural changes in the hippocampus and amygdala of children. However, the mechanism underlying this phenomenon remains unclear. This study aimed to elucidate the molecular pathogenesis of cognitive and emotional deficits induced by IH exposure during infancy, using a rat model of IH exposure that recapitulates sleep-disordered breathing.
Methods: One-week-old Sprague-Dawley rats underwent IH at 20 cycles/h (nadir, 4% O2; peak, 1% O2; 0% CO2) or normoxic air (N group) for 8 h/day on postnatal days 8–21. Learning/memory function, emotional behavior, and locomotor activity were examined. Immunohistochemistry for BDNF and BrdU was performed in the hippocampal cornu ammonis (CA) 1 and CA3 regions, dentate gyrus (DG), and amygdala. Ntrk2, Hif1a and Epas1 mRNA levels were determined for each region.
Results: IH exposure negatively regulated long-term spatial memory and anxiety in male and female rats, and short-term

spatial memory in male rats. The effects of IH on brain development were validated by the increased expression of Ntrk2 and Epas1 mRNA in the DG, Ntrk2 and Hif1a mRNA in the amygdala of male rats, and an increase in the immunohistochemically stained areas in the DG and amygdala in male rats.
Conclusion: These findings provide in vivo evidence for sex- and subregion-specific functional linkages between cognitive function, anxiety tendency, and IH during the early growth period.
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0078

THE SLEEP-DEPENDENT REGULATION OF THE E/I RATIO EMERGES DURING THE CRITICAL PERIOD OF THE PRIMARY VISUAL CORTEX

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Introduction: Maturation of the excitation/inhibition (E/I) ratio is necessary for the development of cortical circuits and optimal brain function. In young adult mice, excitatory and inhibitory synaptic transmission oscillates in a sleep-dependent manner, such that the E/I ratio is increased following the wake-rich periods and decreased following sleep-rich periods. However, exactly when the E/I ratio oscillation emerges in development is unknown. Given that sleep is developmentally regulated and important to synaptic plasticity, we hypothesize that the sleep-dependent E/I oscillation will emerge by the critical period (P24-35) of the primary visual cortex (V1) in wild-type mice, a window of heightened plasticity during postnatal development.
Methods: We used whole-cell patch clamp electrophysiology to isolate miniature inhibitory and excitatory postsynaptic currents (mI/EPSCs) to examine synaptic transmission at V1 L2/3 pyramidal neurons.
Results: We found that a daily alteration in the frequency, a marker for spontaneous presynaptic vesicle release, but not amplitude, a marker for postsynaptic receptor composition, emerges during the beginning of the critical period (P24-P28). The emergence of a daily E/I oscillation during the visual critical period advances the idea of sleep's essential role in brain development.
Conclusion: These results also give rise to further questions about how sleep may modulate the E/I ratio's contribution to synaptic plasticity. Future experiments will observe sleep properties under normal housing conditions in postnatal mice using a novel EEG/EMG implant, investigate if the trajectory of the E/I oscillation emergence is altered in neurodevelopmental conditions using an autism-related mouse model, and identify genes related to the E/I ratio oscillation that are differentially expressed by sleep and time of day using spatial transcriptomics. Collectively, these studies will expand our knowledge of how sleep-dependent regulation of the E/I ratio is crucial for neurotypical development and proper circuit function.
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0079

UP-REGULATION OF KLF2: A POTENTIAL THERAPEUTIC STRATEGY FOR NEUROINFLAMMATION INDUCED BY INTERMITTENT HYPOXIA

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Introduction: Intermittent hypoxia (IH) is a hallmark manifestation of obstructive sleep apnea (OSA), a prevalent breathing disorder. IH causes central nervous system (CNS) inflammation and ultimately leads to neuropathy, and it is regarded as a crucial contributor to cognitive impairment in OSA. However, the mechanisms by which IH-related neuroinflammation leads to cognitive impairment remain unclear and need further exploration.
Methods: C57BL/6J mice were exposed to experimental IH or normoxia for four weeks. Subsequently, the cerebral cortex and hippocampus were separately harvested for mRNA sequencing. Bioinformatics analysis was utilized to screen the differentially expressed genes. Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) enrichment analyses were conducted on the identified differentially expressed genes. The genes commonly altered in the cortex and hippocampus were screened out for experimental verification by Western Blotting (WB) and quantitative polymerase chain reaction (qPCR) in mouse brains and BV-2 microglial cells subjected to IH. To verify the influence of Krüppel-like factor 2(Klf2) on neuroinflammation, BV-2 microglial cells were transfected with plasmids for Klf2 overexpression. The expression levels of inflammatory factors, including TNF-α, IL-1β, and iNOS, were determined through various experimental approaches, namely qPCR, WB, and immunofluorescence. The knockdown of Klf2 in BV-2 microglial cells with siRNA was performed to confirm the abovementioned results.
Results: Compared with normoxia condition, 112 and 22 differentially expressed mRNAs were screened out in the cerebral cortex and hippocampus, respectively, following IH treatment. These genes may be differentially regulated during IH. The results showed that the mRNA and protein expressions of Klf2 declined at both the cellular and animal levels after exposure to IH. Hence, Klf2 was selected to explore its role in IH-induced neuroinflammation further. As revealed by the results, the overexpression of Klf2 in BV-2 microglial cells reduced the release of inflammatory factors like TNF-α and IL-1β induced by intermittent hypoxia. Moreover, the knockdown of Klf2 gene expression mediated by siRNA exacerbated the corresponding inflammatory response.
Conclusion: Microglial Klf2 is identified as a neuroinflammation mediator. Future research will be directed towards further exploring the specific molecular mechanisms of Klf2 in IH-induced neuroinflammation.
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0080

TACR1-CRE;SST-FLPO MICE AS A TOOL TO STUDY SLEEP-ACTIVE CORTICAL NEURONS

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Introduction: While most cortical neurons exhibit reduced activity during slow wave sleep (SWS), we previously identified a population of cortical GABAergic neurons that are active during sleep in three different species. This subpopulation of GABAergic neurons co-expresses somatostatin (Sst), neuronal nitric oxide synthase (Nos1), the Neurokinin-1 receptor (Tacr1) and chondrolectin (Chodl), and corresponds to the Type 1 nNOS neurons that have long-range intracortical projections in mammals. These "SNTC" cells express c-Fos during SWS proportional to the homeostatic sleep drive that accumulates during the preceding wakefulness. However, the role of SNTC cells in sleep regulation, if any, is unknown. Here, we utilized Tacr1-T2A-Cre;Sst-IRES-FlpO mice, an intersectional cross that allowed us to target these cells, to investigate the role of cortical SNTC neurons in sleep/wake regulation.
Methods: Tacr1-T2A-Cre;Sst-IRES-FlpO mice were crossed with Ai65 mice for labeling of SNTC neurons. The sensitivity and specificity of these cells were determined by immunohistochemistry for nNOS. Responses to Substance P were measured with slice electrophysiology. For sleep deprivation studies, one group of mice underwent 6 hours of sleep deprivation (SD) and another received 2 hours of recovery sleep (RS) following SD. For chemogenetic activation of SNTC cells, AAV8.nEF.Con/Fon.DREADD(Gq)-mCherry.WPRE.hGH was injected at 16 sites across both hemispheres of the cerebral cortex in Tacr1-Cre;Sst-FlpO mice (n=7) and mice were implanted for EEG/EMG recording. Saline or deschloroclozapine (DCZ; 0.3mg/kg, i.p.) was administered at ZT18 on recording days.
Results: The sensitivity and specificity of Tacr1/Sst/Ai65 neurons for nNOS protein were determined to be 91.5±2.5% and 59.2±5.8%, respectively (n=5). Substance P activated the majority of cortical Tacr1/Sst/Ai65 neurons (78%, 14/18 cells). Consistent with our previous findings, 64.5±1.19 Tacr1/Sst/Ai65 neurons expressed c-Fos during RS compared to 4.75±0.25 cells during SD ($p < 0.0001$). As also shown by the Batista-Brito lab using Nos1-CreERT2;Sst-FlpO mice, chemogenetic activation of cortical Tacr1/Sst neurons increased NREM sleep ($p=0.0041$).
Conclusion: Our findings indicate that Tacr1/Sst/Ai65 cells are active during sleep and that activation of these cells can drive NREM sleep. These observations are consistent with our previous results and show that Tacr1-Cre;Sst-FlpO mice will be useful to further characterize the role of SNTC neurons in sleep/wake control.
Support (if any): NIH R01 HL059658 to T.S.K.

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0081

RESTORATION OF NREM SLEEP IN AN ALZHEIMER'S DISEASE MOUSE MODEL THROUGH 40-HZ AUDITORY STIMULATION BY REDUCING TONIC GABA CURRENTS IN NNOS NEURONS

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Introduction: The sensory stimulation at 40 Hz showed therapeutic impacts on Alzheimer`s disease (AD). Previous studies reported that amyloid-beta (Aβ) accumulation and sleep disturbances in AD have a positive feedback loop and impaired Ca2+ influx and volume transient in astrocytes. However, the role of astrocytes in sleep disturbances remains unknown. We hypothesized that 40-Hz auditory stimulation could ameliorate sleep disturbances by enhancing the astrocytic Ca2+ influx.
Methods: We used 6-month-old 5xFAD as an Alzheimer`s disease model. Two-hour daily 40-Hz auditory stimulation was applied for two-weeks. We recorded the 24-hour electroencephalographic (EEG) for sleep-wake analysis in pre- and post-stimulation days. Reactive astrocytes and GABA were measured using immunohistochemistry. Patch clamping recordings measured the tonic GABA currents of nNOS neurons. Using GCaMP6f and intrinsic optical signals measured astrocytic Ca2+ and volume swelling. qRT-PCR quantified the transcriptional levels.
Results: Our study demonstrated that repeated auditory steady-state responses (rASSR) at 40 Hz mitigated Aβ pathology and sleep disturbances. We observed that astrocytic γ-aminobutyric acid (GABA) reduced inhibition on neuronal nitric oxide synthase (nNOS)-containing neurons, sleep-promoting cortical neurons, by rASSR. Additionally, rASSR enhanced neuronal activity-induced transient volume and Ca2+ influx in astrocytes, which subsequently decreased monoamine oxidase B (MAO-B) and increased nuclear factor erythroid 2-related factor 2 (Nrf2). Finally, optogenetic enhancement of astrocytic Ca2+ influx using monSTIM1 mimicked the therapeutic effects of the 40 Hz rASSR.
Conclusion: Our findings suggest that 40-Hz rASSR ameliorates Aβ pathology and sleep disturbances by neuron-astrocyte interaction.
Support (if any):

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0082

THE STRUCTURAL INFLUENCE OF DISORDERED SLEEP ON THE WAKE INTRUSION INDEX

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Introduction: Individually, insomnia and obstructive sleep apnea (OSA) are significant public health concerns. Insomnia affects nearly a third of the population, while OSA affects 9% to 38% of adults. Their co-occurrence (COMISA) results in severe health outcomes, including cardiometabolic and neurocognitive morbidity, impaired sleep quality, and reduced quality of life. Although both disorders disrupt sleep, it is difficult to disentangle the effect of each disorder on conventional physiological surrogates of sleep quality. This study attempts to quantify the contributions of OSA and insomnia to the Wake Intrusion Index (WII), a measure of subthreshold intrusions of wakefulness on sleep. We hypothesized that WII is influenced by both respiratory and non-respiratory arousal mechanisms.
Methods: We leveraged polysomnography data and self-reported insomnia symptoms from individuals in the Sleep Heart Health Study. WII was calculated based on the odds-ratio product, a measure of sleep depth. We used structural equation modeling to examine the shared and unique contributions of both respiratory indices such as the Apnea Hypopnea Index and the Oxygen Desaturation Index and frequency of different insomnia symptoms on the WII.
Results: We found that our data had a two-factor structure representing respiratory related arousals, containing all the respiratory variables, and non-respiratory related arousal which contained the questions related to insomnia. Both respiratory

and non-respiratory latent variables influenced the WII, however the non-respiratory arousal (β=8.22) factor had a notably higher influence on the WII over the respiratory arousal factor (β=1.02).
Conclusion: Our study demonstrates that both respiratory and non-respiratory arousal mechanisms significantly influence the WII. These findings highlight the importance of addressing both components in treatment strategies to improve sleep quality and overall health outcomes in COMISA patients.
Support (if any): The Sleep Heart Health Study (SHHS) was supported by National Heart, Lung, and Blood Institute cooperative agreements U01HL53916 (University of California, Davis), U01HL53931 (New York University), U01HL53934 (University of Minnesota), U01HL53937 and U01HL64360 (Johns Hopkins University), U01HL53938 (University of Arizona), U01HL53940 (University of Washington), U01HL53941 (Boston University), and U01HL63463 (Case Western Reserve University). The National Sleep Research Resource was supported by the National Heart, Lung, and Blood Institute (R24 HL114473, 75N92019R002).

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0083

THE MULTIPLICITY OF DREAMS REPORTED FROM NIGHTLY AWAKENINGS

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Introduction: Dream recall has high individual variability affected by a wide spectrum of methodological variables. The possibility that multiple dreams are typically experienced each night has received minimal study.
Methods: 51 subjects were recruited from college psychology classes (35 F/16 M, mean age 22.2). The intake questionnaire queried subject dream recall varying from no dream recall=1, to multiple dreams from each night of sleep=7. A smart phone app with a sixty-minute delay was then used at home to induce hourly awakenings utilizing a bed side check list to notate: no dreaming or defined forms of dreaming including dreams with content, white dreams (awareness of dreaming without content), and nightmares. 44 subjects (86%) competed the full protocol of 8 dream checkoff reports. Reasons for discontinuation: concern with sleep loss (1), technical issues with alarm (2), early rising for work (1), spousal complaint (1).
Results: The mean number of dreams reported on intake using Likert scale was 4.647 (1-3/week). Checkoff dream recall reports were obtained from 395 total awakenings: no dreaming (#150 - 38%); content dreams #98 (25%); white dreams #74 (19%); and nightmares # 14 (3.5%). Some form of dreaming was reported on 186 (47%) of awakenings. Mean number of dreams reported was 4.0/individual during the night of study. One individual reported no dream recall on any awakening and 2/51 reported dreams with content on every awakening. 6/51 (12%) reported some form of dreaming at every awakening. For individuals completing the full protocol, non-dreaming was reported significantly more often on the first two hourly awakenings compared to the last 2 awakenings ($X2=24.7$, $p< 0.001$). There was a statistically significant association between reported intake questionnaire dream recall and the number of dreams reported on checklist during the night of study (Pearson $r = 0.571$, $p < 0.001$).
Conclusion: This small pilot study utilizes a novel, low-tec, safe, and easily expandable protocol to study changes dream recall across the night. Individuals reporting a higher frequency of dream recall on intake had a significantly higher level of dreaming reported from serial awakenings. 12 % of subjects reported some form of dreaming on every awakening.
Support (if any): none

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0084

PREPROCESSING RESULTS FROM AN ALL-NIGHT FMRI SLEEP STUDY

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Introduction: Functional magnetic resonance imaging (fMRI) is emerging as a useful technique for investigating brain activity during sleep, offering superior spatial resolution compared to electroencephalography (EEG). A prior pilot study conducted by our lab highlighted the potential of fMRI to elucidate the neural correlates of dreaming, arousal thresholds, and other sleep-related phenomena. To expand on these findings, we conducted an extensive all-night fMRI sleep study. Here, we describe quality control metrics obtained during data preprocessing.
Methods: Healthy participants (n=58) were enrolled in a two-night fMRI-EEG sleep study protocol. 43 participants successfully completed both nights, while 15 were withdrawn during the first or second night. At 6-8 random intervals throughout the night, participants were woken by auditory stimuli, which increased in intensity until wake onset. Once awake, participants completed a dream questionnaire. Preprocessing of fMRI data was performed using the Analysis of Functional Neuroimages (AFNI) toolbox, including nonlinear alignment to a Tailarach template, data censoring to eliminate outlier time points and artifacts from excessive head motion, and regression of systemic confounds from autonomic variability.
Results: A total of 877 runs of fMRI data were recorded with a mean length of 43.4 min (SD=34.5 min). Average temporal signal-to-noise ratio in brain voxels across all runs was 48.14 (SD=4.99). Post-regression, average global correlation across voxels was 0.013 (SD=0.005), indicating effective suppression of systemic confounds. Average maximum within-run motion displacement was a modest 2.78 mm (SD=2.23 mm), and average fraction of time points censored due to motion or outliers was 8.84% (SD=8.88%). Average spatial correlation between each subject's anatomical and functional scans was 0.837 (SD=0.021), attributable to differences in brain coverage and resolution. Average spatial correlation between each subject's anatomical scan and the Tailarach template was 0.981 (SD=0.005).
Conclusion: These preprocessing results indicate the successful collection and preprocessing of high-quality, low-noise data and validate the effectiveness of our all-night fMRI sleep study protocol. Our next step is to perform group analyses using the auditory arousal threshold and dream questionnaire data collected.
Support (if any): This work was supported by the Intramural Research Programs of the NINDS, NIDCD, and NIMH.

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0085

EXTENDED AMYGDALA NEURAL CIRCUITS LINKING HORMONAL INFLUENCES ON BODY TEMPERATURE TO SLEEP AND CIRCADIAN RHYTHMS

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Introduction: Sleep is key for socioemotional function, and the neuronal mechanisms underlying sleep and emotional regulation remain understudied, especially in women. Body temperature fluctuations are a key feature of sleep/circadian rhythms and are modulated by gonadal steroid hormones. Several brain structures are implicated in interactions between emotional behaviors, hormonal status, and sleep/wake regulation, including the bed nucleus of the stria terminalis (BNST), a core component of the extended amygdala. The BNST regulates emotional responses to stress and consists of distinct cellular populations, including neurons expressing tachykinin2 (Tac2), the gene encoding Neurokinin B (NKB). Tac2/NKB signaling drives the hypothalamic-pituitary-gonadal reproductive axis and is implicated in social stress as well as hot flashes. Thus, we hypothesized that Tac2-BNST neurons regulate hormonal influences on body temperature, sleep, and corresponding emotional arousal states.
Methods: We used wireless telemetry systems for monitoring locomotor activity and core body temperature, and EEG/EMG monitoring for characterizing sleep/wake states in female mice across the estrous cycle, examining changes due to Tac2-BNST chemogenetic stimulation using the excitatory Gq-DREADD (hM3Dq-mCherry). Additional studies assessed sex differences in Tac2-BNST circuit organization using anterograde viral tracing of neuronal output pathways.
Results: We identified estrous cycle effects on core body temperature, which was increased during high estradiol states (estrus and proestrus). Intriguingly, this effect was reversed by Tac2-BNST Gq stimulation. Additionally, we identified a trend toward increased REM and NREM sleep following activation of Tac2-BNST neurons, relative to viral controls. Anterograde tracing revealed greater Tac2-BNST innervation of the lateral hypothalamus (LH) in male mice compared to females, providing a potential circuit basis for sex differences in emotional and thermoregulatory influences on sleep/wake.
Conclusion: Overall, these studies add to our understanding of sex differences in hormonal influences on sleep and will advance the development of therapeutic strategies for treating disorders of stress and sleep by manipulating the Tac2/NKB system.
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0086

THE SPACE-TIME ORGANIZATION OF SLEEP SLOW OSCILLATIONS AS POTENTIAL BIOMARKER FOR HYPERSOMNOLENCE

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Introduction: Research suggests that spatial organization of slow wave activity (SWA) could be altered in hypersomnolence. Slow oscillations (SOs; 0.5-1.5 Hz), single waveform events contributing to SWA, can be labeled as Global, Frontal, or Local depending on their presentation on the scalp. We showed that SO types differentiate in amplitudes, coordination with sleep spindles, and propagation patterns. This study applies our data-driven analysis to the sleep of adults with and without hypersomnolence (HYP) and major depressive disorder (MDD), to explore the potential relevance of SO space-time patterns as HYP signatures in the sleep EEG.
Methods: We leverage an existing dataset of nocturnal polysomnography with high-density EEG in 83 adults, organized in four groups depending on presence/absence of HYP (coded as HYP+/-) and on presence/absence of major depressive disorder (coded as MDD+/-). We detect SOs separately in each of the 173 EEG channels overlaying the scalp and group co-detections at a fixed delay (±400 ms) with k-means clustering to label each SO as Global, Local or Frontal. We compute the percentage of each SO type for each participant as fraction of the total SO count for the night. We identify six scalp regions (frontal, central, parietal, occipital, left and right temporal) to average amplitude of SOs of each type. Group comparisons of SO percentages and SO amplitudes were conducted considering either two groups (presence/absence of HYP, combining two groups in each) or the four groups separately, using general linear models as analyses of variance.
Results: Our data shows more Frontal SOs and reduced Global SO amplitude at centro-parietal regions in HYP+MDD- compared with controls. As Global SOs are known to travel fronto-parietally, we interpret these results as related to loss of coordination of Global SO activity in hypersomnolence without depression, resulting in an overabundance of Frontal SOs.
Conclusion: This study suggests that Frontal and Global SOs may differentiate individuals with hypersomnolence and without depression, and that the space-time organization of SOs could be a mechanistically relevant indicator of changes in sleep brain dynamics related to hypersomnolence.
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0087

A FEATURE-DRIVEN CLASSIFICATION METHOD TO IDENTIFY SPACE-TIME PROFILES OF SLOW OSCILLATIONS IN LOW DENSITY EEG

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Introduction: Sleep slow oscillations (SOs, 0.5-1.5Hz) in the EEG reflect highly synchronous cortical large travelling waves, tied to cortical neurodevelopment, and thought to reflect sleep homeostasis, as well as support memory stabilization, in particular through their coordination with other sleep rhythms. Objective, data-driven description of the spatio-temporal organization of SOs on the EEG manifold is relevant to investigations

on their functional role in cognition and health. Earlier work by our group has introduced a data-driven approach showing that SOs organize on the electrode manifold as Global, Frontal and Local SOs, based on their co-detection at multiple electrodes within a short delay. However, our current approach requires at least 24 head electrodes, preventing its applicability in standard diagnostic polysomnography and at-home studies. We here introduce a deterministic method that identifies space-time profiles of SO types in low density EEG.
Methods: We use >200 waveform features spanning amplitude, phase, and signal complexity. We use a training set (22 individuals, 64 EEG channels) and validation set (34 individuals, 32 EEG channels). Timing of SO events was used to extract activity at 8 EEG channels: F3/4, C3/4, P3/4, O1/2. Machine learning classifiers (xgboost in python) were trained on progressively fewer channels, in 4 conditions: FCPO, FCP, FC and F channels. A version of the model using restricted features was also tested. Model performance was quantified with accuracy and log-loss. Feature role in SO type prediction was studied with SHAP feature-importance.
Results: We introduce a portable SO classifier trained on data recorded from eight or less head EEG channels. Our model recovers an SO's class with accuracy around 75%, and log-loss below 0.6, with performance consistent across the three types. Loss of accuracy in validation was small for all cases except the F channels (only 2 electrodes). Feature importance showed that Global and Frontal SOs are characterized by central and frontal activity, respectively.
Conclusion: These portable simplified SO classification models expand the domain in which the space-time dynamics of sleep oscillations can be used to discover biomarkers and propose target for interventions in clinical populations.
Support (if any): This work was supported by R21HL170255 to PM.

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0088
GENOTYPE-PHENOTYPE CORRELATION FOR SLEEP PATTERNS IN THE CRI DU CHAT SYNDROME

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Introduction: Cri du Chat Syndrome (CDCS) is a rare genetic disorder affecting 1 in 50,000 live births. It results from deletions in the short arm of chromosome 5 (5p), with most deletion sizes varying between 5 and 40Mb. CDCS is characterized by distinct physical features, neurodevelopmental disorders, including autism spectrum disorder, and behavioral and sleep disturbances. However, there has been limited research on the relationship between 5p deletions and sleep problems. This study aimed to detail sleep disturbances that are more frequent in CDCS patients than in neurotypical individuals and establish genotype-phenotype correlations.
Methods: Individuals with CDCS were molecularly genotyped with fine chromosomal breakpoint definition, allowing detailed genotype-phenotype analysis. In our study, 8 individuals with CDCS aged 1–31 years were compared with 8 neurotypical age- and sex-matched controls. Sleep problems were assessed using the Sleep Disturbance Scale for Children (SDSC), and correlations between deletion size and sleep disturbances were analyzed. Within the 5p segment commonly deleted in CDCS, 3 genes have been associated with sleep-related traits: SLC6A3, ADCY2 and TERT. We identified which of the patients had these genes deleted and correlated them with their sleep patterns.
Results: The results revealed that sleep problems, such as difficulty falling asleep, nighttime awakenings, and rhythmic movements, were more common in the CDCS group when compared to the neurotypical group. However, there was no significant correlation between the size of the deletion and the severity of sleep problems. In 4 patients, the 3 sleep-related genes (SLC6A3, ADCY2, and TERT) were deleted in 5p, and only 1 individual with CDCS had none of the genes in monosomy. Associations between the genome dosage of these 3 genes and sleep patterns in CDCS individuals were not observed.
Conclusion: These findings underscore the critical role of sleep in neurodevelopment and the impact of disrupted sleep on daily functioning. While CDCS patients exhibit higher rates of sleep disturbances than neurotypical individuals, these issues are not directly linked to deletion sizes. Further research is needed to understand the genetic and biological mechanisms underlying sleep problems in CDCS and improve care strategies for affected individuals.
Support (if any): AFIP, FAPESP, CNPq.

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0089
PRE-SLEEP INORGANIC NITRATE USE AND SLEEP QUALITY: A PILOT STUDY

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Introduction: Poor sleep quality is bidirectionally associated with cardiovascular and neurocognitive disorders. Preclinical data implicate nitric oxide (NO) in the onset, and maintenance, of sleep. Acute inorganic nitrate supplementation increases NO bioavailability via serial reduction for >12hrs. We tested if objective (Aim 1) or subjective (Aim 2) sleep quality was better following acute, pre-sleep nitrate supplementation relative to a placebo.
Methods: Seven non-shift working adults (4F/3M, 40±8yrs, 25.8±1.6kg/m2) with no history of sleep, cardiovascular, or neurocognitive disorders completed three overnight polysomnography (PSG) visits with time in bed standardized to 2200-0600hrs. Visit 1 was for acclimation and screening for sleep-disordered breathing. On Visits 2 and 3, participants consumed beetroot juice containing (6.45mmol) or devoid of (0mmol) inorganic nitrate at 2200 using a randomized, cross-over study design. PSG-derived outcomes included slow-wave (SWS) and rapid eye-movement (REM) sleep, sleep efficiency, and wake after sleep onset (WASO). Subjective sleep quality assessments were administered in-laboratory including a 0-10 scale, the Stanford Sleepiness Scale (SSS), and performance with mental arithmetic shortly after awakening.
Results: No participant demonstrated evidence for sleep-disordered breathing (apnea-hypopnea index = 1.7±0.9events/hr). Total sleep time (TST, 434±17 vs. 412±19min), sleep efficiency (89±3 vs. 85±4%), as well as SWS duration (75±10 vs.

66±9min) and percent of TST (17±2 vs. 16±2%) were higher after nitrate relative to the placebo (p< 0.05 for all). WASO (47±16 vs. 62±19min, p< 0.05) was lower after nitrate versus placebo and no differences were seen in REM sleep duration (131±23 vs. 117±12min, p=0.45) nor percent of TST (30±5 vs. 29±3%, p=0.80). Neither the 0-10 scale (6.7±0.5 vs. 6.8±0.6units, p=0.84), SSS (2.6±0.4 vs. 2.5±0.3units, p=0.68), or arithmetic performance (82±3 vs. 81±5% correct, p=0.85) differed post-nitrate compared to post-placebo.
Conclusion: These data suggest that acutely increasing nocturnal NO levels via pre-sleep inorganic nitrate supplementation improves objective indices of sleep quality in healthy adults. However, greater amounts of nitrate or prolonged supplementation (weeks) may be needed to improve perceived sleep quality.
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0090

IMPACT OF CANNABIS FREQUENCY, POTENCY, AND STRAINS ON SLEEP IN THE HERBAL HEART STUDY: INVESTIGATING LINKS TO DIFFICULTY FALLING AND STAYING ASLEEP

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Introduction: Evidence suggests that cannabis may impact sleep. The objective of this study is to examine the pattern of specific cannabis consumption characteristics, including frequency of usage, potency/grade and strain, by self-reported sleep difficulties in a cohort of young adult cannabis consumers (CB+).
Methods: The study draws on data from the ongoing Herbal Heart Study (N=200), which examines the impact of cannabis use on subclinical cardiovascular risk among 18-to-35-year-olds in South Florida. Cannabis potency/grade and strain were self-reported via the Cannabis Potency Questionnaire; cannabis use frequency was assessed using the Drug Use History Questionnaire. Difficulty falling asleep and difficulty staying asleep was self-reported via the Medical History Questionnaire. "Poor sleep", a composite, binary variable, was created for individuals who reported experiencing at least one sleep difficulty. Chi-Square/Fisher's Exact tests were conducted where appropriate.
Results: The analytic sample of CB+ (n=126) had an average age of 25.8 years (SD=4.8), 57.1% were female, and 60.3% Hispanic. Among CB+, 24.6% reported difficulty falling asleep and 20.6% reported difficulty staying asleep. Among those with difficulty falling asleep, the majority (77.4%) consumed cannabis more than 20 times a month while 16.1% consumed 10-20 days. Twenty-six percent of participants with a high frequency of cannabis use experienced difficulty staying asleep, compared to 0% of low frequency and 5.3% of moderate-frequency cannabis use (p=0.01). Almost half of the low-to-moderate-grade consumers reported poor sleep (47.4%), compared to 18.2% of high-grade consumers who reported experiencing poor sleep (p=0.04). A greater proportion of respondents consuming indica strain of cannabis (40.0%) reported experiencing overall poor sleep, compared to 28.1% of hybrid consumers and 27.3% of sativa consumers experiencing poor sleep.
Conclusion: Findings suggest a complex relationship between cannabis use patterns, strain types, and sleep difficulties, highlighting the potential for certain consumption behaviors to exacerbate or alleviate poor sleep outcomes. Understanding these associations is critical as cannabis use becomes increasingly normalized, and individuals seek tailored options for sleep support.
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0091

NORADRENERGIC MODULATION CONTROLS CEREBRAL HEMODYNAMICS DURING SLEEP

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Introduction: Cortical arteries undergo coordinated dilations and constrictions during non-rapid eye movement (NREM) sleep that can drive the circulation of cerebrospinal fluid (CSF). CSF flow is thought to stimulate glymphatic clearance and remove metabolic waste, but the drivers of arterial dynamics during sleep remain poorly understood. We explored how norepinephrine (NE), a vasoconstrictor and arousal promoting neuromodulator, could control arterial dynamics during NREM sleep in mice.
Methods: We used two-photon microscopy and fiber photometry to simultaneously measure cortical NE levels and vascular dynamics in head-fixed mice during sleep. NE was measured using a virally expressed GPCR activation-based NE sensor (GRABNE-2m). Blood plasma was visualized with fluorescent albumin (Alb.mScarlet) and intravascular injections of tetramethylrhodamine-isothiocyanate (TRITC). Sleep state was monitored and classified using electrocorticography, electromyography, pupillometry, and behavioral tracking.
Results: We found norepinephrine (NE) levels in the somatosensory cortex were highest during wakefulness, decreased during NREM, and were lowest during rapid eye movement (REM) sleep. Arteriole diameter and blood volume increased during NREM with pulsations consistent with periarterial pumping and was highest during REM sleep. Immediately prior to arousal from sleep, local NE levels rapidly increased back to waking baseline levels, followed by vasoconstriction. To determine if NE release is sufficient to produce these hemodynamic changes at arousal events, we optogenetically stimulated the locus coeruleus (LC) of transgenic mice (TH-cre+ and DBH-cre+) expressing a cre-dependent channelrhodopsin (ChR2) in noradrenergic neurons. Fiber photometry recordings showed that optogenetic stimulation of the LC triggered NE increases and causes vasoconstrictions analogous to those in natural awakening events. Pharmacologic inhibition of NE receptors attenuated vasoconstriction seen during optogenetic stimulation.
Conclusion: Together these experiments suggest that NE signaling is a key driver of the hemodynamic changes seen throughout NREM sleep and at arousal events. Knowledge of the underlying mechanism governing CSF movement and glymphatic clearance during sleep can inform the development of NE-modulating therapies to improve waste clearance and slow neurodegeneration in patients with neurological disorders.
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0092

PHARMACOGENETIC EFFECTS OF MODAFINIL AND CAFFEINE DURING SLEEP DEPRIVATION: DIFFERENTIAL INFLUENCE OF DAT1 GENOTYPE

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Introduction: Striatal dopaminergic and adenosinergic signaling mechanisms are believed to mediate neurobehavioral impairment during total sleep deprivation (TSD). A variable number tandem-repeat polymorphism in the dopamine transporter gene (DAT1) modulates striatal dopamine and trait vulnerability to TSD. However, trait vulnerability to TSD is task-dependent. We conducted a pharmacogenetic study to investigate the role of striatal dopaminergic circuits in mediating TSD-induced impairment on distinct neurobehavioral tasks.
Methods: N=73 healthy adults (ages 25.2±5.2y; 39 males) completed a double-blind, in-laboratory TSD study. After a 10h sleep opportunity, subjects underwent 38h TSD and were randomly assigned to a drug condition. At 4h intervals from 17h to 29h awake (01:00, 05:00, 09:00, and 13:00), they received caffeine (200mg/dose; n=26), modafinil (alternating 200mg and 0mg doses; n=25), or placebo (n=22). At ~2h intervals throughout TSD, a 10min Psychomotor Vigilance Test (PVT), 4min Digit Symbol Substitution Task (DSST), and Karolinska Sleepiness Scale (KSS) were administered to measure vigilant attention, associative learning, and subjective sleepiness, respectively. PVT log-transformed signal-to-noise ratio (LSNR), DSST number correct, and KSS ratings were expressed relative to well-rested baseline (11:30–20:00 average) and analyzed using mixed-effects regression.
Results: There were 44 DAT1 10-repeat (10R) allele homozygotes and 29 DAT1 9-repeat (9R) allele carriers, with 16/16/12 (10R/10R) and 10/9/10 (9R) subjects in the caffeine/modafinil/placebo conditions. DAT1 genotype modulated PVT performance in the placebo ($F[1,67]=5.92$, $p=0.018$) and caffeine ($F[1,67]=5.26$, $p=0.025$) conditions, whereas it modulated DSST performance in the modafinil ($F[1,67]=13.16$, $p< 0.001$) and placebo ($F[1,67]=5.71$, $p=0.020$) conditions, with the 10R homozygotes exhibiting less impairment. DAT1 genotype also modulated KSS ratings in the caffeine condition ($F[1,67]=5.53$, $p=0.024$), but the 10R homozygotes reported greater sleepiness.
Conclusion: DAT1 genotype modulated neurobehavioral impairment during TSD in a task-dependent and drug-dependent manner, indicating distinct underlying mechanisms. Our results corroborate earlier findings that TSD-induced deficits in vigilant attention are dissociable from those in associative learning, and both are dissociable from subjective sleepiness. The observed genotype by drug interaction corroborates modafinil's purported dopaminergic mechanism of action. Our findings are consistent with a role for integrated dopaminergic and adenosinergic signaling mechanisms of the striatal indirect pathway in modulating some, but not all, aspects of sleep-deprived neurobehavioral functioning.
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0093

NREM SLEEP OSCILLATIONS ARE ALTERED IN YOUNG ADULTS WITH HEIGHTENED TRAIT ANXIETY

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Introduction: NREM oscillations play a critical role in memory consolidation, yet their role in sleep-dependent processing of affect and anxiety symptoms remains poorly understood. The present study examines the links between NREM oscillations, emotional memory, anxiety symptoms, and negative affect and investigates whether NREM oscillations are altered in individuals with elevated trait anxiety.
Methods: Forty-two non-help-seeking young adults (M = 19.3, SD = 1.8 years; 77% female), with high (n = 26) vs moderate-to-low (n = 16) levels of trait anxiety symptoms were monitored during a 2 hr mid-day nap opportunity. Sleep-dependent consolidation of emotional memory was tested during this interval. Upon awakening, participants completed the State-Trait Anxiety Inventory (STAI) and Positive and Negative Affect Schedule (PANAS). Sleep spindles and slow oscillations (SO) during N2 and N3 sleep were characterized with automated detectors.
Results: In the entire sample, increased SO activity was associated with reduced negative affect (tsum=-17.41, pcorrected=.045, 7 electrodes) and state anxiety (tsum=-18.74, pcorrected=.046, 7 electrodes), while spindle activity correlated with higher levels of negative affect (tsum=31.57, pcorrected=.02, 13 electrodes) and state anxiety (tsum=31.23, pcorrected=.03, 13 electrodes). The High Anxiety group exhibited reduced SO activity (tsum=-30.29, pcorrected =.04, 6 electrodes) and delta power (tsum=-49.31, pcorrected=.04, 21 electrodes), with no differences in sleep architecture. No group differences were observed in sleep-dependent memory consolidation.
Conclusion: We demonstrated that SO activity is altered in young adults with heightened trait anxiety and is associated with reduced anxiety and negative affect in the entire sample, identifying a putative anxiolytic function. These findings suggest that NREM oscillations may be a novel target for interventions aimed at reducing anxiety.
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0094

IMPACT OF INSUFFICIENT SLEEP ON BIOMARKERS OF NEURODEGENERATION AND NEUROINFLAMMATION IN HEALTHY ADULTS

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Introduction: Sleep disturbances are common among individuals with neurodegenerative diseases including Alzheimer's Disease (AD). Furthermore, sleep disturbances are associated with accelerated cognitive decline and an increased risk of developing AD. Here we examined the impact of four nights of insufficient sleep on biomarkers of neurodegeneration in healthy adults. We hypothesized that insufficient sleep would increase circulating concentrations of markers of neurodegeneration and neuroinflammation including glial fibrillary acidic protein (GFAP), neurofilament light chain (NfL), tau protein, and ubiquitin carboxy-terminal hydrolase 1 (UCHL1).
Methods: Eighteen healthy adults (8 females/10 males) with a mean age of 25±3 years and a mean BMI of 22.7±1.8 kg/m2 participated in a 6-day inpatient study. The protocol consisted of one 9-hour sleep opportunity, followed by four consecutive nights of 5-hour sleep opportunities, and one night of recovery sleep. Fasting blood samples were drawn in the morning, one hour after waking following the initial 9-hour sleep opportunity (baseline), and after the fourth night of insufficient sleep. Samples were analyzed by the Quanterix single molecule array SR-X Analyzer. Single-tailed paired t-tests were performed for a priori hypotheses. Two-tailed t-tests explored potential sex differences. Results are reported as mean±SD.
Results: Participants averaged 7.9±0.8 hours of actigraphy recorded sleep at baseline and 4.5±0.3 hours during insufficient sleep. Baseline concentrations of each biomarker were as follows: GFAP 36.0±12.2, pg/mL; NfL, 4.4±2.0 pg/mL; tau protein, 1.7±0.6 pg/mL; and UCHL1, 17.2±12.5 pg/ml. Compared to baseline, four nights of insufficient sleep resulted in a 18±36% increase in GFAP (p=0.03) and a 13±23% increase in NfL (p=0.03), while tau protein and UCHL1 remained unchanged. No sex differences were detected in the biomarker responses to insufficient sleep.
Conclusion: Four nights of insufficient sleep led to increases in GFAP and NfL, which are markers of brain injury and inflammation and are elevated in AD. These findings highlight the importance of adequate sleep duration and provide a potential mechanistic link between sleep disruption and the development neurodegenerative conditions.
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0095

PAIN PHENOTYPING IN PATIENTS WITH CHRONIC INSOMNIA

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Introduction: Sleep plays a pivotal role in the central nervous system's ability to process and integrate sensory information. Disruptions in sleep architecture, such as those seen in insomnia, can impair nociceptive processing and alter sensory perception, thereby influencing pain modulation. Quantitative Sensory Testing (QST) provides a standardized methodology for assessing sensory processing and pain phenotyping by measuring thresholds for detecting and tolerating thermal stimuli, which are often dysregulated in insomnia.
Methods: This observational study includes 6 patients diagnosed with chronic insomnia and 6 age- and sex-matched healthy controls. The parameters evaluated using QST were: warm detection threshold, cold detection threshold, hot pain threshold, cold pain threshold, hot pain tolerance threshold, and cold pain tolerance threshold (°C).
Results: Patients with insomnia demonstrated significantly higher warm detection thresholds (p=0.0008) and cold detection thresholds (p=0.02) compared to controls. The mean hot pain threshold in insomnia patients was 43.73°C, significantly higher than 38.54°C in controls (p=0.0012). Similarly, cold pain thresholds were elevated in insomnia patients (p=0.002). Cold pain tolerance thresholds were markedly higher in the insomnia cohort (p=0.0001). However, no statistically significant difference was observed in hot pain tolerance thresholds between the two groups.
Conclusion: The findings indicate attenuated sensory responsiveness in individuals with insomnia. Chronic insomnia is associated with dysregulation of the central pain modulation systems, particularly within the descending inhibitory pathways originating in the brainstem and modulated by the periaqueductal gray (PAG) and rostroventromedial medulla (RVM). Insomnia may impair the release of endogenous opioids and neurotransmitters like serotonin and norepinephrine, reducing the efficiency of descending pain inhibition and altering thermal pain thresholds.
Support (if any):

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0096

CHANGES IN NETWORK CRITICALITY AND DIRECTED FUNCTIONAL CONNECTIVITY AS SLEEP PROGRESSES: INSIGHTS INTO THE RESTORATIVE FUNCTIONS OF SLEEP

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Introduction: Sleep plays a crucial role in restoring the brain's functions and preparing it for the cognitive demands of the next day. However, little is known about how the brain's functional dynamics support these functions. This study aims to investigate how network criticality and directed functional connectivity changes as sleep progresses across the night.
Methods: We recorded overnight polysomnography using 256-channel electroencephalography (EEG) in 16 adults (50.2±19.1 years, 6 females). We extracted the first and last episodes of each sleep stage (N=86), as well as wakefulness before and after the sleep episode (N=32), with a minimal duration of 3.5 minutes. To assess criticality, we calculated chaoticity, proximity to edge-of-chaos criticality (PECC), the pair correlation function (PCF), and Lempel-Ziv complexity (LZC). Additionally, the directed phase lag index (dPLI) was used to calculate the feedback dominance index (FDI) in the alpha frequency band (8-13 Hz). Two-way repeated measures ANOVAs, with post-hoc tests using Tukey's correction, were used to compare sleep-wake stages and timing (first vs. last episode).
Results: Across all sleep and wakefulness stages, PCF showed higher values in the later episodes than in the earlier ones (p<

0.001). LZC showed similar results, with later episodes having higher complexity than earlier ones across all states (p< 0.01). Finally, FDI was higher towards the end of the night compared to the beginning across all states (p< 0.05), but only for the left hemisphere. Chaoticity and PECC showed no significant changes between first and last episodes.
Conclusion: These findings suggest that sleep may lead to a gradual restoration of criticality, complexity and feedback-dominant connectivity as the night progresses. The increase of PCF suggests that the brain's activity moves closer to a critical point, and the higher LZC indicates more complexity in later episodes, both pointing to more optimal information processing, adaptability, and computational efficiency. Finally, the increase of FDI suggests that sleep restores anterior-to-posterior information flow as the night advances, potentially supporting the reintegration of distributed neural networks necessary for cognitive functioning and consciousness upon awakening.
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0097

RELATIONSHIP OF AUDITORY HYPEREXCITABILITY AND SLEEP EFFICIENCY IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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Introduction: Sleep problems are common in Autism Spectrum Disorder (ASD), affecting up to 80% of this population. Previous studies have shown associations between sensory hypersensitivity and sleep disturbances in ASD but the potential mechanisms underlying this link are not well defined. Our study tests the hypothesis that altered auditory cortex excitation/inhibition (E/I) balance can explain sleep disturbances in children with ASD.
Methods: Typically developing (TD) children and those with ASD were enrolled in a multi-modal neuroimaging study assessing sleep and neurobehavior. The Hurst Exponent was derived from functional magnetic resonance imaging (fMRI; 12 minutes, TR=1125ms) as a proxy of E/I ratio for the bilateral primary auditory cortex. Sleep quality was assessed using actigraphy in the two weeks preceding the MRI scan. ANCOVA was used to analyze relationships between sleep measures and Hurst exponent, controlling for fMRI quality (in-scanner motion) and age. The results are preliminary as enrollment is ongoing.
Results: Data from 42 participants was included (TD n=25, ASD n=17; 6-11 years, mean=8, SD=1.7). The ASD and TD groups did not significantly differ on age, sex, actigraphy adherence (mean=11±2.8 days) or fMRI quality. Compared to TD participants, actigraphy in children with ASD showed increased sleep onset latency, decreased total sleep time and decreased sleep efficiency (all p< 0.05). The Hurst Exponent was lower in ASD participants, in comparison to TD children, in both left and right auditory cortices (p< 0.05), suggestive of increased excitability. Lower Hurst Exponent in right auditory cortex was associated with lower sleep efficiency (p< 0.05) and increased wake after sleep onset (WASO, p=0.051), in all children, independent of their diagnosis. A similar trend was observed in the left auditory cortex in association with sleep efficiency (p=0.054).
Conclusion: Using objective measures, our data shows correlation between altered excitability of auditory cortex with sleep efficiency and WASO. While this relationship appears to be independent of an ASD diagnosis, we note that children with ASD are disproportionately affected by hypersensitivity to sounds. Our results suggest that this may contribute to disrupted sleep in children with autism.
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0098

MULTIDIMENSIONAL SLEEP HEALTH AND ITS ASSOCIATIONS WITH HIPPOCAMPAL VOLUME IN MIDDLE-AGE AND OLDER ADULTS

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Introduction: The hippocampus is a subcortical brain structure that is known to play a key role in sleep and the consolidation of memories during sleep. Evidence to support that chronic sleep disruptions may hinder neurogenesis and cell proliferation in the adult hippocampus have been found in both human and animal models. Although this suggests that the hippocampus may be structurally sensitive to poor sleep in adulthood, few studies use a multidimensional approach to sleep health incorporating objectively measured characteristics. This study examined the cross-sectional relationship between hippocampal volume and multidimensional sleep health.
Methods: The current study used a sample of 108 adults (Mage = 47) from the Refresher sample of the Midlife in the United States (MIDUS) study's Neuroscience and Biomarker subprojects to investigate the relationship between bilateral hippocampus volume and a composite measure of sleep health using the Ru-SATED (regularity, satisfaction, alertness, timing, efficiency, and duration) dimensions. We used two sleep health composite scores: one calculated based only on self-reported sleep measures and the other one calculated based on the combination of both actigraphy and self-reported sleep measures.
Results: Higher self-reported sleep health composite score (indicating better sleep) was associated with greater hippocampal volume even after adjusting for total intracranial volume, sociodemographic covariates, depression, and time between survey data and neuroimaging (B = -.18, SE =.08, p =.04). These results did not reach significance, however, when using the sleep health composite score comprised of a combination of self-reported and Actigraphy-recorded sleep dimensions (B = -.09, SE =.08, p =.26).
Conclusion: These findings suggest that although there may be a link between sleep health and hippocampal volume, further investigation is needed with larger samples and samples with more diverse sleep health phenotypes as the MIDUS sample had relatively good self-reported and actigraphy-measured sleep health on average. Longitudinal studies are also needed to determine possible causation and directionality of this relationship, which may provide a foundation for investigating possible mechanisms such as lifestyle factors and inflammation.

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0099

INFLAMMATORY BIOMARKERS AND SLEEP: INSIGHTS INTO NEURODEGENERATION AND ALZHEIMER'S DISEASE IN DIVERSE POPULATIONS

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Introduction: Sleep plays a vital role in maintaining brain health, supporting critical functions such as memory, toxin clearance, and neural repair. Sleep disruption increases the risk of Alzheimer's disease (AD) and aging-related dementias. Neuroinflammation, driven by dysregulated sleep and aging, has emerged as a key contributor to AD pathology. Understanding specific inflammatory biomarkers, such as FKBP5, NRSF, IL-6, and TNF-α, in diverse populations may aid early diagnosis and intervention. We hypothesize that changes in the expression of these biomarkers are associated with aging and AD progression, providing insights into neuroinflammation and cognitive decline, particularly with sleep disturbances.

Methods: This study analyzed gene expression in frontal cortical regions of brain samples from individuals aged < 40 to 106 years, using publicly available data (GSE53890). Groups included young (< 40 years), middle-aged (40–70 years), normal-aged (70–94 years), extremely aged (95–106 years), and AD patients. We applied the Hallmark Inflammatory Response and Peptidyl Proline Modification Gene Sets to identify 292 inflammatory gene markers relevant to neuroinflammation. Biomarkers of inflammation (FKBP5, NRSF, IL-6, and TNF-α) were evaluated for their association with aging and AD. Linear regression and Spearman correlation analyses were conducted using GraphPad Prism to examine biomarker expression patterns.

Results: We analyzed gene expression patterns and identified significant changes in FKBP5, NRSF, IL-6, and TNF-α with aging and AD progression. FKBP5 expression was elevated in non-AD aging individuals (R^2=0.5448), consistent with its role in inflammation regulation. NRSF expression remained stable with normal aging (R^2=0.2793). Cytokine markers IL-6 and TNF-α were linked to advanced disease stages, suggesting their utility in tracking AD progression.

Conclusion: These findings underscore the potential of inflammatory biomarkers such as FKBP5, NRSF, IL-6, and TNF-α to enhance our understanding of aging and Alzheimer's disease (AD) pathology. Our lab is actively conducting NIH-funded studies to further investigate these and other inflammatory markers within the context of sleep disturbances and AD risk. This research seeks to unravel the mechanisms underlying neuroinflammation and cognitive decline, with a particular focus on underrepresented Black and Latin-American populations, to promote health equity and inform the development of targeted interventions aimed at reducing AD risk.

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0100

REM ALPHA BURSTS PREDICT HIPPOCAMPAL-DEPENDENT FORGETTING

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Introduction: Recent research has identified mechanisms in REM sleep involved in hippocampal-dependent memory consolidation, specifically with forgetting, and implicated REM alpha bursts in these processes. Additionally, REM sleep rescues non-hippocampal memories weakened by interference, although it is unclear if this also applies to hippocampal memories. We investigated whether REM alpha burst activity impacted forgetting differentially for weak vs. strong hippocampal memories, with the prediction that greater burst activity would predict more forgetting for strong memories.
Methods: We utilized a validated burst detection algorithm to identify alpha bursts (8-13 Hz) during overnight REM sleep in young adults (n = 24, 18 – 35 years). Before and after sleep, participants completed a Face-Name Association (FNA) task, with interference introduced via an AB-AC paradigm to a proportion of the face-name pairs prior to sleep. Accuracy was measured pre-sleep, post-sleep, and for the overnight difference (post-sleep - pre-sleep). We correlated REM alpha burst power and performance for weak (pairs with interference) and strong (pairs without interference) memories.
Results: Participants exhibited forgetting overnight for both weak and strong memories ($p < .05$), with no difference in the extent of forgetting between the two ($p > .05$). REM alpha burst power predicted forgetting for strong memories ($p < .05$), with areas of significance concentrated in the posterior right hemisphere, a hemisphere involved in whole face processing. In contrast, no significant association was found between REM alpha burst power and weak memories ($p > .05$), or with any task performance metric pre-sleep or post-sleep ($p < .05$).
Conclusion: We demonstrate that REM alpha bursts impact strong and weak hippocampal-dependent memories differently, with increased burst activity predicting more forgetting for strong memories, but not weak. These results suggest that alpha bursts are involved in peak normalization during REM sleep, a process where strong and weak memories are leveled such that they are more equally available at retrieval.
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0101

CLOUDED COGNITIVE AWARENESS: THE ROLE OF SUBJECTIVE AND OBJECTIVE SLEEP IN OLDER ADULTS' AWARENESS OF COGNITIVE FUNCTIONING

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Introduction: Cognitive complaints are common in aging, but associations between them and cognitive functioning are inconclusive. Given relationships between sleep and cognition in aging, this study tested whether sleep (subjective and objective) characteristics moderated associations between objective and subjective cognition in older adults.
Methods: Older adults (N=108, Mage=68.6±5.8, 66 women; NCT04282642, AASM:256-FP-21, PI:Curtis) completed cognitive tasks [NIH Toolbox Pattern Comparison (processing speed), Auditory Verbal Learning (episodic memory), List Sort (working memory), Dimensional Change Card Sort (cognitive flexibility)], Cognitive Failures Questionnaire (CFQ-memory, CFQ-distractibility, CFQ-blunders subscores), and 2-weeks of sleep diaries. A subgroup of participants (N=65) completed polysomnography (Sleep Profiler-PSG2TM). Multiple regressions examined whether sleep [subjective/objective sleep onset latency (SOL), total sleep time (TST), sleep efficiency (SE)] moderated associations between objective cognition and cognitive complaints.
Results: Sleep (subjective SOL, TST, SE, objective TST) moderated associations between cognitive domains and cognitive complaints (R2-change's=.02-.04, p's=.01-.04). In those with shortest subjective SOL, worse processing speed was associated with more blunder complaints (B=.-.24, p=.02). In those with longest subjective SOL, worse episodic memory was associated with more distractibility complaints (B=-.49, p=.04). In those with longest TST, worse working memory was associated with more blunder complaints (B=-.96, p=.04). In those with lowest subjective SE, worse episodic memory was associated with less blunder complaints (B=.45, p=.04) and worse cognitive flexibility was associated with less memory complaints (B=1.69, p=.01). In those with highest subjective SE, worse episodic memory was associated with more blunder complaints (B=-.47, p=.04) and worse cognitive flexibility was associated with more memory complaints (B=-1.64, p=.01). In those with shortest objective TST, worse working memory was associated with less blunder complaints (B=1.20, p=.01), and worse cognitive flexibility was associated with less memory complaints (B=2.47, p=.04). In those with longest objective TST, worse cognitive flexibility was associated with more memory complaints (B=-.19, p=.04).
Conclusion: Overall patterns suggest, in older adults, worse sleep may exacerbate the discrepancy between subjective/objective cognition, while better sleep may converge them. Sleep should be considered when interpreting subjective reports versus neuropsychological/objective cognition.
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0102

HOW DOES THE MENSTRUAL CYCLE AFFECT OVERNIGHT EMOTIONAL MEMORY CONSOLIDATION?

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Introduction: Hormonal fluctuations across the menstrual cycle modulate sleep architecture and NREM sleep spindles (sigma activity: 12-15 Hz), but their role in sleep-dependent memory consolidation is unclear. Studies report that emotional memory consolidation is modulated by sleep spindles and estrogen, independently. Yet, their combined effects on memory remains unknown. To address this gap, we investigated how hormonal fluctuations (estrogen and progesterone) across the menstrual cycle affect spindle density and emotional memory consolidation.

Methods: Using a within-subject repeated measures design, fifty-eight healthy women (18–35yr), who were contraceptive-free and with regular menstrual cycles, were assessed in a sleep lab at four timepoints of their menstrual cycle, in random order: low hormones (menses), high estrogen (pre-ovulation), high estrogen and progesterone (mid-luteal), and falling hormones (late-luteal). Participants were tested on an Emotional Pictures Task (neutral and negative) with emotional reactivity (subjective valence and arousal) measured pre and post each night of in-lab sleep, with difference scores calculated and sex hormones measured at each visit. Linear mixed effects models were utilized with the high-estrogen phase (pre-ovulation) as the reference category.
Results: Menstrual phase status impacted emotional memory and reactivity. Compared to the high-estrogen phase, 1) pre-sleep memory (d') for neutral pictures was higher at mid-luteal (b=.199, p=.014); 2) arousal for negative images was reduced at menses post-sleep (b=-.377, p=.026) and for difference score (b=-.436, p=.012); and 3) d' difference score for neutral images was significantly reduced at mid-luteal (b=-.249, p=.038). Additionally, during the high-estrogen phase, there was a significantly different relation to memory (but not arousal) compared to other phases, with spindle density associated with fewer false alarms and greater d' for both negative and neutral images (all p's<.05).
Conclusion: During the high-estrogen phase, women showed less arousal for negative images and better memory for neutral images. Similarly, negative and neutral memory was significantly enhanced by spindles during the high-estrogen phase. Estrogen-related changes in sleep spindles may shift the female brain to be more emotionally resilient during the pre-ovulation phase.
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0103

RECOVERY SLEEP RESPIRATION PREDICTS MEMORY FOLLOWING SLEEP DEPRIVATION

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Introduction: Respiratory activity modulates memory formation and reactivation during wakefulness and sleep, particularly during inhalation. Schreiner and colleagues found that slow-oscillation-spindle coupling most commonly occurs around inhalation peaks and predicts memory reactivation following a nap. Sleep deprivation increases respiratory rate, and impacts cortical pre-inspiratory motor potential amplitude and diaphragm activity. We hypothesized that inspiratory respiration during recovery sleep would have a more pronounced impact on memory the following day compared to baseline sleep.
Methods: Participants were healthy adults (i.e., 9 women; mean age = 23.6, range = 18-36yo) recruited for a 36-hour sleep deprivation period. Baseline and recovery sleep were monitored with polysomnography. Respiratory metrics were derived from chest and abdomen breathing effort belts: respiration rate, time-domain frequency, and amplitude change from onset to peak of inspiration and expiration. Memory was assessed in the morning following baseline and recovery sleep one to three hours after waking from 0830 to 1000 hours. The verbal-auditory memory module of the Repeatable Battery Assessment of Neuropsychological Status assessed immediate memory and delayed memory, comprising total memory percentile, all of which were outcome variables in linear regression analyses conducted using the lmer and parameters packages in RStudio. Predictors were respiration metrics. All variables were compared between baseline and recovery sleep using paired-samples t-tests.
Results: Lower frequency of inspiratory breaths during sleep predicted greater memory percentile following recovery sleep compared to baseline sleep (B=-5.47[CI:-11.61, 0.68], p=0.079). Similarly, lower inspiratory amplitude predicted greater delayed memory performance during recovery sleep compared to baseline (B=-0.03[CI:-0.06, 0], p=0.076). Respiration rate increased from baseline to recovery sleep (p=0.005), whereas immediate memory performance decreased (p=0.022). There were no other significant differences between baseline and recovery.
Conclusion: In line with previous research, we found that the inspiratory phase during recovery sleep predicts memory. Mechanisms by which inspiration improves memory are still under investigation. The inspiratory breath drives CSF flow, which may facilitate more efficient glymphatic clearance during sleep, leading to improved memory. Furthermore, Zelano and colleagues found that respiratory rhythms entrain hippocampal oscillations.
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0104

SLEEP VARIABILITY RELATES TO NEURAL OSCILLATIONS AND PREDICTS ATTENTION IN ALZHEIMER'S DISEASE

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Introduction: The importance of intra-individual sleep variability on pathology and cognition in Alzheimer's disease (AD) is increasingly recognized, but the impact of such variability on the neurophysiology underlying cognition is poorly understood.
Methods: Thirty-two participants on the AD spectrum (ADS; amyloid-PET positive and diagnosed with mild cognitive impairment or AD) and 34 cognitively-normal older adults were included in this analysis. Participants completed a neuropsychological battery from which attention domain scores were calculated, wore an actigraph, and completed a visual attention task during magnetoencephalography (MEG). Actigraph data with sleep diaries were cleaned, reconciled, and analyzed using the Cole-Kripke algorithm. To assess variability, the standard deviation of wake time (wake SD) was used. MEG data were transformed into the time-frequency domain and significant task-related oscillatory responses were imaged. Age, education, and sex were included in all analyses as nuisance covariates.
Results: Significant group interactions with wake SD were observed in theta activity in bilateral superior frontal gyri (SFG; p<.005) and alpha oscillations in the left middle frontal gyrus (p<.005). In the ADS group, we tested whether theta oscillations mediated the relationship between wake SD and attention scores, as measured by neuropsychological assessment, and found that

greater wake SD (p=.005) and greater left SFG theta (p=.038) predicted worse attention. Additionally, greater wake SD was predictive of weaker left SFG theta oscillations (p=.031). There was an indirect effect strongly approaching significance (95% CI:[-0.00, 0.02]), and a significant total effect (95% CI:[-0.03, 0.00]), such that greater wake time variability, concomitant with stronger left SFG theta power, resulted in worse attention performance.

Conclusion: These findings support the importance of sleep hygiene for patients with AD and help solidify sleep as an influential factor in the observed cognitive and neurophysiological outcomes of AD. Sleep health is a key modifiable risk factor and understanding its complex interactions with AD pathology and symptomatology has the potential to vastly benefit prevention, early detection, and help guide future therapeutic interventions.

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0105

SEX DIFFERENCES IN THE ASSOCIATION OF 24H MELATONIN AREA UNDER THE CURVE WITH COGNITIVE FUNCTION IN OLDER ADULTS

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Introduction: Melatonin exhibits neuroprotective benefits in animals, and more circulating melatonin may be associated with better cognitive function in humans. Melatonin is responsive to circulating estradiol and may therefore be more relevant to cognitive function in females compared to males, especially during aging. However, methodological considerations including lack of rigorous melatonin collection and brief, insensitive cognitive measures limit the conclusions from previous investigations. We examined associations of 24h melatonin secretion with cognitive function and explored sex differences in these associations.

Methods: Participants were 29 cognitively unimpaired retired adults (13 females, 16 males; mean age: 68.4 +/-5.6 years). All participants completed an in-lab 24h circadian unmasking protocol (dim light, bedrest, time isolation, constant wakefulness) and a comprehensive neurocognitive battery an average of 6 months after the lab study. Saliva was sampled hourly during the lab protocol and assayed for melatonin. Area under the curve (AUC) was calculated using a spline-based smoothing model. The neurocognitive battery assessed attention, executive function, immediate and delayed recall memory, language, and visuospatial function. Regression analyses examined associations between melatonin AUC and cognitive domains and were adjusted for age and educational attainment.

Results: In the full sample, greater 24h melatonin AUC was associated with better immediate recall memory (beta =.40, p =.033), delayed recall memory (beta =.42, p =.022), and visuospatial function (beta =.56, p =.002). In females, greater melatonin AUC was associated with better immediate recall memory (beta =.72, p =.003), delayed recall memory (beta =.71, p =.020), and visuospatial function (beta =.67, p =.009). Associations were not statistically significant in males (ps >.36).

Conclusion: Greater melatonin may serve as a protective factor for cognitive function in older adults, particularly among females. Any cognitive benefits conferred by greater melatonin production may reflect circadian (e.g., robustness of the circadian timing system) and/or non-circadian (i.e., neurobiological benefits of melatonin as a hormone) properties. Follow up in a larger sample is warranted to confirm sex differences.

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0106

DECODING SPATIOTEMPORAL DYNAMICS OF SLEEP SPINDLES AND THEIR AGE-RELATED EFFECTS ON EMOTIONAL MEMORY CONSOLIDATION

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Introduction: Sleep spindles (SPs) play a pivotal role in sleep-dependent memory consolidation, yet their role in coordinating long-range communication of memory and how this function is altered by aging remain unclear. Our study examined spatiotemporal gradients of SP metrics as they propagate across the cortex, and quantified their relevance to memory consolidation mechanisms in young and older adults using computational modeling.

Methods: Healthy young adults (N=15, YA) and older adults (N=15, OA) completed immediate and delayed recall tasks for emotional recognition memory on both nap and wake days. High-density polysomnography and fMRI data were collected. Unequal variance signal detection (UVSDT) and drift-diffusion models (DDM) modeled the mechanism underlying memory consolidation. Multi-Gaussian curve fitting improved individual and topographical measurements in SP and slow oscillation (SO) peak frequencies and powers following irregular resampling auto-spectral analysis (IRASA). Traveling waves modeled spatiotemporal gradients in SP metrics (frequency, power, density, SO coupling), with memory relevances tested using mixed-effect models corrected for multiple comparisons.

Results: YA exhibited significantly better retention in drift rate v (memory evidence accumulation speed, delayed/immediate, paired ps< 0.001) and da (bias-adjusted detection accuracy, paired ps< 0.05) post-nap compared to wake day for both negative and neutral memories. OA showed opposite but insignificant trends (ps>0.5). YA retained better negative memory than OA post-nap (p=0.02), but not neutral memory (p=0.41). Sleep/wake condition and its interaction with age were associated with v and da (ps< 0.05). OA showed a significantly larger SP frequency gap between frontotemporal and centroparietal clusters than YA (ps< 0.01), characterized by a quadratic cliff across electrodes with a trough at frontotemporal regions (p< 0.001). This discontinuity correlated with poorer retention in v (r=-0.570, p=0.002) and da (r=-0.621, p=0.001) on nap but not wake days (ps>0.05) in both age groups.

Conclusion: While sleep is known to improve retention accuracy, our findings redefine its mediating role in overall consolidation mechanisms from the computational perspective. We provide the first evidence that SP frequency changes continuously along cortical gradients rather than in discrete fast/slow subtypes. Their memory relevance offers important insights into SP involvement in long-distance memory transfer, with

age-related SP disruptions linked to impaired consolidation processes.
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0107

A DATA-DRIVEN MULTIDIMENSIONAL APPROACH EXAMINING THE RELATIONSHIP BETWEEN COGNITION AND SLEEP COMPOSITES IN THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS

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Introduction: Sleep is critical for maintaining overall brain health and may influence the onset and perpetuation of cognitive impairment. Since sleep is a complex and multi-dimensional construct, we hypothesized that methods that incorporate multi-modal measurement of sleep across various domains (i.e. sleep continuity, macro-architecture, power spectral density) may identify groupings of correlated variables that serve as distinct phenotypes that predict cognitive performance outcomes.
Methods: Multimodal measurement of sleep (actigraphy, polysomnography, patient-reported outcomes) and cognitive testing were completed around the time of the 5th follow-up exam (2010 – 2013) from the Multi-Ethnic Study of Atherosclerosis (MESA), a large multiethnic cohort in the United States. A principal components analysis (PCA) with varimax rotation was utilized on 39 sleep variables from multiple domains of sleep health for 1,414 participants who had complete sleep data (overnight polysomnography, 7-day actigraphy, and questionnaires) and completed cognitive function testing. Cognition was measured by performance on the Digit Symbol Coding Task (DSCT), a subtest of the WAIS-III measuring processing speed, working memory, and visuospatial processing. Scores on the DSCT were modeled as the primary outcome and were regressed onto scores derived from principal components (PC, $p < .05$) while controlling for important covariates.
Results: The study sample had an average age of 68.9 years, was 54.3% female, and 38.7% White, 26.3% Black/African American, 24.3% Hispanic, and 10.7% Chinese. Thirteen novel sleep composites were extracted from the PCA that explained about 71% of variance within the sample. Scores from 4 PCs were significantly ($p < .05$) related to DSCT scores when controlling for demographic and lifestyle factors. The description of each of the 4 PCs were as follows: 1) generalized EEG power, 2) strength of rest-activity pattern, 3) spindle and slow oscillation coupling, 4) spindle density.
Conclusion: In this study, interpretable cognition-related sleep composites were identified and characterized by EEG features and actigraphy metrics that have been previously linked to cognition in prior research. Use of data-driven and multi-dimensional approaches may efficiently identify composite biomarkers of multi-dimensional sleep associated with cognitive impairment. Examining correlated dimensions of sleep may shed light on how sleep health and cognition are related.
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0108

COMORBID INSOMNIA AND SLEEP APNEA (COMISA) IS ASSOCIATED WITH WORSE VERBAL EPISODIC MEMORY IN OLDER WOMEN

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Introduction: Women show a higher prevalence of comorbid insomnia and sleep apnea (COMISA) and Alzheimer's disease (AD) than men. Episodic memory is sensitive to early AD-related changes and may be particularly vulnerable to sleep fragmentation in COMISA. While women often outperform men in verbal episodic memory, sleep disturbances may attenuate this. We hypothesized that those with COMISA would perform worse on verbal memory than those without COMISA, with the effects stronger in women than men.
Methods: Ninety-two older adults (ages 65-83yrs) with normal cognition underwent polysomnography, neuropsychological testing, and sleep questionnaires as part of a larger study. The sample was 55.4% women, 83.7%White, 90.2% Non-Hispanic, 20% APOE4 carriers, and 73.9% with Bachelor's degree or higher. COMISA, present in 37% of participants, was defined by an AHI≥5/h and an Insomnia Severity Index (ISI) score≥11. Cognition was assessed using the Alzheimer Disease Cooperative Study Preclinical Alzheimer Cognitive Composite (ADCS-PACC), comprising z-scored Mini-Mental State Exam, Logical Memory Delayed Recall, Digit Symbol Substitution Test, and Free and Cued Selective Reminding Test total score. We conducted moderated linear regression analyses to examine whether gender moderated the relationship between COMISA and cognition, adjusting for age, APOE4 status, body mass index, and education.
Results: Moderated regression showed COMISA and male gender were independently associated with worse ADCS-PACC and Logical Memory scores. A significant COMISA-by-gender interaction was only observed for the Logical Memory subtest, ($B=1.20$, $SE=0.40$, $p=.003$). The overall model accounted for 20% of the variance in scores, $F(7, 84)=3.08$, $p=.006$. COMISA was significantly associated with worse verbal memory ($B=-1.00$, $SE= 0.26$, $p<.001$), and female gender was associated with better verbal memory ($B=-0.75$, $SE=0.24$, $p=.002$). Conditional effects showed that the negative association between COMISA and verbal memory was significant only among the women($B=-1.00$, $SE=0.26$, $p<.001$), with women with COMISA performing significantly worse on verbal memory than those without COMISA.
Conclusion: These findings suggest that COMISA may have a gender-specific impact on verbal memory, with women being particularly affected. Future studies will examine underlying sleep-related mechanisms on AD biomarkers to better understand the unique vulnerabilities in women at risk for AD.
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0109

EXPLORING THE LINK BETWEEN TOTAL SLEEP DURATION ON COGNITIVE PERFORMANCE IN OLDER VETERANS: A PRELIMINARY REPORT

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Introduction: Sleep is an influential factor in cognitive performance, with short sleep duration (6 hours or less) negatively impacting cognition. Prolonged, untreated sleep disturbances have been linked to dementia diagnosis and Alzheimer's disease.
Methods: Here, we conducted a secondary cross-sectional data analysis from a clinical trial (NCT05500170, PI: Weiss) investigating the effects of dietary supplementation with nicotinamide riboside on sleep and cognition in older Veterans (n=24, aged 65-85 years old). We focused on baseline findings related to sleep duration and cognitive function, employing descriptive analysis and Pearson correlation coefficients. Sleep duration was collected using the Fitbit Charge 5, a wrist-worn device capable of monitoring multiple sleep parameters, including total sleep time, time in bed, sleep efficiency, sleep latency, and wake after sleep onset. Cognitive function was evaluated using the Montreal Cognitive Assessment (MoCA), a screening tool for mild cognitive dysfunction. The MoCA analyzes various cognitive domains, including attention and concentration, orientation, language, and memory, with an additional point awarded for higher education attainment. MoCA total score ranges from 0 to 30, with scores above 26 indicating normal cognition, 18-25 reflecting mild cognitive impairment, 10-15 indicating moderate impairment, and severe impairment with a score below 10.
Results: Participants reported TST ranged from 1.84-6.70 hours, and MoCA scores ranged from 25-29 (SD value = 1.25). Preliminary findings showed a modest positive correlation between average baseline total sleep duration and cognitive function (r=0.362).
Conclusion: Future investigations will assess the longitudinal relationship between total sleep duration and cognition progression.
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0110

REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION ENHANCES SLOW-WAVE ACTIVITY AND RESPONSE SPEED IN OLDER ADULTS

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Introduction: Sleep slow-wave activity (SWA) is associated with overnight memory retention and cognition in young adults, but the role of SWA in these processes among older adults at risk for cognitive decline is poorly understood. This study investigated how a single session of excitatory repetitive transcranial magnetic stimulation (rTMS) affected subsequent SWA, overnight memory retention, and cognition in older adults with cognitive complaints.
Methods: Twenty older adults (Mage=70 years, SD=5.2) participated in a 40-minute rTMS session of either high frequency (10Hz) active stimulation (n=11) or sham (n=9) applied over the left dorsolateral prefrontal cortex during wakefulness. SWA was assessed using 64-channel high-density EEG during a baseline and post-rTMS night. Overnight memory retention and executive function were assessed the morning following each overnight, with encoding for the memory tasks occurring the evening prior. Statistical Nonparametric Mapping (SnPM) identified topographic changes in SWA. Mixed linear models tested effects of rTMS on cognition. Bivariate correlations explored whether increases in SWA were associated with improvements in cognition across groups.
Results: In the active stimulation group, SWA increased across the whole night in a medial fronto-parietal cluster (pSnPM=.028) and within the first NREM period (NREM1) in a fronto-parietal (pSnPM=.003) and occipital cluster (pSnPM=.049). Stroop reaction time (RT) improved in the active stimulation group relative to sham, F=6.79, p=.011. Other cognitive outcomes were unaffected, ps>.13. The improvement in Stroop RT correlated with increased NREM1 SWA in the fronto-parietal cluster, r=-.54, p<.038. Exploratory analyses showed that increased SWA also correlated with Stroop RT improvements on congruent and neutral trials and accuracy improvements on neutral trials, rs>-.54, ps<.040, but not improvements in overnight memory retention.
Conclusion: These preliminary results suggest that rTMS produces robust increases in SWA and may improve reaction time in older adults with cognitive complaints. However, one night of increased SWA may be insufficient to modulate overnight memory retention in older adults at risk for cognitive decline. Future studies should test whether multi-session rTMS produces reliable cognitive improvements through SWA.
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0111

DEFINING "TOO LITTLE" AND "TOO MUCH" SLEEP: FINDINGS ON SLEEP DURATION AND COGNITIVE DECLINE IN MIDDLE-AGED AND OLDER GENERAL POPULATION

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Introduction: Sleep is crucial for maintaining cognitive and brain health. While it is now well-established that there exists a U-shaped curve between sleep duration and neurocognitive outcomes, with extreme sleep durations having adverse effect on cognitive aging, there is a lack of consensus on what is considered "too little" or "too much" sleep. Thus, the current study was designed to examine the association between habitual sleep duration and cognitive performance changes in a community-based sample of middle-aged and older adults.
Methods: Baseline data of 2,696 cognitively normal participants (mean age 58.6 6.7 years, 49.9% females) from the Korean Genome and Epidemiology Study (KoGES) were in included in the analyses. These individuals were followed up after 4 years to determine changes in various domains of cognitive performance.

Habitual sleep duration was measured using self-reports and was used as a continuous variable in linear and quadratic terms in linear mixed models assessing the association between sleep and cognitive performance changes. Age, sex, education, cardiovascular disease, smoking, alcohol consumption, sleep medication, APOE genotype, depression, and sleep apnea were used as covariates in the analytic model.
Results: Linear or quadratic terms of sleep duration did not have significant main effects on cognitive outcomes. However, there was a significant interaction between quadratic sleep duration and time on the Trail Making Test-B (TMT-B), indicating that short and long ends of sleep durations were associated with slower performance on cognitive set-shifting. Furthermore, specific ranges of sleep duration ≤4.32 and ≥8.13 hours were determined to be significantly associated with poorer TMT-B performance.
Conclusion: Our findings reiterate the importance of maintaining healthy sleep duration and further suggest that obtaining 5-8 hours of sleep would be optimal to slow the decline of cognitive performance changes in middle-aged and older adults. We suggest that identification and interventions on aberrant sleep duration should become routine clinical practice in the aging populations.
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0112

IMPACT OF REM OSA AND HYPOXIC BURDEN ON SLEEP-DEPENDENT SPATIAL NAVIGATIONAL MEMORY AND WHITE MATTER INTEGRITY IN COGNITIVELY NORMAL ELDERLY WITH OSA

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Introduction: Overnight sleep enhances spatial navigational performance, but such benefits may be minimized by OSA. In this study, we aimed to explore whether REM-specific OSA (REM AHI4%) and Hypoxic Burden (HB) influence overnight task performance differentially compared to standardly-defined presence/absence of OSA, and investigate associations between these sleep apnea variables and diffusion tensor imaging (DTI) metrics of white matter integrity in brain regions critical for memory consolidation.
Methods: Using a virtual 3D Maze, 133 cognitively normal, community-dwelling older adults (age = 66.5 ± 6.4 years, 56% female) performed three timed trials of spatial navigation before (evening) and after (morning) polysomnographically-recorded sleep and analyzed for differences in overnight percent change in completion time (%ΔCT) and trial-by-trial performance. Participants were grouped by overall OSA presence/absence (AHI4% all sleep ≥ 5 events/h vs. < 5 events/h), severe vs. absent REM OSA (REM AHI4% ≥ 30 vs. < 5 events/h) and HB quartiles e.g., time spent under 90% blood SpO_2 (T90), area under the oxygen desaturation curve (HB-AUC). A subset of 57 subjects had brain structural MRI including DTI sequences. We assessed correlations between REM AHI4%, HB, and DTI metrics of white matter integrity (fractional anisotropy (FA)).
Results: Of the 133 participants, 71 had untreated OSA (AHI4% = 11.9 [15.1] events/h). At the group level, we did not observe significant differences in %ΔCT or trial-by-trial performance in those with vs without OSA, however, significant differences in %ΔCT ($p = 0.04$), pre-sleep trial interactions ($p = 0.02$), and post-sleep performance ($p = 0.05$) were observed in severe vs absent REM OSA. Similarly, highest T90 quartiles showed significant pre-sleep trial interactions ($p = 0.01$) and post-sleep group differences ($p = 0.01$) compared to lowest HB quartiles. We observed significant inverse associations between REM AHI4% and corpus callosum FA ($R = -0.31$, $p = 0.02$) and between HB-AUC and cingulum FA (-0.34, $p = 0.01$).
Conclusion: REM AHI4% and HB values seem to be stronger predictors of poor spatial navigational memory performance than standard AHI criteria. Moreover, their associations with white matter damage provide potential mechanistic insight into the cognitive deficits observed in older adults with OSA.
Support (if any):

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0113

THE INFLUENCE OF INSOMNIA SEVERITY ON COGNITIVE FUNCTIONS IN OLDER SURGICAL PATIENTS

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Introduction: Sleep disorders, including insomnia, affect up to one-third of older adults over the age of 65 undergoing surgery, yet they often remain untreated. Insomnia-related sleep disturbances have been linked to weakened immune function, delayed recovery, and impaired cognitive abilities (e.g., attention, memory, language), particularly in older adults. However, the influence of sleep-related disorders on cognitive functions in older surgical patients remains unclear. Given the increasing hospitalization rates in older adults, we hypothesized that greater insomnia severity would be associated with poorer cognitive performance.
Methods: A cohort of 17 older adults (≥70 years) scheduled for total knee, total hip, or spine surgery was recruited. One week before their scheduled surgery, participants were asked to complete the Insomnia Severity Index (ISI) questionnaire and the Montreal Cognitive Assessment (MOCA), which assessed primary cognitive functions, including abstraction, attention, language, orientation, and delayed recall.
Results: We computed a simple linear regression model analysis to investigate whether ISI scores predicted cognitive performances using the total MOCA scores as our key dependent variables. Additional model predictors were tested included surgery type, sex, and age. In alignment with our hypothesis, results suggested that for every 1 SD increase in ISI scores a 0.09 SD

decrease in MOCA scores was predicted (SE =.07, p = 0.26). Although not statistically significant, these preliminary findings are promising, as we are still collecting data and anticipate stronger trends as we reach sufficient statistical power.
Conclusion: Out preliminary results seemed to indicate that older adults with higher insomnia severity may exhibit larger cognitive impairments, potentially increasing their vulnerability during surgical recovery. Further investigation is warranted.
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0114
ROLE OF ENCODING OPPORTUNITY AND CHANGE IN SLOW WAVE ACTIVITY ACROSS K-COMPLEXES ON SLEEP-DEPENDENT SPATIAL NAVIGATIONAL MEMORY IN OLDER ADULTS

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Introduction: While younger adults show significant overnight spatial navigational memory (SNM) performance gains, older adults exhibit attenuated improvements, possibly due to reduced slow wave activity (SWA) during non-REM sleep. Older adults may show equivalent offline gains to younger adults if provided an enhanced encoding opportunity. This study examined whether increased encoding opportunities enhance SNM consolidation in cognitively normal older adults. We additionally probed whether particular features of sleep microstructure correlated with overnight change in performance.
Methods: Thirty-nine cognitively normal older adults (mean age: 65 years, range: 55–76, 79% female) without sleep complaints completed a timed virtual maze task before and after polysomnography over two nights. Encoding opportunities increased from three pre-sleep trials on night 1 to six on night 2. We measured overnight percent change in completion time (CT) and a morning 20-minute psychomotor vigilance task (PVT). We used hierarchical linear regression to assess contributions of full-night SWA (0.5-4Hz) and the average change in SWA across K-complexes (Delta SWAK) toward overnight SNM performance changes.
Results: Increased encoding opportunities on night 2 did not significantly impact overnight SNM performance (p = 0.49) or PVT reaction times (p = 0.67). On night 1, age, sex, years education, and mean reaction time explained 2.0% of the variance in overnight CT change. Delta SWAK in central regions significantly explained an additional 30% of the variance in CT change ($\beta = 0.56$, p = 0.001, $\Delta R^2 = 0.30$), without a significant contribution of SWA. On night 2, age, sex, years education, and mean reaction time explained 12.4% of the variance in overnight CT change, with a particular contribution from sex. We did not observe sleep microstructure features that significantly explained additional variance beyond this baseline.
Conclusion: Increasing encoding opportunities did not enhance SNM consolidation in older adults. Central Delta SWAK significantly predicted overnight CT change on the first but not second night, which is possibly related to a differential contribution of sex between nights. Delta SWAK represents a potentially novel correlate of offline memory processing that could be explored further along with interactions with sex.
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0115
SLEEP-DEPENDENT WORKING MEMORY ACROSS THE MENSTRUAL CYCLE

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Introduction: Alarmingly few studies track sleep and cognition across the phases of the menstrual cycle. Existing studies fail to encapsulate the complex interactions that arise by neglecting to study each of the four hormone phases within a cycle-haver, or limiting the number of variables(e.g. sleep/cognition or menstrual cycle/cognition). This creates a gap in knowledge about how the menstrual cycle affects sleep-dependent cognitive processes. We aim to fill this gap by specifically examining how the menstrual cycle modulates sleep-dependent working memory (WM).
Methods: Healthy young women (18-35yrs; n=65) completed four experimental visits at specific phases of their menstrual cycle: menses, pre-ovulation, mid-luteal, and late luteal. Each visit, women slept overnight with in-lab polysomnography and completed a WM operation span (OSPAN) task before and after sleep. We used linear-mixed-models (LMMs) to predict post-sleep WM performance, with menstrual phase, sleep variables (i.e. sleep architecture and spindle (12-15Hz) density), and pre-sleep WM as predictors. Pearson's correlations were performed to examine the relationship between sleep and post-sleep performance, with a median split to divide participants into high and low pre-sleep performance groups.
Results: We found a significant interaction between pre-sleep WM performance and phase ($p < 0.05$) where pre-sleep performance moderated menstrual phase effects on post-sleep WM, with greater improvements during pre-ovulation compared with mid-luteal. No sleep variables contributed to this interaction. Next, we examined the predictability of each sleep variable on WM performance irrespective of phase. We found an interaction between pre-sleep performance and minutes in REM ($p < 0.05$) and spindle density ($p < 0.05$). Correlations demonstrated that lower REM sleep and spindle density (both $p < 0.01$) predicted better post-sleep WM improvement only in low pre-sleep WM performers.
Conclusion: Our results show that sleep-dependent WM varies across the menstrual cycle, with greater WM during the high estrogen, pre-ovulation phase. While sleep variables did not impact the phase-WM interaction, we found that sleep independently contributed to working memory through our REM and spindle density results. Though we have yet to demonstrate a three-way link, our sleep variable results support previous work showing a negative correlation between NREM sigma and WM.

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0116

SEX DIFFERENCES IN SLEEP AND EPISODIC MEMORY AND EXECUTIVE FUNCTIONING

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Introduction: Sex differences in sleep quality and cognitive performance have been well studied. However, less is known about sex differences in the association between sleep quality and cognitive performance. This study investigates whether older men and women differ in the concurrent and prospective associations between sleep quality, episodic memory (EM), and executive functioning (EF).
Methods: Data came from 390 older adults who participated in the Midlife in the United States Study at two-time points (T1: 2005-2006, T2: 2013-2017, Mage at T2=62). Participants responded to the Pittsburgh Sleep Quality Index (PSQI) and completed the EM and EF by telephone. A series of t-tests first compared the PSQI, EM, and EF levels between sexes at each time point. Then, we used general linear models to examine sex differences in the concurrent and prospective associations of PSQI with EM or EF, adjusting for sociodemographic and health covariates. Prospective models additionally controlled for T1 EM or EF and PSQI score differences between T1 and T2.
Results: Females exhibited poorer sleep quality compared to males, consistently over time (T1: t=3.43, p< 0.001, T2: t=3.96, p< 0.001). Females demonstrated significantly higher EM z-scores than males (T1: t=6.24, p< 0.001, T2: t=6.91, p< 0.001); no significant sex differences were observed in EF z-scores. Concurrently, poorer sleep quality was associated with lower EM and EF, adjusting for sex (EM: B =-0.04, SE=0.01, p=0.012; EF: B=-0.02, SE=0.01, p=0.019), although these associations became not significant in fully adjusted models. Prospectively, poorer sleep quality at T1 was associated with lower EM at T2 in the fully adjusted model (B=-0.41, SE=0.02, p=0.012), but there was no association with EF. There was no significant interaction between sleep quality and sex in either concurrent or prospective models.
Conclusion: The effect of PSQI scores differed between EM and EF, indicating that the importance of sleep quality may vary across cognitive function domains. No interaction with sex was found, suggesting that the importance of sleep quality in cognitive function may be universal across males and females. Future analyses will include actigraphy sleep data to explore sex differences in the objective sleep—cognition link.
Support (if any):

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0117

TIME ESTIMATION DURING NOCTURNAL SLEEP AMONG YOUNG ADULT WOMEN AND MENOPAUSAL WOMEN

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Introduction: Previous studies reported abnormalities in time estimation ability (TEA) in patients with insomnia. Recent research indicates the possibility that menopausal women also exhibit impaired TEA. This study examined subjective sleep parameters (sleep duration, sleep latency etc.) and the relationship among these parameters, objective sleep structure, and body temperature during nocturnal sleep in menopausal and young adult women, to elucidate the psychophysiological mechanisms of menopausal sleep.
Methods: This study was approved by the ethical committee of Saitama Prefectural University (No.24057). A sample of 19 female volunteers (12 menopausal women: mean 52.92±2.73 years, 7 young adult women in the luteal phase: mean 21.83±4.18 years) participated in two-time estimation (TE) trials (first half [FH] and latter half [LH] of the sleep period) during the approximately 7-hour nocturnal sleep period. In each TE trial, participants underwent a structured interview regarding the perceived sleep time(sub-ST) of time passed since before bedtime or first TE trial. Timing of TE trials was executed at the following conditions: participants slept longer than 150 minutes; stage 2 sleep continued for more than 3 minutes; and spontaneous movement arousal occurred in each sleep period.
Results: Objective sleep time did not significantly differ between the FH and LH sleep periods in young women (FH: 227.00±9.73 minutes, LH: 196.67±14.46 minutes, p= 0.345) and menopausal women (FH: 210.82±7.40 minutes, LH: 205.27 ± 6.09 minutes, p= 0.929). Sub-ST significantly decreased according to sleep progression in young women (FH: 330.17±17.77 minutes, LH: 125.00±18.03 minutes, p= 0.028). The amount of slow wave sleep (SWS) showed similar to the time distributions of sub-ST in young women. Sub-ST in menopausal women was not significantly different between the two time periods (FH: 209.45±25.23 minutes, LH: 193.64±19.97 minutes, p= 0.754). Time distribution of SWS in menopausal women differed from those in young women.
Conclusion: Young women overestimated their actual sleep time in FH and underestimated their LH sleep time according to the time profiles of SWS. However, menopausal women estimated each FH and LH sleep period with some degree of accuracy. The amount and time distribution of sleep stage, particularly SWS, may play a role in TEA in both young and menopausal women.
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0118

CHANGES IN REM AND NREM SLEEP SURROUNDING CRAWLING ACQUISITION IN INFANTS

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Introduction: Sleep during motor milestone development is disrupted in infancy, yet the precise causes and effects remain unclear. In rodents, REM supports sensorimotor development through twitches (Sokoloff et al., 2015). Similarly, REM sleep in human infants is hypothesized to play a role in neural reorganization (Cao et al., 2020). NREM sleep, in contrast, aids in procedural memory consolidation, playing a more immediate role in motor learning (Stuart et al., 2007). This study is the first to investigate how REM and NREM sleep change around naturalistic motor learning: the acquisition of crawling.

Methods: Daily motor milestone diaries (Berger & Moore, 2021) and a commercially available video baby monitor (Nanit) were used to collect naturalistic sleep data time-locked to skill onset. Overnight videos were requested for the nights before, of, and after the onset of crawling (>10ft). Sleep states (REM, NREM, indeterminate, and wake) were behaviorally scored using criteria congruent with prior videosomnography research (Anders & Keener, 1985; Grigg-Damberger, 2007).
Results: Fourteen infants (M age = 8.26 months; 9 males) were included in the analysis. Two repeated measures ANOVAs were run on the proportion of the night spent in REM and NREM. The proportion of REM did not show a significant change over time ($F(2,32)=1.223$, $p=0.308$), though it steadily increased from the night of acquisition to the night after crawling. The proportion of NREM varied significantly over the acquisition of crawling ($F(2,32)=4.131$, $p=0.0254$). Pairwise comparisons of estimated marginal means identified a significant difference between the night of onset (M=0.46; SD=0.05) and the night after (M=0.45; SD=0.05) (p=.02).
Conclusion: The increase in NREM the night of acquisition may reflect its immediate role in consolidation, while the increase in REM the night after may reflect neural reorganization as the novel skill is practiced. These findings provide the first analysis of sleep states surrounding motor milestone acquisition in a naturalistic observational setting. Future research should explore the relationship between sleep disruptions and developmental outcomes in infancy.
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0119

A SLEEP-READING PUZZLE IN EARLY ADOLESCENCE

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Introduction: Sleep is associated with cognitive development and academic performance, particularly in reading and English Language Arts (ELA) performance. During early adolescence (ages 11-14 years), biological and social factors cause changes in sleep patterns which can impact key cognitive functions like memory, attention, and language processing. These functions are critical for developing reading and language skills, which are foundational for academic success. The present study examines how specific sleep variables predict reading/ELA scores in early adolescence.
Methods: Young adolescents (N= 296, Mage=12 years old, SD=.69, Female=151) attending 1 of 6 public middle schools in the Denton Independent School District, in Denton, TX completed the district's Texas Assessment of Knowledge and Skills (TAKS) exam. Their reading/ELA scores were provided by the school district. Information on student-reported sleep was obtained by student self-report on the Pittsburgh Sleep Quality Index (PSQI). Within the PSQI we looked at the following sleep variables: 1) sleep quality (i.e., perception of how restful sleep is), 2) sleep latency (time between "lights off" to sleep), 3) sleep efficiency (time asleep/time in bed), and 4) sleep disturbances (i.e., trouble falling asleep and/or staying asleep).
Results: We ran hierarchical multiple regression models to test ethnicity, sex, and grade as model 1 then added the four sleep variables as model 2 to see if they improve the prediction of participants' reading/ELA scores. Model 1 was significant (R^2 =.14, $F(5, 290) = 15.5$, $p <.001$) Model 2 was also significant ($R2=0.18$, $F(5, 290)=7.72$, $p<.001$). We found ethnicity (Hispanic v non-Hispanic) significantly predicted reading/ELA scores ($\beta=-.25$, $p<.001$) along with grade ($\beta=.23$, $p<.001$). For sleep variables, we found sleep latency ($\beta=.19$, $p=.003$) significantly predicted reading/ELA scores.
Conclusion: These results suggest Hispanic participants scored lower in the reading/ELA section of the TAKS test. Additionally, higher grades were associated with better performance. Interestingly, higher sleep latency was associated with higher reading/ELA scores. These findings suggest that both demographic factors and sleep variables influence reading/ELA scores. Our findings are preliminary, future analysis will look at how sleep compares between various race/ethnicity groups and sex using a modified total PSQI score followed up by sleep subcomponents.
Support (if any):

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0120

OBJECTIVE AND SELF-REPORTED SLEEP RELATE DIFFERENTLY TO COGNITIVE MEASURES IN NEUROTYPICAL CHILDREN AND ADOLESCENTS

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Introduction: The relation between sleep and cognitive/behavioral measures in youth is not fully understood. Measures of sleep health and polysomnography (PSG) might speak to complementary sleep properties that relate to cognition differently. To better understand comparisons of self-reported vs. PSG-measured sleep with cognitive/behavioral measures, we acquired subjective and objective sleep measures paired to neurocognitive battery and emotion regulation reports in typically developing youth.
Methods: We recruited neurotypically developing children and adolescents aged 8-19. Participants completed one overnight PSG, measures of cognition (reaction time, processing speed (PSI)), emotion regulation (BASC-3 – internalizing problems), sleep (Epworth Sleepiness Scale – Children/Adolescents), and filled out a daily sleep diary the week before PSG. We quantify self-reported sleep health with the recently introduced Sleep Health Composite (SHC). From PSG, we extract total sleep time (TST) and derive Arousal Index (AI; arousals per hour of sleep) as an objective measure of sleep fragmentation. We group participants based on AI (normal AI< 14 for participants < 12y.o., AI< 10 for participants ≥12y.o.; otherwise, abnormal) or SHC (good (1-3); poor (4-6)). We compare internalizing problems, PSI, reaction time, and TST in participants with normal vs. abnormal AI, and good vs. poor SHC, separately with independent sample t-tests.
Results: 48 participants completed all study measures (Avg. Age=13, S.D.=3, Female=28). Participants with poor SHC (n=13) showed similar PSI (p =.710), reaction time (p =.360), internalizing problems (p =.567), and TST (p =.143) compared to good SHC participants (n=35). Compared with abnormal AI participants (n=7), normal AI participants (n=41) showed no differences on internalizing problems (p =.750) or TST (p =.676), but showed reduced PSI (p =.039) and longer reaction time (p <.001).
Conclusion: We found no explicit relation between a subjective measure of sleep health and cognitive/behavioral measures in

typically developing children. In contrast, an objective measure of sleep fragmentation showed significant relationships with processing speed and reaction time. This needs replication, due to an imbalance between normal and abnormal arousal index in our sample. Our findings support the relevance of objective lab-based sleep measures in studies of sleep and cognition in youth.
Support (if any):

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0121

DAY-TO-DAY COGNITIVE VARIABILITY IN EXECUTIVE FUNCTION BUT NOT HIPPOCAMPAL DEPENDENT MEMORY IN YOUTH WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: Obstructive sleep apnea in development leads to behavior dysregulation, memory deficits, and emotional instability. Adenotonsillectomy is a common surgical treatment that improves sleep-disordered-breathing symptoms, health, and cognition. However, most studies exploring OSA's impact on cognition are obtained cross-sectionally. How surgery impacts day-to-day cognition in youth is unknown at short and long-term intervals. Currently, we are repeatedly and remotely tracking pediatric patients before and after surgery and healthy age/sex matched controls.
Methods: Using a measurement burst design, we tracked patients over nine months: before and twice post-surgery (controls are time matched). Eight pediatric patients (Mage=11.375, SD=1.4. F=4) and eight age/sex matched controls are enrolled. Our mobile health platform, HowRU, administers twice-daily cognitive tasks (hippocampal-dependent word pair associates and executive function operation span at easy and difficult levels), along with sleep diaries and mood assessments. Participants also use Muse and Garmin wearables to track sleep neurophysiology and physical activity. Baseline data are analyzed using a linear regression within the GLMM framework, accounting for the multilevel structure of the data, to examine daily variability in cognitive performance.
Results: Cognitive performance patterns in the baseline period did not significantly differ between patients and controls. For executive function, significant learning effects were observed, improving across difficulty levels after the first day. We found an interaction between easy performance and sleep, with greater sleep duration negatively impacting performance. Neither group showed a circadian-effect on performance. For hippocampal-dependent memory, neither group exhibited learning effects or day-to-day performance variability. However, both groups demonstrated sleep-dependent consolidation, with no significant overnight decline from encoding.
Conclusion: Day-to-day analyses reveals distinct performance patterns in executive function but not hippocampal-dependent tasks. Executive function learning effects were observed. This discrepancy in performance may stem from the heightened sensitivity of executive function to fragmented sleep, whereas hippocampal-dependent memory appears less affected, provided sufficient sleep is obtained. Our preliminary findings are promising, suggesting a nuanced understanding of the impact of fragmented sleep in youth. These findings suggest that youth with OSA experience subtle cognitive disruptions linked to sleep fragmentation, underscoring the need for targeted interventions.
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0122

TOTAL SLEEP DEPRIVATION DISRUPTS WORKING MEMORY UPDATING

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Introduction: Total sleep deprivation (TSD) leaves the ability to maintain information in working memory (WM), i.e., the focus of attention, relatively unaffected. However, its effect on the ability to update information into and out of WM is less clear, in part because many of the tasks used to assess WM updating do not differentiate between maintenance and updating processes. Using a task designed to isolate WM updating from WM maintenance, we anticipated that TSD disruptions to WM updating would impair the ability to flexibly adapt to environmental demands to maintain up-to-date information in the focus of attention.
Methods: N=16 healthy adults completed a 4-day (3-night) in-laboratory study. After a baseline night with a 9h sleep opportunity, participants were randomly assigned to either 39h TSD (n=9) or well-rested control (WRC; n=7). Participants completed a modified delayed match-to-sample (DMS) task approximately 15 minutes after a sham stress test at baseline (session 1) and again 24h later (session 2). On each trial of the DMS, participants encoded an initial pair of figures. They were then shown a second pair of figures and instructed to either begin maintaining the second pair instead or ignore it and continue maintaining the first pair. After a short delay, they saw a single probe figure and had to determine if it matched what should be held in WM.
Results: Mixed-effects ANOVA on instruction (update or ignore), session (1 or 2), condition (TSD or WRC), and their interactions revealed a significant session by condition interaction (p=0.006) and a significant effect of instruction (p=0.013). TSD participants had poorer accuracy in session 2, when sleep-deprived, than WRC participants (p=0.034) and their own rested baseline (p=0.002). In general, participants had better probe accuracy when they had to maintain the second versus first pair in WM (p=0.013).
Conclusion: TSD impaired the ability to recognize to-be-maintained information in WM when told to update or ignore the new pair, indicating that TSD disrupts the ability to appropriately update information. As WM updating is critical in a number of settings, TSD may compromise the ability to maintain situational awareness in both laboratory and real-world tasks (e.g., driving).
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0123

THE EFFECT OF OBSTRUCTIVE SLEEP APNEA ON SLEEP NEUROPHYSIOLOGY AND COGNITION IN SCHIZOPHRENIA

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Introduction: People living with schizophrenia are at high risk of developing obstructive sleep apnea (OSA). Sleep spindle deficits and impaired cognitive performance are commonly reported in schizophrenia, and in non-schizophrenia OSA populations. The effects of comorbid OSA on spindles and cognition in schizophrenia are unclear. We aimed to establish whether abnormal sleep neurophysiology and cognitive deficits in people with schizophrenia could in part be attributable to co-morbid OSA.
Methods: We measured sleep with 256-channel high-density EEG overnight polysomnography in two groups of people with a range of OSA severity, defined by the Apnea Hypopnea Index (AHI), matched for age and sex: 1) people with schizophrenia (n=31) and 2) without schizophrenia (n=30). Participants completed a cognitive test battery that assessed the domains of executive function and attention, and sleep-dependent procedural and declarative memory. Established algorithms detected spindles during NREM sleep and EEG spectral power was computed. General linear models were used to test the fixed effects (Group), and the interaction between Group and AHI for cognitive (adjusted for sex, age, education and subjective sleepiness) and spindle (adjusted by age and sex) outcomes.
Results: The schizophrenia group had significantly worse overnight procedural memory consolidation (B=-16.78;R2=0.12; pgroup< 0.05) and executive function (mean execution time on Tower of London: B=12.55,R2=0.26, p [group]< 0.01) and lower spindle density (Cz: t=2.12, p< 0.05), when compared with the no schizophrenia group. In the schizophrenia group, OSA had no effect on cognitive performance in any domain or spindle density (all p>0.05). High-density EEG analysis showed lower absolute sigma (12-15 Hz) EEG power in a cluster overlying the central region in the schizophrenia group (cluster size=114; p[corrected]=0.018). OSA had no effect on spindle density or sigma power in schizophrenia.
Conclusion: Our preliminary analyses shows impaired cognitive performance and spindle deficits in schizophrenia which does not appear to be attributable to co-morbid OSA. Future work will examine the relationships between spindles, cognition and OSA in this population and evaluate any potential recovery of abnormal sleep neurophysiology in those treated with CPAP therapy.
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0124

INFRASLOW RHYTHMS DURING SLEEP AND THEIR RELATIONS TO MEMORY CONSOLIDATION IN SCHIZOPHRENIA

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Introduction: Sleep spindles, defining oscillations of stage 2 (N2) non-rapid eye movement sleep (NREM), and their coordination with other NREM oscillations mediate sleep-dependent memory consolidation. Schizophrenia patients have spindle deficits that correlate with impaired memory consolidation. Novel findings from humans and rodents show that spindle activity is organized in an infraslow rhythm (~0.02 Hz). Although this temporal organization of spindles correlates with memory consolidation, it has not yet been investigated in schizophrenia. This study investigated infraslow rhythms and their relations to memory consolidation in healthy controls and schizophrenia patients.
Methods: To date we have analyzed archival data from 16 patients with schizophrenia (range: 24-60 yo) and 16 demographically matched healthy controls. Memory consolidation was measured using the Motor Sequence Task. The power and frequency of the infraslow rhythm for each subject were calculated based on the frequency decomposition of the spectrogram of each frequency bin from 1-35 Hz in N2.
Results: Spindle frequency activity (12-15 Hz) fluctuated in the infraslow band (Controls: 0.014±0.008 HZ, Schizophrenia: 0.016±0.011 Hz) and did not differ by group (p=.56). Infraslow rhythm power was reduced in schizophrenia (t(30)=2.81, p=.01). Memory consolidation corelated with the power of the infraslow rhythm only in schizophrenia (r=.64, p=.01) and this relation differed by group (p=.03).
Conclusion: The power of the infraslow rhythm is reduced in schizophrenia. The infraslow rhythm is thought to be generated in the locus coeruleus, which is the main source of noradrenaline in the brain. Our findings suggest that the noradrenergic system may affect the temporal organization of spindle activity in schizophrenia. Higher infraslow rhythm power predicted better memory consolidation in schizophrenia, suggesting that this temporal organization is relevant to memory. We plan to conduct mediation analysis to determine whether infraslow rhythmicity contributes to memory independently of spindles. Additionally, analyses of two archival datasets are underway to further characterize the infraslow rhythm and establish its clinical relevance in schizophrenia.
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0125

THE ROLES OF SLEEP AND CREATIVITY IN SCIENCE LEARNING AND ACADEMIC ACHIEVEMENT

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Introduction: While there is a literature indicating that sleep, creativity, and academic achievement are correlated, the relationships between these constructs are not yet understood. Using an integrative approach, we applied six theoretical models to test if student sleep and creativity are predictive of learning outcomes (controlling for differences in demographics and intelligence) and whether sleep mediates the possible relationship between creativity and learning.
Methods: First-year pre-health and science major students (N=489, 72.2% female, 46.2% white) completed questionnaires pertaining to sleep quality (PSQI), circadian preference (MEQ), social jetlag (midpoint difference of sleep from week to weekend), mental health (anxiety and depression), and creative achievement. They also performed seven assessments of creativity that measure convergent and divergent thinking (i.e.,

processes underlying creative achievement), assessments of fluid and crystallized intelligence, and assessments of organic chemistry and anatomy learning following reading passages and completing virtual lectures (science learning tasks). High school SAT/ACT scores and first-year cumulative GPA were obtained from university records. Structural equation modeling was used to evaluate the relationship between sleep, creativity, and learning outcomes.
Results: The model predicting learning from sleep and creativity, controlling for intelligence and covariates fit relatively well (Comparative Fit Index =.96, Root Mean Square Error of Approximation =.041, Standardized Root Mean Square Residual =.03). Sleep quality and social jetlag predicted GPA (β=-.174, p<.001; β=.097, p=.02, respectively). Convergent thinking predicted organic chemistry (β=.314, p=.028) and anatomy learning (β=.704, p<.001). Fluid intelligence also predicted organic chemistry learning (β=.146, p=.009). Crystallized intelligence (vocabulary score) predicted anatomy learning (β=.097, p=.047). Other predictors of GPA included creative achievement (β=-.137, p=.001), crystallized intelligence (ACT; β=.275, p<.001), and sex (β=.086, p=.047). The model testing sleep quality, social jetlag, sleepiness, and circadian preference as mediators of the creativity and learning relationship was not supported.
Conclusion: Sleep and creativity predict different aspects of learning and academic achievement.
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0126
SLEEP AND DIRECTED FORGETTING OF EMOTIONAL WORDS

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Introduction: Sleep has been demonstrated to selectively improve directed remembering, without enhancing consolidation for information that was directed to be forgotten (Saletin, Goldstein & Walker, 2011). Sleep has also been shown to prioritize memory consolidation for emotional information (Baran et al., 2012; Wagner, Gais & Born, 2001). The question remains whether these two signals of relevance, valence and direction, are differentially impacted by sleep, or interact during the consolidation process. This study aimed to determine whether sleep enhanced directed forgetting could be observed for emotional information, and was an in-person follow-up to a study conducted online.
Methods: The task was a modified version of the directed forgetting paradigm used by Saletin, Goldstein, & Walker (2011). Participants were shown 100 words (50 negative, and 50 neutral) and were directed to either remember or forget each word. After encoding participants completed an immediate recognition task. Following a 12-hour delay, participants were asked to freely recall any of the words they saw on the original list. Participants either encoded in the morning (wake group), or encoded in the evening (sleep group). The sleep groupwore a sleep profiler to record sleep during the delay interval.
Results: At immediate recognition, there was a significant main effect of valence (F(1, 49)= 7.218, p=0.01) and instruction (F(1,49)=67.186, p< 0.001) with negative and remember words being significantly better recognized than neutral or forget words. However, following a 12 hour delay, there were no effects of sleep (F(1,50)=0.62, p=0.435), or valence (F(1,50)=0.274, p=0.603) on free recall. There was however a significant effect of instruction (F(1,50)=65.773, p< 0.001) with remember words being better recalled. Further, negative foils were more commonly recalled than neutral foils (F(1,50=14.081, p< 0.001). In the sleep group, the number of negative foils recalled was significantly associated with REM time (r=0.744, p< 0.001).
Conclusion: In this study, sleep, nor valence was not shown to benefit either directed remembering or forgetting. Rather, only the direction impacted memory for words after a delay.
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0127
SLEEP AND EMOTIONAL MEMORY: TRANSLATING NEURAL RESPONSE AT ENCODING TO CONSOLIDATED MEMORY IN TRAUMA-EXPOSED MEN AND WOMEN WITH AND WITHOUT PTSD

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Introduction: Growing evidence suggests that sleep plays an important role in PTSD outcomes, potentially due to its influence on emotional memory consolidation. This study sought to test the hypotheses that memory for affective visual stimuli was mediated by neural reactivity towards these stimuli and that this mediation was moderated by sleep neurophysiology.
Methods: 44 participants (21 female, 38 veterans) with variable PTSD severity (MCAPS=16, SD=11) viewed 75 negative and 75 neutral IAPS images while electroencephalography (EEG) was recorded. After viewing the images, participants had a 120-minute polysomnography-measured nap opportunity, from which time spent in stages wake, N1, N2, N3, and REM was calculated. Memory accuracy for the images was evaluated after the nap. Generalized additive models were used to model the late positive potential (LPP)—a sustained positivity in the event-related potential following affective stimuli. Moderated mediation analyses were preformed to investigate if emotional memory accuracy (d') was mediated by the LPP and to test if this mediation was moderated by properties of sleep.
Results: Mediation analyses demonstrated that memory accuracy for the stimuli (d') was partially mediated by the LPP (p< 0.05) and that this mediation was moderated by the proportion of time spent in sleep stages REM and N3 (p< 0.05). Specifically, the indirect effect increased in magnitude as the proportion of time spent in N3 and REM sleep increased, indicating greater memory for negative compared to neutral images for those who spent proportionately more time in these sleep stages. PTSD effects on LPP magnitude were observed, with blunting of LPP difference (negative vs. neutral) in PTSD. Sex effects in memory for negative vs. neutral images were also observed, although sleep moderation effects were consistent in both sexes and in both PTSD groups.
Conclusion: The late positive potential mediates an emotional memory benefit which is moderated by the proportion of time

spent in deep (N3) sleep and REM. These findings highlight how sleep physiology may influence the consolidation of information encoded during wake. Further research is critical to understand these effects in the context of biological sex and PTSD group differences in emotional memory.

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0128

SOCIAL ENVIRONMENT AS A POTENTIAL MODERATOR OF THE RELATIONSHIP BETWEEN SLEEP INERTIA, HYPERSOMNIA, AND COGNITION

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Introduction: Literature suggests associations of both sleep inertia and hypersomnia with cognitive function and social environment with cognition function. However, the social environment has not been investigated as a potential moderator of the association of sleep with cognition. We examined both sleep parameters as predictors of poorer cognitive function, with social environment variables as potential moderators, in the Wisconsin Sleep Cohort study.

Methods: Survey data was collected from the ongoing Wisconsin Sleep Cohort (n=505, 45% female, mean [SD] age 74 [6.7] years). The sleep measures were the Hypersomnia Severity Index (HSI) and the Sleep Inertia Questionnaire (SIQ). Cognition measures were assessed in a 30-45 minute battery of tests that included symbol digit modalities, trail making, a pegboard task, digit cancellation, the audio verbal learning test (AVLT), and oral word fluency. Separate multiple linear models were used for each cognitive measure. Measures of the social environment included support and strain scores for participants' relationships with both friends and family. Both type and quality of relationships were evaluated to explore variations in moderating effects. Social environment questions came from the Midlife in the United States (MIDUS) study. Models were adjusted for age, race, sex, self-reported health status, and education and were fit using PROC GLMSELECT in SAS.

Results: Support in relationships with friends significantly (p=0.007) interacted with SIQ such that higher levels of friend support was associated with a mitigation of the reduction in pegboard task performance associated with greater sleep inertia. Borderline significance was found for family support and family strain as potential moderators of associations between SIQ and cognition. All other interactions between relationship factors, hypersomnia, and SIQ predicting cognitive function were not statistically significant.

Conclusion: Some social environment measures were associated with moderation of the relationship of SIQ and cognition. Subsequent research could explore potential underlying mechanisms and what specific aspects of these social environment scores are salient.

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0129

A CO-TWIN CONTROL STUDY OF SLEEP QUALITY AND COGNITION

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Introduction: Sleep quality (SQ) is associated with cognitive performance; however, it remains unclear if this association is causal, and consequently, whether SQ is a modifiable risk factor for cognitive aging. Leveraging data from the Vietnam Era Twin Study of Aging (VETSA; N =1036, Mage =67.46, range=61.37-72.13, 304 monozygotic (MZ) pairs, 214 dizygotic (DZ) pairs), we investigated the causal relationship between sleep and cognition, accounting for genetic and shared environmental confounding.

Methods: Using a Co-Twin Control (CTC) design, we examined whether sleep-cognition associations reflect causal effects versus genetic and environmental confounding, leveraging that MZ twins share 100% of genes while DZ twins share 50%. Measures included sleep quality (Pittsburgh Sleep Quality Index total score), general cognitive ability (GCA), and factor scores across episodic memory, visual-spatial memory, executive function, fluency, and processing speed. SQ-cognition associations were decomposed into between-pair effects (comparing twin pair averages) and within-pair effects (comparing co-twins) to capture familial confounding versus potential causal effects.

Results: At the individual level, poorer SQ predicted worse performance (β = -0.02 to -0.03, all ps <.05). Within-pair effects (β = -0.02 to -0.05, all ps <.05) indicated the twin with poorer SQ performed worse, showing stronger effects in DZ (β = -0.02 to -0.06) than MZ twins (β = -0.001 to -0.02), except for processing speed. Weaker within- than between-pair effects suggested partial genetic confounding. Potential causation was observed for SQ-GCA and SQ-visual-spatial relationships as effects persisted regardless of genetic relatedness. SQ-episodic memory and SQ-semantic fluency associations suggested both sources of confounding as effects were only observed in the full sample. The remaining domains suggested genetic confounding as effects dissipated with increasing genetic relatedness.

Conclusion: Poorer SQ is associated with worse cognitive performance, though the relationship is complex. In some domains, poorer sleep may causally impact cognition, independent of genetic relatedness, albeit effects are small. In others, associations may reflect sources of confounding, with disrupted sleep and cognition representing symptoms of shared neurodegenerative or pathological processes. These findings emphasize the need for a nuanced approach to determine when sleep interventions may be most effective.

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0130

FRONTAL SLEEP SPINDLES, IQ, AND SLEEP DEPENDENT MEMORY CONSOLIDATION IN 22Q11.2 DELETION CARRIERS

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Introduction: 22q11.2 deletion (22qDel) is a recurrent copy number variant that greatly increases risk for Schizophrenia and is associated with lower IQ. Recent work by our group has shown diminished sleep dependent memory consolidation (SDMC) in 22qDel carriers, but it is unclear whether this is associated with sleep spindle dysfunction, nor whether sleep spindles are associated with IQ, as in idiopathic schizophrenia.
Methods: 22qDel carriers (n=20, Mage=20.1±6.1, 10F) and typically developing (TD) controls (n=19; Mage=18.8±3.8, 12F) completed multiple nights (149 nights total; 1-8 nights per subject; median=3 nights) of sleep EEG recordings with a wearable headband (Dreem 3), along with the Wechsler Abbreviated Scale of Intelligence (WASI-II), and a motor sequence SDMC task. Unique sleep spindles were detected across a wide frequency range (10-16Hz) from the F8-F7 derivation during non-rapid eye movement sleep using Luna. We examined group differences in spindle density at each frequency (0.5Hz bins) using linear mixed effects models, accounting for multiple nights' data. We examined if spindle properties averaged across nights (amplitude, density, duration) were related to individual differences in cognition (SDMC, IQ) within group, and whether group moderated such effects. All models controlled for age and sex.
Results: 22qDel Carriers exhibited an altered frequency distribution of sleep spindles, with a peak frequency of 12.5 Hz, compared to the TD group (peak at 11.5 Hz). Spindle density was significantly different between groups at 12.5Hz (b= -0.55, p= 0.02). No group differences in spindle amplitude or duration were detected at this 12.5 Hz target frequency (p's > 0.77). Group moderated (b=-1.7, p=0.05) an association between spindle amplitude and SDMC, such that smaller spindle amplitude was associated with better SDMC in controls (b=-2.03, p< 0.01) but not 22qDel carriers (b=-0.34, p=0.49). Unexpectedly, there were no significant relationships between any spindle metric and IQ (all p's >0.14).
Conclusion: These results indicate 22qDel carriers exhibit differences in the intrinsic frequency and functional outcomes of frontal sleep spindles. These differences may reflect underlying differences in thalamocortical circuitry. Our future work will include investigating the relationship between SDMC and spindle-slow oscillation coupling.
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0131

EXAMINING PROPOSITIONAL LEARNING AMONG PATIENTS WITH INSOMNIA DISORDER

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Introduction: Adaptive decision-making relies not only on recognizing which stimuli co-occur (e.g., whether stimulus A is associated with a positive or negative outcome B) but also on understanding the nature of their relationship (e.g., whether A causes or prevents B). For instance, when encountering the statement "acetaminophen reduces pain", individuals are more likely to make informed decisions if they remember the causal relationship between acetaminophen and pain, rather than simply recalling their association without understanding the relationship. In this study, we investigated whether sleep plays a role in adaptive evaluative choices and whether it depends on integrating memories for both stimulus co-occurrences and their relationships among patients with insomnia disorder and healthy participants.
Methods: Thirty-four patients with insomnia disorder (ID, mean age = 24.90) and 38 healthy participants (HC, mean age = 24.00) learned about hypothetical pharmaceutical products that either caused or prevented positive or negative health conditions. Evaluative choices and explicit memory were assessed at three time points: immediately after learning (pre-sleep), the following morning after sleep (post-sleep), and seven days later (delayed session).
Results: The impact of product–condition relations on evaluative choices significantly increased from pre- to post-sleep in the ID but not HC group, resulting in a significant group difference at post-sleep testing. Additionally, the influence of product–condition co-occurrences decreased from post-sleep to the delayed session in the ID group but remained relatively stable in the HC group. Explicit memory performance showed no significant differences between groups across sessions.
Conclusion: These findings present an unexpected pattern, diverging from prior studies comparing daytime wake and nighttime sleep conditions in healthy participants. Notably, ID showed a pronounced increase in reliance on relational information from pre- to post-sleep, whereas HC exhibited only a modest, non-significant change. Specifically, after a night of sleep, decisions made by individuals with insomnia were more strongly influenced by the causal relationship (e.g., a medication prevents illness) compared to their healthy counterparts. Importantly, these group differences could not be attributed to explicit memory performance. Further investigation is needed to explore the mechanisms underlying these group differences and their potential implications for interventions.
Support (if any):

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0132

EFFECTS OF PARAFACIAL ZONE MEDIATED ENHANCEMENT OF SLOW-WAVE SLEEP ON HIPPOCAMPAL SYNAPTIC PLASTICITY

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Introduction: Sleep deprivation attenuates behavioral learning and memory as well as its physiological proxy, hippocampal CA1 long term potentiation (LTP). Molecular signatures of synaptic plasticity are also affected. Here we examine the role of slow-wave sleep (SWS) by specifically only promoting this stage using chemogenetic activation of the brainstem parafacial zone (PZ). We do this in adult, aged, and aged Alzheimer's (APP/Psen1) mice to examine the beneficial role of SWS in learning and memory as well as neurodegenerative disease.
Methods: Vgat-Cre mice were used except for the Alzheimer's mouse model which was a double-transgenic Vgat-Cre;APP/

Psen. Chemogenetic activation of PZ Vgat neurons triggered at least 3 hours of uninterrupted SWS for each experiment. Behavioral: training completed 1 hr before SWS enhancement, testing 24 hrs later. Hippocampal LTP and RNA-Seq: SWS enhancement for 3 hrs just prior to sample (slice or nuclei) preparation.
Results: Generally "improved" learning and memory followed enhanced SWS in each measure, and this was more evident in aged and aged Alzheimer's mice than in younger mice.
Conclusion: SWS is leads to beneficial gene expression, synaptic plasticity and behavioral outcomes.
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0133

PERINEURONAL NET REMOVAL IN RAT PREFRONTAL CORTEX ALTERS RIPPLE SPINDLE COUPLING IN NREM SLEEP AFTER COCAINE

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Introduction: Environmental stimuli become paired with exposure to drugs of abuse and play an important role in the maintenance of drug memories. In the medial prefrontal cortex (mPFC), parvalbumin (PV) interneurons regulate pyramidal cells critical for cocaine memory consolidation. The majority of PV neurons are surrounded by a perineuronal net (PNN), an extracellular matrix structure essential for supporting fast firing rates and precise spike timing of PV neurons. These qualities of PV cells help generate oscillations and mediate coupling within and between brain regions, which plays an important role in memory consolidation. Removal of PNNs and associated extracellular matrix with chondroitinase ABC (ABC) disrupts acquisition and consolidation of cocaine-associated memories, but it is not known why this occurs.
Methods: After microinjection of either saline (control) or ABC into the mPFC of male Sprague Dawley rats, electrodes were implanted into the mPFC and hippocampal dorsal CA1 (dHIPP). Rats were given intravenous infusions of saline paired with one cue light or cocaine paired with a second cue light over eight alternating days. On the last day, rats were presented both cue lights in a pseudo-randomized order. After each daily session, rats remained in the apparatus for 2 hr to track spindle-ripple coupling during non-REM (NREM) sleep.
Results: Gamma power was elevated in response to the cocaine cue in control but not in ABC-treated rats. While all rats exhibited event-related phase resetting in response to the cocaine cue light presentation, mPFC-dHIPP theta phase coupling was reduced after ABC, and there was a strong trend toward decreased coupling between dHIPP theta phase/mPFC gamma amplitude. During NREM sleep, ABC treatment produced greater frequency of mPFC ripples and a strong trend toward enhanced spindle/ripple coupling. We are currently examining coupling of mPFC ripples with slow oscillations and delta waves.
Conclusion: These findings suggest that consolidation of memory may be compromised by altered dHIPP/mPFC coupling and hypersynchrony of spindle-ripple coupling during NREM sleep.
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0134

SEX DIFFERENCES IN CIRCADIAN-LINKED AND LEARNING BEHAVIORS AMONG MICE IN SOCIALLY-HOUSED AUTOMATED HOME CAGES

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Introduction: Women often report more sleep and circadian misalignment due to biological (e.g., hormones) and/or social (e.g., scheduling demands) factors. Mice are effective model organisms to assess circadian-linked behaviors associated with learning and human sleep due to similarities in sleep cycles. Singly-housed female mice are reported to spend more time awake than male mice and perform learning tasks differently. Despite mice being innately social animals, limited research exists examining circadian-linked behavior in socially-housed mice. Automated home cages allow for continuous monitoring of mice across the circadian cycle. In this study, we aimed to use an automated home cage with socially housed mice to provide naturalistic representation of mouse circadian-linked and learning behaviors that may represent underlying sex differences in human sleep and circadian rhythms.
Methods: We investigated sex differences in the circadian-linked and learning behaviors between male and female mice. Seventeen socially-housed C57BL/6J mice (9 Male; 8 Female) were continuously monitored using the TSE Intelligcage system. Mice were monitored across 15 days (12:12 light-dark cycle). Animals and cage-interactions (i.e., corner visits indicating circadian-activity; nosepokes indicating learning; and water licks indicating learning) were individually tracked. Water ports with various restrictions (e.g., nosepokes; restricted corner access) assessed learning. We created actograms and learning graphs by tracking mouse interactions and conducted independent sample t-tests to compare both sexes over time and for four hours of diurnal activity each day.
Results: Both sexes displayed more nocturnal than diurnal activity and biphasic activity. Across the 24-hour day, sex differences emerged with visit durations (females=longer, $p < 0.01$), licking (males=more, $p < 0.01$) and lick duration (males=longer, $p < 0.001$). During the day (rest), females demonstrated higher nosepokes ($p < 0.01$), visits ($p=0.02$), and licking ($p < 0.01$) than males. Females also demonstrated lower accuracy for water port visits ($p < 0.05$), though total visits considered accurate were comparable to males.
Conclusion: Consistent with disturbed sleep in women, female mice demonstrated more daytime activity. Differences in female circadian-linked behaviors may indicate biological basis for higher frequencies of some sleep and circadian disorders among women compared to men. Female mice appeared to exhibit more exploratory learning behaviors, but learning based on accuracy was otherwise comparable between sexes.
Support (if any):

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0135

EFFECTS OF EARLY-ADULTHOOD SLEEP DISRUPTION ON LONGITUDINAL SPATIAL LEARNING, NEUROINFLAMMATION, AND LATE-LIFE TAU PATHOLOGY IN THE PS19 MOUSE MODEL

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Introduction: Sleep disruption is thought to exacerbate tau hyperphosphorylation and neurodegeneration. This study aimed to investigate how early-adulthood sleep disruption (SD) affects late life spatial memory, tau pathology, neurodegeneration, neuroinflammation, and sleep architecture in PS19 tauopathy mice.
Methods: PS19 (MAPT P301S) mice and wildtype (WT) littermates were exposed to chronic SD using an automated stimulus every 10 seconds for 18 hours daily (ZT 0–18) over eight weeks between 2 and 4 months of age. Control groups were allowed ad libitum (AL) sleep. Sleep architecture was analyzed via 24-hour EEG/EMG. Spatial memory was assessed at 6, 8, and 10 months using the Barnes Maze performance test. Brains were collected between 10–14 months and hippocampal sections were stained for AT8 (phospho-tau) and Iba1 (microglia). Hippocampal CA1 and dentate gyrus (DG) cell layer thickness and lateral ventricle area/volume were quantified using QuPath software.
Results: Sleep architecture analyses confirmed that SD impacted both genotypes equivalently, with significantly reduced total sleep time (TST) ($p< 0.01$), shorter REM ($p< 0.01$) and NREM ($p< 0.01$) bout lengths, and increased arousal indices ($p< 0.001$). At 8 months of age, PS19/AL mice had significantly worse Barnes maze performance compared to all other groups ($p=0.03$), and PS19/SD showed preserved spatial memory at 8 and 10 months compared to PS19/AL. SD showed no impact on WT controls. Despite early-adulthood SD, hippocampal tau pathology (AT8+ neurons) was similar between PS19/SD and PS19/AL (SD: 462 ± 268 vs. AL: 284 ± 98, $p=0.54$). However, hippocampal microglial activation (Iba1 staining cells/ROI) was significantly elevated in PS19/SD vs. PS19/AL (SD: 851.5 ± 151.9 vs. AL: 479.2 ± 81.3, $p=0.039$). Thinner CA1 and DG cell layers and larger ventricles were observed in PS19 mice vs WT, but no differences in these markers of neurodegeneration between SD and AL groups in PS19 mice were observed.
Conclusion: Contrary to expectations, early-adulthood SD preserved spatial memory in PS19 without significantly impacting hippocampal tau tangle load or metrics of neurodegeneration. We did observe significantly increased PS19 hippocampal microglial density in late life following early adulthood SD, but whether this is an epiphenomenon or somehow protective for cognition warrants further investigation.
Support (if any): Alzheimer's Association

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0136

ATTENTION-RELEVANT ALTERATIONS OF CORTICAL AND SUBCORTICAL NEURAL OSCILLATIONS IN RESTED AND SLEEP-DEPRIVED MICE

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Introduction: Consciousness is comprised of a multitude of brain states that reflect varying degrees of exteroceptive awareness and rely on specialized functional neural networks that flexibly respond to the demands of the external world. Fast neural oscillations, such as those in beta (15-30 Hz) and low gamma (30-80 Hz) frequency bands, are prominent in mammalian salience- and attention-associated brain areas during goal-directed behaviors and reflect top-down and bottom-up information processing, respectively. However, how these oscillations vary on a millisecond scale across the attentional timespan, as well as how they are disturbed following sleep deprivation (SD), are not well understood.
Methods: To investigate time-dependent and cognition-relevant changes in neuroelectric activity in mice, local field potential (LFP) electrodes are implanted in various attention- and salience-associated brain regions prior to inclusion in the behavioral protocols. Once trained, these intracerebral multi-site LFPs are measured during self-initiated attentional performance to assess near-instantaneous, moment-to-moment changes in oscillatory activity as animals switch between task-off and task-on behaviors. These recordings are done when mice are rested as well as when they are deprived of sleep.
Results: When mice are not sleep-deprived, preliminary findings reveal an enhancement of beta and low gamma oscillations as well as a robust reduction in high gamma power (>80 Hz) – which is associated with internally-focused cognitive operations and external disengagement – during correct trial performance. These findings highlight a possible reprioritization of task-related network activity to produce a signal-to-noise ratio that underlies optimal signal-driven performance as animals anticipate information-bearing cues. Current manipulations involve depriving mice of sleep prior to task performance to better understand how variations in fast oscillations during attentional effort are disturbed following sleep loss and correlate with SD-induced performance impairments.
Conclusion: So far, these findings suggest rapid changes in neural dynamics as animals shift between behavioral states, including varying levels of exteroceptive awareness and external focus. Through these ongoing efforts, we endeavor to identify electrophysiological biomarkers of normal vigilance that can provide insights into attentional processing under normal conditions and inform potential treatments to mitigate oscillatory and behavioral disruptions caused by poor sleep.
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0137

UTILITY OF A SMARTPHONE ASSESSMENT OF ALERTNESS AND DECISION MAKING FOR REAL WORLD NIGHTTIME WAKING STUDIES

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Introduction: Development of novel sleep promoting drugs requires demonstration that individuals sleeping, after having taken the drug at therapeutic doses, can be awoken by an unforeseen important event. Overnight waking studies require a small number of individuals be admitted to a research units where they are woken from drug-induced sleep and must perform tests of concentration and rapid decision making. This study examined the extent to which a validated cognitive assessment integrated into individuals' smartphones could be used to study unexpected nighttime waking in a real-world setting.
Methods: Middle-aged adults without sleep disorders were recruited to a study where they downloaded the Cogstate Brief Battery (CBB) to their personal smartphone and completed this twice during the daytime. They were instructed to sleep with the smartphone beside their bed, and that at sometime in the second week between 12am and 4pm they would receive a call on that smartphone. The smartphone would then display a link to initiate the cognitive assessment. This was repeated in the third week, so individuals completed the CBB in two overnight waking sessions.
Results: Of 52 people who volunteered, 98% woke at the call. Of these 100% performed the smartphone test with rate of missing data low (6%). Performance accuracy on each test was not meaningfully different between the daytime and nighttime-waking conditions (d's< 0.2). Speed of psychomotor function (d=1.21) and visual attention (d=-1.22) was slower in the nighttime waking condition. Speed of learning and decision making was not influenced by time of testing (d's< 0.2),. There were no differences in performance on any test between the two nighttime waking sessions, with test-retest reliability of each performance speed measure >0.7.
Conclusion: Smartphone-based cognitive assessment is a practical and usable method for examination of effects of pharmacological interventions on cognition in overnight waking studies. This method could allow studies to be conducted as part of larger trials with samples that better represent those who will ultimately use the drug.
Support (if any): The Cogstate Brief Battery was provided by Cogstate Ltd Melbourne. Paul Maruff is a part time employee of Cogstate

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0138

SLEEP AND PERFORMANCE ON TESTS OF PATTERN SEPARATION AND THE CAMBRIDGE NEUROPSYCHOLOGICAL TEST AUTOMATED BATTERY (CANTAB)

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Introduction: Sleep disturbances are considered both a risk factor and symptom of dementia. The present research aimed to identify cognitive tests that are associated with sleep quality or quantity, focusing on cognitive tests designed to evaluate the earliest cognitive changes in dementia.
Methods: We recruited younger (n=89) and older (n=40) adults and remotely monitored their sleep patterns for 7 consecutive days using wrist actigraphy and sleep diaries. On day 7, participants completed a battery of cognitive tests, which included the Prodromal Alzheimer's and MCI battery from the Cambridge Neuropsychological Test Automated Battery (CANTAB) and the Mnemonic Similarity Task (MST), which is a test designed to assess pattern separation. The Psychomotor Vigilance Task (PVT) was used as a positive control measure for all participants. The older adults were also assessed with the Montreal Cognitive Assessment (MoCA).
Results: Multiple linear regression models on the overall sample controlling for gender and age revealed that age was the strongest predictor of performance on MST and CANTAB DMS. Multiple linear regression models in the separate samples showed that sleep (i.e., total sleep time and sleep efficiency), MoCA score, and the interaction between gender and sleep were significant predictors for older adult's performance on the MST and CANTAB DMS. The regression analyses in the younger cohort revealed only significant effects of sleep efficiency on CANTAB PAL.
Conclusion: Performance on cognitive tests designed to assess pattern separation are sensitive to sleep patterns and the early cognitive changes associated with dementia, and should be evaluated for potential use as clinical trial outcome measures for sleep-promoting treatments in older adults.
Support (if any): Dr. Brianne Kent (supervisor)

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0139

OPTIMIZING CLOSED-LOOP AUDITORY STIMULATION TIMING TO MAXIMIZE PROCEDURAL MEMORY CONSOLIDATION

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Introduction: Closed-loop auditory stimulation during sleep (CLASS) enhances slow oscillations (SOs) by delivering short sound bursts synchronized to specific oscillations, such as SOs and spindles, which in turn boosts memory. The current study investigated the timing of stimulation in relation to NREM sleep oscillations to determine which timing was associated with better procedural memory consolidation. Based on prior literature on declarative memory, we hypothesized that stimulation during the SO upstate would lead to better memory.
Methods: Thirty-one healthy adults (15 F, Mage= 28.42 ± 4.92) completed up to three afternoon naps in the lab with EEG monitoring. During each visit, 50 ms bursts of pink noise were delivered during the upstate, downstate, or a randomly timed phase of detected SOs. Participants performed the finger-tapping motor sequence task (MST) before and after each nap to assess procedural memory consolidation. Over-nap improvement in the MST was modeled based on SO phase, SO amplitude, and sigma amplitude during stimulation. Theta phase and amplitude were included on an exploratory basis. We used linear mixed-effects models with a random effect for participants to account for repeated measures.

Results: MST improvement over the nap did not differ across conditions (F(1,3)=0.04, p=0.99,). Theta and sigma amplitudes during stimulation were significant predictors of memory consolidation (theta: B = 18.0, t = 2.19, p =.03; sigma: B = 158.3, t = 2.09, p =.04). These findings did not meet correction for multiple comparisons. Contrary to expectations, the SO phase (rho = 0.17, p=.49) and amplitude (B = -.005, t = -.07, p =.94) did not predict memory consolidation.

Conclusion: These preliminary findings suggest that higher theta and sigma activity during stimulation influence the effects of CLASS on procedural memory consolidation. Theta and sigma may contribute to this effect via cross-frequency coupling, but further analysis is needed to investigate this possibility. Additionally, theta and sigma may support memory processes differently from SOs, potentially due to distinct neural mechanisms involved in procedural versus declarative memory consolidation. Further research and replication are needed to clarify the specific roles of theta and sigma in memory consolidation within the context of CLASS.

Support (if any):

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0140

EXTENDING OVERNIGHT FASTING TO IMPROVE CARDIOMETABOLIC HEALTH IN MIDDLE AGE AND OLDER ADULTS

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Introduction: Circadian rhythms play a fundamental role in regulating cardiometabolic function, with food intake serving as a key metabolic synchronizer. Emerging evidence suggests that time-restricted eating maybe a promising approach for improving cardiometabolic health. In this study we investigated the effect of a 6-week extended overnight fasting (EOF) intervention on glucose regulation, nighttime heart rate variability (HRV) and day-to-night change in blood pressure (BP) and heart rate (HR) in middle and older aged adults, a population particularly vulnerable to cardiometabolic disruptions.
Methods: Twenty-six adults (age: 58±8 years, BMI: 31±4 kg/m², post-menopausal if female, HbA1c < 6.5%) with a habitual overnight fast (OF) of ≤13 hours were randomized to either a 6-week EOF intervention (n=14, 57±7 years, 10 female) or control group (n=11, 60±9 years, 8 female). The EOF group had OF extended by 3 hours (12-16 hours OF) with the last meal consumed ≥3 hours before bedtime, while controls maintained their usual eating schedule. Participants were instructed to maintain their habitual sleep schedule, caloric and macronutrient intake throughout the study period. Assessments occurred during 3-day/2-night laboratory stays at baseline and post-intervention, including a morning 3-hour oral glucose tolerance test (OGTT), overnight HRV, 16.5-hour ambulatory BP and HR monitoring initiated in the afternoon, and polysomnography. Between-group differences in metabolic parameters, nighttime HRV, day-to-night BP and HR dipping, and sleep parameters were analyzed with age as a covariate.
Results: In response to the OGTT, the EOF group showed lower glucose levels ($p < 0.0001$) and higher 30-minute insulinogenic index ($p=0.032$), a measure of beta-cell function. EOF group exhibited reduced low-frequency to high-frequency ratio from HRV ($p < 0.0006$), and showed heightened day-to-night diastolic BP and HR dipping ($p=0.042$ and $p=0.028$, respectively). Sleep architecture remained unchanged between groups.
Conclusion: Six weeks of EOF improved regulation of glucose, nighttime autonomic balance and day-to-night dipping of diastolic BP and HR in middle and older-aged adults. These findings highlight the importance of the inclusion of circadian-aligned eating patterns in lifestyle interventions to enhance cardiometabolic function and health, particularly in older adults.
Support (if any): National Heart Lung and Blood Institute (R01HL140580) and National Institute of Aging (P01AG011412).

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0141

MULTI-LEVEL PHENOTYPIC MODELS OF CARDIOVASCULAR DISEASE AND OBSTRUCTIVE SLEEP APNEA COMORBIDITIES

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Introduction: Cardiovascular diseases (CVDs) are prevalent among obstructive sleep apnea (OSA) patients, presenting significant challenges in predictive modeling due to the complex interplay of comorbidities. Current methodologies predominantly lack the dynamic and longitudinal perspective necessary to accurately predict CVD progression in the presence of OSA.
Methods: This study addresses these limitations by proposing a novel multi-level phenotypic model that analyzes the progression and interaction of these comorbidities over time. Our study utilizes a longitudinal cohort from the Wisconsin Sleep Cohort, consisting of 1,123 participants, tracked over several decades. The methodology consists of three advanced steps to capture the nuanced relationship between these comorbid conditions: (1) performing extensive feature importance analysis using tree-based models to highlight the predominant role of variables in predicting CVD outcomes. (2) developing a logistic mixed-effects model (LGMM) to identify longitudinal transitions and their significant factors, enabling detailed tracking of individual trajectories; (3) and utilizing t-distributed Stochastic Neighbor Embedding (t-SNE) combined with Gaussian Mixture Models (GMM) to classify patient data into distinct phenotypic clusters. In the analysis of feature importance, clinical indicators such as total cholesterol, low-density lipoprotein (LDL), and diabetes emerged as the top predictors, highlighting their significant roles in CVD onset and progression.
Results: The LGMM predictive models exhibited a high diagnostic accuracy with an aggregate accuracy of 0.9556. The phenotypic analysis yielded two distinct clusters, each corresponding to unique risk profiles and disease progression pathways. One cluster notably carried a higher risk for major adverse cardiovascular events (MACEs), attributed to key factors like nocturnal hypoxia and sympathetic activation. Analysis using t-SNE and GMM confirmed these phenotypes, showing marked differences in progression rates between the clusters.
Conclusion: The study highlights key predictive biomarkers and phenotypic patterns representing risk profiles and disease progression pathways of OSA comorbid with CVDs. Specifically, distinct patient clusters of CVD outcomes within the OSA populations have been identified. These clusters differentiate patients by severity and rapidity of disease progression. Future studies focus on expanding these findings through larger, more diverse cohorts and integrating additional predictive markers contributing to the complex etiology of CVDs and OSA.
Support (if any):

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0142

RELATIONSHIP BETWEEN 24-HOUR DAILY LIGHT EXPOSURE AND DIABETES IN MIDDLE-AGED AND OLDER ADULTS: CARDIA

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Introduction: The current project builds upon existing literature suggesting that light exposure may play a role in metabolic function by examining the relationship between objectively measured 24-hour light exposure patterns and diabetes in middle-age to

older adults. The hypothesis is that those with diabetes will be more likely to experience low daytime light or high nighttime light levels.
Methods: The study included cross-sectional data from the CARDIA sleep ancillary study at Year 35. For seven days participants wore a wrist actigraphy monitor with an integrated light sensor and completed a sleep log. Data was collected in 30-second epochs and manually scored for rest intervals. Light variables include time above threshold for the 24-hour day, sleep intervals using 10, 100, 1000 lux thresholds. Diabetes was defined as fasting glucose ≥126 mg/dL or medication use. Logistic regression was used with diabetes as the outcome and light as the exposure. Model 1 adjusted for age, sex, race, field center, education, employment; Model 2 further adjusted for actigraphy measures (total sleep time, sleep fragmentation, sleep midpoint and 24-hour activity level).
Results: Data are from 861 participants with a mean age of 61.5±3.6 years, 63.1% female, 59.0% White, 57.4% employed, and 20.3% with diabetes. Participants with diabetes are 65.1% female, 37.1% White, and 49.1% employed. Those with diabetes spent less time above 1000 lux across the 24-hour day (45.3 (±46.6) mins vs. 59.3 (±53.2) mins), and more time above 10 lux during sleep intervals (8.76±25.5 vs 4.12±11.2 mins). Participants who spent the least time above 100 lux and 1000 lux during the 24-hour day had a higher odds of having diabetes (OR=1.79, 95% CI=(1.04, 3.07); OR=2.25, 95% CI=(1.28, 3.95), respectively) compared with those who spent the most time above specified threshold. Further adjustment (Model 2) attenuated the association.
Conclusion: Habitual light exposure patterns across the 24-hour day are associated with diabetes. Specifically, people with diabetes spend less time in bright light, which seems to be due to how much, how well and when they are sleeping and/or how active they are.
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0143
TIME OF EATING ASSOCIATED WITH BLOOD PRESSURE IN HEALTHY MIDDLE-AGED AND OLDER ADULTS

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Introduction: Recent studies suggest the duration of the overnight fast and how late we eat is related to health. The goal of this analysis was to examine the relationship between time of eating with blood pressure (BP) measures including mean arterial pressure (MAP) which is a key factor in supplying blood to body tissues. We will test the hypothesis that a longer overnight fasting period and longer duration between last meal and bedtime will be associated better BP measures in healthy middle-age and older adults.
Methods: This cross-sectional study recruited adults aged 35-75 years from the community. Participants had height, weight, %body fat (Bioelectrical Impedance Analysis), HbA1c (point of care) and blood pressure measured (average of 3 daytime measures after 5-minute seated) and completed questionnaires related to demographics, sleep and eating habits. Exposure variables included overnight fast duration (OF) and duration between last meal and bedtime (LMBT). The outcome variables were mean arterial pressure (MAP), systolic (SBP) and diastolic DBP) blood pressure. Multivariate regression models were used controlling for age, sex, %body fat, sleep duration.
Results: Data are from 405 participants with a mean (±stdev) age 52.09±10.2 years and 75.1% female. Means (±stdev) were: 30.4±6 kg/m2 for body mass index, 5.5±0.4% for HbA1c, 36.7±9.1% for % body fat, 125.05±17.5 mmHg for SBP, 80.67±10.3 mmHg for DBP, and 95.5±11.9 mmHg for MAP. Mean OF duration was 11.85±1.7 hours and LMBT duration was 2.64±1.4 hours. OF was negatively associated with SBP (r -0.11, p=0,03) and MAP (r -0.103, p=0.04) which was no longer significant after adjustment. The LMBT duration was negatively related to SBP (r -.013 p=0.009), DBP (r -0.10 p=0.03) and MAP (r -0.12, p=0.013). However, after adjustment only SBP and MAP remained significant (b=-1.42 p= 0.013 and b=-0.84, p=0.034, respectively).
Conclusion: These results suggest that in middle-aged and older adults that a longer interval between last meal and bedtime is associated with better blood pressure measures.
Support (if any): National Heart Lung and Blood Institute (R01HL140580) and National Institute of Aging (P01AG011412)

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0144
MODULATION OF THE PERIPHERAL ENDOCANNABINOID SYSTEM ACTIVATION ON SLEEP AND GUT MICROBIOME

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Introduction: The endocannabinoid system (ECS) regulates both sleep and gut physiology. Cannabinoid receptor (CB1R) activation in central nervous system via exogenous cannabinoids has been linked to changes in sleep dynamics, but the role of peripheral CB1R activation in sleep remain unclear. The gut microbiome can modulate the intestinal ECS tone through changes in bacterial lipopolysaccharide levels and composition. Using a peripherally restricted CB1R agonist (CB13), we examined the effect of ECS on the gut microbiome and sleep architecture.
Methods: Nineteen C57BL/6J mice received intraperitoneal injections (1 mg/kg) of CB13 or vehicle for 6 days, with monitoring continuing for 6 days post-intervention. EEG/EMG recordings and fecal samples were collected at baseline, end-intervention, and end-recovery. Sleep was quantified as REM and NREM sleep hours during the 12-hour light period. Gut microbiome composition was assessed using shotgun metagenomic sequencing. Linear mixed-effects models analyzed the effects on sleep and alpha diversity (Shannon index) with Tukey post-hoc tests when appropriate. Correlations examined NREM and Shannon diversity associations at end-intervention and end-recovery. Unadjusted $p < 0.05$ was considered significant.
Results: Time had a significant effect on NREM and REM sleep (p=.034, p<.0001, respectively), but no intervention effects were observed (NREM: p =.535; REM: p =.746). Peripheral ECS activation influenced global microbiome characteristics (Shannon:

group x time p <.001). Mean Shannon diversity was lower in the CB13 group, significantly at end-intervention (p =.010), but not at end-recovery. Group-specific relationships between NREM and Shannon indicated a strong negative association at end-intervention (r = -0.784, p =.037) that switched to a positive association at end-recovery (rho = 0.75, p =.14). The strength or direction of associations were not reflected in controls.
Conclusion: These findings suggest peripheral ECS activation influences alpha diversity, and that the gut microbiome may modulate NREM sleep via ECS pathways, highlighting the potential importance of studying microbial-mediated ECS mechanisms in sleep. Our ongoing research explores ECS pathways and the impacts of alcohol vs. alcohol and cannabis co-use on sleep and the microbiome.
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0145
BREATHING PATTERNING VARIATION DURING POLYSOMNOGRAPHY ACROSS TIME AND SLEEP STAGE

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Introduction: Sleep stages effect breathing patterning with more variation in tidal volume and respiratory rate during rapid eye movement (REM) compared to non-REM sleep. Variation of these metrics across the night, however, is not well-elucidated. We hypothesize that breathing variability in stage N2 is more stable over time compared to REM.
Methods: A retrospective cohort of 2081 polysomnography (1512 diagnostic and 569 titration) polysomnographies in 2014 people from the Department of Veteran Affairs Northeast Ohio Healthcare system (1/1/2010–12/31/2020). Participant demographics at the time of study were assessed using the integrated electronic medical record. Sleep studies were scored for sleep stage by the Stanford University automated scoring algorithm. Studies were included in analyses if at least 15 minutes of usable data for at least one sleep stage was available for analysis. Five-minute contiguous intervals of breathing during wake, N2, and REM sleep were separately analyzed for coefficient of variation (CV) of inspiratory time as a measure of breathing patterning. Linear fits of CV were used to analyze change over time within each sleep stage. Sensitivity analysis included using median absolute deviation of CV and CV of expiratory time and total breath time. We also evaluated differences between diagnostic and titration studies.
Results: Participants were average age 58.2±13.2 years, 92.4% male, mean body mass index of 33.2±6.5 kg/m2. For inspiratory time, N2 had lower linear trend over time compared to both wake and REM (β=-0.0006 for N2, β=0.0113 for wake, β=-0.0157 for REM). Trends were similar for expiratory time and total breath time. Results for expiratory and total breath time were similar to main analyses. Diagnostic studies had higher linear trend for all sleep stages evaluated compared to titration. Median absolute deviation was lowest for N2 compared to wake and REM in both diagnostic and titration studies.
Conclusion: Breathing patterning has greater stability over time within every sleep stage in titration compared to diagnostic sleep studies. N2 has less breathing patterning variation over time than wake or REM sleep.
Support (if any): VA CDA-2 VA IK2CX001882

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0146
FACILITY-MEASURED NOCTURNAL HYPOXEMIA AND SLEEP IN LONG COVID: AN OBSERVATIONAL STUDY

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Introduction: Persistent post-acute sequelae of SARS-CoV-2, i.e., long COVID, is a heterogeneous syndrome involving multiple organ systems. While lower blood oxygen is expected when SARS-CoV-2 infects the lungs, hypoxia without pulmonary symptoms can continue after the acute phase. Ventilation and blood oxygen are more vulnerable during sleep, but nocturnal hypoxemia has not been studied in long COVID in a facility setting using polysomnography (PSG). Here, we characterized blood oxygen levels during sleep.
Methods: This was an observational study with 50 participants (25 long COVID, 25 age-sex-matched healthy controls) using in-laboratory overnight PSG. The long COVID participants were recruited via advertisement and postings on ClinicalTrials.gov (NCT03377543, NCT05606211) and referrals from Beth Israel Deaconess Medical Center, Boston, MA. The controls were a convenience sample of past healthy participants. We calculated the average SpO2, average SpO2 after removing desaturations, hypoxic burden using all desaturations, and respiratory rate. We studied these metrics in different sleep periods and stages. We adjusted for body mass index since it is negatively associated with SpO2. We used the Bonferroni multiple tests correction.
Results: The average SpO2 was lower in long COVID: 1.0% lower after sleep onset until lights on (p = 0.004) and 0.7% lower during REM (p = 0.002); average SpO2 after removing desaturations was also lower in long COVID: 1.3% lower after sleep onset until lights on (p = 0.002), 0.9% lower during REM (p = 0.0004), and 1.4% lower during NREM (p = 0.003); and respiratory rate was 1.4/minute higher in long COVID during REM (p = 0.005). Hypoxic burden showed no difference.
Conclusion: The results suggested that long COVID have a persistent lower nocturnal blood oxygen saturation. The findings highlight the need for further research to better understand how long COVID affects sleep and health.
Support (if any): This research was supported in part by funding from the Open Medicine Foundation and Patient-Led Collaborative (JMM), NIH/NHLBI R01HL136310, and NIH/NINDS R21NS128815 (MH). Dr. Westover is a co-founder, scientific advisor and consultant to, and has a personal equity interest in, Beacon Biosignals.

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0147
NOCTURNAL BLOOD PRESSURE AS AN EMERGING BIOSIGNAL IN SLEEP

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Introduction: Sleep blood pressure (BP) is an important cardiovascular marker. A sporadic BP measurement by traditional oscillometric ambulatory BP monitoring cannot capture dynamic BP fluctuation occurring in sleep. Acute BP surges accompanying an pathological sleep event such as an obstructive sleep apnea (OSA) may provide clinically meaningful information. Based on the inverse relationship between BP and pulse transit time (PTT), PTT can be used to track BP changes. In this study, we tested the hypothesis that individuals with OSA would exhibit variable nocturnal BP fluctuations.
Methods: We included study participants enrolled in a prospective study that aims to investigate the brain glymphatic function in Veterans with OSA. All participants underwent a home sleep study using a system that records PTT via electrocardiography (ECG) and photoplethysmography (PPG). We derived a nocturnal BP fluctuation index (NBPFI), defined as the number of events per hour with systolic BP increase more than 12 mmHg from baseline in association with OSA events. We categorized NBPFI into OSA events with and without accompanying significant desaturation (>=4%). We evaluated the association between NBPFI normalized by AHI and its association with total time spent with oxygen desaturation below 90% (T90%).
Results: Among 7 participants enrolled, 5 participants achieved successful PTT-based BP recording (mean age± SD =53.4 years old±6). All participants had moderate to severe OSA with a mean apnea-hypopnea index (AHI) of 42/hr. ±18 and mean T90% of 27min±20. Regarding the BP surge, the mean maximal BP surge was 28±1.8 mmHg and mean absolute maximal systolic BP was 152 mmHG±23. All participants exhibited NBPFI (rages from 14 to 36/hr.) with mean of 22.9/hr±9.2 with mean NBPI related to without (18.2/hr. ±9.2) and with hypoxia (2.1/hr±2.0). A trend of inverse association was observed between NBPFI normalized by AHI and T90% but not statistically significant.
Conclusion: We found highly variable BP surge patterns in response to OSA events. There appears to be an inverse relationship between the degree of hypoxemia and BP surge events. Future work should investigate how and whether OSA related BP surge events would be related to brain glymphatic function.
Support (if any): VISN 20 Mental Illness Research, Education, and Clinical Center

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0148

TOXOPLASMA GONDII SEROINTENSITY AND PLASMA KYNURENINE METABOLITES ARE ASSOCIATED WITH SLEEP DYSREGULATION

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Introduction: Suicidal self-directed violence (SSDV) has been previously associated with Toxoplasma gondii (T. gondii) IgG positivity and intensity, blood levels of quinolinic acid (QUIN, positively), picolinic acid (PIC, negatively) and kynurenic acid (KYNA, negatively), and sleep disturbance (insomnia, daytime sleepiness, positively). We examined associations between T. gondii IgG serointensity, excitotoxic and neuroprotective kynurenines and their ratios, and sleep disturbance in U.S. Veterans enrolled in mental health treatment.
Methods: Veterans from three Veterans Affairs Medical Centers participated in the study (N=407, mean age = 45.6 ± 11.6 years; 74.7% men). Of these, 203 had a history of SSDV, while 204 had no history of self-directed violence (SDV). T. gondii IgG was measured with ELISAs. QUIN and PIC were analyzed with GC-MS, KYNA with UPLC-MS/MS. Sleep disturbance was estimated using Pittsburgh Sleep Quality index (PSQI). Statistics included ANCOVAs and logistic regressions.
Results: High T. gondii serointensity (classified as high-top quartile) was significantly associated with daytime dysfunction due to sleepiness ($p < 0.05$) in SSDV positive Veterans. This relationship remained significant after adjusting for socioeconomic factors status. T. gondii seropositivity was significantly associated with QUIN positively and PIC/QUIN, and KYNA/QUIN negatively ($p< 0.05$). In turn, QUIN was positively associated with daytime dysfunction due to sleepiness ($p=0.007$) and KYNA/QUIN and PIC/QUIN ratios were negatively associated with sleep disturbance, sleep latency, daytime dysfunction, and PSQI total score ($p< 0.05$).
Conclusion: Limitations include the cross-sectional design, low seropositivity, lack of data on sleep apnea and actual recording of sleep, and multiple comparisons. Sleep- wake dysregulation was positively associated with T. gondii serointensity and QUIN, and negatively with neuroprotective kynurenine ratios. These findings warrant replication in larger, longitudinal studies with direct measuring of sleep parameters.
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0149

ODDS RATIO PRODUCT IS ASSOCIATED WITH BLUNTED HEART RATE VARIABILITY INDEPENDENT OF CORTISOL LEVELS IN ADOLESCENTS

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Introduction: We previously showed that the odds ratio product (ORP), an EEG measure of sleep depth, was associated with lower heart rate variability (HRV), an EKG measure of cardiac autonomic modulation (CAM). Specifically, ORP was associated with decreased low-frequency (LF) and standard deviation between normal sinus rhythms (SDNN) in adolescents. Cortisol, a glucocorticoid of the HPA axis, is secreted in response to stress and is associated with short sleep. As both HRV and cortisol can reflect physiologic responses to stressors, we examined whether the association of in-lab ORP with at-home HRV is independent of in-lab cortisol levels.

Methods: We studied 310 adolescents from the Penn State Child Cohort (Md age=16y; 46% female, 24% racial/ethnic minority). We extracted ORP during NREM sleep from 9-hour, in-lab polysomnography (PSG), evening and morning cortisol levels from saliva samples at 19:00 before PSG and 7:00 following PSG, and LF and SDNN from Holter EKG monitoring during the 24-h after PSG. Stepwise linear regression models first examined the association between ORP with 24-h LF and SDNN. Thereafter, evening or morning cortisol levels were added to the models. Finally, the interaction terms were included in the models. Covariables included sex, age, race/ethnicity, obesity, metabolic syndrome, PSG-measured sleep apnea, insomnia symptoms, and actigraphy-measured sleep duration.

Results: Commensurate with prior findings, higher ORP was associated with lower LF (daytime P=0.041; nighttime P=0.005) and SDNN (nighttime P=0.029). Higher ORP remained associated with lower LF and SDNN after adjusting for evening (LF: daytime P=0.041, nighttime P=0.005; SDNN: nighttime P=0.030) or morning cortisol levels (LF: daytime P=0.043, nighttime P=0.005; SDNN: nighttime P=0.030). The interaction terms between ORP and cortisol levels on LF or SDNN were not statistically significant (all-Ps>0.10). Neither evening nor morning cortisol levels were associated with ORP, LF or SDNN (all-Ps>0.10); yet, evening cortisol levels were associated with shorter PSG-measured sleep duration (P=0.01).

Conclusion: The association between NREM sleep depth and CAM is independent of acute cortisol levels in adolescents. Future studies should examine whether chronic activation of the HPA axis synergistically impacts the association between sleep depth, sleep duration and CAM in adolescents.

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0150

EFFECTS AND GENDER DIFFERENCES OF COMBINED HAND AND FOOT BATHING ON HEAT DISSIPATION, DAYTIME SLEEP STRUCTURE, SUBJECTIVE EVALUATION

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Introduction: Partial body bathing, such as foot bathing, is often used in nursing care and caregiving to improve sleep quality. However, previous studies have focused on subjective evaluation methods, and limited attention has been paid to objective evaluation and the physiological mechanisms underlying these bathing practices. We investigated the relationships among heat dissipation caused by combined hand and foot warm bathing, changes in body temperature, objective sleep structure, and subjective evaluation, as well as examining potential gender-related differences in these parameters among healthy subjects. This study was approved by the ethical committee of Saitama Prefectural University.

Methods: Thirty healthy adults (14 men, 16 women; mean age, 21.47±1.50 years) participated in a 2-day experiment involving a baseline condition (35 ºC) and warm bath condition (40 ºC) using a crossover design. In each condition, participants took a 15-minute hand and foot bath during the day, followed by 1-hour daytime polysomnography. We measured distal skin temperatures (hands and feet) and proximal skin temperatures (subclavian region and forehead) to determine the distal–proximal skin temperature gradient (DPG). Participants completed a visual analogue scale assessment for subjective evaluation after sleep. A registered polysomnographic technologist scored the sleep stages in 30-second epoch periods according to the Scoring Manual of the American Academy of Sleep Medicine.

Results: The DPG during bathing, after bathing, and during sleep were significantly higher in the warm bath than baseline condition ($p < 0.05$, respectively). The duration of slow-wave sleep (SWS) was longer in the warm bath condition (p=0.057), particularly at 20–40 minutes after bedtime (p=0.018). Warm baths improved subjective mental evaluation in women (mental fatigue: p=0.032, difficulty organizing thoughts: p=0.041) and subjective physical evaluation in men (arm sluggishness: p=0.049, backache: p=0.068). In the warm bath condition, stronger SWS was positively correlated with subjective mental evaluation improvement in women (mental fatigue: rho=-0.570, p=0.042, difficulty organizing thoughts: rho=-0.596, p=0.032).

Conclusion: A 15-minute combined hand and foot warm bath promoted heat dissipation and increased the duration of SWS. There were gender differences in the effects of warm hand and foot baths, with improved physical evaluation in men and improved mental evaluation scores in women.

Support (if any):

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0151

THE ASSOCIATION BETWEEN PHYSIOLOGICAL AROUSAL AND SLEEP EEG MICROSTRUCTURE IN YOUNG ADULTHOOD AND MIDDLE AGE

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Introduction: Sleep microstructure, characterized by distinct patterns of brain activity during different sleep stages, has been linked to various physiological and emotional processes. Slow-wave and rapid eye movement (REM) sleep are two prominent sleep stages that are known to influence physiological arousal through the parasympathetic nervous system activity. This study examines the association between microstructure features during slow-wave and REM sleep and heart rate deceleration (HRD) in response to emotional stimuli.
Methods: A total of 133 healthy young (ages 18–35) and middle-aged (ages 36–59) adults viewed a series of negative (e.g., a vicious looking snake) and neutral objects (e.g., a chipmunk), superimposed on neutral backgrounds (e.g., an avenue). During scene viewing, HRD was recorded to measure physiological arousal to negative and neutral scenes. All participants underwent one night of laboratory-monitored polysomnography (PSG), where REM count (total number of REMs across all REM sleep) and slow-wave count (total number of slow waves across all slow-wave sleep) were recorded.
Results: In middle-aged adults, a higher slow-wave count was associated with an increased HRD response to negative scenes (r=0.29, p=.051), but not neutral scenes (r=0.15, p=.319). In contrast, a higher REM count was linked to increased HRD responses to both negative (r=0.34, p=.044) and neutral scenes (r=0.40, p=.017). Correspondingly, a higher slow-wave count was associated with a steeper HRD response to negative versus neutral scenes (r=0.30, p=.044), while REM count did not predict this difference (r=0.07, p=.674). In young adults, however, neither slow-wave nor REM count were correlated with HRD responses (ps>.7).
Conclusion: Microstructure features during slow-wave and REM sleep may differentially influence physiological arousal responses in middle-aged but not younger adults. Slow-wave activities may enhance the discrimination between emotionally salient and neutral information, whereas REM sleep seems to exert a more generalized parasympathetic influence on physiological arousal. These age-related differences in the impact of sleep microstructure on physiological arousal highlight the importance of sleep for maintaining emotional well-being and longevity.
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0152

DREAM AFFECT AND SELF-REPORTED WAKING BEHAVIORAL RESPONSES: A LOGISTIC REGRESSION ANALYSIS

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Introduction: Dreams are hypothesized to influence waking behavior through affective dream experiences. However, it remains untested whether positive affect (PA) and negative affect (NA) in dreams predict approach and avoidance behaviors in waking life. This study examines the relationship between self-reported dream affect and approach or avoidance behaviors toward the subject of the dream.
Methods: A total of 218 participants provided dream reports and rated their dreams' positive affect and negative affect on a 0–10 scale. Participants also reported whether the dream influenced them to approach or avoid (or neither/unsure) the subject of their dream in waking life. Binary logistic regression models were fitted to predict approach and avoidance behaviors separately, using either dream PA or NA as predictors. PHQ-9 total scores (excluding the suicidality item) were included as a covariate to account for amotivational symptoms. The correlation between PA and NA was -0.78, so the predictors were modeled separately to avoid multicollinearity.
Results: For avoidance, NA was positively associated with avoidance behavior (OR = 1.61, 95% CI [1.08, 2.50], p =.025), while PA was negatively associated with avoidance (OR = 0.50, 95% CI [0.30, 0.78], p =.004). PHQ-9 scores were not significant predictors in either model. For approach, PA was positively associated with approach behavior (OR = 1.45, 95% CI [1.06, 2.01], p =.021). NA was not a significant predictor of approach (OR = 0.99, 95% CI [0.73, 1.36], p =.962), nor were PHQ-9 scores in either model.
Conclusion: Dreams with high negative affect and dreams with low positive affect were more likely to elicit self-reported avoidance behaviors in waking life, while dreams with high positive affect were more likely to promote self-reported approach behaviors. Negative dream affect was not related to approach behaviors. Depressive symptoms did not influence these relationships. These findings indicate that the affective content of dreams may shape waking behaviors and suggest distinct pathways for avoidance and approach.
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0153

EFFECT OF SLEEP DURING REDUCED TEMPO TRANSITION PERIODS ON READINESS AND HEALTH DURING HIGH STRESS NAVAL OPERATIONS

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Introduction: As U.S. Navy ships prepare for deployment, crews experience alternating periods (days to weeks) of fluctuating operational tempo, with in-port operations serving as recovery from and preparation for demanding at-sea missions. Poor sleep in-mission and its effects on operational readiness are well known and uncontrollable, so it is critical to understand the impact of sleep during in-port periods on subsequent in-mission readiness and health. This study examined relationships between sleep during in-port periods and markers of operational readiness and health during subsequent missions.
Methods: 309 personnel from eight Littoral Combat Ships participated in the study. Sailors were continuously monitored using commercial wearable sleep-trackers (Oura™ Ring, Generation 2 or 3) across 695 in-port operations and at-sea periods. For each

sailor, mean and standard deviation of total sleep time (TST) and sleep efficiency (SE) during each in-port period were computed, as well as mean of resting heart rate (HR, bpm) and heart rate variability (HRV; RMSSD in msec) across the subsequent at-sea mission period. Linear mixed-effects models with random intercept by individual, and age and gender covariates were used to assess relationships between sleep and number of in-port days with HR/HRV during subsequent high-stress mission periods.

Results: Analyses showed significant effects of daily TST in-port on subsequent HR and HRV responses (Fs > 8.9, ps <.003, R2 = 0.27-0.36), whereby more sleep in port associated with lower HR and higher HRV in mission. Analyses also revealed significant standard deviation of TST × in-port duration interaction effects (Fs > 5.0, ps <.03), whereby consistent TST in port associated with lower HR and higher HRV in mission, but longer periods of variable TST in port yielded increased HR and decreased HRV (all other effects, Fs < 2.4, ps >.13).

Conclusion: These data demonstrate the importance of sufficient sleep quantity and consistency during reduced-tempo transition periods as both recovery from and preparation for high-stress mission operations. This study aimed to clarify the value of sleep during in-port periods on personnel health and readiness at sea, potentially informing optimal timing and duration of transition periods to support operational readiness.

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0154

DO SELF-RATED STRESS LEVELS REFLECT GREATER SLEEP PROBLEMS? LINKING REPORTED STRESS TO SLEEP EFFICIENCY

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Introduction: The linkage between chronic stress and sleep disruption is often known, but the extent to which self-rated stress levels predict specific sleep-related problems remains unclear. This study examined whether individuals who self-report more severe stress demonstrate differences in total sleep time (TST), sleep efficiency (SE), and sleep architecture (i.e., time spent in each stage).

Methods: Data are from the Sleep Heart Health Study (SHHS, N=5,804). Stress was measured using the Sleep Habits Questionnaire (SHQ), a standardized self-report that measures the individual's sleep patterns and behaviors, as well as the severity of reported stress and its impact on sleep. Linear regression models evaluated the relationship between stress and various sleep parameters, including TST, SE, and time spent in Stages 1, 2, and 3–4 of sleep. Models were run both unadjusted and adjusted for covariates (age, sex, race).

Results: In unadjusted models, higher stress levels were associated with slightly longer TST (β=4.61, 95%CI [2.35, 6.87], p< 0.001, R^2=0.0028) and higher SE (β=0.93, 95%CI [0.56, 1.30], p< 0.001, R^2=0.0042). However, after adjusting for demographics, these associations were diminished and no longer statistically significant, TST (β= 1.83, 95% CI [-0.43, 4.09], p= 0.108, R^2=0.049) and SE (β= 0.33, 95% CI [-0.03, 0.68], p= 0.07, R^2=0.084), with overall model fit improving modestly after adjusting for covariates. Stress was not significantly associated with the percentage of time in Stage 1 (β= −0.06, 95%CI [-0.20, 0.08], p=0.43) or Stages 3–4 (~40.79 minutes, β= −0.60, 95%CI [-2.05, 0.85], p=0.42). A marginally positive association emerged for the percentage of time in Stage 2 (~59.67 minutes; β=0.40, 95%CI [0.00, 0.80], p=0.049).

Conclusion: The unadjusted models suggest that there is a positive association between an individual's self-reported stress and measures of objective sleep. However, the associations between self-reported stress and objective sleep measures are diminished after accounting for certain demographic factors. Future research should investigate interactions between perceived stress and other physiological or psychological factors within more diverse samples to better understand the nuanced stress-sleep relationship.

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0155

DEPRESSIVE AND DYSREGULATED: EXAMINING PERSONALITY FACTORS AMONG BEDTIME PROCRASTINATORS

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Introduction: Introduction. Bedtime procrastination, or the tendency to delay bedtime in the absence of external obligations, is consistently associated with insufficient sleep. Although technology use and difficulties with self-regulation are recognized as antecedents to this behavior, little is known of other psychological correlates of bedtime procrastination. Accordingly, the purpose of the present study is to explore the associations between bedtime procrastination and Five Factor Model personality traits (i.e., Neuroticism, Extraversion, Openness, Agreeableness, Conscientiousness). Further, we aimed to determine whether bedtime procrastinators had a unique pattern of associations with personality compared to evening chronotypes.

Methods: Method. 390 young adults (Mage = 24.4, SD = 6.5) completed a questionnaire battery consisting of self-reported measures of personality (NEO-PI-3) and chronotype (Morningness-Eveningness Questionnaire), followed by 14-daily assessments of bedtime procrastination and sleep diaries. Correlational and regression analyses were used to determine the associations among bedtime procrastination, chronotype, and personality scales (domain and facet scales).

Results: Results. Bedtime procrastination (r = -0.27), eveningness (r = -0.24), and later habitual bedtime (r = -0.21) were all negatively associated with Conscientious (ps < 0.001). Bedtime procrastination (r = 0.41, p < 0.001) and eveningness (r = 0.14, p = 0.005) were also associated positively with Neuroticism. Further, bedtime procrastination was negatively associated with Extraversion (r = -0.20, p < 0.001). Bedtime procrastination remained significantly associated with these domains after statistically adjusting for chronotype. Notably, bedtime procrastination was associated with all facets of the Conscientiousness, Neuroticism, and Extraversion domains, except for the Excitement Seeking facet of Extraversion. Facets of Openness (higher Aesthetics and Actions) and Agreeableness (lower Trust and Altruism, higher Modesty) were also associated with bedtime procrastination.

Conclusion: Discussion. Bedtime procrastination was associated with lower Conscientiousness, Extraversion, and higher Neuroticism. Notably, bedtime procrastination, but not chronotype, was negatively associated with Extraversion. These findings suggest that propensity to high negative affect and low positive affect (i.e.,

depressive tendencies) along with self-regulation difficulties may be relevant in the development of bedtime procrastination.
Support (if any):

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0156
LONGITUDINAL EXAMINATION OF THE EFFECTS OF CYCLIC BREATHING ON SLEEP: A PILOT STUDY

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Introduction: Breathwork techniques such as box breathing and paced breathing have been gaining popularity in clinical mental health settings as means to manage stress and enhance well-being. This study explored the impact of a novel controlled breathwork method, cyclic breathing, on sleep in college students. Cyclic breathing involves a double inhale (the first inhale being longer than the second) followed by a prolonged exhale. This is the first study to examine the effects of cyclic breathing on sleep.
Methods: 41 participants were randomly assigned to the intervention or control group and completed baseline measures of sleep (PSQI), anxiety, mood, and perceived control. Additionally, physiological measures—heart rate (HR), respiration rate, blood pressure (BP), and electrodermal activity (EDA)—were recorded while participants were exposed to an auditory stressor (a compilation of emergency and construction sounds played at 70-80dB for 5 minutes). Over the next 4 weeks, participants in the intervention group were instructed to practice cyclic breathing daily. Both groups completed modified CSD (Consensus Sleep Diary) daily. Finally, participants returned to the laboratory, where they were exposed to a different auditory stressor and instructed to breathe naturally and completed the same self-report measures as during the initial session and the CSM (Composite Scale of Morningness).
Results: Participants in the control group experienced declines in TST over the course of the study, unlike those in the intervention group. The intervention group also reported shorter SOL and lower TWT after one month compared to the control group. Physiological measures recorded during the second session indicated that the intervention group exhibited lower HR, lower EDA, and higher vagal tone when exposed to a stressor. The intervention did not significantly impact global self-reported measures of PSQI, stress, anxiety, or mood.
Conclusion: Our findings suggest that cyclic breathing may serve as a simple, accessible tool to enhance sleep and improve resilience to stress. Future research should explore factors influencing treatment adherence, as well as the potential for integrating cyclic breathing into broader interventions to support sleep health and overall well-being.
Support (if any): Support for this research was provided by St. Lawrence University.

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0157
LUCID DREAMING: A POTENTIAL OUTLET FOR AN EXTERNAL LOCUS OF CONTROL

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Introduction: Lucid Dreaming, defined by a preserved sense of insight, thought, and control while dreaming, has been previously linked to internal locus of control, resilience and problem-solving. Lucid Dreaming may be important for individuals to exert a sense of agency in both dreams and daily life. This study therefore investigates how locus of control relates to lucid dreaming frequency.
Methods: Participants (N = 348, 75% Women, M = 22, SD = 6.3) recruited through Oregon State University's SONA system completed a survey assessing their sleep, locus of control, and dreaming. A moderation analysis was conducted in SPSS to determine whether lucid dreaming identity moderates the association between locus of control and lucid dreaming frequency.
Results: Some participants (n = 38) met criteria for and self-identified themselves as lucid dreamers. Lucid dreaming frequency was significantly higher on average for identifying lucid dreamers (about once a month) compared to non-lucid dreamers (less than once a year). Results of the moderation analysis indicated a significant interaction between locus of control and lucid dreaming identity (b = -0.06, SE = 0.03, p = 0.04). Higher external locus of control was associated with greater lucid dreaming frequency for lucid dreamers.
Conclusion: External locus of control was associated with higher lucid dreaming frequency for lucid dreamers but not for non-lucid dreamers. These findings suggest that individuals who experience an external locus of control during the day may use lucid dreaming to reclaim a sense of agency. Future research should continue to investigate the mechanisms of lucid dreaming experiences, especially related to resiliency and problem solving. Additionally, future research should investigate lucid dreaming experiences in people with an external locus of control to better understand new ways people may utilize lucid dreaming productively.
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0158
EXAMINING THE IMPACT OF LATE VERSUS EARLY MEAL TIMING ON MOOD IN A RANDOMIZED CROSSOVER TRIAL

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Introduction: Among shift workers, there is an increased prevalence of mood-related disorders. Our previous work showed that simulated night shifts adversely affect mood. We have also shown that daytime meal intake only, versus daytime and nighttime, during simulated night shifts, mitigated such adverse effects. These observations indicate that aligning mealtime to the circadian system can benefit mood independent of mistimed sleep/wake schedules. However, whether changing the timing of food intake without changing the sleep/wake cycle influences mood regulation is unknown. We hypothesize that a later eating schedule worsens mood compared to an earlier one during day shifts.
Methods: We conducted a randomized, controlled, crossover trial (ClinicalTrials.gov NCT02298790) to determine the effects of late versus early eating while rigorously controlling nutrient intake, physical activity, sleep, and light exposure. We assessed eight mood perception measures hourly during two test days for both eating protocols to assess the effect of the first day and the fourth day of late eating. Mood was assessed using computerized visual analog scales (VAS). The main outcome for mood was "HAPPY" (from 0 sad to 100 happy). We also

assessed three measures for well-being ("SICK", "STRESSED", and "UNMOTIVATED"), and four for mental/physical sleepiness ("ALERT", "SHARP", "FRESH AS A DAISY", and "PHYSICALLY EXHAUSTED"). Measures were analyzed by linear mixed model.

Results: 15 participants (mean±SD; age, 36.06±10.8 years; 4 women; BMI, 29.05±2.47 kg/m2) completed this study and contributed mood data. During the test days, late eating decreased the daily average rating of "HAPPY" (p=0.0074). Consistently, late eating increased the daily average rating of "SICK" (p=0.0043). However, late eating decreased ratings of "UNMOTIVATED" (p=0.0003) and "PHYSICALLY EXHAUSTED" (p=0.0313). There was an interaction effect of protocol (late vs. early eating) and test day (first vs. fourth day) for "FRESH AS A DAISY" (p=0.0346) and "ALERT" (p=0.0021), being greater for late eating during the fourth day. The other measures were not significantly influenced.

Conclusion: These findings demonstrate that meal timing may affect mood. Future studies are required to examine if longer-term changes in meal timing affect mood and determine underlying mechanisms.

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0159

CARDIAC EVENT-INDUCED PTSD SYMPTOMS LINK TO CONTINUOUS HEART RATE IN CORONARY ARTERY DISEASE PATIENTS, INDEPENDENT OF SLEEP AND DIURNAL VARIATION

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Introduction: Elevated posttraumatic stress symptoms (PSS) affect among ~13% of coronary artery disease (CAD) patients after acute cardiac events. PSS have been separately associated with short sleep duration and elevated sympathetic nervous system activation (SNA), both of which increase risk for recurrent cardiovascular events. We investigated the association between PSS and heart rate (HR), indexing SNA, in the daily lives of recently discharged cardiac patients, independent of sleep and diurnal HR variation.

Methods: Patients were enrolled in the emergency room of a large urban hospital, had confirmed acute coronary syndrome (ACS) or prior CAD with suspected ACS, were taking >1 cardiovascular medication, and had elevated or non-elevated PSS (PTSD Checklist for DSM-5 [PCL] score ≥20 or ≤5) 1 month post-discharge. Participants completed two weeks of 24-hour electrocardiography monitoring (ZioPatch). Sleep and physical activity were monitored with actigraphy. Beta-blocker adherence was assessed via electronic pill caps. Three-level multilevel cosinor wave models tested associations between PSS and HR, adjusting for diurnal HR variation, sleep episode length, and other factors known to influence HR: physical activity, beta-blocker adherence, and demographic/medical covariates.

Results: Among 116 enrolled patients (34.4% women, 74% Hispanic, mean age 61 ± 11 years; 293,897 observations), 36.2% had elevated PSS (mean PCL = 33.1; non-elevated PSS mean PCL = 1.2). In adjusted models, there was no significant difference in HR for participants with elevated (77.1 bpm) vs. non-elevated PSS (73.6 bpm, p =.11). However, reporting 10 points higher on continuous PCL score (range 0-80) was associated with a 1.6 bpm higher HR (95% CI [0.44, 2.82], p =.007). Further, sleep episode length (-.28 bpm/additional hour, p =.0002) and diurnal variation (p =.0002) were related to HR but did not moderate the PSS effect (p >.21).

Conclusion: Early cardiac-induced PSS are associated with elevated HR, independent of sleep episode length and diurnal HR rhythm, physical activity, beta-blocker adherence, sex, age, race, cardiac risk, and medical comorbidities. Interventions targeting PSS after cardiac events as well as sleep-specific interventions may reduce chronic sympathetic arousal and thus cardiovascular risk in CAD patients.

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0160

IMPACT OF CIRCADIAN PHASE AND DISTINCTIVENESS ON FATIGUE AND EXCESSIVE DAYTIME SLEEPINESS: A NATIONWIDE STUDY

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Introduction: Chronotype influences daily functioning and sleep quality, often assessed through self-reported questionnaires. Oginska's Chronotype Questionnaire (ChQ) introduces a two-dimensional approach, evaluating circadian phase and distinctiveness (or amplitude). While strong circadian distinctiveness is linked to poorer sleep quality, its association with daytime fatigue and sleepiness remains underexplored. This study aims to examine the associations between chronotype dimensions and daytime functioning, focusing on both circadian phase and distinctiveness.

Methods: We analyzed 1,779 participants (mean age: 43.1 ± 12.9 years; range: 19–65 years; 918 males) from a 2018 nationwide Korean survey on sleep and headache. Chronotype was assessed using the ChQ, classifying participants as morning, intermediate, or evening types based on the 25th and 75th percentiles of the Morningness-Eveningness score, and as strong or weak distinctiveness based on the median Distinctiveness score. Fatigue and excessive daytime sleepiness (EDS) were measured using the Fatigue Severity Scale (FSS) and the Epworth Sleepiness Scale (ESS), respectively. Multivariable logistic regression models were used to analyze associations between chronotype dimensions and daytime functioning, adjusting for potential confounders.

Results: Among participants, 27.3% were classified as morning type, 48.5% as intermediate type, and 24.2% as evening type. Additionally, 60.20% showed strong circadian distinctiveness. Significant fatigue (FSS ≥ 36) was observed in 501 participants (28.2%). On multivariable analysis, morning chronotype

was associated with lower odds of fatigue (OR [95% CI], 0.572 [0.439–0.746], p< 0.001), while strong distinctiveness was associated with higher odds (1.362 [1.097–1.689], p=0.005). Combining both dimensions, strong and weak morning chronotypes had lower odds of fatigue compared to intermediate types (0.671 [0.492–0.916], p=0.012 and 0.439 [0.293–0.657], p< 0.001, respectively). EDS (ESS ≥ 11) was reported in 12.3% of participants. Morning chronotype was associated with lower odds of EDS (OR [95% CI], 0.668 [0.466–0.957], p=0.028), while strong distinctiveness was linked to higher odds (1.685 [1.236–2.298], p=0.001). Combining both dimensions, only weak morning chronotype showed significantly lower odds of EDS compared to intermediate types (0.505 [0.287–0.889], p=0.018).
Conclusion: This study highlights the importance of evaluating both circadian phase and distinctiveness in chronotype research. Integrating these dimensions provides a more comprehensive understanding of chronotype's impact on daytime functioning.
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0161

THE ASSOCIATION BETWEEN RACISM AND INSOMNIA AMONG ASIAN AMERICANS

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Introduction: Studies have found that experiences of racial/ethnic discrimination may adversely affect sleep outcomes. However, no studies have examined the association between anti-Asian racism stemming from the COVID-19 pandemic and its impact on insomnia among Asian Americans.
Methods: The cross-sectional study consisted of 256 Chinese-, 256 Korean- and 267 Vietnamese Americans ages 30 years or older residing in Southern California. Anti-Asian racism was assessed by using a 6-item scale that included the following questions. How often have you: (i) witnessed someone blaming Asian people for the Coronavirus pandemic?; (ii) been treated differently or mistreated because someone suspected you of having Coronavirus?; (iii) avoided wearing a mask because you are worried about experiencing anti-Asian racism?; (iv) avoided going out in public because you are afraid of someone committing a crime against you because you are Asian?; (v) been subjected to racial slurs or jokes in person or online because you are Asian?; and (vi) How often have other people acted uncomfortable around you or avoided you because you are Asian? The Anti-Asian racism scale had high internal consistency (Cronbach's alpha=0.82). Responses were summed to create a total score. Insomnia was assessed by using the Insomnia Severity Index and dichotomized as moderate/severe insomnia (Score ≥ 15) vs. no/subthreshold insomnia.
Results: Mean age of the study population was 55 year and 56% identified as female sex. Fifteen percent of the study population reported moderate/severe insomnia. One unit increase in the anti-Asian racism scale was associated with 2.18 times the odds of having moderate/severe insomnia (95% Confidence Interval (CI): 1.40-3.38), adjusting for age, sex, Asian subgroup, marital status, education employment status, income, and type of health insurance. When depression (assessed by CES-D) was further adjusted, the association attenuated (OR=1.60, 95% CI: 1.00-2.56). In an exploratory analysis, Korean group had the highest association (OR=4.19; 95% CI: 1.92-9.12), followed by Vietnamese (OR=4.00; 95% CI: 1.50-10.70), and Chinese (OR=0.98; 95% CI: 0.44-2.22) (interaction p-value= 0.05).
Conclusion: Anti-Asian racism associated with the COVID-19 pandemic was significantly associated with insomnia. Future prospective analysis is needed to understand the causal pathways linking anti-Asian racism and insomnia among Asian Americans.
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0162

THE ASSOCIATION BETWEEN PERCEIVED STRESS AND INSOMNIA AMONG ASIAN AMERICANS

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Introduction: Studies have found that perceived stress is associated with sleep outcomes. However, there is a lack of data examining the association between perceived stress and insomnia among community-dwelling Asian Americans. We investigated the association between perceived stress and insomnia among 779 community-dwelling Asian Americans.
Methods: The cross-sectional study consisted of 256 Chinese-, 256 Korean- and 267 Vietnamese Americans ages 30 years or older residing in Southern California. We assessed perceived stress using a 4-item Perceived Stress Scale (PSS) (Range 0-16; Cronbach's alpha = 0.62). A summed continuous total score was calculated. Insomnia was assessed by using the Insomnia Severity Index (ISI) and dichotomized as having moderate/severe insomnia (ISI score ≥ 15) vs. no/subthreshold insomnia. Logistic regression analysis examined associations between perceived stress and insomnia.
Results: Mean age of the study population was 55 years, and 44% identified as male sex. In total, 15% of the study population met the criteria for moderate/severe insomnia. One unit increase in the perceived stress scale was associated with 1.20 times higher odds of moderate/severe insomnia (95% Confidence Interval (CI): 1.10-1.30), adjusting for age and sex. When this association was further adjusted for the Asian subgroup, marital status, education, employment status, income, and type of health insurance, the association did not change substantively (OR=1.16, 95% CI:1.06-1,28). However, with further adjustment for depression (assessed by the Center for Epidemiologic Studies Depression Scale (CES-D)), the association was no longer significant (OR = 0.99; 95% CI: 0.88-1.10). This association did not differ by the Asian subgroup.
Conclusion: Higher levels of perceived stress were associated with higher odds of insomnia among Asian Americans after adjusting for sociodemographic variables. Adjustment of depression resulted in attenuation of the association. Whether depression mediates or confounds the association between perceived stress and insomnia should be examined in the prospective analysis.

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0163

SLEEP QUALITY AND SOCIAL INTERACTION: THE MODERATING ROLE OF ATTACHMENT STYLE

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Introduction: Longitudinal research has consistently linked poor sleep health (e.g., short sleep duration, poor efficiency, and irregular sleep) to the onset of psychiatric symptoms and disorders. One important mechanism thought to be responsible for these associations is altered emotional and social functioning, such as decreased motivation for social engagement, fewer peer relationships, and lower positive affect. However, individual differences that may exacerbate the effects of poor sleep are still largely unexplored. Anxious attachment (difficulties with trust and low self-esteem in relationships) and avoidant attachment (negative view of others, avoidance of emotional intimacy) are related to more interpersonal conflict and altered emotional experiences in relationships, and may result in exaggerated sleep-related socioemotional impairment. The current study examined whether attachment moderates the relationship between sleep quality and daily socioemotional experiences.
Methods: Participants included 68 young adults who completed the Pittsburgh Sleep Quality Index, Experiences in Close Relationships-Revised questionnaire, and daily self-reports capturing experiences of social emotions and social approach/avoidance behaviors over two weeks.
Results: Preliminary analyses indicated that anxious attachment was related to poorer sleep quality (r = -.28, p <.02). Poorer sleep quality was also related to fewer daily social approach behaviors (r = -.28, p =.02), and marginally more daily reports of guilt/shame, social rejection/social anxiety, and less feelings of love/affection towards others (p's =.07-.08). Regression analyses indicated that attachment anxiety moderated the effect of sleep quality on daily feelings of envy/jealousy (b = -.22, SE =.09, p =.02). Poor sleep quality was associated with more daily envy/jealousy (b =.55, SE =.27, p =.04), but effect was only significant for those with high levels of attachment anxiety (p =.01).
Conclusion: Results suggest that poor sleep quality is related to anxious attachment and daily social behaviors/emotions. In addition, sleep disturbances are related to more envy/jealousy in social relationships, but only for those with higher trait relationship anxiety. This study provides preliminary evidence that the effect of sleep on social emotions may depend on individual differences in relationship styles, and that those with insecure attachment may be most at risk of the socioemotional effects of poor sleep.
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NO ADDED BENEFIT OF TARGETED MEMORY REACTIVATION DURING NAPS ON NEGATIVE MEMORY RESCRIPTING

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Introduction: Memories for negative life experiences play a key role in our mental health and are processed by the sleeping brain. Here, we attempted to bias the sleeping brain towards processing a more adaptive version of a negative autobiographical memory during a nap using targeted memory reactivation (TMR).
Methods: Forty-seven participants (23.6±5.5 years old; 68% female) provided details about one negative and one neutral life experience and provided self-report ratings on arousal to each memory (0=very calm; 10=very aroused) and distress to the dominant emotion associated with their negative memory (0=no distress; 10=extreme distress). They completed an imagery rescripting intervention for their negative memory during which they heard a repetitive sound cue and a similar procedure for their neutral memory during which they heard a different cue. All participants were then allowed a 2-hour PSG-monitored nap opportunity in the lab and were randomized to hear either the sound cue associated with their negative (n=22) or neutral (n=18) memory (i.e., to have one memory "targeted" for reactivation); participants who got less than 15 minutes of non-REM sleep were reclassified into a "wake" group (n=7). After the nap and one week later, participants repeated arousal and distress ratings.
Results: Arousal to both negative and neutral memories decreased after the interventions and nap period (β=-1.64, p< 0.0001) and remained lower one week later (β=-1.51, p< 0.0001), but this did not depend on whether the memory was cued via TMR. Similarly, emotional distress decreased after imagery rescripting (β=-2.98, p< 0.0001) and decreased further after the nap period (β=-1.00, p=0.04), but this reduction did not depend on TMR cueing. Participants in the wake group appeared to show a different pattern in which distress to dominant emotions increased after the nap period, but this difference was not significant in the current sample.
Conclusion: TMR did not enhance the arousal- and distress-reducing effects of imagery rescripting, but a nap did appear to further reduce emotional distress. Further research on the benefits of sleep and TMR on processing negative autobiographical memories is warranted.
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0165

ACTIGRAPHY-BASED SLEEP PARAMETERS AND HEALTH CORRELATES IN VETERANS WITH GULF WAR ILLNESS

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Introduction: During military service, sleep/wake patterns are often altered due to irregular or unpredictable operational schedules, non-conducive sleeping conditions (e.g., threatening environments), and/or time zone changes. The lack of consistency in sleep-wake patterns during military service may precipitate sleep disturbances post-military. This analysis examined the associations between objective sleep parameters and self-reported measures of health in veterans with Gulf War Illness (GWI).
Methods: Participants included 86 veterans with GWI (Mage= 54.1±7.1 y, 87.2% male) who wore an actigraphy monitor on

their non-dominant wrist for 24 hours per day for seven consecutive days during a baseline assessment. Actigraphy data were manually scored using the manufacturer's software to derive parameters of sleep timing, duration, and quality/continuity (time in bed [TIB], midpoint of sleep, total sleep time [TST], sleep efficiency [SE], wake after sleep onset [WASO], number of awakenings (NWAK), motor activity counts [MAC], and mean motor activity during TIB [AMEAN]). Participants completed several questionnaires: Patient Health Questionnaire (depression), Posttraumatic Symptom Checklist (PTSD), PROMIS® Adult Short Form v1.0 – Pain Interference, and Pittsburgh Sleep Quality Index. Associations between objective sleep parameters and self-reported measures of health were examined using Spearman's rank correlations.
Results: Many of the participants (n=62; 72.1%) slept less than six hours per night with some sleeping less than five (n=36; 41.9%). Participants on average slept 5.3±1.6 h (SD), had 27.6±10.4 awakenings, 83.8±33.2 min of WASO, and a SE of 72.7±8.3% per night. Spearman correlations revealed that MAC and AMEAN were positively related to self-reported sleep quality (rho= 0.35, 0.33, respectively), depression (rho= 0.27, 0.30), PTSD (rho= 0.22, 0.28), and pain interference (rho= 0.26, 0.24; p< 0.05 for all). WASO and SE were also significantly related to subjective sleep quality (rho= 0.27, -0.31; p< 0.01).
Conclusion: Objective parameters of poor sleep quality and continuity (MAC, AMEAN, WASO, SE) were associated with poor self-reported sleep quality and greater symptoms of depression, PTSD, and pain interference in veterans with GWI. Future research will assess variability in sleep timing and profiles of sleep characteristics and their impact on functional health outcomes.
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0166
RELIGIOUS INVOLVEMENT AND SLEEP HEALTH IN MIDDLE-AGED AND OLDER ADULTS

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Introduction: Previous studies found that religious involvement, both public (e.g., religious attendance) and private (e.g., prayer) activity, is associated with better sleep, including increased sleep duration and quality. Furthermore, some evidence suggests that this connection may be modified by depressive symptoms. However, little is known about how religiosity is associated with other aspects of sleep health, such as global sleep health, sleep regularity, and insomnia symptoms, and whether anxiety symptoms impact this association. This study sought to explore how public and private religious involvement are associated with sleep health factors and whether anxiety symptoms moderate these associations.
Methods: Participants (N=370) were middle-aged and older adults (Mage=62.8, 60.3% female) who participated in an online study that included questionnaires measuring religious attendance, private religious involvement, global sleep health, insomnia symptoms, sleep regularity, daytime sleep-related impairment, and anxiety symptoms. Bivariate correlations examined direct associations between variables while SPSS PROCESS macro was used to determine whether anxiety moderated associations between religiosity and sleep.
Results: More religious attendance was correlated with poorer sleep health, higher insomnia symptoms, lower sleep regularity, and increased daytime sleep-related impairment (all p's <.01). Higher private religious involvement was correlated only with increased sleep regularity (p <.01). Anxiety moderated the associations between religious attendance and sleep factors such that those with high anxiety symptoms showed a positive association between religious attendance and better sleep, while those low in anxiety symptoms had a negative association. Similarly, anxiety moderated the association between private religious involvement and sleep regularity, such that those high in anxiety symptoms had a significantly stronger positive association than those low in anxiety symptoms.
Conclusion: Overall, public religious involvement was associated with poor sleep, while private involvement was associated with better sleep health. Anxiety may impact the religiosity-sleep association as those high in anxiety symptoms had a positive association between religious involvement and sleep health, while those low in anxiety had the opposite, a negative association. These results suggest that different factors of religiosity may be uniquely associated with aspects of sleep health, and that anxiety may be an important underlying factor of this association.
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0167
EVOLVING REM SLEEP ABNORMALITIES FOLLOWING EXPERIMENTAL TBI

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Introduction: Disrupted sleep is a common symptom following traumatic brain injury (TBI). It can last for months and impair the recovery process. Sleep disturbances can also contribute to memory dysfunction and induce adverse changes in cognitive performance. Understanding the mechanisms of sleep abnormalities triggered by TBI is essential for managing functional recovery and improving the quality of life in patients with TBI.
Methods: Continuous video EEG monitoring was used to investigate sleep patterns after experimental TBI. Injury Model: Controlled cortical impact (CCI) injury was induced in a large animal model (swine). It produced clinically relevant focal and diffuse pathologies previously described in human post-mortem TBI tissue. Electrodes Implantation: MRI-based Brainsight neuronavigation system was used to guide 64-channel silicon depth electrodes into the ipsilateral cortex and hippocampus of pigs two (n=3) and four (n=1) months after CCI and sham (n=2) injuries. Four skull ECoG screw electrodes were also placed on the contralateral and ipsilateral hemispheres to the CCI injury site. Wireless EEG System: Neuralynx CUBE2 head stage was used to acquire 30kHz EEG signals and wirelessly record them with the Digital Lynx 4SX system. Sleep Analyses: 2D pose estimation software YOLO was used for video-based activity tracking in home cages. Animals' velocity synchronized with EEG was used to identify sleep-wake cycles. The measure of animals' movement and spectral analyses of cortical delta, cortical gamma, and hippocampal theta oscillations were used to stage sleep (awake, NREM, and REM).
Results: Two months after the CCI injury, an increase in animals' movement during sleep was identified. Moreover, tiny twitches in the animals' bodies were present during REM sleep. Additionally, sharp-wave ripples and high-frequency oscillations,

hallmark hippocampal oscillations present only during awake state and NREM sleep, were also present during REM sleep two months after the CCI injury. These symptoms were even more pronounced at four months after the CCI injury.
Conclusion: These results may indicate the development of parasomnias (REM sleep without atonia) after TBI. Further investigation will be vital to understand how progressive changes in REM sleep might evolve in parallel with other TBI-associated pathologies.
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0168
THE MEDIATING ROLES OF DYSFUNCTIONAL BELIEFS AND PRE-SLEEP AROUSAL IN THE SELF-COMPASSION-SLEEP QUALITY LINK

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Introduction: Sleep disturbances affect a significant portion of college students in the United States, with 60% meeting the criteria for poor sleep quality (Becker et al., 2018). Identifying modifiable psychological factors, such as self-compassion, to alleviate these issues is essential. While self-compassion has emerged as a promising resource linked to improved sleep, the cognitive pathways contributing to this association remain unclear. Theoretical models of insomnia emphasize the role of dysfunctional interpretive processes—including unrealistic attitudes, beliefs, and expectations about sleep—and psychophysiological arousal as mechanisms maintaining sleep disturbances (Lundh & Broman, 2000; Harvey, 2002). For instance, poor sleepers often engage in maladaptive strategies, such as thought suppression, worry, rumination, and imagery control, which perpetuate arousal and interfere with sleep onset and maintenance (Espie et al., 2006). Self-compassion, characterized by treating oneself with kindness and understanding during difficult times (Neff, 2003), may mitigate dysfunctional control strategies through its facilitation of adaptive coping (Allen & Leary, 2010) and emotion regulation strategies, such as tolerating negative emotions (Diedrich et al., 2017). Building on models emphasizing dysfunctional cognitive processes in sleep disturbances, this study examined self-compassion as a modifiable factor in these pathways.
Methods: 221 undergraduate students (M = 19.88, SD = 1.50) completed measures of self-compassion, dysfunctional sleep beliefs and attitudes, pre-sleep arousal, and sleep quality.
Results: A serial mediation model examined whether dysfunctional sleep beliefs and attitudes (M1) and pre-sleep arousal (M2) sequentially mediated the relationship between self-compassion (X) and poor sleep quality (Y). Self-compassion had an indirect association with poor sleep quality through dysfunctional sleep attitudes and beliefs and pre-sleep arousal (X→M1→M2→Y; completely standardized indirect effect = -.05, SE =.01, 95% CI [-.08, -.02]). The non-significant direct effect of self-compassion on sleep quality with mediators suggests full serial mediation (direct effect = -.02, p =.772, 95% CI [-.66,.50]).
Conclusion: Self-compassion may reduce unrealistic expectations and maladaptive beliefs about sleep, lowering cognitive and physiological arousal before bedtime and ultimately improving sleep quality. Although the observed effect size was small, these findings highlight the potential of self-compassion as a modifiable factor in targeted interventions addressing cognitive and psychophysical sleep disruptions.
Support (if any): n/a

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0169
CAFFEINE AND BRIGHT LIGHT EFFECTS ON MOOD OUTCOMES DURING EVENING HOURS

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Introduction: Nighttime caffeine administration and bright light exposure has been shown to reduce melatonin levels, increase core body temperature, and increase alertness and performance. The effects of nighttime caffeine and bright light exposure on mood however is less understood. Here we examined the effects of evening caffeine administration and bright light exposure individually and in combination on mood outcomes in the evening hours.
Methods: Five healthy adults (3 females) aged (24±4 years) participated in a randomized, double-blind, placebo-controlled, crossover research design. Participants were studied in the Sleep and Chronobiology Laboratory on four separate visits. Following an initial constant routine to assess circadian phase, participants were assigned to one of four treatment conditions including caffeine (2.9 mg/kg) or placebo (rice-filled powder) 3h prior to habitual bedtime plus 3h of bright (~3000 lux) or dim light (1.5 lux) exposure starting at habitual bedtime. Mood was assessed including 17 mood variables, using Visual Analog Scales (VAS) during treatment.
Results: Participants reported being more interested and more friendly when receiving caffeine versus placebo ($p < 0.05$) and during exposure to dim versus bright light ($p < 0.05$). Furthermore, participants reported feeling less sad during the dim-light-caffeine versus the dim-light-placebo ($p < 0.05$) and bright-light-caffeine ($p < 0.05$) conditions.
Conclusion: These findings show that mood outcomes were generally more positive (i.e., more interested, more friendly, and less sad) after receiving caffeine in the evening hours, but that mood was generally less positive during exposure to bright light. Our findings for caffeine are consistent with prior research showing that caffeine elevates mood during daytime and nighttime. Previously, bright light has been shown to have beneficial effects on mood during the morning/daytime. Our findings suggest that the effects of bright light exposure on mood may be dependent upon the biological time of day, with evening exposure being less favorable. The latter is consistent with epidemiological findings that artificial light at night is associated with mood disorders.
Support (if any): NIH HL081761 and TR001082

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0170
CHRONIC STRESS-MEDIATED DYSREGULATIONS OF BASAL FOREBRAIN GABAERGIC NPAS1+ NEURONS AND IMPLICATIONS IN STRESS-INDUCED SLEEP AND PSYCHIATRIC DISEASES

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Introduction: American Servicemembers are routinely exposed to prolonged periods of intense stress during deployment and combat exposure. These stressors are critical risk factors for the pathogenesis and severity of psychiatric disease—a leading cause of permanent disability within VA that significantly increases risk of suicide. However, the identity of the regions, cell types, and mechanisms integrating the effect of stress on sleep disruption remain poorly characterized, thus hindering the development of effective treatments. I have previously found that BF Npas1+ neurons project to numerous brain regions implicated in arousal, reward, and the stress response, and disrupt normal sleep behavior and oscillatory activity when chemogenetically activated, and are therefore potential mediators for stress-induced sleep disruption and psychiatric disease.
Methods: I explored this using a chronic multimodal stress paradigm (10 days, 4h/day) in mice. Mice were implanted with EEG and EMG electrodes to monitor sleep behavior and oscillations before and during the 10 days of stress. Stress-sensitive mice were identified by a reduction in their sucrose preference. Immunohistochemistry was performed in basal forebrain tissue for the transcription factor NPAS1 and the immediate early gene cFOS.
Results: Preliminary findings indicate that Npas1+ neurons in the basal forebrain (BF) are potently activated by stress (30-40+% cFOS-expressing), correlating with disruptions in sucrose preference. These stress-sensitive mice tended to spend less time awake (n=8, p=0.13) and in NREM sleep (p=0.09) during the light-(active) period, with more dramatic shifts seen in the dark-(inactive) period with wake ($p< 0.05$) and NREM sleep ($p< 0.01$). Individual wake and NREM bouts tended to be less frequent after stress. Furthermore, slow and delta wave decreased following stress, correlating to the degree of increased NREM sleep. Sleep-spindle density also significantly decreased following chronic stress. Notably, the proportion of cFOS-expressing Npas1+ neurons correlates with the post-stress change in wake (p=0.07), and with NREM (p=0.04) and REM sleep (p=0.01).
Conclusion: I conclude Npas1+ basal forebrain neurons are potently activated by stress and may play a key role in stress-induced sleep and psychiatric illness.
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0171

EFFECTS OF STRESSFUL LIFE EVENTS AND EMOTIONAL SUPPORT ON INSOMNIA AMONG RURAL AND URBAN LATINOS

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Introduction: Sleep difficulties are prevalent among Latinos in the United States. Individuals with insomnia have been shown to experience a greater number of stressful life events compared to those without insomnia, yet social support may be a counter-balancing factor. The purpose of this study was to examine associations between stressful life events and emotional support and insomnia.
Methods: A population-level sample (N = 603) from DORMIR that focuses on the causes of insufficient sleep in rural and urban areas of Florida was utilized. Stressful life events were assessed based on the number of major stressors experienced within the last year (e.g. marital separation, loss of spouse). Emotional support was measured using the PROMIS Emotional Support 4, with higher scores indicating greater perceived emotional support. Severity of insomnia was assessed using the Insomnia Severity Index (ISI), where higher scores reflect more severe insomnia. Linear regression analyses were performed to assess the effects of both stressful life events and emotional support on ISI scores, adjusting for covariates including age, gender, education, race, Hispanic ethnicity, marital status, employment, income, and language.
Results: The number of stressful life events was positively associated with ISI score ($\beta = 1.05$; 95% Confidence Interval [CI]: 0.48 to 1.62; $P < 0.001$), while emotional support was negatively associated with ISI score ($\beta = -0.30$; 95% CI: -0.42 to -0.17; $P < 0.001$). Spanish-speaking individuals are associated with significantly higher ISI scores compared to English-speaking individuals ($\beta = 1.70$; 95% CI: 0.69 to 2.69; $P < 0.001$).
Conclusion: Stressful life events and emotional support are key predictors of insomnia among rural and urban Latinos, with more stress associated with higher ISI scores and greater social support associated with lower ISI scores. Spanish-speaking individuals tend to have higher levels of insomnia severity compared to English-speaking individuals. Further studies are needed focusing on whether other factors mediate the effects of stress and emotional support on insomnia.
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0172

ANXIETY AND SOCIAL SUPPORT ASSOCIATE WITH INSOMNIA AMONGST ENGLISH AND SPANISH SPEAKING HISPANICS IN FLORIDA

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Introduction: Sleep health is critical for overall health and mental well-being. Both anxiety and social support can influence one's sleep quality, as high levels of anxiety and inadequate

levels of social support are associated with worsening sleep outcomes leading to declining insomnia levels. There is a lack of research and literature regarding the association between anxiety and social support on insomnia as it pertains to the Insomnia Severity Index (ISI). This study aims to evaluate the associations of anxiety and social support with insomnia amongst English and Spanish speaking Hispanics in Florida.
Methods: Survey data were collected from Determinants, Outcomes, Responses, and Markers of Insufficient Sleep in Rural-Urban (DORMIR) study, a cross-sectional study at the University of Miami Miller School of Medicine. A linear regression analyses was built to regress ISI on the PROMIS Emotional Distress Anxiety (Short Form 8a) and PROMIS Emotional Support Scale (Short Form 4a), adjusting for age, sex, race/ethnicity, Hispanic origin, marital status, employment, education, income, Body Mass Index (BMI), and whether the respondent participated using the English or Spanish version of the questionnaires among 603 participants.
Results: The average age amongst the English and Spanish speaking participants was 41.57 ± 16.65 with a total of 223 individuals in the Spanish-speaking sample and 380 in the English-speaking sample. The study has a total of 399 (66.2%) females and 204 (33.8%) males. A one-unit increase in anxiety scores was associated with a 0.32 increase in ISI scores (b [95% Confidence Interval (CI)]: 0.32 [0.24, 0.39], p< 0.001). A one-unit increase in social support was nearly associated with a -0.11 decrease in ISI scores (b [95% CI]: -0.11 [-0.23, 0.01], p=0.069).
Conclusion: Higher anxiety levels are associated with worsening ISI scores, while an increase in social support scores may associate with lower ISI outcomes amongst the English and Spanish speaking sample. Anxiety and social support independently were associated with ISI outcomes. Additional research is needed to assess the relation between anxiety levels and social support to enhance overall ISI scores and overall sleep quality.
Support (if any): R01HL152453, R01HL142066, R01HL095799, R01MD016236, R01MD016236-03S1, R01MD004113, R01AG072644, R01AG067523, R01AG075007, U19AG074865, R56AG072547, R01AG072547, OT2OD032581, R21AA029201

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0173

FOSTER PARENT EMOTIONAL INVESTMENT ASSOCIATED WITH SLEEP HEALTH IN THEIR CHILDREN

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Introduction: Healthy foster parent-child relationships are critical for children's overall health (Frosch et al., 2021). With parents playing a significant role in children's bedtime routines and sleep health, understanding foster parents' emotional investment in children under their care is important. Emotional investment includes foster parents' willingness to commit to the child's health and wellbeing and think of them as part of their family. While studies have examined sleep health and bedtime routines in this child population, foster parents' emotional investment has been unexplored. This study examined associations between foster parents' emotional investment and children's sleep health.
Methods: Foster parents (n = 218) were recruited to complete a Qualtrics questionnaire through open/closed Facebook groups for US foster parents (focus on child ages 3-11). The Foster Parent Emotional Investment Scale (FPEIS) was developed to measure foster parents' emotional investment in the children under their care. Similarly, the Revised Inventory of Parental Attachment (RIPA) Trust subscale assessed trust between the parent and child (Johnson et al., 2003). Sleep health was assessed using the PROMIS Sleep Disturbance, Bedtime Routines Questionnaire (BRQ), sleep quality scale, and the use of sleep comfort objects (Forrest et al., 2018). Associations between sleep health and emotional investment was assessed.
Results: The 13-item FPEIS scale had strong internal consistency (Cronbach's alpha =.70). Pearson correlations revealed that higher parental emotional investment was associated with consistent bedtime routines (r =.42), fewer night wakings (r = -.53), higher sleep quality (r =.45), fewer sleep problems (r = -.39), and reduced need for sleep comfort objects (r = -.34), p's <.01. Additionally, greater parental trust correlated with consistent bedtime routines (r =.47) and fewer night wakings (r = -.36), p's <.01.
Conclusion: The FPEIS scale demonstrates the importance of foster parents' emotional investment in foster children and its association with children's sleep health. Moving forward, interventions related to emotional investment and sleep health education programs are necessary to ensure that foster families understand their roles in children's health and wellbeing and have the tools to establish healthy sleeping habits to decrease sleep challenges for children in the foster care system.
Support (if any):

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0174

SLEEP AND EMOTIONAL MEMORY OF PRESCHOOL CHILDREN ADOPTED FROM FOSTER CARE: A COMPARISON WITH A COMMUNITY SAMPLE

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Introduction: Sleep is an active state that plays a critical role in memory consolidation, learning, and emotional processing. Children exposed to early-life adversity/trauma demonstrate disproportionately elevated rates of sleep disturbance, which contribute to greater risk for development of cognitive and emotional problems. Yet, sleep and cognition among children who experience early adversity/trauma remains understudied. This study examined, for the first time, objectively measured differences in sleep and sleep-related emotional memory between children with and without foster care histories.
Methods: Data were collected from two groups of 3- to 5-year-old U.S. children (M= 4.38 years, SD=0.78 years): children adopted from foster care (N=32) and a community sample (N=35). Demographic variables did not significantly differ between the two groups. Sleep was measured objectively using actigraphy and subjectively via Children's Sleep Habits Questionnaire (CSHQ), and the Nap Transition Questionnaire (NTQ). To assess emotional memory, participants remotely viewed a video story containing neutral and negative elements and completed evening (immediate) and morning (delayed) recall tasks. Adverse childhood experiences (ACEs) were assessed using the ACE questionnaire.
Results: As expected, the adopted sample experienced more ACEs (M=3.9; Range: 1-9) than the community sample (M=0.17; Range: 0-2). Children adopted from foster care had significantly shorter actigraphy-based sleep duration (t(45)=2.1004, p<.05)

and worse sleep quality, including higher WASO (t(45)=-3.0326; p<.01), and lower efficiency (t(45)=4.0247; p<.001). Further, the adopted sample scored higher on the CSHQ Parasomnia subscale (t(59)=2.064; p<.05), which was significantly correlated with ACEs (r(59)=0.398; p<.01). However, the community sample had a later sleep midpoint (t(41)=2.348; p<.05) and a lower nap frequency across the week (t(54)=-2.5526; p<.05). There were no significant differences in total memory scores or negative bias on the emotional memory story task between the groups.
Conclusion: Findings corroborate prior work demonstrating that children with early-life adversity/trauma (e.g., those adopted from foster care) experience poorer nocturnal sleep health, assessed both objectively and subjectively. Moreover, ACEs may contribute to higher rates of parasomnias. Future studies should examine emotional memory performance in a larger sample and in a controlled setting.
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0175
PERCEIVED SAFETY AND INSOMNIA SEVERITY: EXPLORING THE ROLE OF PHYSICAL AND EMOTIONAL ABUSE IN INSOMNIA

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Introduction: Feeling unsafe is antithetical to healthy sleep. This study aims to explore the relationship between reports of physical or emotional abuse, and insomnia severity as measured by the Insomnia Severity Index (ISI) in a diverse population of Latin American and Hispanic individuals residing in both rural and urban communities in Florida.
Methods: The Determinants, Outcomes, Responses, and Mechanisms of Insufficient Sleep in Rural-Urban Settings (DORMIR) study investigates the relationship between insufficient sleep and cardiovascular health. Of 603 respondents, 381 (63.2%) responded in English and 222 (36.8%) responded in Spanish. Respondents of 23 different national origins are represented. The average age was 41.6 ± 16.6 years, and there were 399 females, 204 males. A 'Safescore' was computed by adding responses to 4 domains from the Social Needs Screening Tool (AHC), answered on a 5-point scale (never, rarely, sometimes, fairly often, frequently) measuring frequency of how often 'anyone', including family and friends: i) "physically hurt you"; ii) "insult or talk down to you"; iii) "threaten you with harm"; iv) "scream or curse at you". Scores range from 0-20 (higher is less safe). A linear regression was conducted to examine the relationship between the AHC Safescore and Insomnia Severity Index (ISI), adjusting for age, sex, race/ethnicity, marital status, education level, employment status, Body Mass Index, income, and whether the questionnaire was responded to in English/Spanish.
Results: A 1-unit increase in the Safescore was associated with a 0.46 increase in ISI scores (β [95% Confidence Interval] (95% CI) = 0.46 [0.24, 0.67], p< 0.001). Of the 4 domains, "insult or talk down to you" and "scream or curse at you" were the primary drivers of the statistical signal. Per increase in frequency of "insult or talk down to you" and "scream or curse at you", ISI scores are estimated to increase by 1.66 and 1.33 points, respectively (1.66 [0.64, 2.67], p< 0.001; 1.33 [0.76, 1.90], p< 0.001).
Conclusion: Emotional safety concerns were associated with greater insomnia severity. Future interventions should focus on creating safe environments and providing targeted support to vulnerable populations.
Support (if any): R01HL152453, R01HL142066, R01HL095799; R01MD016236, R01MD016236-03S1, R01MD004113; R01AG072644, R01AG067523

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0176
SLEEPING TO COPE OR COPING TO SLEEP? EXPLORING THE ASSOCIATION BETWEEN SLEEP AND EMOTION REGULATION IN ADOLESCENCE

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Introduction: Using path analysis, we examined bidirectional associations to determine the impact of sleep quality on the use of active or avoidant emotion regulation strategies and conversely, whether those emotion regulation strategies predicted sleep quality. Additionally, we analyzed whether sleep quality or emotion regulation strategies independently predicted psychopathology.
Methods: Data came from a longitudinal study of 226 children and adolescents with measures of sleep quality, emotion regulation, and internalizing and externalizing problems collected at ages 14 and 16. Analyses controlled for emotional and behavioral problems assessed at age 11.
Results: Findings demonstrated that sleep quality and emotion regulation strategies independently predicted internalizing and externalizing symptoms at ages 14 and 16. Sleep quality did not predict emotion regulation strategies, nor did these strategies predict sleep quality. However, sleep quality at age 14 predicted internalizing and externalizing symptoms at age 14 and internalizing symptoms at age 16. Avoidant emotion regulation strategies at age 14 predicted internalizing symptoms, while active strategies were negatively associated with internalizing symptoms at both ages.
Conclusion: These findings suggest that sleep quality and emotion regulation strategies independently influence adolescent psychopathology and could be key targets for prevention and intervention.
Support (if any):

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0177
AIR POLLUTION AND PSYCHOSOCIAL STRESS EXPOSURES IN RELATION TO SLEEP HEALTH IN MIDDLE CHILDHOOD

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Introduction: Prior studies raise concern for air pollution and psychosocial stressors as potential independent risk factors of poor sleep health in children. Chemical-by-non-chemical stress interaction frameworks further suggest that joint air pollution and psychosocial stress exposures could exacerbate this risk, but such interactions are poorly understood. We examined independent and interactive associations of air pollution (PM2.5, NO2, and O3 exposures during early infancy and early childhood) and psychosocial stressors (adverse childhood experiences/ACEs) with sleep health outcomes in middle childhood.
Methods: Participants included 1,166 children from a three-cohort consortium (ECHO-PATHWAYS) with available air pollution and sleep data. Of these, 719 from a single cohort (CANDLE) additionally had ACEs data. Spatiotemporal prediction modeling was used to estimate PM2.5 (μg/m3), NO2 (ppb), and O3 (ppb) at children's residential locations, time-weighted across early infancy (0–6 months) and early childhood (6 months–6 years) exposure periods. ACEs were measured via retrospective parent report of children's cumulative lifetime exposures (up to age 8–9 years) to eight ACE types. Sleep outcomes were measured via children's self-report on the PROMIS sleep disturbance and sleep-related impairment questionnaires at age 8–9 years. Analyses fit linear regression models and adjusted for a priori-selected confounders.
Results: In the ECHO-PATHWAYS cohort, greater NO2 exposure during early infancy associated with lower sleep-related impairment in middle childhood (β=-0.31, 95% CI [0.01, 0.61]). In CANDLE only, the NO2-by-ACEs interaction term was significant for the early infancy (β=0.43, 95% CI [0.08, 0.78], p=.02) and early childhood (β=0.41, 95% CI [0.08, 0.73], p=.02) NO2 exposures periods on sleep-related impairment in middle childhood: Greater NO2 associated with lower sleep-related impairment at lower ACE levels, but at higher ACE levels, greater NO2 associated with greater sleep-related impairment.
Conclusion: This study adds novel evidence of independent NO2 and interactive NO2-by-ACEs associations with sleep-related impairment. Other findings were null and inconsistent with prior research.
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0178

THE RELATIONSHIP OF SLEEP HYGIENE, SLEEPINESS, AND SLEEP QUALITY TO MENTAL HEALTH (BURNOUT, DEPRESSION, ANXIETY, AND STRESS) AMONG COLLEGE STUDENTS

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Introduction: Student burnout has been reported from 10.3% to 71.0% and mental health symptoms have worsened for young adults in recent years. Disturbed sleep has been linked with burnout and mental health issues (e.g. reduced engagement, poor academic achievement, low self-efficacy, low self-esteem, sleep disorders, and suicidal ideation) and may increase vulnerability. Sleep hygiene, behaviors related to quality and quantity of sleep (e.g. consistent bedtimes, comfortable sleeping conditions, and technology use during and before bed), may provide an avenue to treat or protect from burnout, depression, anxiety, and stress. We assessed the relationship between sleep hygiene, sleepiness, sleep quality, and mental health in college students and examined specific modifiable sleep hygiene behaviors as potential targets for intervention.
Methods: 104 undergraduate students (M = 20.4 years, SD = 1.32, 77 females, 23 males) completed online questionnaires: Pittsburg Sleep Quality Index, Epworth Sleepiness Scale, Sleep Hygiene Index-Technology, Copenhagen Burnout Personal Subscale, School Burnout Inventory, Depression Anxiety Stress Scale, and Mental Toughness Questionnaire.
Results: Sleep Quality and Sleepiness: Greater sleep disturbance was significantly related to greater personal burnout, school burnout, depression, anxiety, and stress, rs (59)=.233 to.537, all ps <.05. Greater sleepiness was significantly related to more personal burnout, r(73)=0.338, p=.002, anxiety, r(76)=0.396, p<.001, and stress, r(74)=0.349, p=.001. Sleep Hygiene: Poor sleep hygiene was related to greater personal burnout, r(72)=.365; p<.001, school burnout, r(71)=.336; p=.002, and lower mental toughness, r(72)= -.237; p=.021. Poorer mental health was significantly related to the specific sleep hygiene behaviors of long naps, irregular bedtimes, extended time in bed, negative emotions before bed, and anxiety in bed. Frequent technology use in bed predicted all negative mental health measures, rs (72)=.202 to.334, all ps<.05.
Conclusion: We found a relationship between sleep, sleep hygiene, burnout, and mental health. Sleep disturbance and maladaptive sleep hygiene were significantly related to poorer mental health in these students. The sleep hygiene behaviors identified here (especially technology use during bedtime) are modifiable with cognitive and behavioral interventions and could be avenues for reducing mental health vulnerability in this student population.
Support (if any): Virginia A. McCormick Pittman Distinguished Professorship

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0179

STRESS-RELATED NEURAL MECHANISMS LINKING EARLY ADVERSITY TO SLEEP DISTURBANCES: THE ROLE OF AMYGDALA REACTIVITY

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Introduction: Early life adversity (ELA) in childhood is associated with poorer adulthood sleep quality, though the underlying mechanisms remain unclear. ELA in rodent models induces alterations in stress-related neurocircuitry related to neuropsychiatric phenotypes including sleep disturbances. However, this circuitry remains less explored in humans. To investigate these relationships, we assessed stressor-evoked activity in proximal

stress control regions and sleep quality in young adults with differential exposure to ELA.

Methods: Participants (n=97, 21-35 years) were recruited with graded exposure to ELA as quantified by the Childhood Trauma Questionnaire (CTQ). Poor sleep quality was measured with the Pittsburgh Sleep Quality Index (PSQI). Each participant underwent fMRI during a Multi-Source Interference Task (MSIT), a Stroop-like mild cognitive stress task. In this task, participants identify the number that differs among three numbers in incongruent vs. congruent conditions, with performance titration by accuracy. Stressor-evoked activity is extracted from regions of interest (bed nucleus of the stria terminalis, BNST; subgenual nucleus of the anterior cingulate cortex, sgACC; paraventricular nucleus of the hypothalamus, PVN; amygdala) using incongruent vs. congruent contrasts. Linear mixed effect and moderation models assessed relationships between ELA, MSIT reactivity, and sleep.

Results: Early life adversity (CTQ) was associated with worse sleep quality (PSQI) (B_standardized/std=0.53, p< 0.001). In the MSIT, significant relative deactivation was demonstrated in the BNST, sgACC, PVN, and the basolateral amygdala (BLA). No linear bivariate associations were observed between CTQ and stress reactivity. However, the relationship between CTQ and BLA stress reactivity was moderated by PSQI score (B_std=-0.31, p=0.003). Participants with the worst sleep quality (>75% percentile for PSQI) (n=25) showed that higher CTQ was associated with greater stressor-evoked activity (greater relative deactivation) within the BLA (B_std=-0.30, p=0.038), an effect not seen with better sleep quality (< 25% percentile) (n=21, B_std=0.70, p=0.25).

Conclusion: In this study, ELA is associated with worse sleep and a greater stressor-evoked activity in the basolateral amygdala in adults. A better understanding of subcortical stress-related neurocircuitry interactions with sleep may inform future work on intermediary targets for neuropsychiatric interventions. Future studies will assess importance of risk/resiliency factors in ELA-related sleep and stress-related neural reactivity measures.

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0180

SLEEP DURATION AND HIPPOCAMPAL-DEPENDENT MEMORY TRAJECTORIES SHAPED BY EARLY SUBCLINICAL DEPRESSIVE SYMPTOMS IN PRE-ADOLESCENTS

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Introduction: Preadolescence is a vulnerable time for the onset of depressive symptoms and early depressive symptoms confer a heightened risk for long-term depression. The adolescent transition period is also marked by dynamic shifts in sleep patterns that manifest as delayed and variable bedtimes, increased sleep onset latency, and reduced homeostatic sleep pressure. Sleep supports cognition and mood, with impairment reported with insufficient sleep (e.g., short sleep duration, variable timing). However, less is understood about the impact on hippocampal dependent memory of poor sleep and depressive symptoms during the adolescent transition.

Methods: Data included thirty-four 9-to-13-year-olds (M = 11.75, SD = 1.63, F = 16) in a measurement burst longitudinal study spanning one year. Every four months, for seven consecutive days, participants completed daily sleep diaries, a word-pair task (hippocampal-dependent), and questionnaires on depressive symptoms. Participants wore Garmin Vivo Smart 5 watches to monitor sleep patterns. We conducted a group-based trajectory model estimation to identify and cluster subpopulations of participants based on longitudinal changes in sleep and sleep-dependent memory.

Results: Preliminary analyses revealed that baseline subclinical depressive symptoms served as a key factor in clustering youth and were associated with the rate of decline in total sleep time across the age range. Youth with higher initial depressive symptoms exhibited a steeper decline, and slope clusters were predicted by these initial depressive symptoms. Regarding sleep-dependent memory, baseline depressive symptoms again clustered youth and their performance. Youth with lower depressive symptoms followed a quadratic trajectory in performance over the year, whereas youth with higher depressive symptoms showed a flat trajectory in sleep-dependent performance change and reduced ability to distinguish between targets and false alarms.

Conclusion: Our initial trajectory analyses suggest that depressive symptoms may serve as an early vulnerability marker. Baseline subclinical depressive symptoms emerged as a predictor for the rate sleep duration declined across pre-adolescence. Further, they predicted overnight sleep-dependent memory performance change, suggesting possible potential consolidation issues for those with higher symptoms. Monitoring daily and longitudinal changes in sleep offers valuable insight into the longitudinal interplay between sleep and depressive symptoms, which can be used for future intervention development.

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0181

RELATIONSHIP BETWEEN SLEEP HEALTH OF RURAL COLLEGE FRESHMAN AND SCREEN TIME

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Introduction: College students face sleep issues, including difficulty maintaining consistent sleep schedules and not getting enough sleep. Rural students face unique challenges compared to their peers, including adjusting to a louder, faster-paced lifestyle and a more affluent environment, all of which may cause increased stress and ultimately impact sleep. Excessive screen time usage also impacts sleep negatively. Combined with the challenges of transitioning to a college environment, sleep for rural college freshmen is likely to be impacted by screen time. Although numerous studies have been conducted on screen time, including some involving sleep, there is a gap in research regarding sleep health of rural freshmen in the United States. In this study we hypothesized that more phone use within two-hours before bedtime is associated with shortened sleep duration, poorer sleep quality, and later sleep timing for freshmen in college from rural areas. Twenty freshmen (aged 18 to 24) from rural backgrounds were recruited, all of which enrolled in a public university in the Western United States. Objective measures of sleep quantity and quality using GENEActiv wearable devices were collected over the course of one month. Key sleep measures include nocturnal sleep duration (measured by total

sleep time), sleep quality (measured by wake-after-sleep-onset), sleep timing (measured by midpoint of nocturnal sleep), and daytime naps. We also collected data on hourly phone screen time use records and most-used applications during the study period. In addition, participants reported their prior screen time use (ABCD Youth Screen Time Survey) and sleep health before college. A one-on-one interview was conducted with the participants to collect qualitative information on any influential factors of their sleep and phone use, such as exams, social activities, and illnesses. We plan to examine the between-person and within-person associations of phone screen time and sleep factors with a multilevel regression analysis. Regression model results will provide insights on the effect of phone use on sleep health for college students from rural areas. The qualitative and quantitative data will be combined to develop actionable recommendations for improving sleep health among rural college freshmen as they adjust to college life.
Methods: Above
Results: Above
Conclusion: Above
Support (if any):

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0182
THE IMPACT OF DEPRESSION ON SLEEP AMONG HIGH SCHOOL STUDENTS IN JAMAICA

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Introduction: Depression is associated with sleep disorders such as insomnia; reported to create a cycle that makes it difficult to get an adequate amount of sleep. As adolescents (ages 10-19) develop, adequate sleep is an important component of mental and physical well-being. We examined this relationship among Jamaican high school students.
Methods: The study included a 3-stage stratified cluster sample of 358 students (12-to-19-years) from a high school in Kingston, Jamaica. Participants completed a web-based questionnaire including the Patient Health Questionnaire 9, Car, Relax, Alone, Forget, Friends, Trouble (CRAFFT) Screening Tool, and Gaming Addictions Scale for Adolescents. Chi-square tests compared proportions.
Results: From this sample (N=358; mean age: 14.8 years), 33.5% reported mild depression and 46.6% moderate depression. Over half (57.2%) of students with depression reported issues with sleeping ($p< 0.0001$). Sleep issues were reported in 64.4% of females compared to 55.4% of males ($p=0.261$). Students in single parent households reported sleep issues more often than two-parent households (69.0% vs 48%; $p=0.010$). There was a higher prevalence reported inadequate sleep among students in grades 10-13 (62.4%) compared to 1-9 (58%) in grades 1-9 ($p< 0.05$).
Conclusion: Jamaican students with sleep difficulties were more likely to have mild to moderate depression. Females, older students, and those in single-parent households were also more likely to have problems with sleep. Further investigation is needed to better understand the relationship between depression and sleep in Jamaican adolescents.
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0183
EXAMINING THE DAILY ASSOCIATIONS BETWEEN LONELINESS, RUMINATION, AND SLEEP OUTCOMES IN A COMMUNITY SAMPLE OF ADOLESCENTS

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Introduction: Sleep is vital for mental and physical health, yet it is often influenced by psychological and social factors. Loneliness and rumination, key predictors of emotional distress, are consistently linked to poor sleep outcomes. Indeed, the U.S. Surgeon General recently identified loneliness as a growing public health epidemic, emphasizing its profound impact on health, including disruptions to sleep. Much research has focused on trait-level links between loneliness, rumination, and sleep, however, emerging evidence suggests the possibility for daily links. Therefore, the current study examined daily within-person links between these socioemotional challenges and adolescent sleep outcomes.
Methods: Participants were twins who participated in the 13-year study wave (twin M=13.53, SD=1.03) of a broader longitudinal study (N=389; 50.3% female; 57.2% non-Hispanic White; 27.6% Hispanic/Latino). Twins completed questionnaires, and wore wrist-based actigraph accelerometers while completing daily diaries for approximately one week (M=6.70, SD=1.28). Actigraph sleep indicators included duration, efficiency, and wake after sleep onset [WASO]. Loneliness was assessed daily using a single item from the PANAS and rumination with the question, "Overall today, how much did you focus on your problems/stress?". Three-level multilevel models were fit in Mplus v.8.10.
Results: After controlling for between-person loneliness and rumination, day-level loneliness and rumination were not significant predictors of nightly sleep duration, efficiency, or WASO (βs=-.01–.03, ps>.05). However, loneliness and rumination were significantly lower on weekends (βs=-.09 to -.03, ps<.001), suggesting that adolescents tend to experience less loneliness and rumination on weekends compared to weekdays. Additionally, variances were significant (βs=.30–2.88, ps<.001), indicating substantial day-to-day variability in loneliness and rumination.
Conclusion: Daily fluctuations in loneliness and rumination may not significantly impact sleep that night in adolescents, with stable traits, such as chronotype or baseline anxiety levels, more likely to influence sleep outcomes. However, loneliness and rumination were lower on weekends, possibly reflecting reduced academic and cognitive demands and more opportunities for connection with peers. Significant day-to-day variability in loneliness and rumination highlights their dynamic nature. Future research should examine the potential moderating factors of social support on these daily links to understand if such associations vary across subgroups.
Support (if any): Eunice Kennedy Shriver National Institute of Child Health and Human Development grant 2R01HD079520

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0184
THE IMPACT OF THE TRANSDIAGNOSTIC INTERVENTION FOR SLEEP AND CIRCADIAN DYSFUNCTION ON ADOLESCENT MENTAL HEALTH

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Introduction: Sleep and circadian rhythm problems may worsen adolescent mental health; sleep disorders in adolescents are often linked to anxiety, depression, and attention difficulties. Interventions, such as the Transdiagnostic Intervention for Sleep and Circadian Dysfunction (TranS-C), have been found to be effective at improving adolescent sleep health, and a small pilot study demonstrated that TranS-C may improve mental health symptoms in adolescents with ADHD. As a secondary aim of a larger study examining the effectiveness in TranS-C in improving sleep in night-owl adolescents, we evaluated whether this sleep intervention would significantly improve emotional regulation abilities and reduce symptoms of depression, stress, anxiety, and suicidality in adolescents.
Methods: 31 adolescents and their parents completed a six-week TranS-C sleep intervention; at baseline and immediately following the intervention, adolescents completed the following measures: the Emotional Regulation Questionnaire (ERQ), the Difficulties in Emotion Regulation Scale (DERS), the Depression Anxiety and Stress Scale (DASS), the Columbia-Suicide Severity Rating Scale (C-SSRS), and the Pittsburgh Sleep Quality Index (PSQI). Paired-sample t-tests and non-parametric repeated-sample comparisons were used to evaluate how emotional regulation abilities and depression, anxiety, stress, and suicidality symptoms changed after the course of the sleep intervention.
Results: No statistically significant changes were found in emotional regulation ability, anxiety, stress, depression, or suicidality from pre-post ($p > .05$). Since no changes were found, it was examined if sleep improvement (change in PSQI total score) served as a moderator in mental health improvement; the presence of sleep improvement as part of the sleep intervention did not serve as a statistically significant moderator ($p > .05$).
Conclusion: Sleep interventions alone may not be a powerful enough intervention target to improve emotional regulation ability, anxiety, stress, depression, or suicidality. Future research should look at whether combining sleep treatment with evidence-based mental health interventions enhances the overall effectiveness of mental health treatment.
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0185

DAILY ASSOCIATIONS BETWEEN RELATIONSHIP STRESS AND SLEEP ARE MODERATED BY A HISTORY OF INTERPERSONAL VIOLENCE IN YOUNG ADULTS WITH REGULAR ALCOHOL USE

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Introduction: Interpersonal violence (IPV) includes physical, sexual, or emotional abuse from a romantic partner or non-partner. IPV is related to poor health and social functioning, but little research has examined sleep outcomes. Moreover, most studies focus on childhood abuse history (vs. more proximal abuse during young adulthood) and do not consider IPV history in combination with day-to-day relationship stress. We tested interactive and independent effects of IPV history and daily relationship stress on same-night shorter total sleep time (TST), lower sleep efficiency (SE), longer sleep onset latency (SOL), and later sleep timing (midpoint) via ecological momentary assessment (EMA) among young adults.
Methods: 292 regular drinkers aged 21-30 (64% female; 64% White) from two studies of alcohol use and health self-reported demographics and current/past-year IPV history, and participated in an 18-day EMA protocol. Participants reported daily sleep (TST, SE, SOL, midpoint); cannabis use (yes/no); alcohol use (total drinks); and stress with family, partner/spouse and friends (each rated: 0=not at all to 3=very much; also summed to 0-9 overall score). We fit mixed-effects models and estimated within-subject effects, including: (1) interaction of daily stress variables and IPV history on sleep outcomes that night, and (2) main effects of daily stress variables and IPV history on sleep outcomes that night. All models included time-invariant (age, study, income, sex, partner status) and time-variant covariates (weekend, cannabis, alcohol, pre vs. post-pandemic).
Results: Participants with IPV history (12%) reported a stronger effect of overall relationship stress on SOL [B(95%CI)=0.02(0.00-0.03), p=0.041 for interaction]. Considering main effects, higher overall relationship stress on a given day [B(95%CI)=0.01(0.00-0.02), p=0.023], particularly friend stress [B(95%CI)=0.02(0.00-0.03), p=0.011], was associated with longer SOL that night. Participants with (vs. without) a history of IPV reported later sleep midpoint [B(95%CI)=0.47(0.10-0.85), p=0.012] on a given day.
Conclusion: Daily relationship stress and IPV history are related to disturbances in sleep initiation and timing in a well-characterized sample of young adults. Results highlight the importance of querying trauma and stress, and how these experiences impact cognitions, feelings, and behaviors around sleep, in order to comprehensively identify and address contributors to sleep problems in behavioral sleep medicine interventions.
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0186

GENDER DIFFERENCES IN MENTAL HEALTH, SLEEPINESS, AND SLEEP QUALITY IN COLLEGE STUDENTS

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Introduction: Studies have shown that women may have an increased sleep duration need compared to men. Additionally, college life presents additional stressors and challenges that impact sleep duration and quality, and mental health in college students. The purpose of this study was to investigate sleep, mental health, and gender factors in college students.
Methods: Participants included 361 (male=62) full-time undergraduate students (mean age=19.93, SD=2.49 years). Participants completed an online survey that consisted of a series of questionnaires that examined demographics, depression, anxiety, and stress symptoms (Depression Anxiety Stress Scale, DASS-21), sleepiness (Epworth Sleepiness Scale, ESS), fatigue (Multidimensional Assessment of Fatigue, MAF), sleep hygiene (Sleep Hygiene Index, SHI), and sleep quality and duration (Pittsburgh Sleep Quality Index, PSQI).
Results: Preliminary data comparison tests were conducted. There were no gender differences in sleep duration (Mfemale=7.057, Mmale=6.93; p=.477), but women demonstrated worse sleep quality (Mfemale=6.80 vs Mmale=5.72; p=.020), more stress symptoms (Mfemale=19.73 vs Mmale=16.49, p=.037), greater

sleepiness (Mfemale=6.86 vs Mmale=5.52; p=.032), and greater fatigue (Mfemale=24.02 vs Mmale=18.77; p=.048) compared to men. There were no differences in depression or anxiety symptoms. Women also demonstrated poorer sleep hygiene habits than men (Mfemale=21.77 vs Mmale=19.37, p=.019).
Conclusion: Preliminary results showed that female college students obtained about the same sleep duration as men, however, their increased sleepiness, fatigue, and stress symptoms indicated that they experienced a more negative impact compared to men. It is unclear if the negative experiences were a result of worse sleep hygiene practices, greater perceived stress, or other factors. However, it is likely that women generally have a greater sleep need compared to men and simply increasing sleep duration is not the solution. Further, women may need to increase both quantity and quality of sleep to experience better mental and physical health. This study was limited by observational data collection, and further study is warranted to determine causal relationships. Additional work is being conducted at other institutions in the Southeast to determine if these trends are generalizable to other colleges.
Support (if any): None.

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0187
EFFECTS OF COMMUNITY VIOLENCE ON PEDIATRIC SLEEP HEALTH: A SYSTEMATIC REVIEW

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Introduction: Sleep is vital for child health and development and sets the foundation for lifelong health. Children living in disadvantaged neighborhoods are more likely to be exposed to community violence, which may disrupt sleep health through noise, anxiety, fear, stress, and hypervigilance. The purpose of this systematic review is to examine the associations between community violence and pediatric sleep health.
Methods: We systematically searched four electronic databases (CINAHL, SCOPUS, PubMed, Embase) using terms related to sleep, community violence, and pediatrics and screened for relevant articles that explored associations between community violence and pediatric sleep health. At least two reviewers screened all articles. We included English-language articles that addressed the relationship between community violence and sleep in pediatric populations. We did not place a time limit on our inclusion. We organized the results based on the B-SATED definition of pediatric sleep health.
Results: We screened 2,271 papers and included 29 eligible studies. Studies focused on sleep behaviors (n=4), sleep satisfaction/quality (n=17), alertness/sleepiness (n=7), timing (n=7), efficiency (n=10), and duration (n=12). Most studies included adolescents (n=19), while others included children in infancy (n=1), early childhood (n=2), and across a wide range of ages (n=7). The authors of most studies used self-report measures of sleep and community violence, and measures had varying reliability and validity. Some studies had small samples. Community violence exposure was negatively associated across all sleep health dimensions, particularly satisfaction, duration, and alertness. Evidence was weaker for behaviors, timing, and efficiency.
Conclusion: Exposure to community violence is negatively associated with all pediatric sleep health dimensions, especially satisfaction, duration, and alertness. Consistent definitions and measures of sleep dimensions and community violence are needed to promote rigor, reproducibility, and comparisons across studies. Future research should focus on infants and children under 6 years of age, covariates including potential risk and protective factors, sleep behaviors, timing, and efficiency. Policy changes and community, school, and individual-level interventions may help buffer the harmful effects of community violence on pediatric sleep health to promote health equity, but more research is needed.
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0188
SLEEP QUALITY AND PARENTAL STRESS IN MOTHERS OF CHILDREN WITH COMPLEX CHRONIC CONDITIONS

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Introduction: In recent years, there have been advancements in the diagnosis and treatment of acute and rare diseases. As a result, these diseases have become persistent throughout life, leading to long-term disability and the emergence of a subset of children with complex chronic conditions (CCC). The families of these children experience the burden of care transfer, which impacts their health and well-being, resulting in high levels of parental stress and sleep disturbances.
Methods: Cross-sectional observational quali-quantitative evaluation assessment involving primary caregivers of children and adolescents with CCC. Exclusion criteria encompassed CCC patients who deceased, were readmitted, or were unreachable by phone. Questionnaires covered main caregiver sociodemographic data. Pittsburgh Sleep Quality Index (PSQI) and Parental Stress Scale were employed. Analyses comprised descriptive statistics with mean, standard deviation, percentage, tests for normality, one-way ANOVA with post hoc analysis and ANCOVA.
Results: The sample comprised 31 caregivers of children and adolescents with CCC and 31 caregivers of healthy children. Among primary caregivers of children with CCC, 93% were female, a mean PSQI score of 7.6, an average total sleep time of 5 hours and 45 minutes, and sleep latency of 37 minutes. Among caregivers of healthy children, 90% were female, a mean PSQI score of 6.8, an average total sleep time of 6 hours and 27 minutes, and sleep latency of 16 minutes. Comparisons between the groups showed significant differences in daytime caregiving time (7.0 vs 2.8 hours), total parental stress scale scores (7.6 vs 6.8), parental stress domain scores (18.9 vs 13.8), and sleep latency (37.3 vs 16.6 minutes). The groups also differed in daytime caregiving time regardless of total sleep time (5 hours 45 minutes vs 6 hours and 27 minutes).
Conclusion: Families of children with CCC, compared to families of healthy children, spend more time on caregiving, experience higher parental stress, taking longer to fall asleep and have shorter total sleep durations.
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0189

POOR SLEEP QUALITY AND DURATION PREDICT INTRUSIVE MEMORIES IN WOMEN AFTER AN ANALOGUE TRAUMA

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Introduction: Disturbed sleep is a key component of posttraumatic stress disorder (PTSD) symptomology, and sleep disturbances and PTSD have a bidirectional association. In the context of a larger experimental intervention study we evaluated the impact of pre-trauma sleep on intrusive memory frequency and characteristics, including distress, vividness, and avoidance, in healthy women after analogue trauma exposure.
Methods: Using the trauma film paradigm as an experimental model of trauma exposure, healthy female participants (N = 120) reported baseline sleep characteristics using the Pittsburgh Sleep Quality Index and viewed a distressing film, then listened to either a 30-minute guided yoga nidra meditation or instrumental music. Intrusive memory frequency and characteristics (vividness, distress, avoidance and sense of 'nowness') were monitored in the acute period immediately after the film and over 1-week ('long-term').
Results: Worse sleep quality predicted greater acute memory avoidance and distress and greater acute and long-term vividness and nowness. Lower sleep duration was associated with greater avoidance of acute intrusions. Neither sleep quality nor duration was associated with intrusion frequency.
Conclusion: Sleep over the month prior to an analogue trauma predicted intrusive memory characteristics acutely and long-term, though its impact varied depending on the specific sleep metric —quality versus duration. In contrast with previous analogue and naturalistic trauma studies, while baseline sleep predicted intrusive memory characteristics, it did not predict the frequency of intrusive memories. This research further underlines the impact of baseline sleep on the development of psychological symptoms after trauma exposure and suggests that trauma memory characteristics, in addition to frequency of intrusions, are a potentially informative outcome in trauma-sleep studies. These findings may have implications for development of preventative interventions aimed at reducing the subjective impact of intrusive memories after stressful events and improving key sleep metrics in the immediate aftermath of such events.
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0190

MENSTRUAL PHASE-DEPENDENT CHANGES IN CBT ACROSS SLEEP MAY PREDICT NEXT-MORNING MOOD IN YOUNG ADULT WOMEN

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Introduction: Core body temperature (CBT) varies across the menstrual cycle, with lower CBT in the follicular phase and higher CBT in the luteal phase. Evidence suggests women have poorer sleep and mood outcomes in the luteal phase, yet it is unclear whether this is influenced by temperature changes occurring during sleep onset. The present study assessed CBT across sleep onset and its influence on next-morning sleepiness and mood in young adult women.
Methods: Nine healthy young women (mean age = 19.78 = 1.86 years) participated in both follicular and luteal phases. Participants ingested a telemetric pill to continuously measure CBT. Polysomnography was recorded. CBT was averaged 3 hours before and after sleep onset in each phase. Upon awakening, participants completed the Stanford Sleepiness Scale and Positive and Negative Affect Schedule. Paired samples t-tests were performed to compare temperature, sleepiness and affect between phases. A linear mixed-effects model tested whether the difference in CBT from wake to sleep predicts sleepiness and mood upon awakening by phase.
Results: There was a significant difference in CBT after sleep onset between the follicular and luteal phase ($t(8)=-3.12$; $p=0.01$); CBT in the luteal was higher. There was no significant difference between CBT before sleep onset ($t(8)=0.017$; $p=0.98$), sleepiness ($t(8)=0.814$; $p=0.44$), or affect ($t(8)=-0.077$; $p=0.94$) between phases. However, there was a significant interaction between menstrual phase and wake/sleep CBT difference in predicting next-morning positive affect ($p=0.001$). In the follicular phase, greater wake/sleep CBT difference was associated with increased positive affect. In the luteal phase, greater wake/sleep CBT difference was associated with decreased positive affect. There was no significant interaction for sleepiness ($p=0.29$).
Conclusion: The differences in CBT during sleep in the luteal and follicular phases are consistent with prior work. Interestingly, the impact of CBT fluctuations on mood differed by menstrual phase. In the follicular phase, a larger difference in CBT might indicate better thermoregulation aligned with a stronger circadian rhythm, improving mood, while in the luteal phase, the same change in temperature may suggest less optimal thermoregulation resulting in poorer mood. Future analyses will incorporate sleep physiology and ovarian hormones that may clarify how phase-related temperature differences influence mood.
Support (if any):

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0191

THE INTERPLAY BETWEEN MOOD AND SLEEP AT DIFFERENT PHASES OF THE MENSTRUAL CYCLE

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Introduction: Understanding the intricate relationship between menstrual phases, sleep, and mood remains a critical area of investigation. Existing literature often falls short by relying on small sample sizes or failing to comprehensively evaluate women using a within-subject design across multiple time points of the menstrual cycle. Furthermore, few studies incorporate assessments of daily mood, sleep, and hormonal fluctuations. This study addresses these gaps by examining how menstrual phases modulate the interplay between mood and sleep in healthy young women.
Methods: We collected daily sleep and mood self-report measures in 60 healthy young women (18-35 years old). Each

participant completed in-lab visits during four menstrual phases (Menses, Pre-Ovulation, Mid-Luteal, and Late-Luteal), and hormone levels were collected through saliva samples. Objective sleep was examined at each visit via polysomnography (PSG) recordings. Using Pearson's correlations, we examined the relationship between self-reported scores of positive, negative, and angry mood, hormone levels, and objective sleep at each menstrual phase.

Results: Key findings indicate that reduced Stage 2 sleep is associated with negative emotions (less positive and more negative mood, r=-0.48,p< 0.001), particularly during the Mid-luteal phase. Progesterone was positively correlated (r=.16,p=0.04) with negative mood, and progesterone and testosterone was positively correlated (r=.21,p=0.009,r=.23,p=0.017) with Stage 2 sleep across all menstrual phases. Furthermore, positive mood consistently correlated with increased REM sleep across all menstrual phases(MS:r=.35,p=0.04, PO:r=.56,p=0.001,ML:r=.29,p=0.04,LL:r=.40,p=0.03)

Conclusion: These results underscore the dynamic interdependence between menstrual cycle phases, mood, and sleep. Our findings suggest that hormonal fluctuations modulate these relationships, providing a nuanced understanding of sleep and mood variability in young women.

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0192

DO WOMEN NEED MORE SLEEP THAN MEN? A STUDY ON GENDER DIFFERENCES IN COLLEGE STUDENT SLEEP AND MENTAL HEALTH

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Introduction: College students in general tend to have poor sleep quality and face stressors that impact their sleep and mental health. Further, women may have a greater sleep need compared to their male counterparts. The purpose of this study was to investigate sleep, mental health, and gender factors in college students via objective and subjective data collection.

Methods: Participants included 32 (male=16) full-time undergraduate students enrolled in a Psychology of Sleep course. Participants wore a Philips Respironics Actiwatch Spectrum device during one week of typical sleep. After one week, participants completed an online survey that consisted of a series of questionnaires that examined demographics, depression, anxiety, and stress symptoms (Depression Anxiety Stress Scale, DASS-21), sleepiness (Epworth Sleepiness Scale, ESS), fatigue (Multidimensional Assessment of Fatigue, MAF), and sleep quality and duration (Pittsburgh Sleep Quality Index, PSQI).

Results: Preliminary data comparison tests were conducted. There were gender differences in sleep duration (Mfemale=7.31h, Mmale=6.47h; p=.011), but no differences in sleep efficiency (Mfemale=84.57% vs Mmale=82.66%), wake after sleep onset (Mfemale=55.88 min vs Mmale=49.84 min), or number of awakenings (Mfemale=26.35 vs Mmale=25.89). There were no significant differences in sleep quality (PSQI), although the scores did represent poor quality (Mfemale=7.50 vs Mmale=6.13). Results showed that women experienced significantly greater sleepiness (Mfemale=9.88 vs Mmale=5.94; p=.033), and approaching significance in terms of greater fatigue (Mfemale=20.22 vs Mmale=13.89; p=.056) compared to men. There were no significant gender differences in depressive symptoms (Mfemale=6.31 vs Mmale=5.31), but women experienced greater anxiety (Mfemale=8.81 vs Mmale=3.69; p=.017) and stress (Mfemale=13.44 vs Mmale=6.38; p=.018) symptoms.

Conclusion: Preliminary results showed that the female college students taking the sleep course were obtaining significantly more sleep than men, with similar quality and efficiency. However, their increased sleepiness, fatigue, anxiety, and stress symptoms indicated that they were experiencing a more negative impact compared to men. It is likely that women generally have a greater sleep need compared to men, however, simply increasing sleep duration is likely not the answer. This study was limited by observational data collection, and further study is warranted to determine causal relationships and future intervention plans to improve sleep in women.

Support (if any): None

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0193

LATENT SLEEP PROFILES AND THE ROLE OF PARENT-CHILD SLEEP INTERACTIONS IN CHILDREN WITH A HISTORY OF MALTREATMENT

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Introduction: Sleep is critical for child development, yet children with maltreatment history frequently experience sleep disturbances linked to poor academic performance, mental health issues, and substance abuse. Children adopted from foster care, often exposed to early adversity, are at increased risk for sleep and emotional difficulties. However, little is known about their distinct sleep patterns and associations with maltreatment. We aimed to identify latent sleep profiles among children adopted from foster care and examine whether parent-child sleep interactions predicted profile membership.

Methods: Participants were adoptive parents of 362 children (Mage = 5.50 years) who completed surveys assessing child sleep health, foster care history, and maltreatment. Sleep was measured using the Child Sleep Habits Questionnaire (CSHQ) and parent-child interactions around sleep using the Parent-Child Sleep Interactions Scale (PSIS). Latent profile analysis (LPA) was conducted in MPlus, with CSHQ subscales standardized as z-scores. Multinomial logistic regression examined predictors of profile membership, with the 'Good Sleep' (GS) profile as the reference group.

Results: Five sleep profiles were identified: GS (36.0%), 'Sleep Onset Delay Problems' (SODP; 16.0%), 'Pre-Sleep/Bedtime Sleep Problems' (PSBSP; 12.9%), 'Severe Sleep Disturbance Problems' (SSDP; 12.9%), and 'Broad Behavioral Sleep Problems' (BBSP; 8.6%). Most children (64%) fell into one of the disturbed sleep profiles, with over a fifth (21.5%) exhibiting pervasive sleep issues spanning multiple domains (BBSP and SSDP). Parent-child sleep interactions significantly predicted profile membership. Higher scores on the PSIS sleep conflict subscale increased the odds of membership in the BBSP (RRR = 4.11), SSDP (RRR = 3.89), and PSBSP (RRR = 2.51) profiles. Similarly, higher sleep dependence scores were associated with increased likelihood of membership in the SSDP (RRR = 6.86), PSBSP (RRR = 3.58), and BBSP (RRR = 1.98).

Conclusion: Findings identified five distinct sleep profiles, reflecting varied sleep challenges among children adopted from foster care. Most children exhibited some sleep disturbances, with the BBSP and SSDP profiles representing severe dysregulation. Parent-child sleep interactions, particularly sleep conflict and dependence, emerged as significant predictors of profile membership. Results emphasize the need for interventions targeting these interactions to address sleep disturbances and mitigate their impacts on well-being.
Support (if any):

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0194

ASSOCIATIONS BETWEEN PARENT-CHILD RELATIONSHIP QUALITY DURING ADOLESCENCE AND SLEEP INTO ADULTHOOD AMONG INDIVIDUALS WITH A HISTORY OF FOSTER CARE

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Introduction: Children in foster care (FC) face caregiver attachment disruptions, leading to hyperarousal and poor sleep that may persist even after achieving permanency. Caregiver-child relationship quality may protect against poor sleep by down-regulating hypervigilance and fostering a sense of safety, but this is understudied in this population. We examined associations between resident parent-child relationship quality (PCRQ) in adolescence and sleep from adolescence into adulthood in individuals with a FC history.
Methods: Participants were 178 individuals from the National Longitudinal Study of Adolescent to Adult Health who reported a FC placement history at Wave III (W3) of the study. Participants were in grades 7-12 during W1 (mean age=15.34 years, SE±0.21) and were 60% female, 60% White, 17% Black, 11% Hispanic, and 29% reported a resident parent receiving public assistance. At W1, participants rated PCRQ for their resident parent(s). For overall PCRQ, mother and father scores were averaged for two-parent households and the single score was used in single parent households. Insomnia symptoms and insufficient sleep duration were measured at W1, W3 (ages 18-26 [duration only]), W4 (ages 24-32), and W5 (33-43). Design-based analyses were conducted, including use of sampling weights. We used Poisson regression with robust variance, adjusting for demographic characteristics and wave.
Results: Neither overall PCRQ or maternal PCRQ in adolescence were associated with insomnia symptoms or insufficient sleep duration. However, each 1-point increase in paternal PCRQ during adolescence was associated with a 6% reduced risk for insomnia symptoms from adolescence into adulthood (Risk Ratio=0.94, SE=.03, p=0.025). Associations between PCRQ and sleep did not differ by wave.
Conclusion: Among individuals with FC histories, higher PCRQ with a resident father in adolescence was associated with reduced risk of insomnia symptoms over time. Lack of associations with overall PCRQ and maternal PCRQ highlights the need for additional research into the unique roles of fathers and other contextual factors on lifelong sleep health in people who experienced FC. This work will inform the tailoring of sleep interventions for this population.
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0195

DAY-TO-DAY ASSOCIATIONS BETWEEN STRESS MANAGEMENT AND SLEEP HEALTH IN SOCIOECONOMICALLY DISADVANTAGED FAMILIES

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Introduction: Parenting toddlers is stressful and for caregivers experiencing low socioeconomic status (SES), stress can be exacerbated by insufficient resources. Cross-sectional examinations suggest that stressful life events and ineffective stress management relate to poor sleep. This evidence base fails to recognize that naturally occurring stressors, stress management and sleep are dynamic and are marked by fluctuations within-persons from one day to the next. Not known is the day-to-day experience of stress among toddler caregivers, and how daily stress management relates to caregiver sleep in low-SES family contexts. Therefore, this study aims to characterize the day-to-day experience and response to stressors in association with caregiver sleep health.
Methods: We enrolled 60 caregiver-toddler dyads who were eligible for federally funded programs (e.g., WIC, Medicaid). Using a micro-longitudinal design, we used 24/7 actigraphy to measure caregiver sleep health (duration, efficiency, timing) over two-weeks. Concurrently, caregivers completed daily electronic diaries reporting experienced stressors, their severity, stress management strategies and their effectiveness. Generalized Linear Models utilizing GEEs quantified the associations between caregiver stress and sleep health.
Results: Caregivers (90% mothers, 48% Black, 25% < high school educated) slept on average 417.12 (SD=76.88) minutes/night, had 83% (SD=5.64) sleep efficiency and an 11:15 pm bedtime. One-quarter of caregivers reported family/parenting issues as their primary stressor, with up to 90% taking a healthy action against stress (e.g., mindfulness-based techniques, distraction), yet 44% reported healthy strategies as ineffective in managing their stress. Mixed model results showed that caregiver sleep efficiency varied by stress management effectiveness (p=0.009), ranging from a low of -0.4% decreased sleep efficiency (ineffective strategies) up to a high of 1.5% increased efficiency (very effective strategies). Similarly, on days when caregivers reported high strategy effectiveness, their sleep duration increased by 48-minutes (p=0.034).
Conclusion: Our findings underscore the importance of perceived stress management effectiveness on sleep quality and quantity in low-SES contexts. Future work is needed to better understand how toddler caregivers are employing stress management strategies, and if targeting such strategies may positively affect caregiver sleep.
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0196

THE IMPACT OF A SLEEP AND CIRCADIAN INTERVENTION ON TRAUMA-RELATED SYMPTOMS IN ADOLESCENTS

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Introduction: Post-traumatic stress disorder (PTSD) is a debilitating condition that commonly causes sleep disturbances. Interventions that target sleep disturbances have gained traction as a way to alleviate PTSD symptoms. Circadian misalignment (CM), the discrepancy between one's sleep patterns and biological clock, is a potential contributor to poor sleep, especially in adolescents. We examined if a sleep intervention (the Transdiagnostic Intervention for Sleep and Circadian Dysfunction (TranS-C)) improved trauma symptoms in adolescents with CM. We hypothesized that adolescents would experience reduced trauma symptoms after completing TranS-C.

Methods: Thirty-one adolescents ages 14-18 actively experiencing CM (had a weekday bedtime of after midnight) engaged in a six-week TranS-C sleep intervention. Both before and immediately after the intervention, participants completed the International Trauma Questionnaire (ITQ.) We used nonparametric Wilcoxon Signed-Rank tests to compare the presence of PTSD symptoms and trauma-related functional impairment before and after the sleep intervention.

Results: Post-test scores were significantly higher than pre-test scores across three subtests of the ITQ: Disturbance in Relationships ($p = .013$), Disturbances of Self-Organization ($p = .007$), and Affective Dysregulation ($p = .042$); all other subtests had no significant change.

Conclusion: These results are contrary to our hypothesis, suggesting that while the intervention aimed to address CM and improve overall sleep health, it may have inadvertently heightened participants' awareness of trauma-related symptoms. This could reflect increased emotional processing or sensitivity to trauma cues as a result of improved sleep quality facilitated by the intervention. Further research is needed to explore these unexpected findings, examine potential mediating factors, and refine the intervention to better address both sleep and trauma-related outcomes.

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0197

CAN DIGITAL CBT-I BE AS A SCALABLE WORKPLACE SOLUTION FOR INSOMNIA-RELATED PRODUCTIVITY LOSSES?

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Introduction: Previous research demonstrated that insomnia significantly impairs work productivity, leading to substantial economic losses. Traditional Cognitive Behavioral Therapy for Insomnia (CBT-I) is effective in alleviating insomnia symptoms, but largely inaccessible due to the scarcity of trained providers and associated costs. Digital CBT-I (dCBT-I) offers a scalable and accessible solution, showing evidence in reducing insomnia severity. When investigating dCBT-I's effect on work productivity, existing studies have shown promise, but also have limitations, including homogeneous samples and insufficient follow-up data. This study examines whether dCBT-I can lead to meaningful improvements in overall work productivity.
Methods: The 658 participants in this study met the DSM-5 criteria for insomnia. Participants were randomized to complete six core sessions of dCBT-I (n=358), or receive six weekly emails of sleep education (n=300). Work productivity was measured using the Work Productivity and Activity Impairment Questionnaire specified to a specific health problem: insomnia (WPAI:SHP). The WPAI:SHP questionnaire was administered pre-treatment, post-treatment, and one-year follow up. Total work impairment was the primary outcome. Secondary analyses included presenteeism and absenteeism subscales. A meaningful improvement was operationalized as 15% improvement, which corresponds to 6 hours in a 40 hour work week.
Results: Total work impairment was reduced 16.5% (b = -16.5 ± 2.7 SE, p <.001) more in the dCBT-I condition compared to the SE condition at post-treatment. At the one-year follow up, reduction in total work impairment remained 12.9% (b = -12.9 ± 2.8 SE, p <.001) greater than the SE condition. Sensitivity analysis indicated dCBT-I participants were 2.7 times more likely to achieve a 15% reduction in work impairment (95% CI [1.7, 4.3]) post-treatment. No significant effects were found for absenteeism in the secondary analysis, but participants in the dCBT-I group were 2.2 times more likely to achieve a 10% reduction in presenteeism (95% CI [1.4, 3.5]).
Conclusion: This study demonstrates the potential for dCBT-I as a scalable solution to rescuing insomnia-related productivity losses. Our results demonstrated that dCBT-I may recover almost a full day of work productivity. Integrating dCBT-I into workplace occupational health programs may help companies recoup insomnia-related productivity losses while improving employees' sleep health.
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0198

EVALUATING THE CAUSAL IMPACT OF SLEEP-RESTRICTION ON COGNITIVE AND AFFECTIVE EMPATHY

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Introduction: Insufficient sleep is known to degrade neurobehavioral functioning, but its impact on social responses to others is not well-understood. One key social response is empathy, namely the ability to understand and share in others' mental states. Empathy refers to both cognitive appraisals (understanding others) and affective responses (feeling with others). While linked to sleep, the dearth of experimental studies limits current understanding of whether commonly-experienced levels of sleep loss cause changes in cognitive and affective empathy. In this vein, the current pre-registered experiment tested whether experimentally-induced sleep restriction diminished cognitive (emotion-recognition) and affective empathy (concern for others).
Methods: College-age adults (n=70, 52% female, 66% White) were randomly assigned to either maintain their typical sleep or curtail it (by shifting bed and wake times over two days). Empathy changes were measured with the Multifaceted Empathy Test using emotional faces where participants had to accurately classify the emotion (cognitive) and report their feeling of concern for each depicted individual (affective), before and after the sleep manipulation. Regression analyses tested the impact of sleep-restriction condition on post-manipulation empathy (alongside baseline empathy and sex as covariates), while actigraphy assessed sleep.
Results: Sleep-restriction was successful, on average leading to a 4.5 hours deficit among the restricted group. Regression analysis indicated that cognitive and affective empathy were significantly diminished among sleep-restricted participants, even after accounting for their baseline empathic responses and sex. As a result, sleep-restricted individuals ultimately showed significantly lower empathic accuracy (58% vs. 63%) and empathic concern (d=.50), confirmed by associations with measured sleep duration.
Conclusion: The findings provide novel and much needed evidence about the impact of commonly experienced levels of sleep loss on a core human capacity—the ability to understand and feel with others. Despite methodological limitations (e.g., simple stimuli), the findings provide important causal evidence suggesting sleep loss reduces both cognitive and affective empathy in young adults. This carries important theoretical implications for of how sleep shapes social behavior, but also applied ones for occupations which require empathizing in order to be effective (e.g., first-responders).
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0199

SLEEP'S IMPACT ON SOCIAL WELLNESS: A NATIONAL SLEEP FOUNDATION POPULATION STUDY OF BLACK AND HISPANIC ADULTS

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Introduction: A robust and compelling literature has documented the importance of social connectedness and community in Black and Hispanic populations. A growing body of research has documented that poor sleep may negatively impact peoples' social lives, including hindering social engagement with friends and family; however, less is known about the potential positive impact of good sleep health on social functioning. Given the lack of research on the positive social impact of sleep health in communities of color, the present study examined the positive effects of getting enough quality sleep on social functioning among Black and Hispanic American adults.

Methods: A random sample of 608 nationally representative Black and Hispanic American adults were recruited to complete a survey that was administered in English or Spanish. The survey consisted of demographic questions and items probing the potential impact of a good night's sleep on social functioning. Descriptive statistics were used to analyze rates of experiencing positive social functioning benefits due to good sleep health within both Black and Hispanic adults.
Results: The large majority of Black and Hispanic adults reported a positive social impact of getting enough sleep (80%) and getting good quality sleep (79%). When asked about the impact of a good night's sleep on their ability do all the activities with friends that they want to do, 82% of Black and Hispanic adults reported good sleep has a positive impact. Over eight out of every ten people (83%) reported that a good night's sleep had a positive impact on their ability to do the family activities they want to do.
Conclusion: Good sleep health has a large and profound impact on the social functioning of Black and Hispanic American adults—facilitating activities with both friends and family alike. Considering the centrality of social connectedness in communities of color, messaging around the beneficial effects of good sleep health on social functioning should be highlighted in efforts to promote sleep health for Black and Hispanic Americans.
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0200

HOW MANY NIGHTS ARE ENOUGH? A PRE-REGISTERED STUDY EXAMINING THE RELIABILITY OF SLEEP INTRAINDIVIDUAL VARIABILITY DERIVED FROM 10,412 NORMAL SLEEPERS

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Introduction: Individual sleep/wake patterns are characterized by the intraindividual mean and variability, which captures night-to-night fluctuations. Although research has focused on mean sleep parameters, higher sleep duration and timing variability are associated with negative physical and mental health outcomes. Most accelerometry-based sleep studies assess 5–14 nights of data, which may be insufficient for reliable variability estimates. This pre-registered study quantifies how many nights are needed for reliable sleep intraindividual mean and variability estimates using accelerometry.
Methods: Participants (N = 10,412, M-age = 37.75 ± 10.65, 50% women) wore a validated wrist-worn biometric device (WHOOP strap) for one year (3,700,492 person-nights). Total sleep time (TST), sleep onset, mid-sleep, sleep offset, wake after sleep onset (WASO), and sleep percentage were derived from heart rate and accelerometer data. Reference intraindividual means (iM) and standard deviations (iSD) were calculated from all (363) nights. Reliability correlation coefficients compared reference values with 2–362 consecutive nights randomly selected per participant, with r ≥.80 considered reliable. 95% limits of agreement were calculated using the Bland-Altman method.
Results: Reliable estimates of sleep iM required 2–8 nights (TST: 8 nights; sleep onset, midsleep, sleep offset: 2 nights; WASO and sleep percentage: 4 nights). Reliable iSD estimates required substantially longer durations, 41–67 nights (TST: 43 nights; sleep onset, midsleep, sleep offset: 41 nights; WASO and sleep percentage: 67 nights). iSDs from 7- or 14-nights showed poor reliability (7-nights: r =.48–.57; 14-nights: r =.59–.68). 95% limits of agreement on absolute values for 14-night iSDs were, TST: -42.80–34.57 (min), sleep onset: -60.80–44.58 (min), midsleep: -52.22–37.34 (min), sleep offset: -61.45–45.74 (min), WASO: -25.07–19.24 (min), and sleep percentage: -3.56%–2.66%.
Conclusion: Eight nights of accelerometry data are sufficient to estimate intraindividual mean sleep, but ~6–10 weeks (41–67 nights) are needed to reliably estimate intraindividual sleep variability. These findings highlight the importance of tailoring study periods to the specific sleep metric of interest. Longer monitoring periods may improve diagnostic accuracy and inform evidence-based recommendations for sleep assessments in clinical and research settings.
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0201

PAIN AND SOCIAL ISOLATION AS MECHANISMS LINKING THE ASSOCIATION BETWEEN SLEEP HEALTH PROBLEMS AND FRAILTY IN OLDER ADULTS IN THE UNITED STATES

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Introduction: Sleep health problems are common among older adults and are associated with various aging outcomes, including frailty. Older adults with sleep health problems may also experience pain and social isolation which can lead to physical and psychological consequences that exacerbate frailty. In this study, we examined the pathways, such as physical pain and social isolation, through which sleep health problems may contribute to the development of frailty among older adults.
Methods: 963 community-dwelling older adults (65+) were included in this two-wave longitudinal study from the National Aging and Health Trends Study (NHATS, 2013-14). Sleep health problems, including dissatisfaction, poor daytime alertness, suboptimal sleep timing, inefficiency and inadequate sleep duration were self-reported. Frailty was assessed using Fried's frailty phenotype and included muscle weakness, slow gait speed, exhaustion, low physical activity and weight loss. The presence of any chronic pain, activity-limiting pain, and social isolation, assessed through the 6-item Social Network Index participation domains, were included as mediators. We used multivariable logistic regression models to examine the associations and the Karlson–Holm–Breen (KHB) method to assess the mediation.
Results: After adjusting for baseline frailty, socio-demographics, and chronic conditions, older adults with more sleep health problems had 29% higher odds of being frail (OR: 1.29, 95% CI: 1.09, 1.53). Those who reported any pain (OR: 2.14, 95% CI: 1.35, 3.41), activity-limiting pain (OR: 1.72, 95% CI: 1.09, 2.72), and social isolation (OR: 1.98, 95% CI: 1.23, 3.18) had higher odds of frailty. The results of the KHB analysis indicate that pain (10%), activity-limiting pain (15.4%) and social isolation (9.9%) mediated the association between sleep health problems and frailty.
Conclusion: Older adults with more sleep health problems were found to have an increased risk of frailty, with pain, activity-limiting pain and social isolation being potential pathways in this association. The findings highlight the importance of addressing these factors to delay age-related declines in older adults

experiencing sleep health problems. Interventions aimed at improving sleep quality, managing pain effectively, and reducing social isolation may help mitigate the progression of frailty.
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0202

SLEEP HEALTH PROFILES ON EMOTIONAL FUNCTIONING AND QUALITY OF LIFE OF LONG-TERM SURVIVORS OF PEDIATRIC HODGKIN LYMPHOMA

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Introduction: Sleep is a neurophysiologic and behavioral state essential for wellness. Pediatric cancer survivors are at elevated risk of developing sleep problems due to cancer and/or treatment-related factors, but their sleep health is understudied. We used unsupervised clustering to identify sleep health profiles in survivors and controls and evaluated differences in emotional function across sleep groups.
Methods: Long-term survivors (> 5 years from diagnosis) of Hodgkin lymphoma (n=224, mean±SD age=40±9.5) and matched community controls (n=184, age=38±11.4) completed sleep questionnaires. Following the SATED model, sleep health components were derived from PSQI responses indicating Satisfaction, Alertness, Timing, Efficiency, and Duration. Continuous sleep metrics were computed as Euclidean distances of associated PSQI items, and Latent Profile Analysis identified sleep profiles. Parametric bootstrapped likelihood ratio tests estimated the number of profiles and robustness was assessed using Adjusted Rand Index. The health-related quality-of-life (SF36) and Brief Symptom Inventory (BSI-18) evaluated emotional function, and ANOVAs, t-tests, and $\chi 2$ assessed group differences.
Results: Three sleep profiles were identified: good-sleepers (PSQI=3.6±1.8), average-sleepers (PSQI=6.9±2.9), and poor-sleepers (PSQI=10.2±3.2). Profile distribution was significantly different between survivors and controls ($\chi 2=19.2$, $p< 0.001$) with a larger proportion of survivors in the poor-sleeper profile (33.9%vs15.2%). Average-sleepers had worse Alertness than good-sleepers, with no difference compared to poor-sleepers ($F(2,405)=68.2$, $p< 0.001$). Good-sleepers had better Timing than poor-sleepers, with no difference compared to average sleepers ($F(2,405)=30.1$, $p< 0.001$). Differences between all three profiles were found in Satisfaction ($F(2,405)=85.7$, $p< 0.001$), Efficiency ($F(2,405)=110.7$, $p< 0.001$), and PSQI disturbances ($F(2,405)=71.4$, $p< 0.001$), but no differences in Duration ($F(2,405)=1.4$, $p=0.237$). Considering quality-of-life, survivors have worse bodily pain, general health, and physical and role-physical limitations compared to controls. Poor-sleepers survivors reported worse mental ($t(79)=-2.8$, $p< 0.001$) and emotional health ($t(78)=-2.5$, $p< 0.001$). No sleep profile evidenced Survivor vs Control differences for depression or anxiety symptoms.
Conclusion: Distinctive sleep health profiles were found in pediatric Hodgkin lymphoma survivors and community controls. Survivors reported more pain, poorer general health, and more physical and role-physical limitations, while poor-sleepers exhibited worse mental and emotional health compared to controls. We highlight the importance of understanding the dimensions of sleep health to inform targeted interventions focused on improving overall well-being in pediatric cancer survivors.

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0203

EFFECTS OF LATE MEAL TIMING ON HUNGER, APPETITE, AND DIETARY BEHAVIORS OF ADULTS WITH OVERWEIGHT/OBESITY: A RANDOMIZED, CROSS-OVER, CONTROLLED TRIAL

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Introduction: Late eating has been linked with obesity and unhealthy food choices. However, no randomized clinical trial investigated causality between food timing and eating behaviors. Therefore, we conducted a randomized, cross-over, controlled trial to assess the effects of late vs early eating on hunger, appetite, and dietary behaviors of adults with overweight/obesity.
Methods: Sixteen participants (age:37.25±2.85y; 31% female; BMI:28.66±0.59 kg/m2) complete two 9-day in-laboratory protocols, one with early eating (isocaloric meals 1h0m, 5h10m, and 9h20m after wake) and the other including late eating (5h10 m, 9h20 m, and 13h30 m). The order of early and late protocols was randomized. Each protocol included a 6-d regular sleep/wake schedule followed by a 40-h Constant Routine [continuous wakefulness, semi-recumbent position, dim light (~4lux)] on days 7 and 8, a recovery night, and discharge on day 9. Throughout the Constant Routine, hunger/appetite and craving were assessed hourly. After controlled dietary schedules, participants' ad-libitum, self-selected dietary intake was assessed four times, including dinner and post-dinner snacks on day eight and breakfast and post-breakfast snacks on day nine, for each protocol. Moreover, participants' dietary intake was assessed by a photo-food diary for one week after each discharge.
Results: There was no significant difference in the area under the curve (AUC) in late vs early protocols (AUC mean difference ± SE) for hunger (-82.85±93.48, p=0.389), desire-to-eat (-158.48±104, p=0.148), fullness (13.58±79.95, p=0.867), thirstiness (-35.86±81.83, p=0.667), overall craving (-806.28±167.76, p=0.614), or craving for dairy (-150.42±84.90, p=0.096), meat (-119.61±103.97, p=0.268), vegetables (-139.95±120.41, p=0.263), fruit (-154.23±88.09, p=0.10), salty foods (-175.33±112.84, p=0.141), sweets (-139.11±188.56, p=0.472), and starchy foods (-117.34±86.19, p=0.193) during the Constant Routine. Late eating decreased participants' subsequent ad libitum dinner % of total energy fat intake (-4.98±1.98, p=0.024) and increased breakfast dietary glycemic index (3.06±0.97, p=0.007). During the 1-week post-discharge, late versus early eating decreased total energy intake (-169±65.60, p=0.049) and increased the dietary inflammatory index (0.19±0.06, p=0.034).
Conclusion: These findings suggest that late eating causes unhealthy dietary patterns characterized by a higher dietary glycemic index (in-patient phase) and dietary inflammatory index (out-patient phase). Future studies are needed to assess the long-term effects of meal timing on individuals' dietary behaviors.
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0204

FATIGUE IN TEAMS: COULD TEAMING BE AN EFFECTIVE FATIGUE RISK MANAGEMENT COUNTERMEASURE?

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Introduction: When working face-to-face, teams rely on nuanced behaviours to ensure effective team performance. In the operational environment teams are increasingly distributed across multiple locations and must work together effectively despite removing the beneficial visual aid of face-to-face interactions. This study examined the impact of forced disaggregation during sustained operations on alertness and self-reported sleepiness.
Methods: In this study 24 participants in six, 4-person teams (aged 25±7y, 13F/11M, BMI 23.8±4.5kg/m2) completed a 31.5h sustained operations protocol during which they completed one of three team tasks every 2h. The team tasks included Captain Sonar (co-located, cooperative team task), Dungeon game (co-located, collaborative team task) and COHESION (distributed, collaborative team task). Before and after completing each team task participants completed a Karolinska Sleepiness Scale (KSS; sleepiness scale) and Psychomotor vigilance task (PVT; response time task to measure alertness). For KSS and PVT, multiple linear mixed-effects models, with fixed effects of Time Awake, Task (COHESION, Dungeon and Captain Sonar), Pre/Post (before task and after task), and their interaction (Task*Pre/Post) were run.
Results: There was a significant main effect of Time Awake, such that with increasing time awake sleepiness increased ($p < .001$), PVT response time slowed ($p < .001$) and PVT lapses (missed responses) increased ($p < .001$). There was also a significant Task*PrePost interaction for sleepiness, such that following 24h of time awake (07:00), individuals reported significantly increased sleepiness following the distributed team task (COHESION) while participants reported to be less sleepy following Captain Sonar (co-located, co-operative task). Further, participants performance improved at night ($p < 0.01$), with faster response times, following the co-located team tasks (Dungeon and Captain Sonar). Additionally, teams completing co-located tasks maintained overall team performance across the protocol, unlike distributed team tasks with worsened team performance.
Conclusion: This study is the first to look at the impact of team performance during sustained operations in both co-located and distributed locations. These findings highlight the benefits of face-to-face interactions within the context of teaming. Typically fatigue research highlights the impact of fatigue on the individual. This study suggests working within a co-located team environment improves alertness, minimising the detrimental effects of sustained operations.
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0205

SLEEP OF ATHLETES WITHIN PROFESSIONAL RUGBY CLUB: FROM PREVENTION AND COACHING TO PERFORMANCE OPTIMIZATION

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Introduction: Elite Athletes are susceptible to sleep inadequacies especially poor sleep quality and short sleep habits. Poor sleep and sleep habit are associated with decreased athletes' performance, increased injuries and less teams' success. Expert consensus and clubs' medical staff are searching for awareness program, medical assessment and more research in this field. We assessed a 360° sleep program (SoSleep) on club's request in prospective follow-up upon volunteer athletes to raise awareness, evaluate and coach with personnalized sleep goals to improve player's sleep for recovery and performance optimization upon elite rugby teams.
Methods: 72 rugbymen athletes from professional teams were proposed for educational and voluntary sleep program (SoSleep) over last 2 seasons in prospective study. The program was consisting in 360° sleep's evaluation directly at club's training field area with education briefing, sensibilization programs, on-line questionnaires, individual sleep assessment, in-board nap room, wearable polysomnography (EEG head band), medical sleep clinic evaluation with full home polysomnography test on medical staff's requirements.
Results: We had 45 awareness program forms, 36 players with several medical interviews, 106 questionnaire sets, 29 head band nights, 2 medical assessment pathways. Awareness program results showed that 52% were exposed to bad sleep prior to program then 89% to individual sleep better knowledge and 98% better sleep management intention after completion. Wearable polysomnography results (n=29) showed 7h52 mean sleep time (49% light-sleep, 17% deep-sleep, 26% REM-sleep, 8% WASO). Average players' satisfaction program level was 4,53/5.
Conclusion: Sleep education program with specific follow-up and polysomnographic evaluation at training field bedside and our results seem of great interest and very promising. Results deserve to be discussed and confirmed subsequently, notably the low polysomnography deep sleep proportion. Up to date main explanation would be that evaluations were made during the regular or final phase season when physical training is adjusted, likely different from pre-season trainings with modified sleep needs. Associated with last rugby team's results with double national and continental victories in major league (French TOP14, European Champions cup), sleep optimization within professional clubs seems to be a required and promising implementation both for the player's individual recovery and performance and for the team's collective performance.
Support (if any):

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0206

SLEEP BEHAVIORS ARE ASSOCIATED WITH CHRONIC DISEASES IN PUBLIC SECTOR HEALTHCARE WORKERS

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Introduction: Healthcare workers work long or irregular shifts and report high occupational stress, resulting in short and poor sleep. Previous research demonstrated the effect of sleep duration/quality on overall physical and mental health of the general population. The association between sleep behaviors and the incidence of specific chronic diseases has not been well studied in healthcare workers.
Methods: A cross-sectional survey measured sociodemographics, work schedules, sleep, and chronic diseases (diabetes, hypertension,

high cholesterol, low back diseases and others) in healthcare workers at five public sector facilities in the northeast U.S.
Results: Among 1,553 healthcare workers (mean age 46.4 years, 61.5% female), 29% reported sleep disturbances, 51% reported short sleep duration (≤ 5 hours/day), and 20% reported two or more episodes of sleep per day. In total, 42% of the participants reported at least one chronic disease, including 15% diabetes, 28% hypertension, 22% high cholesterol, 14% low back disorders, and 18% others. Hypertension was associated with each of sleep disturbances, short sleep duration and ≥ 2 episodes; low back disorders were associated with sleep disturbances and short sleep duration; and high cholesterol was associated with sleep disturbances. Adverse sleep behaviors (sleep disturbances or short duration or ≥ 2 episodes, score range 0-3) were associated with a crude linear increase in the prevalence of chronic diseases (Chi-square=31, p< 0.001). The risk of any chronic disease was significantly elevated with two or more adverse sleep behaviors after adjusting for sociodemographics (Prevalence Ratio=1.3, 95% Confidence Interval=1.2-1.6).
Conclusion: Healthcare workers' adverse sleep behaviors were associated with an increased prevalence of chronic diseases. Cross-sectional design of the study limited the ability to examine causal relationships, therefore adverse sleep behaviors could be contributors or outcomes of chronic diseases. Evidence-based workplace interventions are needed to improve healthcare workers' sleep behaviors in order to reduce chronic diseases and improve overall health of this occupational group.
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0207

SLEEP, LIFESTYLE BEHAVIORS, AND SLEEP-RELATED DAYTIME IMPAIRMENTS IN U.S. NAVY SHIPBOARD ENVIRONMENTS

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Introduction: The U.S. Navy shipboard setting is associated with high stress and negative health outcomes due in part to constraints limiting opportunities to engage in healthy lifestyle behaviors. Improving our understanding of the relationship between sleep and lifestyle behaviors in this setting may help identify interventions to improve health outcomes. We examined service members' sleep in the shipboard operational setting and investigated the relationships among lifestyle behaviors, sleep, and sleep-related daytime impairments.
Methods: Service members (n = 758, 30 ± 8 years [mean ± SD], 24% female) wore a commercial sleep-tracking device (Oura™ Ring, Generation 2 or 3) to measure total sleep time (TST) while in port and while underway. Participants slept either at home or on ship, depending on their mission and schedule. Participants also completed surveys assessing sleep-related impairment (PROMIS-SRI short form) and multiple lifestyle behaviors, including sun exposure, diet, typical daily exercise, and caffeine/nicotine intake. Relationships between lifestyle behaviors, TST, and sleep-related daytime impairments were examined using linear mixed models, with command included as a random effect.
Results: Service members slept 6.3 ± 1.1 hours/day and reported moderate levels of sleep-related impairments (55.2 ± 9). TST was related to ship schedule (6.2 ± 1.1 underway, 6.8 ± 0.9 in port) but not lifestyle behaviors (all behaviors, p >.05). For sleep-related impairment, shorter TST (B = -1.45, SE = 0.31, p <.001) and poor diet (B = -2.22, SE = 0.33, p <.001) were related to higher impairment. Less physical activity approached statistical significance (B = -3.26, SE = 1.69, p =.053).
Conclusion: Even under the many constraints of shipboard settings and the potential variation due to person-specific characteristics (e.g., department, rank, service years), daytime impairments were related to sleep and lifestyle behaviors, suggesting persistent synergistic connections among them. Therefore, targeting sleep as well as certain lifestyle factors (i.e., diet and exercise) when developing health-related interventions for the U.S Navy personnel serving on warships should be considered.
Support (if any): Defense Health Agency (work unit no. N2010).

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0208

ARE CANADIAN VARSITY ATHLETES SLEEPING WELL? INSIGHTS ON ADHERENCE TO OPTIMAL SLEEP RECOMMENDATIONS

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Introduction: In 2021, Walsh and colleagues highlighted the importance of sleep education for athletes and proposed a series of tips to educate athletes. These tips can be summarized as follow: (1) get more sleep than the standard recommendations; (2) nap to supplement insufficient nocturnal sleep; (3) maintain a good sleep hygiene; (4) having a training schedule in-line with their chronotype. The aim of this study was to explore the proportion of Canadian varsity students who follow these recommendations.
Methods: A total of 173 Canadian varsity athletes (M=20.8 ±2 years 66.5% females) completed an anonymous online survey of about 20 minutes during the academic year. The survey included questions about sleep habits, sleep hygiene, sleep environment, training schedule and lifestyle habits.
Results: Data showed that 65.8% of athletes do not get 8 hours of sleep during weekdays and 29% during weekends. Moreover, 31.5% of athletes do not even get 7 hours of sleep on average during weekdays and 11% during weekends. In addition, before a game, 58,4% rarely or do not nap, while 41,1% occasionally or always nap. On the other hand, during regular weekdays, 66.9% will nap at least once, while 33,1% never nap. Regarding training, 58.3% report training at a time that is not in-lined with their chronotypes. Data on sleep hygiene show that 65% of the athletes use their cellphone within one hour of going to bed, seven days a week, and 33.3% do not turn their notifications off during the night. Finally, 21.4% report that their sleep is disturbed by roommates, 41% report that ambient temperature is interfering with their sleep, 30.1% that ambient light affects their sleep, and 32.9% of them report environmental noise disturbing their sleep.
Conclusion: These results highlight that Canadian varsity athletes seem to be far from sleeping in line with the recommendations set by Walsh et al (2021). Most of Canadians varsity athletes do not

get enough sleep. Our results also seem to indicate that Canadian varsity athletes may not be sleeping in an environment conducive to optimal sleep. Further studies are needed to investigate the factors that may prevent athletes from achieving optimal sleep.
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0209

WORLD BELIEFS, NOT RECOVERY EXPERIENCES, PREDICT SUBJECTIVE SLEEP QUALITY

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Introduction: Our beliefs about the situations in which we find ourselves influence how we think and behave in those situations. Recent research on primal world beliefs, beliefs about the nature of the world as one big situation, has shown strong relationships between "primals" and important waking psychological variables such as depression, political affiliation, and well-being. These beliefs, which are present in all situations, likely also impact sleeping experiences. The current study explores the relationships between four core primals and subjective sleep quality, in conjunction with measures of waking recovery experiences, which have been shown to be positively related to sleep quality.
Methods: Undergraduate students completed a survey with measures of subjective sleep quality, primal world beliefs, recovery experiences, and demographics. Subjective sleep quality was assessed with the Sleep Quality Scale (SQS). The Good, Safe, Alive, and Enticing primals were measured using the Primals Inventory-18 (PI-18), and recovery experiences were measured using the Recovery Experiences Questionnaire (REQ).
Results: A total of N = 281 students completed the survey, with sample characteristics 72.6 % female, 49.9% White or Caucasian, and average age 20.0 (SD = 1.67). Of the primals measured, Good (r = -.244, p <.001), Safe (r = -.132, p =.029), and Enticing (r = -.251, p <.001) significantly correlated with subjective sleep quality, such that more positive primals (e.g., stronger belief that the world is good) were associated with better subjective sleep quality. The relationship between Alive and sleep quality was not significant (r = -.117, p =.053). The REQ did not significantly correlate with subjective sleep quality (r = -.110, p =.070), nor did the detachment subscale (r =.043, p =.476), which has previously shown a strong relationship with sleep quality.
Conclusion: Preliminary findings indicate that beliefs about whether the world is a good, safe, or enticing place positively predict subjective sleep quality. Further, these beliefs seem to be more strongly related to sleep quality than are recovery experiences. Future research should explore the relationship between worldview and sleep health in more detail by examining the relationships between primals and thorough, objective measures of sleep quality.
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0210

POOR SLEEP QUALITY AND EXCESSIVE DAYTIME SLEEPINESS AMONG CANADIAN UNIVERSITY STUDENTS: A COMPARISON A VARSITY ATHLETES AND SEDENTARY STUDENTS

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Introduction: Studies have shown that professional athletes and American varsity athletes experience sleep disturbances and short sleep duration, which lead to impaired daytime functioning. Nevertheless, very little is known about Canadian varsity athletes. The objective of this study is to compare the sleep of Canadian varsity athletes and sedentary university students.
Methods: A total of 676 Canadian university students (166 varsity athletes and 510 sedentary students; M= 21.73 ±3.00; 73.4% females) completed an anonymous online survey which included the Pittsburgh Sleep Quality Index (PSQI), the Epworth Sleepiness Scale (ESS), and the Insomnia Severity Index (ISI). Mantel-Haenszel chi-square analyses were used to determine differences in the rates of sleep quality, excessive daytime sleepiness, and insomnia symptoms between varsity athletes and sedentary students, controlling for gender. The Mantel-Haenszel analysis was also employed to compare the proportion of varsity athletes and sedentary students who met the recommended minimum daily sleep duration of 7 hours.
Results: Results showed no group difference on the PSQI, $\chi 2$ (1) = 1.15, p=.284, and ESS scores, $\chi 2$ (1) = 1.46, p=.228. Data showed that 81.3% of varsity athletes and 86.7% of sedentary students scored > 5 on the PSQI. Also, 60.2% of varsity athletes and 53.6% of sedentary students scored > 10 on the ESS. Results showed that varsity students had significantly fewer insomnia symptoms than sedentary students, $\chi 2$ (1) = 11.43, p <.001. Furthermore, data revealed that 27.0% of sedentary students had clinical insomnia, whereas 7.8% of varsity athletes did. Also, 32.1% of varsity athletes and 42.3% of sedentary students slept less than 7 hours per night on weekdays, whereas it was 10.4% and 14.3%, respectively, on weekends.
Conclusion: These results suggest that the sleep of varsity students doesn't seem to be very different from that of sedentary students. Yet, both populations show significant sleep problems, including short sleep duration and sleep disturbances that may affect daytime functioning. Given the importance of sleep for mental health, recovery and athletic performance, this study highlights the urgent need for concrete strategies to target university students, whether they are an athlete or not.
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0211

SLEEP'S IMPACT ON PRODUCTIVITY FOR BLACK AND HISPANIC ADULTS: POPULATION DATA FROM NATIONAL SLEEP FOUNDATION

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Introduction: Sleep research has had disproportionately little focused on communities of color. Similarly, less research has examined the benefits of healthy sleep as compared to the deficits of poor sleep. Home and work productivity are important components of flourishing and represent relatively novel endpoints in sleep research. Therefore, we sought to document the perceived benefits of sleep health on both work and home productivity and responsibilities in Black and Hispanic adults.
Methods: An online, national survey was administered to a probability-based, random sample of 608 Black and Hispanic U.S. adults during Fall 2024. The survey was administered in English or Spanish, included demographic questions, and asked about the impact of getting enough quality sleep on home and work productivity, as well as ability to perform specific tasks. Descriptive statistics were used to analyze rates of experiencing

positive productivity benefits due to good sleep health within both Black and Hispanic adults.
Results: The vast majority of Black and Hispanic adults reported experiencing positive impacts of getting enough sleep on home (87%) and workplace (90%) productivity. People also reported productivity benefits of good quality sleep at both home (87%) and work (91%). In terms of specific productivity-related behaviors and benefits, Black and Hispanic adults indicated that a good night's sleep had a positive impact on their ability to work the required number of hours (81%), get going at the beginning of the day (85%), stay on task (82%), think clearly (86%), handle the workload (83%), and do their work without making mistakes (82%).
Conclusion: The benefits to productivity, both at home and work, of good sleep health were widely experienced and reported by Black and Hispanic adults. Public health and other awareness campaigns in communities of color can emphasize the positive effects of healthy sleep for productivity-related endpoints and help reframe the narrative on why to prioritize sleep health.
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0212

POPULATION DIFFERENCES IN AVOIDING AND PREVENTING DROWSY AND DRUNK DRIVING: A NATIONAL SLEEP FOUNDATION STUDY

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Introduction: Drowsy driving is impaired driving, just like drunk, drugged, and distracted causes of crashes. Drowsy driving is a significant public health and safety concern. There are several actionable steps individuals can take to avoid and prevent impaired driving, including changing plans, finding alternative transportation (e.g., taxi or rideshare), and urging others not to drive impaired. This study sought to identify and highlight differences in the likelihood that people would take action to avoid and prevent drowsy driving and drunk driving.
Methods: National Sleep Foundation (NSF) conducted a random, representative national survey of 1,372 US adults, oversampled for Black and Hispanic adults. The survey asked how likely people were to (1) change plans, (2) find alternative transportation, or (3) drive anyway if they had (a) only gotten 3-4 hours of sleep or (b) had several alcoholic drinks. Descriptive statistics were used to summarize rates of likelihood to take steps to avoid and prevent impaired driving, while chi-square tests were used to explore differences based on sleep health.
Results: More U.S. adult drivers stated they would change plans if they had several drinks (81%), compared to if they got insufficient sleep (52%). Nearly 7 in 10 adult drivers (69%) were likely to find alternative transportation to avoid drunk driving compared to only 40% who would do the same to avoid drowsy driving. Strikingly, 50% of U.S. drivers reported being likely to keep their plans and drive despite only sleeping 3-4 hours, while only 11% reported being likely to drive despite having several drinks. Finally, drivers who were likely to avoid drowsy driving had longer average weekly sleep durations and better sleep quality.
Conclusion: Being awake and alert behind the wheel is as important as not being under the influence. Unfortunately, adult drivers reported being nearly five times more likely to keep their plans and drive while drowsy than if they had been drinking. Notably, those with better sleep health were more likely to take steps to avoid drowsy driving. It appears established attitudes and behaviors to prevent drunk driving have not generalized to drowsy driving, another high-risk form of impaired driving.
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0213

SLEEP AND EMPLOYEE FUNCTIONING: A NATIONAL SLEEP FOUNDATION STUDY OF THE CONSEQUENCES OF NOT GETTING HEALTHY SLEEP

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Introduction: Much research and public education have documented the numerous negative consequences of poor sleep health, with the bulk of this research focusing on the personal consequences of poor sleep health including mood changes, cognitive difficulties, numerous physical health concerns, and social problems. Less is known about the potential negative effects of not getting healthy sleep in the workplace and employee functioning, which includes general productivity, thinking clearly, working carefully, and avoiding mistakes—among others. This study aimed to document the workplace and employee experiences with the myriad negative effects of not getting healthy sleep.
Methods: Data were drawn from an online, national survey utilizing a probability-based, random sample of 1,372 U.S. adults, oversampled for both Black and Hispanic individuals. The survey was administered in English or Spanish, and included demographic information and questions probing about the employee-reported negative impacts of not getting healthy sleep. Measures of central tendency were used to characterize rates of reported negative consequences of poor sleep in the workplace.
Results: The majority of adults in the US reported negative impacts of not getting enough sleep (58%) and not getting quality sleep (66%) on their general levels of work productivity. In terms of specific workplace and employee-related consequences of not getting healthy sleep, large proportions of adults indicated that poor sleep had a negative impact on their ability to work the required number of hours (54%), get going at the beginning of the day (71%), think clearly (67%), do work carefully (57%), interact with people in person, in meetings, or on the phone (45%), control their temper in front of people (45%), handle the workload (58%), and do work without making mistakes (58%).
Conclusion: Not getting healthy sleep has a real, meaningful, negative impact on the workplace and employees. Over 50% of people indicated poor sleep has a negative impact on their general work productivity, including working required hours, not making mistakes at work, and being able to interact appropriately with others at work. Such negative consequences can have large ramifications on business performance, economics, public health and safety. Employers should invest in the sleep health of their workforce.
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0214

ASSOCIATION BETWEEN SLEEP INERTIA AND COGNITIVE PERFORMANCE IN THE WISCONSIN SLEEP COHORT STUDY

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Introduction: Sleep inertia is a transitional state between wake and sleep, resulting in disorientation or grogginess upon waking. Frequent symptoms of sleep inertia are reduced alertness and impaired performance. Although sleep inertia is common, its relationship with objective neurocognitive assessment is understudied and unclear. Thus, this investigation examined the association between subjective, typical sleep inertia severity and a standardized afternoon-assessed objective cognitive testing battery in a population sample of middle-aged and older adults.
Methods: Wisconsin Sleep Cohort participants (N = 462; average age = 74 ± 6.7 years) completed the validated Sleep Inertia Questionnaire (SIQ) and six cognitive tasks: Grooved Pegboard (PEGSUM), Symbol Digits Modalities Test (SDMT), Auditory Verbal Learning Test (AVLT), Oral Word Frequency (OWFRAW), Digit Cancellation Test (Digitcan), and Trail Making Test Part B (TMT-B). All tests were administered and coded by a trained technician following standardized protocols. Associations between total and subscale (physiological, responses to sleep inertia, emotional, and cognitive) SIQ scores with performance on the cognitive tasks (outcome) were assessed using linear regression modeling. All models were adjusted for age, sex, body mass index, education, caffeine use, apnea-hypopnea index, smoking, alcohol, and circadian preference (morning/evening).
Results: Mean SIQ score was 10.74 (SD: 9.54, range: 0 - 63). With every 1 unit increase in the SIQ score, there was an average 1.52-second increase in the time to complete PEGSUM ($p < 0.0001$), a reduction in the average number of matches on SDMT by 0.11 ($p = 0.011$), and an increase of an average of 1.08 seconds to complete TMT-B ($p < 0.0001$). SIQ subscale analysis demonstrated that performance on these tasks was associated with physiological, emotional, and cognitive SIQ subscale scores, but not responses to sleep inertia subscale score. Sensitivity analysis considering apolipoprotein E4 status (N = 391) did not substantially alter results.
Conclusion: These findings suggest sleep inertia may be an important consideration when objectively assessing neurocognitive performance. Future research that examines neurocognitive function among patients with excessive sleep inertia, and probes cause-effect relationships between sleep inertia and cognitive performance are indicated.
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0215

CHRONIC VARIABLE SLEEP DEFICIENCY IMPAIRS DECLARATIVE MEMORY IN WOMEN BASED ON MENSTRUAL CYCLE PHASE

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Introduction: Chronic variable sleep deficiency (CVSD) is a pattern of insufficient sleep commonly illustrated by sleep loss on weekdays to accommodate social and occupational demands and "catch-up" recovery sleep on weekends. Women are more vulnerable to acute overnight sleep loss during the follicular phase compared to the luteal phase of the menstrual cycle. We therefore examined the impact of chronic sleep loss on declarative learning and memory by menstrual cycle phase using a CVSD paradigm.
Methods: Data from 12 healthy naturally-cycling pre-menopausal women (mean±SEM: 29.95±1.46 years) who completed an ongoing 11-day inpatient study of the neurobehavioral impacts of CVSD were analyzed. Participants were randomized to begin the CVSD protocol at either the follicular (n=8) or luteal phase (n=4) and underwent three cycles of a 10-hour sleep opportunity followed by two consecutive nights of 3 hours sleep, aligned by wake time with a 12-hour recovery sleep before discharge. On the morning after the first 10-hour sleep, participants were trained on a paired-associates task in which they were presented and repeatedly tested on a list of 36 unrelated word-pairs until they achieved a 50%-learning criterion. Participants were asked to recall the same word-pairs the next morning after a 3-hour sleep opportunity. Different sets of word-pairs were used in the first and third CVSD cycles.
Results: Women learned a similar number of word-pairs in the follicular and luteal phases in CVSD-cycle 1 (28.87±1.83 vs. 28.00±2.79, $p=0.79$, respectively) and CVSD-cycle 3 (31.37±0.99 vs. 31.00±2.27, $p=0.86$, respectively). Women recalled significantly fewer words in CVSD-cycle 3 compared to CVSD-cycle 1 (i.e., 5 nights vs. 1 night of sleep loss, respectively) (85.35% ± 3.14 vs. 95.65% ± 3.19, $p=0.04$, respectively) during the follicular phase, but had no difference in word-pair recall between CVSD-cycle 3 and CVSD-cycle 1 during the luteal phase (93.02% ± 3.07 vs. 79.62%±11.41, $p=0.06$, respectively).
Conclusion: These results suggest that CVSD differentially impaired declarative memory in the follicular phase compared to the luteal phase. Additional work with a larger sample size is needed to confirm these preliminary findings and examine the impact of CVSD by menstrual cycle phase on other neurobehavioral outcomes.
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0216

RELATIONSHIP BETWEEN SLEEP, PHYSICAL ACTIVITY, AND COGNITIVE FUNCTION IN COMMUNITY-DWELLING OLDER ADULTS

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Introduction: Poor sleep quality is a common problem in older adults, with an estimated prevalence rate of 12%–40%. The European Guideline for the Diagnosis and Treatment of Insomnia states that exercise may be effective for insomnia management, suggesting that physical activity could improve sleep quality in older adults. Physical activity may attenuate some of the negative impact that poor sleep has on cognition, and sleep is important through which physical activity improves cognitive abilities. In Japan, where the population is aging, improving the health of elderly individuals in the community is a critical issue. The purpose of this study was to examine the relationship

between sleep, physical activity, and cognitive function in community-dwelling older adults.
Methods: Fourteen consecutive volunteers aged ≥ 60 years were included in this study. After approval by the Chubu University Ethics Review Committee, all participants were informed about the study and its methods, and written consent was obtained from each participant. Actigraphy, sleep diaries, and pedometry were conducted over a period of two weeks. Sleep was analyzed based on data obtained from the actigraphy and sleep diary, while physical activity was assessed with pedometer data. Cognitive function was evaluated using the Trail Making Test Part B (TMT-B) and the Mini-Mental State Examination (MMSE). Participants were classified into two groups: those with a sleep efficiency of 90% or greater and those with a sleep efficiency of less than 90%. The relationship between sleep efficiency and each of these measures was then examined.
Results: TMT-B completion time was significantly longer in the group with sleep efficiency < 90% than group with sleep efficiency ≥90%. Physical amount, number of steps, and total distance was significantly greater in the group with sleep efficiency ≥90% than group with sleep efficiency < 90%. There was no significant difference in MMSE score between the two groups. TMT-B completion time was significantly correlated with the sleep efficiency (r=-0.49, p=0.024)
Conclusion: Sleep quality was associated with both physical activity and cognitive function. Our findings suggest that daily exercise along with sleep guidance may be important.
Support (if any):

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0217
NEUROTICISM TRAITS PREDICT RESILIENCE TO EXECUTIVE FUNCTION DECLINE DURING SLEEP DEPRIVATION

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Introduction: Sleep deprivation (SD) impairs a range of cognitive abilities. There are also consistent inter-individual differences in resilience to these effects. Prior work suggests that personality traits such neuroticism, trait-anger, and introversion are associated with resilience during psychomotor vigilance performance. Here, we extended this line of research to determine the role of neuroticism in sustaining resilience to the degrading effects of SD on a Go/No-Go (GNG) inhibitory task that included a cognitive reversal of the contingencies half-way through. We used metrics of neuroticism, particularly anger hostility (AH) to predict inhibitory resilience during sleep deprivation.
Methods: Participants (n=20; 9 female; age=23.6, SD=4.7 years) completed a 39-hour in-lab sleep deprivation period. One week before arriving at the lab, participants completed the NEO-PI, a personality test of the Big 5 traits, including Neuroticism and its facets. During the in-lab sleep deprivation period, participants awakened at 0700 and completed the GNG task a total of three times: once after waking up on the first day, one at hour thirteen, and one at hour thirty-six of continuous wakefulness. The change from the second to the third GNG score was used as the dependent variable in a multiple linear regression with the Neuroticism facets as predictors.
Results: Simultaneous entry of all 6 facets of Neuroticism yielded a significant model predicting total GNG scores (R=0.783, P=0.03). Of these, anxiety (β=1.073, p=.029), AH (0.757, p=.003), and vulnerability (-0.831, p=.045) had the greatest contributions to the model. We then ran a stepwise model to determine whether other facets predicted above and beyond the effect of AH. The stepwise model only retained AH as accounting for significant variance (R=.523; p=0.18).
Conclusion: The three strongest traits contributing to inhibitory resilience during sleep deprivation were greater anxiety and angry hostility, and lower vulnerability. However, anger/hostility was the strongest predictor when subjected to stepwise entry/deletion. These findings are consistent with prior work showing that trait-anger facilitates resilience to sleep deprivation, presumably through increased tonic arousal that sustains cognitive performance in the face of building homeostatic sleep pressure. These findings also extend this resilience phenomenon to cognitive flexibility and inhibitory capacity.
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0218
WAKE TIMING AND SLEEP MAINTENANCE EFFICIENCY ARE ASSOCIATED WITH EATING IN THE ABSENCE OF HUNGER IN PREADOLESCENTS

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Introduction: Poor sleep health is associated with childhood obesity, but the mechanisms underlying this association remain unclear. This study aimed to determine if sleep health variables are related to daily frequency of eating in the absence of hunger (EAH), an obesogenic eating behavior, in preadolescents. We hypothesized that children would be more likely to engage EAH following nights of shorter, later, or less efficient sleep compared to their usual sleep.
Methods: Children 8-12 years of age (n=51) completed wrist actigraphy and smartphone-based ecological momentary assessment to capture eating occasions for 2 weeks during the school year. Prior to each eating occasion, children rated their hunger on a 100-point visual analogue scale. Eating in the absence of hunger (EAH) was defined as pre-meal hunger < 35. Separate multilevel models examined the effect of the previous night's total sleep time, sleep maintenance efficiency, and sleep timing (onset, offset, midpoint) on the percentage of eating events classified as EAH (%EAH). Sleep variables were person-mean centered to disaggregate within- and between-person effects. Covariates included child age, sex, pubertal status, BMI z-score, race/ethnicity, type of day (weekend vs. weekday) and eating occasion reports (number/day), and total sleep time for models examining sleep timing and efficiency.
Results: Participants were 10.5 ± 1.5 years old, 52% female, 85% non-Hispanic white, and 56% with overweight or obesity. The mean daily %EAH was 16.4 ± 17.6%, meaning that on average, about 1 in 6 eating events occurred when the child was not hungry. Children slept 8.3 ± 0.6 hours per day and the mean sleep onset time was 10:16 PM ± 85 minutes. There were no significant effects of within-person sleep variables on %EAH. At the between-person level, children with later mean sleep offset (B= 7.62, p=0.03) and higher mean sleep efficiency (B=-1.57, p=0.03) had a lower %EAH.

Conclusion: Contrary to our hypothesis, night-to-night variation in sleep health is not related the frequency of EAH the following day; however, less efficient sleep and early waking on average may be a risk factor for more frequent EAH, which may in turn increase risk for excess energy intake and obesity.
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0219

ASSOCIATION BETWEEN DEPRESSIVE SYMPTOMS AND VIGILANT ATTENTION IN HIGH SCHOOL STUDENTS

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Introduction: Depressive symptoms during adolescence may impair vigilant attention, yet the association has not been fully explored. This study aimed to investigate the relationship between depressive symptoms and vigilant attention in Japanese high school students.
Methods: We recruited a total of 426 high school students (ages 15–17) from two high schools in Japan. Each participant completed the Center for Epidemiologic Studies Depression Scale (CES-D) and underwent the Brief Psychomotor Vigilance Test (PVT-B) to measure vigilant attention. Two primary indicators were derived from the PVT-B: response speed (reciprocal reaction time) and lapse (number of reaction times ≥355 ms). For the analysis, the worst 20% of students on each PVT-B metrics (response speed and lapse) were defined as having impaired vigilant attention. Gender-stratified analyses were conducted to examine potential differences between male and female students. Logistic regression was used to compare students with CES-D ≥20 to those with CES-D < 20, adjusting for age, BMI, sleep duration, caffeine intake, and time from awakening to conducting PVT.
Results: In the total participants, depressive symptoms (CES-D ≥20) were associated with slower response speed (adjusted odds ratio [OR] = 1.61, 95% confidence interval [CI]: 0.97–2.67) with marginal statistical significance (p=0.08). Lapse was significantly associated with depressive symptoms (OR = 1.95, 95% CI: 1.16–3.28, p=0.01), suggesting that students experiencing depressive symptoms showed reduced vigilant attention on the PVT-B. Gender-stratified analyses revealed no significant associations between response speed and lapse among male students. However, depressive symptoms were significantly associated with slower response speed (OR = 2.27, 95% CI: 1.14–4.52, p=0.02) and higher lapse (OR = 2.72, 95% CI: 1.34–5.55, p=0.01) among female students.
Conclusion: The present study showed that depressive symptoms are associated with impaired vigilant attention in female high school students, but not in male one.
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0220

THE ROLE OF CO-RUMINATION AND BELONGINGNESS IN PREDICTING INSOMNIA AMONG COLLEGE STUDENTS

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Introduction: Co-rumination, the excessive discussion of problems in dyadic pairs with an emphasis on negative feelings, is associated with internalizing depressive symptoms and sleep problems. Limited research has examined co-rumination's effect on sleep problems, specifically insomnia. A general sense of belongingness, associated with relationship satisfaction and quality, may moderate the negative impact of co-rumination. The primary hypotheses were that co-rumination and belongingness would both be significantly related to insomnia symptoms. The exploratory hypothesis was that the relationship between co-rumination and insomnia would be moderated by belongingness.
Methods: Participants (N=189) were college students (Mage = 22.8, SD = 6.98, 71% Female) from Oregon State University recruited from the online subject pool system who answered an online survey including the Insomnia Severity Index, the General Belongingness Scale, and the Co-Rumination Questionnaire–Abbreviated. Multiple regression analysis in SPSS examined whether a general sense of belonging moderated the relationship between the independent variable, co-rumination, and the dependent variable, insomnia.
Results: Multiple regression analysis showed that the overall model was significant (F[3, 185] = [8.63], p < 0.001) accounting for 12.27% of the variance in insomnia symptoms. Co-rumination significantly predicted greater insomnia symptoms (b= 0.13, p=0.02). Belongingness was a significant independent predictor of insomnia (b= -0.19, p < 0.001) with greater belongingness associated with lower insomnia symptoms. The interaction term between co-rumination and belongingness was not significant (b = -0.05, p = 0.31) indicating that belongingness did not moderate the relationship between co-rumination and insomnia.
Conclusion: This study is the first to identify an association between co-rumination and insomnia. Higher co-rumination was associated with greater insomnia, suggesting that co-rumination may be one mechanism of insomnia in college students. This relationship could be in part due to co-rumination's association with internalizing negative symptoms, particularly depression, giving rise to potential sleep disturbances. Belongingness independently predicted better insomnia outcomes, supporting prior research linking social connection to better sleep outcomes, however, it did not moderate the relationship between co-rumination and insomnia as hypothesized. Future research should aim to further investigate the mechanisms through which co-rumination affects insomnia and different sleep health variables.
Support (if any):

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0221

QUANTITY, QUALITY, OR PERCEPTION: FACTORS CONTRIBUTING TO ADOLESCENT EXECUTIVE FUNCTION

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Introduction: Sleep duration is frequently related to executive function (EF) in adolescents, though the relationship between EF and other aspects of adolescent sleep health remains unclear. This secondary analysis aimed to examine how EF is related to multiple domains of sleep health in adolescents, specifically sleep quality, daytime sleepiness, and chronotype.
Methods: We used two adolescent datasets that assessed for self-reported sleep health and executive functioning (N = 83, Ages

14-18). All participants completed the Morning-Eveningness Questionnaire (MEQ) to measure chronotype, the Epworth Sleepiness Scale (ESS) to measure daytime sleepiness, the Pittsburgh Sleep Quality Index (PSQI) to measure sleep quality, and the Behavior Rating Inventory of Executive Function (BRIEF) to measure EF; the BRIEF parent report was used in one study (N=31) and the self-report for another (N=52); we used standardized t-scores of the global executive composite (GEC) scale to allow for comparison across studies. A multiple linear regression was performed to examine the predictive effect of adolescent sleep quality, daytime sleepiness, and chronotype on EF. A multiple linear regression was performed to evaluate how adolescent sleep quality, daytime sleepiness, and chronotype predict EF.
Results: Sleep quality (PSQI) was found to be a significant predictor of adolescent EF ($p < 0.001$; adjusted R-squared =.19), with worse sleep quality predicting greater EF impairment. ESS and MEQ were not found to be significant predictors of adolescent EF (p's >.05).
Conclusion: Adolescents with poorer self-reported sleep quality demonstrated greater EF impairment, suggesting that other aspects of sleep health (beyond sleep duration) may play a critical role in EF abilities. However, chronotype and daytime sleepiness did not significantly influence EF, suggesting that perceived sleep quality (above perceived daytime impairment and/or optimal sleep timing) may serve as a more useful predictor when understanding adolescent EF.
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0222

THE THEORY OF PLANNED BEHAVIOR AND HEALTHY SLEEP DURATION BEHAVIOR AMONG UNDERGRADUATE COLLEGE STUDENTS

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Introduction: Ajzen's Theory of Planned Behavior (TPB) (1991) has been usefully applied as a framework in studies examining the sleep intentions and behaviors of college students. However, existing research remains limited, with considerable variation in methodologies—i.e., differing definitions of sleep duration, settings, and timeframes assessed (past 24 hours, 7 days, 30 days) — leading to inconsistent results across studies. The present study applied the TPB to sleep duration (SD) behavior in college students, examining whether 1) favorable attitudes, favorable subjective norms, and strong perceived behavioral control towards SD predicted intentions to healthy SD behavior; 2) strong perceived behavioral control and intention were directly associated with healthy SD.
Methods: 507 Old Dominion University undergraduates aged 18-24 completed an online Qualtrics questionnaire between April-May 2023 or April-May 2024 with sleep quality, socio-demographic, and TPB construct questions. Using the Target, Action, Context, and Time principle, SD behavior was categorized from the PSQI item as healthy (7-< 9 hours) vs. unhealthy (< 7 or ≥9 hours); and healthy (vs. unhealthy) SD attitudes, norms, control, and intentions based on questions regarding 7-8 hours SD in the past 30 days. Adjusted odds ratios (OR) were estimated from logistic regression models.
Results: After adjusting for race/ethnicity, class, age, enrollment status, and gender, favorable attitudes (OR=3.63, 95% CI, 2.07-6.38), favorable subjective norms (OR=2.74, 95% CI, 1.62-4.63), and strong perceived behavioral control (OR=6.48, 95% CI, 4.31-9.75) were significantly associated with healthy SD intentions. Students reporting healthy (vs. unhealthy) SD behavior had significantly higher odds of strong perceived behavioral control (OR=5.73, 95% CI, 3.57-9.19) and behavioral intention (OR= 4.27, 95% CI, 2.67-6.84) after adjustments.
Conclusion: Favorable attitudes, favorable subjective norms, and strong perceived behavioral control towards SD behavior predicted students' intentions to engage in healthy SD behaviors even after adjustments for socio-demographic factors. Strong perceived behavioral control and behavioral intention predicted self-reported healthy SD, highlighting their critical role in promoting healthy sleep behavior among college students. Findings suggest TPB constructs were predictive of SD intentions and behavior and may help inform interventions targeting behavioral antecedents including perceived behavioral control, intentions, attitudes, and subjective norms to promote healthy sleep practices and overall health among college students.
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0223

LONELINESS AND ANXIETY SHOW INDEPENDENT ASSOCIATIONS WITH INSOMNIA SEVERITY AMONG SOUTH FLORIDA HISPANIC ADULTS

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Introduction: Meta-analyses suggest that there is a gap in the literature on potential mediators of the known relationship between loneliness and sleep. This study aims to assess the relationship among loneliness, anxiety, and insomnia severity among a cohort of rural and urban Latinos living in South Florida.
Methods: This sample included 608 individuals who participated in the Determinants, Outcomes, Responses, and Mechanisms of Insufficient Sleep in Rural-Urban Settings (DORMIR) study, which investigates the connection between sleep health and cardiometabolic health in South Floridian Hispanic population. Our primary outcome was the Insomnia Severity Index (ISI), a validated, 7-item questionnaire with higher scores suggesting more severe symptoms. We operationalized anxiety by the PROMIS Emotional Distress - Anxiety (Short Form 8a) and loneliness by an item from the Social Needs Screening Tool – "How often do you feel lonely or isolated from those around you?": rarely, sometimes, often/always. All linear regression models were adjusted for age (non-linear), sex, race/ethnicity, Hispanic origin, marital status, education, employment, income, and Body Mass Index. Model 1: loneliness and the ISI. Model 2: anxiety and ISI. Model 3 loneliness and anxiety and ISI scores.
Results: Model 1 showed significant associations between experience of loneliness (rarely, sometimes, often/always) and ISI scores: "rarely" b [95% Confidence Interval(CI)] = 2.60 [1.40, 3.77], p<

0.001; "sometimes" b [95% CI] = 3.45 [2.25, 4.65], p< 0.001; and "often/always" b [95% CI] = 5.03 [3.38, 6.68], p< 0.001. Model 2 showed a significant association between anxiety and ISI scores: b [95% CI] = 0.38 [0.32, 0.43], p< 0.001. Model 3, simultaneous modeling of loneliness and anxiety, showed reduced associations for both loneliness and anxiety: "rarely lonely" b [95% CI] = 1.39 [0.28, 2.5], p=0.014; "sometimes lonely" = 1.37 [-0.06, 2.33], p=0.063; "often/always lonely" = 1.37 [-0.31, 3.05], p = 0.110; anxiety score = 0.34 [0.28, 0.41], p< 0.001.

Conclusion: Loneliness and anxiety are independently correlated with insomnia symptoms. Future research should explore the chronological relationship between anxiety and loneliness, particularly how anxiety may mediate the relationship between loneliness and insomnia, in Hispanics.

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0224

BIDIRECTIONAL ASSOCIATIONS BETWEEN SLEEP HEALTH AND CHRONIC PAIN INTERFERENCE IN MIDDLE-AGE AND OLDER ADULTS

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Introduction: In 2021, almost 52 million adults in the U.S. reporting having chronic pain, 17 million of whom also reported that their pain significantly interfered with their daily lives. While poor sleep is recognized as a risk factor for chronic pain and vice versa, less is known about the temporal relationship between characteristics of pain (such as interference and location) and multiple dimensions of sleep health.

Methods: The current study investigated longitudinal bidirectional relationships between aspects of chronic pain and a multidimensional measure of sleep health incorporating sleep regularity, satisfaction, alertness, timing, efficiency, and duration in three ways: presence of chronic pain, interference of pain with daily life (such as activities and social relationships), and number of pain locations. The components of the sleep health composite score were measured using a combination of Actigraphy and self-report from a daily sleep diary over 7 consecutive days. The analytical sample consisted of 154 middle-age and older adults from the Midlife in the United States (MIDUS) longitudinal study who responded to questions about chronic pain and provided Actigraphy and sleep diary data.

Results: Bidirectional associations between pain interference and sleep health were found in a subsample of participants (N = 107) who responded to questions about how much their pain interfered with their daily life. These associations indicate that an increase in sleep health problems from timepoint 1 (T1) to timepoint 2 (T2) approximately 9 years later was associated with an increase in pain interference (B =.31, SE =.14, p =.03), and that an increase in pain interference from T1 to T2 was associated with more sleep problems at T2 (B =.16, SE =.07, p =.03) even after controlling for sociodemographic and health covariates as well as baseline sleep health and baseline pain interference.

Conclusion: These findings may have implications for behavioral changes that can be made to reduce pain interference and can provide a foundation for investigating possible mechanisms of the relationship between sleep and pain such as inflammation.

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0225

A LATENT CLASS ANALYSIS IN ULTRA-LONG RANGE COMMERCIAL AVIATION OPERATIONS

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Introduction: Fatigue Risk Management System (FRMS) aviation studies are a data-driven alternative method of compliance to the Federal Aviation Administration regulations. FRMS allows for continuous monitoring and management of safety risks associated with fatigue-related errors, using well-defined and validated measures associated with alertness, fatigue and cognitive performance. This study, which was a sub-analysis of a larger FRMS study, took a novel approach towards identifying underlying factors of behavior, performance, and fatigue in aviation, via a latent class analysis (LCA). Specifically, LCA was used to identify subpopulations of aviation pilots within ultra-long range commercial aviation operations under FRMS.

Methods: Data from 251 Captains and 821 First Officers flying across 24 long-range and ultra-long range routes was collected via pre-study questionnaires, sleep/work logbooks, wrist-worn actigraphy, and the psychomotor vigilance task (PVT). Data collection occurred in real time over the course of a pilot's trip, including 3 pre- and 3-5 post-trip days. Variables included self-reported fatigue, sleepiness, sleep quality, fatigue mitigation strategies, flight information, flying experience, and demographics (e.g., gender, age, BMI). Objective sleep duration was collected with actigraphy and objective cognitive performance was collected with the 5-minute PVT.

Results: This is the first study to use a LCA to identify latent subpopulations within commercial aviation pilot data from real-time, long-range and ultra-long range commercial aviation operations.

Conclusion: Identification of latent subpopulations can support targeted implementation of fatigue prevention strategies and real-time fatigue countermeasures to inform Fatigue Risk Management Systems in the aviation industry, especially relating to improved flight-crew member alertness and cognitive performance.

Support (if any):

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0226

WHERE DOES SLEEP VALUE FIT IN OUR OVERALL VALUE SYSTEM?

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Introduction: Sleep value reflects the relative importance individuals place on sleep. The Sleep Valuation Item Bank (SVIB) assesses five well-validated dimensions of sleep value: wanting, appreciating, prioritizing, preferring, and not devaluing sleep. Previous research identified five distinct sleep value profiles: Concerned, Appreciative, Devaluing, Ambivalent, and Unconcerned. This study explored the relationships between these sleep value dimensions and profiles with participants' overall value systems, measured through commonly held terminal values (e.g., health, social status).

Methods: Participants aged 18–85 (M = 45) completed an online survey including demographics, the SVIB, and a novel Values Inventory adapted from Milton Rokeach's survey of 38 terminal values. The factor structure of the Values Inventory was determined using exploratory factor mixture modeling and confirmatory factor analysis (CFA). Correlations examined associations between SVIB factors and Values Inventory factors. MANOVA compared sleep value profiles across terminal value factors.
Results: CFA revealed five factors of terminal values (CFI =.951, TLI =.941, RMSEA =.052): Health/Wellbeing (e.g., "mental health"), Fundamental Human Values (e.g., "happiness"), Social Status (e.g., "public image"), Personal Accomplishment/Global Advancement (e.g., "gaining knowledge"), and Community/Belonging (e.g., "belonging"). Valuing health/wellbeing was associated with older age, higher income, and fewer dependents ($p < .01$ for all). It correlated with higher appreciation of sleep, lower prioritizing, and lower devaluing of sleep ($p < .001$). The Appreciative sleep value profile demonstrated the highest levels of valuing health/wellbeing, significantly greater than the Devaluing profile. In contrast, individuals with Ambivalent sleep values tended to prioritize social status and community/belonging.
Conclusion: These findings provide context for interpreting sleep value dimensions and profiles. Specifically, individuals who highly value health/wellbeing are more likely to appreciate sleep, while those ambivalent about sleep's value tend to prioritize social and community-oriented aspects of life. Understanding these associations can inform interventions that align sleep-related messaging with individuals' broader value systems.
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0227

YAWN AND ON: IMPACTS OF SLEEP VARIANCE AND REGULARITY ON ADOLESCENT EXECUTIVE FUNCTION

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Introduction: Executive function (EF; higher order cognitive processes including cognitive flexibility and inhibitory control supports)is crucial for adolescent success. Short sleep, common during adolescence, can negatively affect EF, though less is known about how other domains of sleep health relate to EF. Therefore, we aimed to evaluate how both sleep variance (SV; variance in sleep onset) and sleep regularity (SR; variance in sleep midpoint) relate to EF in adolescents. Specifically, we hypothesized that adolescents with greater sleep regularity and lower sleep variability would have greater levels of executive functioning, in comparison with adolescents with less sleep regularity and greater sleep variability.
Methods: Adolescents (ages 14-18; N = 84) who participated in two separate research studies provided 7-10 days of actigraphy where sleep was monitored via an ActiWatch 2; from this data, we computed SV (standard deviation of sleep onsets) and SR (standard deviation of sleep midpoints) across the observational period. The Behavior Rating Inventory of Executive Functioning (BRIEF) was administered to teens or parents across the studies; standardized T-scores in the Global Executive Composite (GEC) score were used as the dependent variable. Regression analyses were conducted to evaluate whether SV or sleep regularity SR predicted scores on the GEC.
Results: Due to high collinearity between SV and SR, we ran two separate regression analyses to determine whether SV and SR predict GEC for adolescents. SV approached significance in predicting GEC ($F(1, 62))=3.58$, $p=0.063$; $R^2=0.055$). SR significantly predicted GEC ($F(1, 62)=4.15$, $p=0.046$; $R^2 = 0.063$). In both cases, greater variability and greater regularity predicted higher GEC scores, reflecting greater EF impairment.
Conclusion: We found the predictive effect of SV to be near-significant and SR to be significant with regards to adolescent GEC, suggesting that SV and SR have a small negative impact on executive functioning. The findings suggest that interventions to improve consistency in sleep timing (and thereby improving SV and SR) could be beneficial for enhancing EF skills in adolescents, particularly if the intervention encourages sleep timing to promote adequate sleep duration, given previous research showing a strong relationship between sleep duration and EF.
Support (if any):

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0228

BP1.15205, A NOVEL OREXIN-2 RECEPTOR AGONIST, DEMONSTRATES PHARMACOLOGICAL EFFECTS IN A MOUSE MODEL OF NARCOLEPSY

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Introduction: Narcolepsy is a chronic sleep disorder often caused by selective deficiencies in orexin, a brain neurotransmitter that regulates wakefulness. BP1.15205 is a novel, highly potent, and orally bioavailable orexin-2 receptor (OX2R) agonist investigated for its biological effects in a mouse model of type 1 narcolepsy. Present results show BP1.15205 has a favorable pharmacokinetic (PK) profile, robust wake-promoting effects, and no safety signals in rodents.
Methods: Human receptor in vitro studies were performed using a FLIPR calcium assay. For in vivo pharmacology studies, both male wild-type (WT; C57BL/6J) and orexin/ataxin-3 transgenic (TG) mice were used. Male Sprague-Dawley rats (aged 8 weeks) were used for non-GLP toxicity studies. Vehicle or BP1.15205 were administered as suspension or solution via oral gavage. Results from studies in mice were analyzed by the two-tailed Shirley-Williams test with a $p \leq 0.05$ considered statistically significant.
Results: Human receptor in vitro studies demonstrated BP1.15205 is highly potent (EC50 = 0.015 nM at OX2R) with >600-fold selectivity over orexin-1 receptor. PK results support once-a-day dosing, and pharmacodynamic correlations were observed in both WT and TG mice following a single oral administration of BP1.15205. Wake promoting effects were more pronounced in the TG mice as compared to WT at same exposure. Single dose administration in TG mice at beginning of the 12-hour dark phase of a 24-hour light/dark cycle produced significant and dose-dependent increases in total wakefulness time and prolongation of sleep latency, starting at the 0.1 mg/kg dose as compared to vehicle-treated animals. Significant and dose-dependent decreases in the total number and duration of cataplexy-like episodes were also observed in the TG mice in response to BP1.15205 compared to vehicle. In the toxicity study, rats were dosed by oral gavage once daily for 2 weeks (increasing dose levels; one dose/ per group) to identify the No Observed Adverse Effect Level. No changes in body weight, food

consumption, hematology, organ weights, or histopathology were noted at any dose level of BP1.15205.
Conclusion: BP1.15205 is a novel, highly potent OX2R agonist with potential for once-daily dosing that produces significant wake-promoting and cataplexy-suppressing effects in a dose-dependent manner.
Support (if any): Teijin Pharma Limited, Bioprojet, Harmony Biosciences

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0229
BEDTIME PROCRASTINATION EXPERIENCES IN UNIVERSITY STUDENTS: A QUALITATIVE STUDY

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Introduction: Bedtime procrastination, a common phenomenon among university students, has been quantitatively shown to be linked to both sleep health and mental well-being. Gaining insight into university students' experiences with bedtime procrastination can provide valuable guidance for designing targeted interventions to reduce this behavior in the future.
Methods: A descriptive qualitative study was utilized. From September to November 2024, we conducted semi-structured individual interviews—either face-to-face or online—with university students recruited through social media advertisements and campus posters at five universities in Hong Kong. The interviews were audio-recorded, transcribed word-for-word, and analyzed using conventional content analysis.
Results: Seventeen university students (6 male and 11 female), aged 18 to 24 and from various majors, participated in the study. Eighteen subthemes across six main themes were identified. Theme 1: being master of myself before bedtime at night (e.g., archiving more me-time); Theme 2: bedtime procrastination being a reward and celebration (e.g., bedtime procrastination as a form of self-reward for the school day); Theme 3: bedtime procrastination becoming a habit (e.g., phone scrolling becoming a pre-bedtime habit); Theme 4: mindless bedtime procrastination (e.g., immersed in negative emotions); Theme 5: productivity, body image, and emotions influenced by bedtime procrastination (e.g., bedtime procrastination influencing body image); Theme 6: modifying bedtime procrastination being not an easy thing (e.g., deficiency of targeted bedtime procrastination reduction interventions).
Conclusion: The findings suggest that bedtime procrastination among university students in Hong Kong is a multidimensional construct, involving both reflective and automatic cognitive processes. Future interventions could be improved by adopting a dual-process approach, along with additional strategies such as integrating knowledge of bedtime procrastination, educating on sleep hygiene, and addressing the impact of negative peer influence to reduce bedtime procrastination.
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WITHDRAWN

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0232
EFFECTS OF CAFFEINATED COFFEE ON MOOD AND SLEEPINESS UNDER SLEEP RESTRICTION CONDITIONS

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Introduction: It has been shown that mood is disturbed by sleep restriction (SR). We examined how mood and sleepiness after SR are impacted by the use of caffeinated coffee.
Methods: Data from 72 volunteers were assessed during 3 baseline and 5 experimental (E1 to E5) days. The control group (n=15, 66.7% male, mean age ± SD 28.0 ± 5.7) had 8 h time in bed (TIB) throughout the study. The sleep restriction group (n=21, 57.1% male, 26.4 ± 3.7), the decaffeinated coffee group (DECAFF, n=17, 58.8% male, 27.9 ± 5.3) and the caffeinated coffee group (CAFF, n=19, 57.9% male, 29.9 ± 5.0) had 8 h TIB at baseline and 5 h TIB during the experimental nights. Both coffee groups consumed standardized 600 ml (E1 to E4) or 400 ml (E5) coffee. Only in the CAFF group, the coffee contained caffeine (200 ml coffee: 100 mg caffeine). Positive (PA) and negative (NA) affect (PANAS) and KSS sleepiness were rated 4 times during scheduled wakefulness. We report here results of mixed ANOVAs and Dunnett-adjusted comparisons of daytime averages during SR.
Results: At baseline, PA, NA, and sleepiness were not different between groups. Compared to baseline, PA deteriorated in the sleep restriction group on E1 through E5 (all $p < 0.001$), in the DECAFF group on E2 through E5 (all $p < 0.001$), and in the CAFF group on E3 through E5 (all $p < 0.001$). Compared to the control group, PA was worse in the sleep restriction group (E2 and E3, both $p < 0.035$), and in the DECAFF group (E1 through E5, all $p < 0.03$), but not in the CAFF group (all $p > 0.2$). NA remained unchanged (group x condition: $p > 0.2$). Compared to baseline, sleepiness increased in the sleep restriction, DECAFF, and CAFF groups on E2 through E5 (all $p < 0.045$). The DECAFF and CAFF groups (but not the sleep restriction group) were sleepier than the control group on E2 through E5 (all $p < 0.035$).
Conclusion: PA and sleepiness, but not NA, were negatively affected by SR. The use of caffeinated coffee under chronic sleep loss may be more effective in improving mood than in counteracting sleepiness.
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0233
ELUCIDATING ASSOCIATIONS OF COMBINED ALCOHOL AND CAFFEINE CONSUMPTION WITH SLEEP AMONG BLACK ADULTS

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Introduction: Alcohol and caffeine are widely consumed psychoactive substances commonly known to disrupt sleep. The Sleep Foundation recently reported that nearly 2/3 of U.S. adults drink caffeine daily. Furthermore, alcohol and caffeine are often imbibed together in cocktails such as espresso martinis and Jägerbombs. Per the CDC, individuals who mix alcohol and caffeine are more likely to report binge drinking and high blood pressure. Increases in the prevalence of alcohol abuse, combined with known health and sleep disparities experienced among Black Americans emphasizes a necessity to further examine how these substances can negatively impact sleep in tandem. Objectives: This study explored the associations between alcohol, caffeine, and sleep architecture among Black adults residing in New York City and South Florida.
Methods: Participant data was leveraged from two larger studies: ESSENTIAL and MOSAIC (n=381, mean age=51 years, 67% female). Alcohol and caffeine ingestion were obtained from participant self-report. Sleep architecture and related variables (e.g., REM, awakenings, light sleep, time spent in bed, time awake/asleep) were recorded at-home for seven days via SleepImage Ring, Fitbit, and ActiGraph devices. Multiple linear regression, adjusting for age and caffeine/alcohol source, assessed the associations between alcohol and caffeine consumption on sleep.
Results: Analyses indicated that participants who reported having one or more alcoholic drink(s) per week spent less time asleep and had increased number of awakenings, time spent in bed, and light sleep ($p<.01$). Participants who reported drinking beer weekly had lower sleep quality indices and REM sleep ($p<.05$). Furthermore, participants who had both at least one alcoholic drink per week and one cup of coffee per day spent more time awake ($p<.05$). Participants who drank 16 ounces or more of non-diet soda daily had reduced sleep efficiency and REM sleep, as well as more time awake and in bed ($p<.05$). Participants who reported drinking both soda daily and wine weekly had more awakenings ($p<.05$).
Conclusion: These preliminary results indicate that alcohol and caffeine consumption are significantly associated with sleep architecture, especially when consumed together. Future studies aim to increase sample size and sleep metrics to further elucidate negative health consequences.
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0234

BIDIRECTIONAL RELATIONSHIPS BETWEEN SLEEP AND CAFFEINE CONSUMPTION

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Introduction: Caffeine is the most widely used drug in the world and its negative impact on sleep is well documented. However, most studies examining the impact of caffeine on sleep have been experimental or cross-sectional. Individuals can develop tolerance to caffeine, and real-world caffeine use may not have the same impact on sleep as in experimental settings. Further, individuals may use caffeine because they already have poor sleep. The present study used intensive longitudinal methods to evaluate bidirectional relationships between caffeine intake and sleep. We hypothesized that greater daily caffeine intake would predict greater same-night sleep disturbance, and that greater daily sleep disturbance would predict greater next-day caffeine intake.
Methods: 57 college students (72% female, mean age 24) participated in a two-week study assessing their daily sleep and caffeine intake patterns. Participants wore the Phillips Actiwatch Spectrum and completed daily diaries capturing self-reported sleep quality (1 to 5), morning alertness (1 to 5), and caffeine intake. Linear multi-level models assessed whether daily caffeine intake predicted changes in sleep that night. Linear multi-level models assessed whether the previous night's sleep predicted the next day's caffeine intake. Race, age, sex, and day type (weekday or weekend) were controlled in the analyses. Non-significant covariates were dropped from the final models.
Results: Greater daily caffeine intake predicted lower self-reported sleep quality the night of intake ($B = -0.05$, $SE = 0.025$, $p < 0.05$), and lower morning alertness the next day ($B = -0.061$, $SE = 0.028$, $p < 0.05$). Daily caffeine intake did not predict any objective sleep measures (measured by actigraphy) the night of caffeine intake. Greater daily sleep onset latency (measured by actigraphy) predicted higher next-day caffeine intake ($B = 0.003$, $SE = 0.001$, $p < 0.05$). No other daily sleep variables predicted next-day caffeine intake.
Conclusion: These findings suggest a dynamic, bidirectional relationship between sleep and caffeine intake. Higher daily caffeine was associated with poorer self-reported sleep quality and alertness, although it did not predict objective sleep measures. Additionally, individuals who struggle to fall asleep may compensate by consuming more caffeine the next day.
Support (if any): Idaho State University, Graduate School; PSI CHI; INBRE.

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0235

CANNABIS USE AS A MODERATOR BETWEEN SLEEP AND ACADEMIC PERFORMANCE IN CANADIAN UNIVERSITY STUDENTS

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Introduction: Good sleep quality plays a crucial role in optimal cognitive functioning and well-being, making it a key factor in academic performance. However, university students are particularly vulnerable to sleep disturbances that may be influenced by lifestyle factors such as substance use. Cannabis, a commonly used substance among young adults, is known to disturb sleep and impair cognitive performance. Hence, we investigated the moderating effect of cannabis use on the relationship between sleep disturbances and academic performance of Canadian university students.
Methods: A total of 778 Canadian university students (M=22.5 ±4.6 years; 71.4% females) participated in a 20-minutes anonymous online survey. The survey included, among others, the Pittsburgh Sleep Quality Index (PSQI) and a homemade lifestyle habits questionnaire. A moderation analysis was performed using PROCESS 4.2 to examine the moderating effect of cannabis use (average weekly usage) on the relationship between sleep disturbances (subscale #5 of the PSQI) and academic performance (self-reported satisfaction with school performance).

Results: The moderation model was significant (F[3,774] = 4.32, p =.005), explaining 1.7% of the variance. Cannabis use had a significant main effect on school performance (b = -0.04, p =.015), and the interaction was significant (b = -0.07, p =.005). Sleep disturbances were associated with school performance when cannabis use was at one SD below the mean (b = -0.15, p =.027) but not at the mean (b = -0.09, p =.118) or above the mean (b = 0.04, p =.537). A simple slope analysis showed that among students with minimal or no cannabis use, fewer sleep disturbances was associated with better academic performance, while more sleep disturbances predicted poorer performance. However, for students with moderate or high cannabis use, fewer sleep disturbances were not associated with better academic performance.
Conclusion: This study highlights how cannabis use may mitigate the beneficial effect of undisturbed sleep on academic performance. Given the modest explained variance, it is essential to consider additional factors. Further research on the influence of lifestyle habits on the relationship between sleep and academic performance among Canadian university students is needed to help students achieve their full academic potential.
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0236

TIME-OF-DAY EFFECTS ON EATING BEHAVIOR: EXAMINING CIRCADIAN TIMING AND CALORIC INTAKE PATTERNS

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Introduction: Studies have demonstrated increased impulsivity, poorer health behaviors, and greater risk for type 2 diabetes among individuals with evening chronotype. However, few studies have evaluated these effects relative to circadian biomarkers. Additionally, time of day may impact how chronotype affects behaviors.
Methods: Participants completed an eating in the absence of hunger task during randomly assigned morning and evening sessions, separated by at least 10 days. In each session, participants consumed a preloading portion of unflavored oatmeal until comfortably full, then given free access to various snack foods. Calories consumed from bland, salty, and sweet snacks served as the primary outcomes. For the morning test, participants fasted for at least 8 hours and completed the task around 9 AM. For the evening test, participants fasted for 3 hours and completed the task at 9 PM. Circadian timing was measured as dim light melatonin onset (DLMO) on the day following the morning taste test. Mixed models evaluated differences in caloric intake across food types and sessions, adjusting for order of administration, age, sex, and race. In separate models, caloric intake was regressed onto DLMO and administration order for both morning and evening tests.
Results: A total of 113 participants completed the protocol (57 female; age: M = 35.6, SD = 9.87). Significant time-of-day effects were observed, with lower intake of neutral (B = -5.67, p < 0.001) and salty foods (B = -15.53, p = 0.015) in the evening. Significant order effects showed greater intake during the second administration for total calories and all food categories (ps < 0.01). These findings persisted after adjusting for covariates. No significant associations were found between DLMO and caloric intake in either session.
Conclusion: Time of day influenced specific aspects of eating behavior, with reduced evening intake of neutral and salty foods. The absence of significant associations between DLMO and food intake highlights the complexity of circadian influences on eating.
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0237

DAYLIGHT EXPOSURE DRIVES CAUSAL IMPROVEMENTS IN DEEP SLEEP AND NEXT-DAY ALERTNESS

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Introduction: Light serves as the most potent zeitgeber for synchronizing circadian rhythms and shaping sleep-wake cycles. While prior studies have highlighted associations between daytime daylight exposure and sleep quality, the direct causal effects of outdoor light exposure on sleep remain largely unexplored in real-world settings. This study aimed to bridge this gap by investigating the impact of an afternoon stroll under high-intensity light (HIL) or attenuated light (AL) conditions on self-reported and objective sleep quality and alertness.
Methods: Ten healthy participants (4 males and 6 females, aged 19–28 years) participated in a within-subject field study. Each participant completed a three-hour afternoon walk, scheduled during the circadian dead zone, under one of two conditions: high-intensity light (HIL, goggles without neutral density filters) or attenuated light (AL, goggles with neutral density filters reducing light intensity to ~10 photopic lux). The conditions were randomized and spaced across two weeks. Salivary Dim Light Melatonin Onset (DLMO) was assessed at baseline and after each walk to determine the circadian phase and adjust walk timing accordingly. Sleep was subsequently monitored using at-home polysomnography (PSG), while subjective alertness and self-reported sleep quality were evaluated with the Karolinska Sleepiness Scale (KSS) and Groningen Sleep Quality Scale (GSQS), respectively. Data were analyzed using linear mixed models to examine changes across conditions.
Results: There were no significant differences between interventions in the subsequent phase angle of entrainment, confirming that the walk was appropriately centered around the circadian dead zone (p>0.05). No significant differences were observed between the HIL and AL conditions in terms of sleep duration or subjective sleep quality ratings (p>0.05). However, nighttime delta power accumulation was significantly higher following HIL exposure, along with an increased number of epochs scored as deep sleep at the expense of wakefulness after sleep onset (p's< 0.01). Morning alertness following HIL exposure was significantly higher compared to AL exposure (p< 0.05).
Conclusion: This study indicates that daytime exposure to high-intensity natural daylight promotes deeper sleep and reduces next-day sleep inertia. These findings underscore the importance of daylight exposure for optimizing nighttime sleep and next-day alertness, with potential applications for mitigating sleep inertia complaints.
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0238

EFFECTS OF BLUE-ENRICHED WHITE LIGHT AND AN AFTERNOON NAP ON ALERTNESS AND MOOD DURING A SIMULATED LONG-HAUL FLIGHT

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Introduction: Cognitive functioning and mood are important determinants of a passenger's flight experience. We hypothesized that ocular exposure to blue-enriched white light (BEWL) would improve cognition and mood in partially sleep-deprived passengers during a simulated long-haul business class flight. Daytime functioning was measured before and after an afternoon nap to test for effects of BEWL under high and low levels of homeostatic sleep pressure.

Methods: In a within-participant study, 51 adults (30 women; median age=23y) underwent 2 simulated long-haul flights (10:00-19:00) in a physical business class cabin simulator after a night of short sleep (5h). Participants were exposed to typical white light (control) or BEWL (intervention) matched for photopic illuminance for 2h before and after a scheduled nap in darkness (14:30-16:30). The melanopic equivalent daylight illuminance was 2-fold higher in the intervention versus the control at a given seat location (range=42-100lx versus 18-45lx). Self-rated alertness, reaction times, and positive affect were measured during baseline, pre-nap, and post-nap sessions. Two-way repeated measures ANOVA was used to test for effects of study visit (control, intervention) and session (baseline, pre-nap, post-nap) on behavioral outcomes.

Results: Effects of BEWL on alertness, reaction times, and positive affect did not differ relative to the control (interaction effect, P>0.11; main effect of study visit, P>0.41 for each comparison). However, there was a strong main effect of session (P≤0.001 for each comparison) where daytime functioning was better after the nap compared with either the baseline or pre-nap sessions. Pairwise comparisons showed that BEWL was associated with negligible effects relative to typical white light (Cohen's d, range=0.00-0.20, P>0.16), whereas large effect sizes were observed for post-nap versus pre-nap behavior (Cohen's d, range=0.70-2.14, P< 0.001).

Conclusion: BEWL did not boost daytime performance or mood using light levels that are typical of an airline cabin environment. By comparison, there were marked improvements in alertness, reaction times, and positive affect after an afternoon nap. These results suggest that sleep is more effective than BEWL at preventing deterioration in cognition and mood in partially sleep deprived passengers.

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0239

EFFECT OF A LIGHT INTERVENTION ON MORNING SLEEP INERTIA SYMPTOMS

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Introduction: Sleep inertia — sleepiness and performance impairment experienced upon waking —improves with light exposure following nocturnal awakenings both in the laboratory and real-world environments. However, light exposure at habitual waketime appears to be less effective. This study investigated the effects of light exposure on sleep inertia at habitual morning waketime in a real-world environment.

Methods: Twenty-nine healthy adults (16 female; mean age 27.1 ± 5.1 y), kept habitual sleep patterns at-home monitored by actigraphy for a week. Following experimental night 7 (monitored by electroencephalography, EEG), participants were woken at their habitual morning waketime via a phone call. Participants were randomized by sex and night-order to either wear light-emitting glasses with the light on (intervention) or off (control) during a test battery that included a 5-minute visual Psychomotor Vigilance Task (PVT; NASA PVT+ App), the Karolinska Sleepiness Scale (KSS), mood and alertness visual analog scales (VAS), and a 3-minute auditory Descending Subtraction Task (DST). Testing occurred at 2, 12, 22, and 32 minutes after waking. Testing sessions were monitored remotely via web-based cameras. Data were analyzed using mixed-effect models with fixed effects of test bout, condition, and their interaction, and a random effect of participant. Baseline performance, duration of ambient light exposure > 10 lux during the testing period (Actiwatch Spectrum PRO), total sleep duration from the prior night (EEG), sex, and randomization order were included as covariates.

Results: There was a significant main effect of condition for PVT speed with those in the light condition performing worse than the control condition (p =.049). There was a significant main effect of test bout for PVT lapses (p =.028), DST total responses (p =.023), DST correct responses (p =.001), VAS-alert (p <.001), with impairment dissipating across time since waking. There were no other significant main or interaction effects (p >.05).

Conclusion: These findings align with previous studies suggesting that light exposure has limited effectiveness after waking in the morning. Worse performance on the PVT may be due to glare from the light glasses interfering with screen visibility. Further exploration of delivery methods for light exposure is needed.

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0240

HORMONAL CONTRACEPTIVES IMPAIR PSYCHOMOTOR VIGILANCE TASK PERFORMANCE UNDER SLEEP DEPRIVATION WITH STRESS INDUCTION

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Introduction: Hormonal contraceptives (HC) have been shown to impact cognitive performance in different ways depending on the domain being measured, but limited research has assessed the influence of HC on cognitive performance during sleep deprivation. In line with prior research demonstrating greater fatigue among individuals using HC, we hypothesized that psychomotor vigilance task (PVT) performance would be worse among HC females than naturally cycling (NC) females across a period of sleep deprivation, as compared to males.

Methods: Forty-eight participants (18-30 years; 23 females) were sleep deprived for 32 hours and completed 4 Maastrict Acute Stress Tasks between approximately 7pm and 7am. A PVT was

administered every 2 hours between 12pm on Day 1 and 2pm on Day 2. Several metrics were log-transformed before mixed effects models were created with PVT score (Lapses, Speed, Reaction Time, and False Starts) as the outcome, group (males, NC females, HC females) and time as fixed effects, and participant as a random effect.
Results: A significant group effect was identified for PVT Lapses ($F(2,45) = 3.75$; $p = 0.031$) and Bonferroni-corrected pairwise comparisons revealed that HC females, but not NC females, had significantly more lapses than males at timepoints 9 (4am), 11 (8am), 12 (10am), and 13 (12pm) (Cohen's d range = 0.47-0.64; $p < 0.03$). A significant group effect was also identified for PVT Speed ($F(2,45) = 3.43$; $p = 0.04$), with HC females, but not NC females, taking significantly longer than males at timepoints 9-14 (4am-2pm) (Cohen's d range = 0.47-0.60; $p < 0.03$). There were no significant effects of group on PVT Reaction Time or False Starts.
Conclusion: HC females, but not NC females, performed significantly worse than males in terms of PVT lapses and speed during the second half of a 32-hour sleep deprivation protocol. Further work is needed to comprehensively evaluate the effects of HC on cognitive performance in a larger sample of real-world sleep deprivation scenarios and understand potential underlying mechanisms that drive these effects.
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0241

INVESTIGATING THE EFFECTS OF REPEATED TASK EXPOSURE ON CONTROL AND SLEEP DEPRIVED PERFORMANCE IN A SERIAL NOVEL OBJECT RECOGNITION TASK IN RATS

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Introduction: Novel Object Recognition (NOR), a common rodent behavioral task that probes short-term recall via exploration time of a novel versus familiar object, is impaired by sleep deprivation (SD). However, habituation dynamics in repeated testing, along with effects of test order and time of day are often overlooked. These factors may affect learning/performance of tasks with repeated exposures and post-SD recovery performance. Building off our previous work, we present a unique serial NOR paradigm that investigates repeated-exposure habituation, combined with SD, recovery, and test order/Zeitgeber-time (ZT) effects.
Methods: Male Sprague Dawley rats (N=32), housed on ZT0-ZT12 light cycle, underwent ZT12 baseline NOR testing. Tests included three phases: acclimation (no objects), familiarization (identical objects), and recognition (novel/identical objects). Rats were then randomly assigned to 12hr-SD during light cycle or undisturbed controls. A second test followed 12SD/0SD at ZT12, after which rats returned to cages for recovery time of 2-, 4- or 24-hrs. A third test followed at either ZT14 or ZT16 the same day, or ZT12 the next day, matching recovery time. We analyzed object discrimination ratio (DR) and total exploration time at recognition phase using mixed-effects ANOVA, with fixed-effects of test (baseline, treatment, recovery), condition (0SD/12SD), and their interaction. Planned comparisons were made between conditions and testing.
Results: There was a significant difference in DR between conditions at the treatment test ($p < 0.001$). Control rats improved from baseline to treatment, then worsened slightly at 2hr/4hr recovery ($p < 0.08$), but became significantly worse at 24-hr recovery ($p < 0.001$). Performance in the SD condition declined after baseline, but did not vary significantly between treatment and recovery testing ($p>0.39$). Total exploration was not significantly different by group or test.
Conclusion: The serial NOR reliably shows a decline in control performance at third test sessions. This decline is worse at ZT12 than ZT14/16 recovery testing, indicating habituation may be occurring from multiple test sessions at the same ZT. SD continues to inhibit short-term recall. Further investigation is needed to elucidate habituation, as control exploration time remained stable while DR declined, and whether changes in test order/ZT can reduce these effects.
Support (if any): WSU Department of Translational Medicine and Physiology

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0242

ASSOCIATIONS BETWEEN SLEEP WITH BODY WEIGHT AND ENERGY BALANCE FOLLOWING BARIATRIC SURGERY IN ADULT FEMALES

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Introduction: Bariatric surgery is the most effective treatment for obesity, yet many individuals experience substantial weight regain following surgery. Body weight is influenced by sustained changes in energy balance, which include energy intake (EI) and energy expenditure (EE). Short sleep and poor sleep quality are risk factors for primary weight gain, yet its impact on body weight, EI and EE after bariatric surgery remains largely unknown. The purpose of this cross-sectional analysis is to examine associations between sleep (duration, efficiency, and architecture) with body weight, body composition, EI and EE adult females who have undergone bariatric surgery.
Methods: Eighteen female adults (age: 54.3±9.7 years; body mass index (BMI): 34.8±9.0 kg/m2; body fat: 43.9±9.3%) who underwent bariatric surgery >1 year ago completed a 7-day study protocol. Actigraphy-derived sleep efficiency and duration were calculated using the Cole-Kripke algorithm. On one night, sleep was captured via in-home polysomnography and analyzed for duration, efficiency, and architecture (i.e., stage N2, N3, rapid eye movement (REM) sleep). Participants self-reported date of surgery. Current body weight and body composition were measured via Bod Pod. EI was self-reported via 3-day food logs. Total daily EE was calculated as the sum of resting metabolic rate (via indirect calorimetry), physical activity EE (via actigraphy), and the thermic effect of food (estimated 10% of daily EE). Spearman partial correlations assessed relationships between actigraphy- and polysomnography-derived sleep with body weight, body composition, and components of energy balance, with time since surgery (months) as a covariate.
Results: Actigraphy-measured sleep duration and sleep efficiency were inversely associated with total daily EE (rho=-0.73, $p< 0.01$; rho=-0.62, $p=0.01$, respectively) and body fat percentage (rho= -0.50, $p= 0.04$; rho= -0.52, $p= 0.03$, respectively). Stage N3 duration was inversely associated with current body weight (rho= -0.51, $p= 0.04$). REM sleep duration was also inversely associated with body fat percentage (rho= -0.57, $p= 0.02$). There were no associations between sleep with EI.
Conclusion: Results from these pilot findings suggest that greater total sleep duration, characterized by higher stage N3 and REM sleep duration, and greater sleep efficiency may have beneficial impacts on body weight and body composition following bariatric surgery.
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0243

SLEEP PATTERNS OF RECREATIONALLY ACTIVE ADULTS THROUGHOUT A THREE-WEEK HIGH-INTENSITY OVERREACHING TRAINING PROTOCOL

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Introduction: Sleep disturbances are often reported in athletes classified as overtrained; however, it is unclear whether poor sleep contributes to the progression of overtraining or is merely a symptom. Few studies have objectively measured sleep during periods of intensified training. The purpose of this study was to investigate how chronic, high-intensity exercise affects sleep characteristics–including sleep regularity–in healthy, moderately active adults.
Methods: Twenty healthy, recreationally-active adults were randomized into training (TR, n=11) or control (CON, n=9) groups. TR participants underwent a three-week training protocol designed to induce short-term overtraining (overreach, OR) under laboratory conditions, followed by a three-week recovery phase. Sleep was measured daily using actigraphy and paired sleep surveys. Exercise performance was measured weekly (graded exercise test, cycle ergometer). Illness symptoms were assessed using the Wisconsin Upper Respiratory Illness questionnaire.
Results: Across all visits, total sleep time (TST) was similar between CON and TR groups (7.01 ± 1.11 versus 6.68 ± 1.21 hours·night-1, respectively); however, the TR group exhibited higher TST variability (59 ± 11 vs. 77 ± 23 minutes·night-1, respectively; p=0.04) and were more likely to accumulate sleep debt ($p< 0.05$). Compared to the CON group, the TR group exhibited later sleep onset times during the training phase (22:50 ± 1:22 vs. 23:17 ± 1:35, respectively; p=0.010). After training, three TR participants were classified as OR (-10.3% ± 5.4% decrease in exercise performance); TR participants without performance decrements were considered adapted (AD, n=8). Across all visits, the OR group exhibited progressive increases in self-reported sleepiness and fatigue at sleep and wake times, compared to CON and AD groups ($p< 0.05$). No sleep differences were detected between AD and OR groups; however, illness symptoms increased during both the training and recovery phases in the OR group but remained unchanged in CON and AD groups ($p< 0.05$).
Conclusion: High-intensity exercise may impact TST regularity and sleep onset, thereby promoting the accumulation of sleep debt. Significant increases in illness symptoms in OR participants in the absence of sleep differences between AD and OR groups suggests that immune system function plays a role in the pathological progression of overtraining.
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0244

THE EFFECTS AND ASSOCIATIONS OF PHYSICAL EXERCISE IN LUTEAL PHASE ON HEAT DISSIPATION, SLEEP STRUCTURE, AND SUBJECTIVE EVALUATION

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Introduction: The menstrual cycle and body temperature significantly influence sleep in women. This study focused on enhancing heat dissipation through physical exercise, examining the effects of resistance training (RT) on pre-bedtime and nighttime heat dissipation, as well as its impact on objective and subjective sleep evaluation during the follicular phase (FP) and luteal phase (LP).
Methods: The experiment involved 12 young women over four days, under the following four conditions: FP Non-Exercise Condition, FP Exercise Condition, LP Non-Exercise Condition, LP Exercise Condition. Participants engaged in 40 minutes of moderate-intensity RT during the day. Sleep EEG and skin temperature were recorded at home overnight, and participants completed a Visual Analogue Scale (VAS) assessment before and after sleep. The distal-proximal temperature gradient (DPG), a key marker of heat dissipation and sleep onset, was calculated from distal and proximal skin temperature differences. The study received approval from Saitama Prefectural University ethics committee.
Results: In the LP Exercise Condition, RT enhanced DPG both pre-bedtime and nighttime, accompanied by an increase in Stage N3 (p=0.028). Notably, Stage N3 sleep was sustained during the latter half of sleep, with concurrent increases in delta-power (p=0.043) and DPG (p=0.046). Subjectively, participants reported significant improvements in difficulty organizing thoughts and eye fatigue compared to the LP Non-Exercise Condition (p=0.039, p=0.041). Additionally, in the LP Exercise Condition, stronger heat dissipation before sleep correlated positively with feeling refreshed(r=0.829, p=0.042) and mood improvement (r=0.812, p=0.049), while showing a negative correlation with physical fatigue (r=-0.883, p=0.020). Furthermore, in the LP exercise condition, the higher the appearance rate of Stage N3, the more it showed a positive correlation with alertness (r=0.829, p=0.021), and a negative correlation with sleepiness (r=0.852, p=0.015) and difficulty organizing thoughts (r=0.802, p=0.030).
Conclusion: The findings suggest that daytime physical exercise during the luteal phase enhances heat dissipation before sleep and promotes deeper sleep, particularly SWS. These changes contribute to improved subjective evaluations upon waking, including reduced fatigue and improved mood. Thus, incorporating physical exercise during the luteal phase may serve as an effective strategy for improving sleep quality and post-sleep well-being in women.
Support (if any):

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0245

A RANDOMISED PILOT TRIAL FOR BEDTIME PROCRASTINATION: EXAMINING THE EFFICACY & FEASIBILITY OF THE REDUCING EVENING SCREEN TIME ONLINE INTERVENTION

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Introduction: Bedtime procrastination is associated with inadequate sleep and is a novel intervention target to improve sleep health. Formative work indicates that pre-sleep electronic device use, a ubiquitous bedtime procrastination behaviour, may be targeted using a behaviour change approach. This pilot study aimed to examine (1) the acceptability and feasibility of the Reducing

Evening Screen Time online program (REST-O) in new career starters, and (2) the preliminary effect of the program on daily pre-sleep electronic device use and sleep duration, as well as weekly measures of bedtime procrastination, excessive device use, and sleep quality and duration.
Methods: Participants (N = 55) were randomised into three arms; an active Control (n = 19), Prevent (n = 18) and Substitute (n = 18), who used behavioural substitution at different times of day. Daily assessments were conducted for two weeks, and weekly measures at baseline, pre-intervention, post-intervention, and follow-up (end of Week Three).
Results: All groups experienced a reduction in daily pre-sleep device use (M = 23.4 mins per day) and an increase in daily sleep duration (M = 12.7 mins per day) post-intervention. Continued reductions in bedtime procrastination, excessive device use, and improvements in sleep quality and duration were observed at follow-up.
Conclusion: The program appears feasible and acceptable to participants with a high daily completion rate (M = 84.7%). Reductions in habit strength and hedonic motivation suggest potential mechanisms of change. Findings provide preliminary evidence for behaviour change interventions in targeting pre-sleep electronic device use and bedtime procrastination, with broader implications for sleep health.
Support (if any):

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0246

NEUROBEHAVIORAL OUTCOMES IMMEDIATELY FOLLOWING A DAYTIME SLEEP OPPORTUNITY WITH PINK NOISE

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Introduction: Pink noise is purported to enhance slow wave activity during sleep. Increased slow wave activity during a sleep episode has been associated with greater sleep inertia symptoms after waking. We investigated whether a pink noise intervention during a 4-hour daytime nap affected neurobehavioral outcomes immediately after the sleep opportunity.
Methods: Fourteen participants (7 female, 7 male; mean age = 24.86 y, SD = 5.20) spent two 26-hour periods in the sleep laboratory, both preceded by a week at home of 8.5 hours' time-in-bed (verified by actigraphy). Both lab visits included a 4-hour nap opportunity ending 10 hours after habitual waketime on the first day (i.e., during the circadian day). In a randomized, crossover design, the nap either involved pink noise (50 dB) played through headband speakers (intervention), or a headband with no sound playing (control). A test battery including the Karolinska Sleepiness Scale (KSS) and a 5-minute psychomotor vigilance task (PVT; NASA PVT+ App) was administered before lights out and again at 2, 12, 22, and 32 minutes after lights on. Participants were seated at a desk adjacent to their bed during testing. Mixed effects models were used to investigate the difference between the two conditions and across test bouts. Sex and baseline measures were included as covariates.
Results: There was no difference in sleep inertia outcomes between conditions. There was a significant effect of test bout for KSS with the greatest sleepiness experienced 2 minutes after the end of the nap opportunity (p =.004). There were no other significant main or interaction effects for KSS, PVT speed, or PVT lapses (all p >.05).
Conclusion: These preliminary findings suggest that there was no difference in subjective alertness nor objective vigilant attention in the 40 minutes following a daytime nap opportunity with pink noise compared to a no-noise control. Future analyses are needed to investigate how sleep metrics may have influenced these results.
Support (if any): This study was funded by the NASA Human Research Program, Human Factors and Behavioral Health Element.

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0247

VIGILANCE AND REACTION TIME VARIABILITY AFTER SLEEP RESTRICTION IN ADOLESCENTS: THE INFLUENCE OF ADHD AND MENTAL HEALTH SYMPTOMS

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Introduction: Sleep restriction compromises vigilance. While adolescents commonly experience sleep loss, attention-deficit/hyperactivity disorder (ADHD) may expose vulnerability. Reaction time variability (RTV) is a cardinal deficit of ADHD, yet it is relatively understudied as a sleep loss phenotype compared to lapses. As vigilance may further contribute to mental health in ADHD, we investigated how ADHD and mental health symptoms interact with the effect of sleep restriction on vigilance and response time variability in youth.
Methods: Fifty-five adolescents in R01HD103665 (29F; ages: 12.3±1.2yrs, range: 10-15yrs) completed two crossover conditions: sleep optimization (5 nights of 10h time-in-bed (TIB) anchored to optimal risetimes) and sleep restriction (5 nights at 7.5h TIB; equally delaying bedtime and advancing risetime). After each condition, participants completed a 10-minute psychomotor vigilance task (PVT) yielding lapse (RTs>500ms) and reciprocal reaction time (1/RT [RRT]) variables. We then separated gaussian and exponential components of the RT distribution and estimated RTV via sigma (gaussian variability) together with mu and tau (means of gaussian and exponential components). Conners-3 parent t-scores indexed ADHD symptoms in inattention (58.0±14.0; range: 40-90) and hyperactivity/impulsivity (60.6±16.4; range: 41-90) domains. Mental health symptoms were measured on PROMIS scales for child-reported anxiety (47.8±9.0; range: 35.6-66.2) and anger (45.1±8.9; range: 31.5-61.6) and psychological stress (parent-report 47.8±14.9; range: 4-71.1; child-report: 50.1±8.1; range: 39.5-68.8). Separate linear mixed models examined how sleep condition (restriction vs. optimization) and each symptom interact in explaining PVT performance.
Results: Sleep restriction moderated the effect of inattention on RTV (b=0.51, SE=0.24, p=.042). Higher inattention was associated with more variable RTs (sigma) only in sleep restriction. For lapses, we identified a main-effect of condition (b=12.68, SE=4.74, p=.010) and an interaction with psychological stress

(b=-0.21, SE=0.095, p=.032); worse psychological stress was associated with fewer lapses after sleep restriction. No other analyses were statistically significant.
Conclusion: These data indicate that ADHD and mental health symptoms may differentiate vigilance and response time variability after sleep restriction. The well-established association between ADHD symptoms and response time variability was only observed in sleep restriction; optimizing sleep schedules may mask ADHD sequelae. We will continue to probe the origin and consequence of these inter-individual differences.
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0248
GAME-CHANGING SLEEP: A BRIEF AND PERSONALIZED INTERVENTION APPROACH FOR ATHLETIC PERFORMANCE

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Introduction: Sleep is increasingly recognized as a critical factor influencing athletic performance in college athletes. While cognitive-behavioral therapy for insomnia (CBT-I) is the gold-standard treatment for sleep disturbances, it can be time-consuming and overly comprehensive for athletes seeking targeted sleep optimization. This study aimed to evaluate the effectiveness of a personalized, brief behavioral sleep intervention for Division 1 college football players.
Methods: A pilot study was conducted with 27 Division 1 football athletes. Two weeks prior to their first appointment, athletes received a Polar Grit X Pro device to monitor baseline sleep. Baseline sleep assessments included the Athlete Sleep Screening Questionnaire (a measure of athlete sleep disturbance), RU-SATED (a measure of sleep health), the Ford Insomnia Response to Stress (a measure of reactivity to new sleep environments), STOP-BANG (a measure of sleep apnea risk), the Depression Anxiety and Stress Scale and constructed measures of sleep resilience, vulnerability, self-efficacy, and valuation. At the first appointment, a doctoral-level interventionist conducted a sleep assessment and provided motivational interviewing, psychoeducation, and 1 to 3 individualized, evidence-based strategies to improve sleep health. Athletes implemented these strategies for two weeks, maintaining daily electronic sleep diaries and wearing the Polar Grit X Pro for continuous monitoring. A follow-up appointment included repeated assessments, progress reviews, problem-solving, and treatment maintenance guidance.
Results: Paired-sample t-tests revealed significant improvements in sleep disturbance (ASSQ scores; $p = 0.02$, $g = 0.45$) and sleep self-efficacy ($p = 0.01$, $g = 0.64$) from pre- to post-intervention. Depression, anxiety, and stress total scores showed a trend toward improvement ($p = 0.06$), while other measures remained unchanged.
Conclusion: A brief, targeted behavioral sleep intervention effectively improved sleep disturbance and self-efficacy in Division 1 football athletes, providing a practical alternative to traditional CBT-I. These findings suggest that such personalized interventions can enhance sleep health and accessibility in athlete populations. Although improvements in mood measures approached significance, the small sample size and short intervention period may have limited broader effects.
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0249
SELF-RATED PERFORMANCE IMMEDIATELY FOLLOWING A 1-HOUR NIGHTTIME NAP

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Introduction: Sleep inertia is the temporary impairment of performance and alertness experienced after waking. Subjective perceptions of performance during this period may not match actual performance, which is problematic in occupational settings where fitness for duty is self-assessed. We investigated self-rated performance predictions following a 1-hour nighttime nap with blue-enriched light compared to a no-nap dim light condition.
Methods: Following a week at home of 8.5 hours' time-in-bed (verified by actigraphy), n = 15 participants (7 female; mean age = 25.86 y, SD = 6.35) spent two 26-hour periods in the sleep laboratory. In a within-subjects, randomized, cross-over design, one visit included a 1-hour nap opportunity ending 21 hours after habitual waketime (i.e., during the circadian low), followed by exposure to blue-enriched light (250 lux; nap + light). The other visit involved a 1-hour rest period without sleep in a semi-recumbent position in dim light (< 10 lux), followed by exposure to 150 lux (no-nap + dim). A test battery including a 5-minute psychomotor vigilance task (PVT, NASA PVT+) was administered before lights out and again at 2, 12, 22, and 32 minutes after lights on. Participants estimated their performance prior to each PVT on a 100 mm visual analog scale. Linear mixed-effects models were run separately for each condition (nap + light; no-nap + dim) to evaluate the association between subjective performance estimates and actual PVT performance (speed, 1000/reaction time) and test bout, with participant as a random effect.
Results: Subjective performance was significantly associated with PVT speed ($p = .02$) in the nap + light condition but there was no effect of test bout. In the no-nap + dim condition, subjective performance was not related to PVT speed but there was a significant effect of test bout ($p < .001$).
Conclusion: These preliminary findings suggest that participants were more able to predict their performance while exposed to blue-enriched light following a nap and less able when kept awake at night in dim light. Future analyses will investigate the influence of sleep metrics and different interventions on these results.
Support (if any): NASA Human Research Program, Human Factors and Behavioral Health Element.

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0250
PERCEIVED ALERTNESS MODERATES THE RELATIONSHIP BETWEEN ACTUAL AND PERCEIVED PERFORMANCE

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Introduction: Previous work has shown that performance degrades following sleep loss as does the ability to self-assess one's performance. In this study, we investigate the extent to which humans are aware of their own ability to perform and what other factors may contribute to their judgments of their own ability.
Methods: Following a week of 8.5 h time-in-bed (verified by actigraphy), n = 15 participants (7 female; mean age = 25.86

y, SD = 6.35) spent two 26-hour periods in the sleep laboratory. Participants completed a test battery including a 5-minute psychomotor vigilance task (PVT, NASA PVT+ App) 4.5 hours after habitual wake and then 16 times throughout the evening and night after a four-hour daytime nap opportunity. Immediately before each PVT, participants were asked to indicate how well they expected to perform on their upcoming PVT (VASperformance). During each battery, participants also rated their own sleepiness on a 100 mm visual analog scale (VASsleepiness) We ran a linear mixed-effects model predicting estimated performance (VASperformance) to actual performance (PVT speed), with participant as a random effect (baseline model). The same model was repeated with perceived sleepiness (VASsleepiness) as another independent variable to evaluate the strengths of the relationships between these constructs.

Results: In the baseline model, better PVT speed was associated with significantly higher performance estimates (beta = 18.0, p <.001) indicating individual awareness of their ability to perform. The model that included sleepiness ratings revealed a reduced coefficient between speed and perceived performance (beta = 9.0, p <.001) and a significant main effect of subjective sleepiness (beta = -0.3, p <.001).

Conclusion: These results suggest that during a single overnight study in a controlled laboratory setting, participants have some sense of their own ability to perform, though their perceived sleepiness attenuates this effect and affects how participants rate their ability. Future work will investigate the role that acute sleep loss and circadian misalignment play in the accuracy of perceived judgments of ability.

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0251

QUANTIFYING SCRATCH DURING SLEEP IN ATOPIC DERMATITIS PATIENTS WITH THERMAL CAMERA TECHNOLOGY

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Introduction: Scratching during the sleep period in atopic dermatitis patients results in inflammation or a lesion on the affected area and further perpetuates the itch-scratch cycle. Night scratching disrupts patients sleep and negatively affects overall quality of life. The purpose of this work is to quantify amount of nocturnal scratching in atopic dermatitis patients and to compare scratching on the dominant and non-dominant hand.

Methods: A FLIR a400 thermal camera was set up in a sleep laboratory to record atopic dermatitis patients sleeping over night. The thermal video was annotated for scratch by trained annotators. Right and left hand scratches were annotated separately and hand dominance from each patient was recorded. Twelve nights were recorded from seven patients, five patients had two nights recording and three patients had one night of observation. Data from patients with two nights of data were averaged. The SCORAD clinical rating scale was used to quantify the severity of each patients atopic dermatitis.

Results: On average, all patients scratched for 15.1 minutes (14.1 minutes std) over each night. The dominant hand did most of the scratching (9.6 minutes, 11.1 minutes std). The non-dominant hand did on average 5.4 minutes (3.2 minutes std) of scratching per night. Each scratch event is called a bout, there were on average 109.5 bouts (59.6 std) per night. There were more dominant hand scratching bouts per night (63.1 bouts, 41.1 std) than non-dominant hand bouts (46.4 bouts, 20.7 std). The Pearson Product Correlation between the SCORAD clinical rating and time scratching per night was 0.451.

Conclusion: There is a large variation in how much atopic dermatitis patients scratch per night. A patient with a severe SCORAD score scratched less than a patient with a moderate SCORAD score. The low correlation between SCORAD and time spent scratching overnight indicates the importance of quantifying nocturnal scratching in atopic dermatitis patients. The atopic dermatitis patients in this study scratched more often with their dominant hand, compared to their non-dominant hand.

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0252

CHRONOTYPE AND DISORDERED EATING BEHAVIOR: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: Chronotype refers to an individual's typical or preferred timing of behaviors throughout the day. A later chronotype has been associated with emotional dysregulation, psychological disturbances, and unhealthy foods, although these findings are still controversial and inconclusive. Therefore, we conducted this systematic review and meta-analysis to investigate the association between chronotype and disordered eating behaviors among the general population.

Methods: Online databases, including PubMed, Scopus, and ISI Web of Science, were searched. We used the PECOS framework as follows: Population (general population), Exposure (individuals with later chronotype), Comparison (individuals with earlier chronotype), Outcome (disordered eating behaviors), and Study design (observational studies). We enrolled 36 studies comprising 28,352 participants with a mean age and BMI ranging from 14.1-52.6 years and 19.83-34.54 kg/m2, respectively.

Results: Later chronotype (i.e., a lower MEQ score) was associated with a higher binge-eating behavior score (Correlation coefficient [r]: -0.39; 95% CI, -0.43, -0.35; P < 0.001; I2 = 94.38 %), higher disordered eating attitude score (r: -0.17; 95% CI, -0.20, -0.13; P < 0.001; I2 = 95.45 %), higher emotional eating score (r: -0.06; 95% CI, -0.11, -0.02; P = 0.010; I2 = 56.97 %), higher uncontrolled eating score (r: -0.14; 95% CI, -0.22, -0.06; P < 0.001; I2 = 77.01 %), higher food addiction score (r: -0.17; 95% CI, -0.23, -0.11; P < 0.001; I2 = 80.19 %), higher food craving score (r: -0.09; 95% CI, -0.12, -0.06; P < 0.001; I2 = 69.97 %), higher food-related disinhibition score (r: -0.11; 95% CI, -0.14, -0.08; P < 0.001; I2 = 76.85 %), and higher night-eating syndrome score (r: -0.19; 95% CI, -0.28, -0.10; P < 0.001; I2 = 80.26 %); as well as a lower restrained eating score (r: 0.11; 95% CI, 0.06, 0.15; P < 0.001; I2 = 7.01 %).

Conclusion: Our findings highlight an association between late chronotype and increased disordered eating behaviors; however, we need more longitudinal and intervention studies to test causality and underlying mechanisms.

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0253

TOTAL SLEEP DEPRIVATION IMPAIRS DECISION MAKING MORE IN HEALTHY SLEEPERS THAN IN INDIVIDUALS WITH CHRONIC INSOMNIA

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Introduction: Work in healthcare routinely involves night and rotating shifts, early morning starts, and variable call schedules, resulting in short and/or disrupted sleep. We conducted a laboratory-based experiment in both normal sleepers and those with chronic insomnia to better understand implications of total sleep deprivation (TSD) on decision making using a reversal learning task (i.e., go/no go; GNG) with unannounced reversal contingences.
Methods: 28 individuals completed the sleep study, 15 with sleep-onset insomnia (ages 22-40, 11 females), of whom 7 underwent TSD, and 13 normal sleeper controls (ages 22-40, females), of whom 7 underwent TSD. The insomnia group met International Classification of Sleep Disorders (3rd edition; ICSD-3) criteria for chronic insomnia with no other clinically relevant condition contributing to their sleep disturbance. Subjects were in the laboratory for 5 days/4 nights. The first 2 days and nights were baseline days, each with a 10h opportunity for sleep (22:00—08:00). This was followed by 38h of TSD or another nighttime sleep opportunity for the control group. The last day was a recovery day, with a 10h sleep opportunity for all participants. Unique versions of a GNG task were administered in random, counterbalanced order at baseline and 24h later during TSD (or 2h awake in the control group).
Results: There was a significant main effect of day ($F_{1,69}$= 10.37, P=0.002), condition ($F_{3,69}$ = 5.94, P = 0.001), phase ($F_{1,69}$ = 10.03, P = 0.002), and day by condition by phase interaction ($F_{10,69}$ = 4.73, P < 0.001). In general, participants performed better before TSD and pre-reversal. While both TSD groups showed poorer performance post-reversal during TSD, only the TSD insomnia group showed relatively intact performance pre-reversal.
Conclusion: TSD led to significant impairment on a reversal learning task for both normal sleepers and those with chronic sleep-onset insomnia. This has important implications for healthcare workers who are routinely exposed to disrupted sleep which may leave them more susceptible to making potentially life-threatening errors. Hyperarousal, the widely accepted underlying mechanism perpetuating insomnia, may provide those chronically exposed to sleep loss some level of protection on decision making tasks compared to normal healthy sleepers during TSD.
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0254

COGNITIVE AND CORTISOL MEASURES DURING SLEEP DEPRIVATION AND PSYCHOLOGICAL STRESS INFLUENCE RECOVERY SLEEP METRICS

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Introduction: Little is known about the factors during total sleep deprivation (TSD) and psychological stress that affect recovery sleep. We determined the relative contributions of cognitive and cortisol measures, which represent distinct domains, as predictors of recovery sleep timing and duration.
Methods: We conducted a five-day experiment under highly controlled conditions in 32 healthy adults (ages 27-53; 14 females). Salivary cortisol samples were collected during 1) TSD morning (TSD AM; after 25h of TSD) and 2) TSD evening following a modified Trier Social Stress Test, which induced psychological stress (TSD PM; after 34h of TSD). Digit Span Test (DS), Digit Symbol Substitution Test (DSST), and Psychomotor Vigilance Test (PVT) performance data were collected at 0400h, 1130h, and 1730h during TSD and averaged. Wrist actigraphy assessed sleep indices during the first recovery night following TSD (10h time in bed). Multiple linear regression models determined the impact of TSD cognitive and cortisol measures as predictors of recovery sleep timing and duration. The models and independent variables were all significant ($p < 0.05$).
Results: Sleep Onset. Each 1-point DS total # correct increase predicted a 0.042h later sleep onset and each 1 µg/dL AM cortisol increase predicted a 0.958h later sleep onset. Sleep Offset. In addition, each 1 PVT lapse increase predicted a 0.031h later sleep offset and each 1 µg/dL PM cortisol increase predicted a 1.205h earlier sleep offset. Sleep Duration. Each 1 PVT lapse increase predicted a 2.153 minute sleep duration increase, and each 1 µg/dL AM cortisol increase predicted an 87.367 minute sleep duration decrease. In addition, each 1-point DSST # correct increase predicted a 1.657 minute sleep duration decrease and each 1 µg/dL PM cortisol increase predicted a 100.535 minute sleep duration decrease. Across models, 35.8%-40.6% of the sleep timing and duration variance was explained, with r ranges between 0.598-0.637.
Conclusion: Our results elucidate the important roles of cognitive performance and cortisol metrics obtained during sleep loss in influencing recovery sleep timing and duration, suggesting the possibility of intervening on these measures to modify subsequent sleep. Our findings highlight hypothalamic-pituitary-adrenal axis and cognitive measures as biomarkers for recovery sleep health.
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0255

SLEEP INTERRUPTED: EXPLORING THE EFFECTS OF TOTAL SLEEP DEPRIVATION ON CHRONIC INSOMNIA THROUGH POLYSOMNOGRAPHY

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Introduction: Conventional sleep staging is the standard for diagnosing most sleep disorders but has little diagnostic yield for chronic insomnia. Despite this, there has been a large effort to identify unique polysomnographic (PSG) patterns in chronic insomnia. Current consensus of PSG markers of chronic insomnia includes increased sleep onset latency (SOL) and wake time after sleep onset (WASO) and decreased total sleep time (TST) and sleep efficiency (SE). Less is known about how acute total sleep deprivation (TSD) may impact these same sleep markers. We investigated PSG patterns at baseline and after TSD in individuals with chronic sleep-onset insomnia as compared to healthy sleeper controls.

Methods: 11 individuals with chronic insomnia and 11 healthy controls (ages 22-40y, 14 females) completed a 5-day laboratory study with an adaptation night, baseline night, assignment to 38h TSD (n=6 insomnia, n=5 control) or equivalent non-TSD control (n=5 insomnia, n=6 control), and recovery night. Sleep periods were 10h (22:00-08:00) and measured with PSG. Data were analyzed using mixed effects ANOVA with fixed effects of condition (TSD or control) and night (baseline and recovery) and their interaction, with a random effect over subjects on the intercept.
Results: There was a significant interaction of condition by night with increases in TST ($F_{3,18}=5.61$, $P< 0.01$), SE ($F_{3,18}=5.53$, $P< 0.01$), and total N3 ($F_{3,18}=12.76$, $P< 0.001$), and a decrease in SOL ($F_{3,18}=3.91$, $P=0.026$), N1 ($F_{3,18}=3.82$, $P=0.028$), and WASO ($F_{3,18}=4.32$, $P=0.018$) in both the insomnia and healthy controls following TSD. No significant difference between conditions were observed in any measured sleep metric at baseline (all $P>0.13$).
Conclusion: After TSD, both groups demonstrated the expected increased SE and total N3 alongside decreases in WASO and SOL and were not significantly different from each other. These findings suggest that conventional sleep staging lacks the sensitivity to identify distinct features of insomnia, both with and without TSD. This underscores the need for alternative methods of measurement such as spectral analysis, the results of which are forthcoming. Additionally, these findings highlight the importance of incorporating subjective sleep assessments in studies of insomnia as objective metrics may not always align with subjective reports of poor sleep.
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0256

BIDIRECTIONAL PREDICTORS BETWEEN CATECHOLAMINES DURING SLEEP DEPRIVATION AND STRESS AND BASELINE AND RECOVERY SLEEP

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Introduction: We examined whether baseline sleep measures the night before total sleep deprivation (TSD) predicted concentrations of two catecholamines, epinephrine (adrenaline) and norepinephrine (noradenaline), during TSD and psychological stress. We also assessed whether these markers predicted subsequent recovery sleep measures.
Methods: During a controlled five-day experiment, epinephrine and norepinephrine via blood samples were collected in 8 healthy adults (ages 28-42): 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 determined predictive relationships between B2 and R1 sleep metrics and TSD AM and TSD PM epinephrine and norepinephrine metrics ($p< 0.05$ was significant).
Results: Longer B2 sleep duration significantly predicted greater TSD AM and PM epinephrine (r: 0.722-0.725; β: 0.955-0.964), while longer B2 sleep onset latency significantly predicted lower TSD AM and PM epinephrine levels (r: −0.937-−0.864; β: −3.893-−3.638). Later B2 sleep onset significantly predicted lower TSD PM epinephrine levels ($r=-0.702$; $\beta=-55.717$). Greater B2 wake after sleep onset (WASO) significantly predicted higher TSD AM norepinephrine levels ($r=0.790$; $\beta=4.092$), while higher B2 percent sleep showed the opposite relationship ($r=-0.777$; $\beta=-20.457$). B2 sleep measures predicted 49.3%-87.9% of the TSD epinephrine and norepinephrine variance. Higher TSD AM and PM norepinephrine significantly predicted shorter R1 sleep duration (r: −0.933-−0.775; β: −0.218-−0.206), and higher TSD AM norepinephrine significantly predicted greater R1 WASO, and lower sleep efficiency and percent sleep (r: −0.954-0.925; β: −0.036-0.133). TSD AM and PM norepinephrine predicted 60.0%-91.0% of the variance in R1 sleep measures. TSD epinephrine concentrations, however, did not significantly predict R1 sleep measures.
Conclusion: Baseline sleep measures uniquely predicted a remarkably high percentage of epinephrine and norepinephrine variance during TSD and psychological stress. Similarly, norepinephrine levels predicted a notably high percentage of the variance in recovery sleep metrics. Our novel findings highlight important biomarkers and mechanisms between catecholamine regulation and sleep health.
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0257

IMPACT OF SLEEP DEPRIVATION ON SYNAPTIC DENSITY IN HUMAN BRAINS

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Introduction: According to the synaptic homeostasis hypothesis, wakefulness will lead to an increase in synaptic strength. Several lines of evidence indicate in animals that markers of synaptic strength increase during wake and decline during sleep. Examples of proxies of synaptic strength are the amount of AMPA receptors, the cortical spine density, the number and size of synapses and the local field potential rising. Nevertheless, some in-vitro and in-vivo studies of synaptic strength in animals reveal opposite results which may be due to differences in examined brain regions, cortical layers or housing of animals. Thus far, changes in EEG following transcranial magnetic or direct current stimulation have been an indirect marker of altered plasticity in humans. Results from these studies point to an increase of synaptic strength. Synaptic vesicle protein 2A (SV2A) is an established marker of synaptic density and can be quantified by F-18 SynVesT 1 positron emission tomography (PET). Here we report a cohort (n=40, f/m 14/26) which was randomized to either a normal sleep (n=20) or an acute total sleep deprivation group.
Methods: F-18 SynVesT-1 PET and MRI data were collected twice in the morning on consecutive days in healthy volunteers (age: 27.5± 6.5 years) using a MR/BrainPET system. The control group slept for 7.8 hours (scheduled 23 to 7 or 0 to 8:00 h) in-between. At the start of the second scan the sleep deprivation group had been awake for an average of 28.5 ± 2.0 hours. SV2A was quantified by using the simplified reference tissue model 2 with centrum semiovale as reference region.

Results: We found a significant increase in synaptic density after sleep deprivation in most of the investigated brain regions, e.g. Thalamus +4.6±7.3% (p=0.005); Hippocampus +5.6±8.2% (p=0.013); Parietal cortex +3.2±5.1% (p=0.014)).
Conclusion: Our results suggest - for the first time in humans - that there is a global increase in synaptic density after sleep deprivation.
Support (if any):

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0258
SLEEP MODERATES THE RELATIONSHIP BETWEEN BODY FAT PERCENTAGE AND APPETITE

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Introduction: Body fat percentage is a known predictor of appetite measures, such as hunger, fullness, desire to eat, and prospective food consumption (PFC). Sleep deprivation has also been associated with changes in these appetite measures. This study examined whether sleep deprivation moderates the relationship between body fat percentage (BF%) and appetite responses (feelings of hunger, fullness, desire to eat, and PFC) following an ad libitum lunch.
Methods: Eighteen participants (6 females; 23.2±3.8 years; body fat (BF%)=18.8±9.9%) underwent 3 sleep conditions following a randomized crossover design: one habitual sleep night (control), and two sleep deprivation conditions where sleep was shortened during the second half of the night (early wake) or the first half of the night (late bedtime). The next day, measures of appetite were captured via four visual analog scales (immediately following an ad libitum lunch. BF% was measured with Dual-Energy X-Ray Absorptiometry (DEXA) at baseline. Four moderation analyses were conducted, with BF% as the predictor, sleep condition (Control, Early wake or Late Bedtime) as a categorical moderator, and post-lunch hunger, fullness, desire to eat, and PFC as dependent variables.
Results: With desire to eat as the outcome, the model was significant (F[5,48]=3.83, p=.005, R2=.29) with a significant interaction term (b=.51, t(48)=3.33, p=.002). Specifically, there was no relationship between BF% and Desire to eat in the control condition (b=-.18, t(48)=-1.67, p=.10), but the relationship was positive and significant in both the early wake (b=.27, t(48)=2.52, p=.02) and late bedtime (b=.33, t(48)=3.04, p=.004) sleep deprivation conditions. The models for hunger (F[5,48]=.90, p=.49), fullness (F[5,48]=.16, p=.98), and PFC (F[5,48]=.47, p=.80) were not significant.
Conclusion: These results suggest that post-meal desire to eat is increased in individuals with higher BF% following sleep deprivation, but not following habitual sleep duration. These findings suggest that sleep deprivation may amplify a person's desire to eat, and that individuals with larger BF% may be at a greater risk. These findings provide further evidence on the role of sleep deprivation in modulating appetite and may, consequently, be a risk factor for greater energy intake in individuals with higher BF% or at greater risk for obesity.
Support (if any):

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0259
ALCOHOL AND CANNABIS AFFECT NEUROBEHAVIORAL IMPAIRMENT FROM ACUTE TOTAL SLEEP DEPRIVATION

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Introduction: Acute total sleep deprivation (TSD) is common due to extended work hours or other time demands. In controlled laboratory settings, individuals exposed to TSD display highly reproduceable profiles of neurobehavioral impairment. In real-world settings, however, TSD is often combined with substance intake, including alcohol and cannabis. In this pilot study, we investigated the effect of substance intake on the neurobehavioral response to TSD.
Methods: Six healthy individuals (ages 23-37y, all male) completed two 24h in-laboratory study visits separated by ≥1 week. During each visit, they were kept awake from 15:00 until 06:00 the next day, and they completed a 10min PVT every 2-3h. This was followed by an 8h recovery sleep opportunity. For the second visit, participants were randomized – three per group – to receive oral administration of cannabis at 22:30 (10mg) or alcohol at 23:30 (peak blood alcohol concentration of 0.043±0.006% at 00:13, decaying to 0.005±0.007% by 03:55). PVT mean RT, number of lapses (RT>500ms) and false starts were analyzed using mixed-effects regression.
Results: As expected, PVT performance deteriorated through the second half of the extended waking period (after midnight), with slower mean RT, more lapses, and more false starts (F>3.6, P< 0.002). Alcohol increased mean RT (F=4.9, P=0.002) and lapses (F=7.7, P< 0.001), but did not significantly affect false starts (F=1.0, P=0.41). Cannabis did not significantly affect mean RT (F=0.9, P=0.46), lapses (F=1.1, P=0.37), or false starts (F=0.8, P=0.56) during TSD.
Conclusion: Alcohol exacerbated neurobehavioral impairment during TSD, even at blood alcohol levels below the legal limit of most countries and states, reaching statistical significance despite our small sample size. Cannabis at the dose provided did not significantly further degrade PVT performance during TSD. Importantly, no attempt was made to make the alcohol and cannabis doses equipotent; therefore, these results should not be interpreted as evidence of their relative effect sizes or safety profiles. Yet, our findings provide preliminary evidence suggesting that commonly used drugs such as alcohol may amplify neurobehavioral impairment from sleep loss, which may have critical implications for automobile driving and other safety-sensitive activities.
Support (if any): National Safety Council

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0260

MAPPING THE BRAIN AROUND THE CLOCK: SPONTANEOUS NEURAL ACTIVITY IS INFLUENCED BY TIME AWAKE AND TIME OF DAY

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Introduction: The timing and depth of sleep and wakefulness are influenced by a homeostatic process that reflects accumulating sleep pressure over time (Process S) and a circadian process (Process C) that produces an oscillating diurnal rhythm of alertness. Together, these two processes influence an individual's propensity toward sleep or alertness throughout the day, but their neurobiological mechanisms remain to be fully elucidated. Here, we obtained repeated resting state fMRI scans every 6 hours during 39 hours of continuous sleep deprivation and mapped the changes in cerebral Amplitude of Low Frequency Fluctuations (ALFF), a measure of spontaneous neural activity.
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 continuous wakefulness. Beginning at 0900, rsFMRI scans were collected at 3T every 6-hours. Data were preprocessed and analyzed using standard pipelines using CONN v22.v2407. Spontaneous neural activity was identified using ALFF at each timepoint. Two GLMs were calculated: 1) the linear change in ALFF across sessions, controlling for the circadian rhythm (based on a cosine function model), and 2) the circadian rhythm, controlling for the linear effects of time awake.
Results: There was a significant ($p<.05$, FDR corrected) linear effect of sleep deprivation (Process S), showing increasing ALFF within primary sensory and motor regions (e.g., precentral/postcentral gyri; superior temporal gyrus, occipital cortex) and thalamus, basal ganglia, amygdala, and medial orbitofrontal cortex). After removing the effect of sleep deprivation, ALFF showed significant ($p<.05$, FDR corrected) circadian modulation (Process C) primarily within higher order cortex including dorsolateral prefrontal, ventromedial prefrontal, lateral orbitofrontal, inferior parietal cortices, and the temporal poles.
Conclusion: This is the first study to demonstrate changes in spontaneous neural activity over the course of sleep deprivation. There was a linear increase in ALFF within frequently used regions of the sensorimotor cortex, consistent with the tenets of the synaptic homeostasis hypothesis (SHY), which posits a buildup of synaptic potentiation with increasing time awake. Higher order regions involved in executive functioning showed a circadian pattern of spontaneous neural activity. These findings provide a neurobiological basis for models of cognitive fatigue during sleep loss.
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0261

SOCIAL BEDTIME PROCRASTINATION ASSOCIATES WITH GREATER NEED TO BELONG

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Introduction: Bedtime procrastination involves choosing to go to bed later despite being aware of its potential negative consequences. In this study, we investigated how socializing for leisure contributes to bedtime procrastination in a residential college. We hypothesized that social bedtime procrastination on school nights would be associated with shorter nocturnal sleep, and membership and ties within the bedtime procrastination social network would be predicted by a greater need to belong.
Methods: University students in a residential college (n=104, 59 women) wore actigraphy watches and proximity beacon watches for 2 weeks during the school semester to track their nocturnal sleep and the times they were in close proximity to one another. Daily diaries recorded instances of in-person social bedtime procrastination and the person(s) who were involved in delaying bedtime. The Need to Belong Scale assessed individual differences in the desire for acceptance and belonging. Linear mixed models tested associations between social bedtime procrastination and sleep, while exponential random graph models predicted tie formation in the bedtime procrastination social network.
Results: Sleep duration was about an hour shorter on school nights when students procrastinated their bedtime for in-person social leisure activities (β=-0.97 h, 95% CI=-1.34 to -0.59 h). On these nights, students' bedtime was strongly correlated with the timing of their last objectively measured proximity to the person who delayed their bedtime ($r=0.81$, $P< 0.001$). Students within the bedtime procrastination social network scored higher on need to belong compared with students outside the network (Cohen's $d=0.63$, 95% CI=0.21 to 1.03). Furthermore, need to belong predicted tie formation within the bedtime procrastination social network (log odds ratio=0.97, 95% CI=0.49 to 1.45).
Conclusion: Social bedtime procrastination may be an important factor contributing to late bedtimes and short sleep among students living in residential colleges or dormitories. Individuals with a stronger need to belong may be more inclined to delay their bedtime to partake in social activities. These insights could inform interventions aimed at promoting healthier sleep habits within social contexts.
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0262

SLEEP RESTRICTION INCREASES EXPERIENCES OF BOREDOM AND INHIBITS INTEREST

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Introduction: Studies on sleep and emotional experiences suggest robust effects of sleep loss on blunted experiences of positive affect. However, research has largely relied on broad experiences of positive or negative mood, and few studies have examined the impact of sleep loss on experiences of specific types of emotions. The current study examined how sleep restriction may alter experiences of interest and boredom.
Methods: Healthy participants (N = 16; 85% female, ages 18-25 years) completed an intake assessment followed by two weeks of at home sleep monitoring using actigraphy. On nights 7 and 14, participants completed a night of sleep restriction (4h sleep opportunity) or control sleep (9h sleep opportunity) using a randomized crossover design. Following each sleep manipulation, participants returned to the lab to complete several behavioral

tasks. Specifically, participants completed a boredom/interest task where they were presented with a variety of randomized, counterbalanced stimuli (i.e., abstract art, summaries of science discoveries, and philosophy quotes) and were asked to rate how interested and bored they were in response to each stimuli. Participants also completed a Thought Action Repertoire task where they were asked to list all of the things they would be interested in doing at that moment.
Results: After sleep restriction, participants reported less interest in response to all stimuli. Specifically, after sleep restriction, participants reported less interest in response to abstract art (p =.018, d =.67), science discoveries (p =.04, d =.56), and philosophy (p =.04, d =.56). Participants also reported more boredom in response to abstract art (p =.019, d = -.66). After sleep restriction, participants reported that they would be interested in pursuing fewer activities (t(14) = 2.18, p =.04, d =.56) compared to after a night of control sleep. Differences in the types of activities listed also emerged.
Conclusion: This study is one of the first to examine the effects of sleep loss on experiences of interest and boredom. Implications for the role of sleep in the development of depression and anhedonia (i.e., loss of interest and engagement in activities) will be discussed.
Support (if any): N/A

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0263

THE SWEET SPOT OF WEEKEND CATCH-UP SLEEP: A PROTECTIVE FACTOR AGAINST DEPRESSIVE SYMPTOMS?

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Introduction: Chronic sleep deprivation is common and often linked to increased internalizing symptoms. Weekend catch-up sleep (WCS) or extending sleep duration on weekends to compensate for weekday deficits, has shown mixed effects on mental health across age groups. This study examines the association between WCS duration and internalizing symptoms in adolescents.
Methods: Data were drawn from year four of the Adolescent Brain Cognitive Development (ABCD) Study (n = 1,877; mean age = 13.5 years). Sleep duration was objectively measured using Fitbit devices, while internalizing symptoms were assessed using the Brief Problem Monitor-Youth (BPM-Y). Three independent variables captured weekend catch-up sleep (WCS): (1) WCS duration, calculated as the difference between weekend and weekday sleep duration; (2) WCS classification, a binary variable indicating whether WCS duration was greater than 0 hours or not; and (3) WCS groups, categorized as WCS duration < 0 hours, 0 to < 2 hours, and ≥ 2 hours. The dependent variable was internalizing symptoms, measured as a continuous factor score derived from the BPM-Y. Linear regression analyses were conducted to examine the associations between WCS and internalizing symptoms.
Results: No significant association was observed between WCS classification (WCS > 0 hours or not) and internalizing symptoms (t = 0.68, p = 0.498). However, adolescents with 0–2 hours of WCS exhibited fewer internalizing symptoms compared to those with no WCS (β = -0.139, p = 0.048). In contrast, longer WCS durations (continuous variable) were associated with a slight increase in internalizing symptoms at year four follow-up (β = 0.008, p = 0.029).
Conclusion: Moderate WCS (0–2 hours) may protect against internalizing symptoms in adolescents, while excessive WCS appears to have the opposite effect. These findings highlight the importance of understanding optimal sleep balance during adolescence, though further research is needed to clarify the directionality of these relationships.
Support (if any):

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0264

THE IMPACT OF REPORTED SLEEP DURATION AND SUBJECTIVE SLEEP SUFFICIENCY ON ANXIETY, DEPRESSION, AND FATIGUE

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Introduction: Short sleep duration is linked to increased psychiatric risks, yet the protective role of subjective sleep sufficiency in short sleepers remains unclear. This study examines how reported sleep duration and subjective sleep sufficiency influence anxiety, depression, and fatigue in a Korean adult population.
Methods: Data from 2,492 participants in the Korean Sleep Headache Study were analyzed (age range: 19-92, mean 47.9 ± 16.4yrs, 49.6% male). Reported sleep duration was classified as inadequate (< 7 hours) or adequate (≥7 hours) based on weighted weekly averages from the Korean Munich Chronotype Questionnaire. Subjective sleep sufficiency was assessed via the question, "Do you think you are getting enough sleep at night?" with responses categorized as "sufficient" or "insufficient." Anxiety, depression, and fatigue were defined using Generalized Anxiety Disorder-7 (≥10), Patient Health Questionnaire (≥10), and Fatigue Severity Scale (≥36), respectively. Logistic regression analyses, adjusting for sociodemographic, lifestyle, and sleep quality covariates, were performed to evaluate the associations between reported sleep duration and sufficiency on anxiety, depression, and fatigue.
Results: Participants reported inadequate sleep in 42.87% and insufficient sleep in 56.11%. Inadequate sleep duration was significantly associated with higher odds of anxiety and fatigue (OR [95% CI], 4.13 [1.75-11.41], p=0.003, and 1.33 [1.12-1.61], p= 0.002, respectively), while insufficient sleep was significantly associated only with fatigue (1.43 [1.18-1.72], p< 0.001). Depression was not significantly associated with either. Participants were categorized into sufficient adequate sleep (26.67%), insufficient adequate sleep (30.46%), sufficient inadequate sleep (17.22%), and insufficient inadequate sleep (25.65%). Notably, insufficient inadequate sleepers had the highest odds of anxiety (3.92 [1.24-17.42], p=0.036) and fatigue (1.89 [1.46-2.45], p< 0.001) compared to sufficient adequate sleepers, followed by insufficient adequate sleepers (1.48 [1.16-1.89], p=0.002) and

sufficient inadequate sleepers (1.40 [1.06-1.86], p=0.018) for fatigue. For depression, insufficient inadequate sleepers showed slightly higher odds (1.22 [0.80-1.85], p=0.354), though this was not statistically significant.
Conclusion: Inadequate sleep duration and insufficient subjective sleep may exacerbate on daytime symptoms such as anxiety and fatigue. While sufficient subjective sleep may mitigate the impact of short sleep, particularly on fatigue, securing adequate sleep remains essential for managing mood and fatigue.
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0265

SLEEP DIFFICULTIES, ANXIETY, AND DEPRESSION AMONG CANNABIS CONSUMERS AND NON-CONSUMERS IN THE HERBAL HEART STUDY

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Introduction: Research indicates that individuals with sleep disturbances report higher rates of anxiety and depression. Cannabis is used to self-manage sleep disturbances; however, little is known about differences between anxiety and depression by sleep difficulties and use. This study examined these relationships in the Herbal Heart Study, a cohort of 18-to-35-year-olds.
Methods: Cannabis (CB+) was self-reported and confirmed by urine. Anxiety and depression were evaluated via Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI). Difficulty falling and/or staying asleep was self-reported via the Medical History Questionnaire. A binary variable, "poor sleep", represented those with >1 type of sleep difficulty. Mann-Whitney U tests compared median BAI/BDI scores by sleep and cannabis use.
Results: Majority (63.0%) of the sample (N=200; mean age: 25.2 years, SD = 4.8; 65.0% female; 54.5% Hispanic/Latino) were CB+. Sleep difficulties were reported by 23.0% (difficulty falling asleep; DFA), 16.5% (difficulty staying asleep; DSA), and 29.0% (poor sleep) of the sample. CB+ with sleep difficulties had higher median BAI scores: DFA (15.0 vs 7.0, p< 0.0001), DSA (17.0 vs 7.0, p< 0.0001), and poor sleep (17.0 vs 7.0, p< 0.0001). Median BDI scores were also higher: DFA (17.0 vs 7.0, p< 0.0001), DSA (20.5 vs 7.0, p< 0.0001), and poor sleep (20.5 vs 7.0, p< 0.0001). Non-consumers with sleep difficulties had higher median BAI scores: DFA (13.0 vs 5.0, p< 0.001), DSA (15.0 vs 6.0, p < 0.001), and poor sleep (14.0 vs 4.5, p< 0.01). Median BDI scores showed the same pattern: DFA (15.0 vs 5.0, p< 0.001), DSA (20.0 vs 5.0, p< 0.001), and poor sleep (15.5 vs 5.0, p< 0.0001).
Conclusion: Those with sleep difficulties had elevated anxiety and depression scores, attenuated by CB+. Further investigation is needed to explore the complex relationship between cannabis, mental health, and sleep to inform public health interventions.
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0266

SLEEP RESTRICTION, ACADEMIC-ORIENTED PERFORMANCE, AND ADHD SEVERITY IN ADOLESCENTS

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Introduction: Adolescents experience insufficient sleep that may impact academic performance. Youth with attention-deficit/hyperactivity-disorder (ADHD) may be particularly vulnerable to the effects of sleep loss. By leveraging ecologically relevant tests of math and language arts, we investigated how sleep restriction affects academic performance in children differing in ADHD symptoms.
Methods: Fifty-seven adolescents from R01HD103665 provided usable data (27M; age: 11.6±1.04yrs, range: 10-15yrs) and were grouped by ADHD symptoms on the Conners-3-Parent ADHD Index Probability score as high (ADHDy; ≥50%ile; n=25) or low (ADHDn; < 50%ile; n=32). All completed online quizzes featuring standardized-test math and language questions (prior grade-level) during two counterbalanced conditions: 5 nights of sleep optimization (10h TIB) and 5 nights of sleep restriction (7.5h TIB, equally delaying bedtime and advancing risetime). Quizzes were given in the afternoon after 1, 3, and 5 nights of each condition graded from 0-8 correct answers. We examined performance on days 1 and 5 and the change from day 1 to 5. All analyses used 2x2 ANOVAs modeling effects of group (ADHDy vs. ADHDn) and condition (restriction vs. optimization).
Results: For performance on Days 1 and 5, we found no significant main effects or interactions (all p's>=.09, ηp^2's=<.07), and a trending main-effect of group at Day 1. With respect to change in performance (Day 5 - Day 1), we found a significant main-effect of condition (F(1,41)=4.30, p=.04, ηp^2=.09), such change in performance during the restriction condition (0.68±0.24 points) was higher overall than during the optimization condition (-0.03±0.3 points), and a trending main-effect of group (F(1,41)=3.73, p=.06, ηp^2=.08), but no condition-x-group interaction (F(1,41)=0.01; p=.92; ηp^2=.00). Post-hoc tests indicated performance in the ADHDy group increased from Day 1 to 5 during sleep restriction (1.10±1.58 points; t(20)=-3.18; p=.01; d=1.58) but not during sleep optimization (.09±2.24 points; t(22)=-0.19; p=.85; d=-.039). ADHDn group performance did not change across either condition (p's >.23).
Conclusion: These analyses examine whether ADHD symptoms moderate the impact of 5-nights of insufficient sleep on academic performance. We identify paradoxical improvements across sleep restriction but only in youth with high ADHD symptoms. We will next examine how compensatory factors such as hypervigilance may explain these results.
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0267

SUBSTANCE USE AND SLEEP ISSUES: FINDINGS FROM AN INTERNET GAMING ADDICTION STUDY ON JAMAICAN ADOLESCENTS

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Introduction: Addiction and sleep disorders are a problem due to its impact on sleep physiology. We evaluated substance use, gaming addiction, and sleep issues among adolescents.
Methods: Data are from a 3-stage stratified cluster-sample of Jamaican students (N=358; 14.8y (2.2), 54.2% female, 45.8% male) in one highschool. Measures included Patient Health Questionnaire-9, Car, Relax, Alone, Forget, Friends, Trouble Screening Tool, Gaming Addictions Scale for Adolescents, and demographics. STATA 18 analyzed data via Chi-square and logistic regression.
Results: Sleep was associated with "who you live with" (p=0.010), parental marital status (p=0.046), and substance use (p< 0.001). Of the 14.5% of substance consumers, moderate users (59.6%) reported sleep issues more frequently than severe users (23.1%, p=0.010). There was a significant association between sleep, substance use, and internet gaming addiction (p=0.0002). Moderate substance users had a 3.13 higher odds of sleep issues than non-users (95% CI=1.39, 7.07). Severe substance users had 9.42 higher odds of reporting sleep issues than non-users (95% CI=1.21, 73.59). Odds of sleep issues in students with internet-gaming-addiction was 1.62 higher than those without internet-gaming-addiction (p=0.048).
Conclusion: Findings suggest that substance use and internet gaming addiction are potential risk factors for sleep issues among adolescents. Further studies should focus on parental marital status, substance use, who you live with, and internet gaming addiction in adolescents who exhibit sleep related issues.
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0268

NOCTURNAL LONELINESS: EXPLORING A UNIQUE SYMPTOM OF INSOMNIA AND ITS LINK TO SUICIDAL IDEATION FREQUENCY

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Introduction: Nocturnal loneliness—feeling disconnected and isolated when awake at night—is a commonly overlooked symptom of insomnia with potential implications for its course, prognosis, and treatment. Both loneliness and insomnia are associated with suicidality, and prior research has found a strong link between being awake at night and increased suicidality. This study aimed to validate a novel Nocturnal Loneliness Scale (NLS) and examine whether nocturnal loneliness uniquely mediates the relationship between insomnia severity and suicidal ideation.
Methods: A total of 442 participants (ages 18–80, M = 46) completed an online survey via Qualtrics. Measures included demographics, NLS, the 20-item UCLA Loneliness Scale (general loneliness), the Insomnia Severity Index, the Frequency of Suicidal Ideation Index (past year), and the Patient-Reported Outcomes Measurement Information System (PROMIS) Depression Short Form. The NLS factor structure was examined using exploratory and confirmatory factor analyses. Structural equation modeling tested whether nocturnal loneliness mediates the relationship between insomnia severity and suicidal ideation frequency while accounting for general loneliness, depression, and demographic variables.
Results: The NLS demonstrated a single-factor structure with excellent reliability (Omega =.97). Insomnia severity was significantly associated with suicidal ideation frequency (p <.001). Both nocturnal and general loneliness significantly mediated this relationship (p <.01 for both). However, when depression was included as a mediator, it fully accounted for these relationships (p <.001).
Conclusion: Our findings replicate the established association between insomnia severity and suicidal ideation frequency. Nocturnal loneliness, while distinct from general loneliness, was not uniquely associated with suicidality beyond the influence of depression. Depression emerged as the strongest mediator, suggesting that insomnia's impact on suicidal ideation is primarily explained through depressive symptoms, and not through loneliness. Although nocturnal loneliness warrants further exploration as a unique symptom of insomnia, its role in frequency of suicidal ideation appears secondary to depression.
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0269

THALAMO-TEMPORAL FUNCTIONAL CORRELATES OF THE SLEEP-SUICIDAL IDEATION ASSOCIATION

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Introduction: Suicide claims nearly 800,000 lives annually, profoundly impacting millions worldwide. Addressing suicide risk requires identifying mechanisms of modifiable factors, such as sleep disturbances including insomnia and nightmares, which are both common and strongly linked to suicidality. We hypothesize that sleep disturbances increase neural activity during sleep, disrupting its restorative processes and leading to brain region-specific impairments in daytime functioning. This pilot study investigated functional brain differences across wake and sleep in relation to sleep disturbances and suicidality.
Methods: Participants included individuals with recent suicidal ideation (SI; n=10) and those with no history of suicidal ideation (NSI; n=13). All participants completed 10+ days of sleep diaries, sleep and mood questionnaires, overnight ambulatory polysomnography, and wake and sleep electroencephalography-functional magnetic resonance imaging (EEG-fMRI). Ten minutes of wake in the morning scan and ten minutes of sleep following self-reported sleep onset from the evening scan were used in the analysis. Key measures included the Insomnia Severity Index (ISI), Disturbing Dream and Nightmare Severity Index (DDNSI), Patient Health Questionnaire (PHQ-9), and Frequency of Suicidal Ideation Inventory (FSII). Functional connectivity changes from wake to sleep were analyzed using seed-to-voxel analyses in the CONN Toolbox, with regions of interest including the anterior cingulate (caudal and rostral), insula, middle frontal

gyrus, posterior cingulate, thalamus, amygdala, and orbitofrontal cortex.
Results: The SI group exhibited smaller functional connectivity changes from wake to sleep, that was specific to the right thalamus to the left (t = 6.1, p-FDR < 0.001) and right superior/middle temporal regions (t = 5.37, p-FDR < 0.001).
Conclusion: Reduced functional connectivity changes in the thalamo-temporal regions among the SI group support the local sleep deprivation hypothesis, suggesting that deficits in auditory processing may be diminished during wakefulness and/or hypervigilant during sleep. These findings underscore the role of thalamic dysfunction during sleep as a potential mechanism through which sleep disturbances are associated with suicide risk, highlighting the importance of targeting specific brain mechanisms during sleep in suicide prevention efforts.
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0270
EXAMINING THE RELATIONSHIP BETWEEN DEFENSE STYLES AND RISK-TAKING PROPENSITY AMONG SLEEP-DEPRIVED SUBJECTS

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Introduction: There is considerable inter-individual variability in risk-taking propensity during sleep deprivation. We hypothesized that Defense Styles – an individual's response to perceived stressors, which have the function of alleviating discomfort or distress – assessed prior to sleep deprivation would predict risk-taking propensity when it was presented.
Methods: Thirty-three healthy participants completed the Defense Styles Questionnaire-40 (DSQ-40) prior to 32 hours of total sleep deprivation. The DSQ-40 measures 20 different defenses. The Balloon Analogue Risk Task (BART) was administered at two time-points: 14:15 on Day 1 (after a normal night of sleep), and 14:15 on Day 2 (after 32 hours of sleep deprivation). Participants experienced either neutral (n=15) or negative (n=18) mood inductions between the two BART administrations. Adjusted average number of pumps was used as a measure of risk-taking propensity. A stepwise regression was used to determine whether specific defenses predicted risk-taking propensity.
Results: There was a significant association between Splitting and risk-taking propensity ($F(1,31)=8.80$, $R2=.22$, $p=.006$). Additionally, a combination of five defenses predicted risk-taking propensity during sleep deprivation, but only within the negative mood-induction condition (Suppression, Rationalization, Passive Aggression, Idealization, and Splitting: $F(5,12)=22.62$, $R2=.90$, $p<.001$). Greater Suppression ($\beta=.53$, $t(17)=4.21$, $p=.001$), lower Rationalization ($\beta=-.53$, $t(17)=-4.83$, $p<.001$), lower Passive Aggression ($\beta=-.48$, $t(17)=-4.48$, $p<.001$), lower Idealization ($\beta=-.50$, $t(17)=-4.84$, $p<.001$), and greater Splitting ($\beta=.28$, $t(17)=3.07$, $p=.010$) predicted increased risk-taking following sleep deprivation.
Conclusion: Splitting predicted increased risk-taking propensity when the sample was examined as a whole. Greater suppression, lower rationalization, lower passive aggression, lower idealization, and greater splitting were predictors of increased risk-taking propensity among those in the negative mood-induction condition. When under the stress of sleep deprivation, those who make efforts to avoid confronting negative emotions and adopt polarizing views tend to take greater risks when sleep-deprived. However, those who justify their past behaviors, indirectly express negative emotions, and view others in an excessively positive way tend to take lower risks when sleep-deprived. These findings suggest that individual emotional coping strategies are associated with risk-taking behavior during sleep deprivation.
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0271
BIDIRECTIONAL PREDICTORS BETWEEN BASELINE AND RECOVERY SLEEP AND CORTISOL AND C-REACTIVE PROTEIN DURING SLEEP LOSS

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Introduction: We determined whether baseline sleep measures obtained the night before total sleep deprivation (TSD) predicted two common biological metabolites, cortisol and high-sensitivity C-reactive protein (CRP), during TSD and psychological stress. We also assessed whether these markers predicted subsequent sleep measures during recovery.
Methods: We conducted a five-day experiment under highly controlled conditions in 32 healthy adults (ages 27-53; 14 females). Cortisol via saliva samples and CRP 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). For CRP, undetectable samples were assigned half of the minimum detectable value. 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 cortisol and CRP metrics ($p< 0.05$ was significant).
Results: Greater B2 sleep efficiency significantly predicted both lower TSD AM ($r=-0.399$; $\beta=-0.159$) and PM ($r=-0.391$; $\beta=-0.172$) CRP levels, explaining 15.3%-16.0% of the CRP variance. Notably, B2 sleep measures did not significantly predict TSD cortisol concentrations. Greater TSD AM cortisol levels significantly predicted longer R1 sleep onset latency ($r=0.388$; $\beta=6.390$) and later R1 sleep onset ($r=0.517$; $\beta=1.021$), while greater TSD PM cortisol concentrations significantly predicted earlier R1 sleep offset ($r=-0.469$; $\beta=-1.573$). In addition, both greater TSD AM ($r=-0.532$; $\beta=-106.927$) and PM ($r=-0.486$; $\beta=-121.308$) cortisol levels significantly predicted shorter R1 sleep duration. Overall, TSD AM and PM cortisol levels predicted 15.1%-28.3% of the variance in R1 sleep measures. By contrast, TSD CRP concentrations did not significantly predict R1 sleep measures.
Conclusion: Our novel results demonstrate that baseline sleep measures uniquely predicted CRP, but not cortisol levels during TSD and psychological stress. By contrast, cortisol, but not CRP levels during TSD and psychological stress predicted recovery sleep metrics. Thus, our results underscore crucial relationships, mechanisms and biomarkers between sleep health, inflammatory, and hypothalamic-pituitary-adrenal axis indicators.
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0272

THREE DAYS OF SLEEP RESTRICTION INCREASES 24-HOUR GLUCOSE LEVELS IN HEALTHY YOUNG ADULTS AS MEASURED BY CONTINUOUS GLUCOSE MONITORING

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Introduction: The adverse effect of sleep restriction on glucose metabolism is now well-established. Most prior reports used measures of insulin sensitivity or glucose tolerance at a specific time point following sleep restriction; for example, by conducting a euglycemic-hyperinsulinemic clamp or oral/intravenous glucose tolerance test after exposure to sleep restriction. With the advent of continuous glucose monitoring (CGM), it is now possible to obtain a highly granular assessment of the glucose response to sleep loss across longer periods of time. Thus far, few studies have used CGM to examine glucose responses following sleep loss.
Methods: 10 healthy young adults (30.5±4.7y, 4F) participated in an inpatient study of sleep restriction. CGM was recorded during three baseline days (10h overnight sleep opportunity) and three days of sleep restriction (10h overnight time-in-bed, 5h sleep opportunity, centered). Interstitial glucose measurements were taken every 15 min over the course of each day. All participants lived in the laboratory for at least four days prior to the baseline measurement. Macronutrient content and clock timing of meals were matched between baseline and sleep restriction. Mixed models were used to analyze the outcomes.
Results: We found a significant ~5.0% increase in 24-hour glucose area-under-the-curve (AUC) during three days of sleep restriction compared to three days of baseline (p=0.0028). We also examined 10h overnight glucose AUC and 14h daytime glucose AUC separately and found that both were significantly higher during sleep restriction compared to baseline (+5.8% overnight, p=0.0203 and +4.6% daytime, p=0.0031).
Conclusion: Sleep restriction significantly increased 24-hour, overnight, and daytime glucose AUC in healthy young adults. Given the widespread prevalence of sleep insufficiency, even short durations of insufficient sleep may contribute to the development of metabolic disorders such as type 2 diabetes.
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0273

PERCEIVED SLEEPINESS AND OBESITY RISK: EFFECT OF EXCESSIVE DAYTIME SLEEPINESS ON ADOLESCENTS' FOOD CHOICES AND SEDENTARY ACTIVITY

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Introduction: Adolescence is a critical period of development with increased risk for disrupted sleep and obesity. Current research suggests insufficient sleep duration and quality are associated with obesogenic behaviors such as increased intake of calories, carbohydrates, and added sugar and sedentary activity. However, research on the relationship between excessive daytime sleepiness (EDS) and obesogenic behaviors is limited. We hypothesize that higher EDS will be positively associated with carbohydrate intake, added sugar intake, and sedentary activity and negatively associated with physical activity in adolescents.
Methods: Data was collected across three separate studies. Ninety-nine adolescents (ages 14-18; 86.8% European American; 50.5% female) wore Actiwatch 2 wrist accelerometers (for sleep measurement) and an ActiGraph GT3x+ (for sedentary/physical activity measurement) across a 7-10 day monitoring period; during this monitoring period, they also completed 2-3 dietary recalls (the Automated Self-Administered 24-hour Dietary Assessment Tool) and completed the Epworth Sleepiness Scale (ESS). Partial correlation analyses were run to examine associations between daytime sleepiness and dietary intake and physical activity while controlling for sleep duration (measured by accelerometry) and sleep quality (measured by the Pittsburgh Sleep Quality Index). An independent sample t-test was run to examine differences between EDS groups (high sleepiness: ESS≥10; low sleepiness: ESS< 10) and dietary intake and physical activity.
Results: While controlling for sleep duration and quality, there was no association between ESS scores and total kilocalories (p=.607), grams of carbohydrates (p=.805), and added sugars (p=.108) or minutes spent in sedentary (p=.835), light (p=.399), or moderate-vigorous physical activity (p=.533). There was no difference between those with higher EDS (ESS≥10) and those with lower EDS in total kilocalories (p=.706), grams of carbohydrates (p=.807), and added sugar consumption (p=.487) or minutes spent in sedentary (p=.904), light (p=.729), or moderate-vigorous physical activity (p=.477).
Conclusion: Excessive daytime sleepiness is not associated with macronutrient intake and physical activity when controlling for sleep duration and sleep quality, suggesting that feeling sleepy may not be the driving mechanism linking poor sleep with increased obesogenic behaviors.
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0274

PHYSICAL ACTIVITY AND DIETARY QUALITY ARE ASSOCIATED WITH SLEEP-RELATED IMPAIRMENT AMONG RURAL AND URBAN LATINOS

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Introduction: Despite the increasing use of lifestyle interventions to improve sleep and related outcomes, gaps remain regarding the associations between lifestyle factors, such as physical activity and dietary quality, and sleep-related functioning or impairment in specific populations. This study examines associations

between physical activity and dietary habits on Sleep-Related Impairment (SRI) among rural and urban Latinos.
Methods: 613 participants from rural and urban areas of Florida in the Determinants, Outcomes, Responses, and Markers of Insufficient Sleep in Rural-Urban settings study (DORMIR). Physical activity was measured using the Leisure Score Index (LSI) from the Godin-Shephard Leisure-Time Physical Activity Questionnaire; higher scores indicate greater physical activity. Dietary quality was assessed using the Rapid Eating Assessment for Participants-Shortened Version (REAP-S); higher scores indicate higher dietary quality. SRI was assessed using the PROMIS Sleep-Related Impairment Short Form 4a; higher scores reflect more impairment. Both LSI and REAP-S scores were standardized to compare effect sizes. SRI scores were regressed on LSI and REAP-S scores in a linear regression, adjusting for covariates including age, gender, education, race, Hispanic ethnicity, marital status, employment, income, and language.
Results: After adjusting for covariates, a standard deviation increase in LSI (mean = 5.61, SD = 4.87, range = 0–21), reflecting greater physical activity, was significantly associated with a 0.09-unit decrease in SRI (β = -0.09; 95% Confidence Interval [CI]: -0.15 to -0.02; P = 0.008). Similarly, a standard deviation increase in REAP-S score (mean = 27.03, SD = 3.84, range = 14–36), indicating better dietary quality, was significantly associated with a 0.11-unit decrease in SRI (β = -0.11; 95% CI: -0.20 to -0.03; P = 0.007).
Conclusion: Greater physical activity and higher dietary quality are significantly associated with reduced SRI among rural and urban Latinos, with a slightly stronger association for dietary quality. While the effect sizes are modest, they suggest that lifestyle interventions focused on improving diet and physical activity could effectively address SRI. Further studies are needed to explore additional lifestyle factors and their potential to improve sleep and related outcomes.
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0275

ASSOCIATION FOUND BETWEEN DIET AND SLEEP QUALITY: INSIGHTS FROM REAP SCORES AND INSOMNIA SEVERITY IN A LATINO POPULATION IN FLORIDA

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Introduction: While substantial evidence links healthy dietary patterns to reduced insomnia symptom prevalence, the specific impact of diet on insomnia severity within the Latino/a population remains underexplored. This study seeks to address this gap by examining the relationship between dietary habits, assessed through the Rapid Eating Assessment for Participants (REAP) score, and insomnia severity, measured by the Insomnia Severity Index (ISI).
Methods: This work utilized data from the NIH-funded DORMIR study, investigating determinants of sleep and heart health outcomes among urban and rural Latinos/as living in Florida. A sample of 603 participants completed the Rapid Eating Assessment for Participants (REAP-S) and Insomnia Severity Index (ISI) capturing their diet and sleep quality measures. The respondents had a mean age of 41.6 years (±16.6), with 399 females and 204 males. A linear regression analysis was performed to determine if the quality of a participant's diet is associated with insomnia severity. Models were adjusted for age, sex, race/ethnicity, Hispanic origin, education, income, employment, Body Mass Index, and whether participants responded in English or Spanish.
Results: A one-unit increase in REAP diet scores was associated with a -0.24 decrease in ISI scores, after adjustment (β [95% Confidence Interval] (95% CI) = -0.24 [-0.37, -0.12], p< 0.001). Notably, those responding in Spanish independently had higher ISI scores (β [95% CI] = 1.59 [0.58, 2.61], p =0.002).
Conclusion: The results indicate that a healthier diet is significantly associated with lower ISI scores among a diverse group of Hispanic adults in South Florida. These results underscore the importance of culturally and linguistically tailored public health strategies to address insomnia across diverse populations.
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0276

RELATIONSHIP BETWEEN RELIGIOUS FREQUENCY AND SLEEP LATENCY AMONG BLACK ADULTS

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Introduction: Religion has influenced society for centuries and research suggests it may also impact sleep health through various pathways. These pathways include religious coping strategies, such as prayer and meditation, which promote relaxation and reduce stress, as well as religious involvement that fosters social support and mental well-being, improving sleep. Additionally, religious involvement often fosters social support and enhances mental well-being, both of which contribute to improved sleep. However, research on minoritized groups is limited, highlighting a gap in understanding sleep health disparities. This study aims to explore the impact of religious frequency on sleep health among Black adults, using sleep latency as a key indicator of sleep quality and overall well-being.
Methods: The data was collected in collaboration with two NIH-funded observational studies, investigating sleep and health disparities among Black and African American individuals (N=318, 62.4% females, aged 51.5±33.5 years) in South

Florida. Over a 7-day period, sleep metrics were collected using a wearable device known as the Sleep Image Ring. The device provided data used to access sleep latency, alongside subjective baseline questionnaire data. The baseline questionnaire gathered demographic information, including religion practiced, place of worship attendance, and frequency of religious participation. A linear regression analysis was conducted to analyze the relationship between sleep latency and religious frequency, controlling age and gender. All analysis was performed using RStudio 4.3 3.
Results: The regression analysis revealed a significant association between religious frequency and sleep latency (r2 =.01, 95% CI: [63.86, 892.29]). These findings suggest that individuals who attended a place of worship experienced longer sleep onset times compared to those who did not attend. This finding suggests that religious involvement may impact sleep patterns, particularly sleep onset, though the small R-squared value indicates other unaccounted factors may also influence this relationship.
Conclusion: Results indicate that Black adults who attended a place of worship more frequently take longer to fall asleep. These findings provide an insight into how religious practices may influence sleep patterns. Further research is needed to explore the underlying factors contributing to this association and to determine its practical significance in relation to sleep quality.
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0277

SLEEP DURATION, EFFICIENCY, AND NOCTURNAL BLOOD PRESSURE AMONG A SAMPLE OF PARTICIPANTS WITH SHORT SLEEP DURATION AND ELEVATED BLOOD PRESSURE

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Introduction: Multiple aspects of sleep, including duration and efficiency, are important for blood pressure (BP) regulation and cardiovascular health. While prior research links sleep efficiency (SE) and total sleep time (TST) to BP outcomes, less is known about these associations among populations with chronic short sleep duration. This study examined associations between SE, TST, and 24-hour ambulatory BP in individuals with elevated BP and sleep duration < 7 hours per night.
Methods: Participants were screened for a randomized sleep extension intervention among individuals with elevated BP (□120 mmHg systolic and/or 80 mmHg diastolic) and habitual short sleep. SE and TST were measured via 7-day wrist actigraphy. Participants completed 24-hour ambulatory BP monitoring, with variables including average awake and asleep SBP/DBP and dipping ratios (asleep BP/awake BP, classified as non-dipping if ≥0.9). Associations between sleep and BP outcomes were analyzed using linear regression for continuous outcomes (e.g., SBP, DBP, dipping ratios) and Poisson regression with a log-link for binary outcomes (e.g., Asleep Hypertension, Non-Dipping SBP, Non-Dipping DBP). Two models were tested: Model 1 (unadjusted) and Model 2 (adjusted for age, sex, and race).
Results: The study included 114 participants (mean age: 42 years, SD: 11; 40% female). Longer TST was significantly associated with more favorable nocturnal BP measures. For every 10-minute increase in TST, the odds of Asleep Hypertension decreased by 6.3% (OR = 0.937, 95% CI [0.896, 0.980], p = 0.009), and the odds of Non-Dipping DBP decreased by 8.7% (OR = 0.913, 95% CI [0.844, 0.990], p = 0.031). SE was significantly associated with DBP Dipping Ratio in unadjusted models (b = 0.0035, 95% CI [0.0001, 0.0068], p = 0.040) but was marginal after adjustment (b = 0.0033, p = 0.059). Neither TST nor SE were associated with awake BP measures.
Conclusion: Longer TST was consistently associated with better nocturnal BP, including lower odds of asleep hypertension and non-dipping DBP. The relationship with SE and BP values diminished significance after adjustment, suggesting confounding. Results align with prior literature, highlighting the importance of promoting adequate sleep duration to mitigate cardiovascular risks in populations with short sleep and elevated BP.
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0278

ASSOCIATIONS OF OBJECTIVELY MEASURED SLEEP RESTRICTION-REBOUND PATTERNS WITH ALL-CAUSE MORTALITY

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Introduction: Clinical guidelines recommend 7–9 hours of regular sleep and weekend catch-up sleep following weekday sleep deficits for optimal health. However, real-world sleep patterns are more complex than laboratory-studied models or simple weekday-weekend cycles. The associations of day-to-day sleep restriction-rebound patterns with mortality remain poorly understood.
Methods: In this prospective cohort study of 85,881 UK Biobank participants, we analyzed accelerometer-derived objective sleep data and identified five sleep restriction-rebound patterns: regular sleep, mild sleep restriction (SR) without rebound, mild SR with rebound, SR without rebound, and SR with rebound. Using Cox proportional hazards regression models, we examined their associations with all-cause mortality across short, medium, and long baseline sleep durations.
Results: The mean (SD) age was 61.8 (7.9) years; 56.4% were female. Compared to regular sleep, SR without rebound was significantly associated with increased mortality risk across all groups (adjusted HR for short sleepers = 1.43, 95% CI = 1.22-1.68; for medium sleepers = 1.49, 95% CI = 1.08-2.04; for long sleepers = 1.72, 95% CI = 1.20-2.47). Mild SR without rebound was associated with mortality only in short sleepers (HR = 1.22, 95% CI = 1.05-1.42). The presence of sleep rebound mitigated these risks. Among long sleepers, the associations were stronger in men than in women.
Conclusion: Our findings suggest that short-term sleep restriction might be detrimental, particularly for short sleepers, and highlight sleep rebound as a potential strategy to reduce mortality risk in vulnerable groups.
Support (if any): None.

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0279

IMPACT OF INSUFFICIENT SLEEP ON RESPIRATORY QUOTIENT AND SUBSTRATE UTILIZATION

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Introduction: Overeating and insufficient sleep have been reported to increase total daily carbohydrate utilization. Here we evaluated substrate utilization over 24h and specifically during nighttime hours under insufficient sleep conditions.
Methods: Thirty-six healthy participants (18 women/18 men) aged 25.5±4.7y (mean±SD), with normal body mass index (BMI) 22.4±1.7kg/m2 completed a 13-16 day in-laboratory study. Participants were randomly assigned to one of three groups with different sleep opportunities simulating two work weeks (WW1 and WW2) and one weekend between them. After three baseline (BL) laboratory days of 9h sleep opportunity per night, participants in the control group (n=8) were scheduled to 10 days of 9h sleep opportunity; the sleep restriction (SR) group (n=14) were scheduled to 10 days of 5h sleep opportunity, and the weekend recovery (WR) group (n=14) were scheduled to five days of 5h sleep opportunity (WW1) followed by two days of ad libitum weekend recovery sleep, followed by three days of 5h sleep opportunity (WW2). Participants were provided an energy balanced diet for three days prior to laboratory admission and continued for the three BL days. Food intake was ad libitum during WW1 and WW2. Whole room indirect calorimetry assessed hourly substrate utilization on days 3 (BL), 5 (WW1) and 11 (WW2). Respiratory quotient (RQ), fat and carbohydrate utilization were assessed by oxygen consumption and carbon dioxide production. Differences in RQ and substrate utilization throughout the 24h were analyzed within groups across BL, WW1 and WW2.
Results: Sleep restriction significantly ($p < 0.05$) increased carbohydrate utilization, especially during the 4h prior to bedtime, during WW1 (SR: 0.28g.min-1±0.02 and WR: 0.31g.min-1±0.02) and WW2 (SR: 0.30g.min-1±0.02 and WR: 0.31g.min-1±0.02)compared to baseline (SR: 0.15 g.min-1±0.02 and WR: 0.14g.min-1±0.02) for SR and WR groups. Additionally, the 24h RQ and 24h carbohydrate utilization were higher for the WR group in WW2 compared to BL ($p < 0.05$).
Conclusion: Insufficient sleep under conditions of ad libitum food intake appears to increase nighttime carbohydrate utilization prior to bedtime. These findings contribute to our understanding of how insufficient sleep alters energy metabolism in humans.
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0280

SUBCORTICAL DYNAMICS DURING FAILURES IN MAINTAINING ALERTNESS AFTER SLEEP RESTRICTION IN THE HUMAN BRAIN

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Introduction: Sleep restriction significantly impairs our ability to maintain alertness during tasks, leading to delayed responses, omissions, and even microsleeps. However, the neural mechanisms underlying these periods of extreme drowsiness and the subsequent recovery of alertness remain poorly understood. While previous fMRI studies have focused primarily on cortical and thalamic regions, these areas may reflect the downstream consequences of dysregulated arousal mechanisms originating in the brainstem and hypothalamus, as highlighted by extensive animal research. Due to their small size and deep location, high-resolution imaging of these critical brain structures in humans has been challenging.
Methods: This study aimed to address these challenges by using ultra-high-field (7T) fMRI to assess activity in brain regions essential for sleep-wake regulation during a simple attention task (psychomotor vigilance task) in sleep-restricted individuals (n=25). Advanced subcortical segmentation techniques were employed to analyze hemodynamic activity linked to the first omission trial (a marker of drowsiness onset) and the first alert trial following an omission (a marker of regaining alertness), across all nuclei of the ascending arousal network (AAN).
Results: Our findings revealed a significant reduction in activity across all AAN regions during the transition into drowsiness, with the exception of the tuberomammillary nucleus of the hypothalamus, which showed increased activity. Upon regaining alertness, a marked increase in fMRI signal was observed across all AAN regions, except in the hypothalamic preoptic area, where activity decreased in line with its role in promoting wakefulness. Notably, the brain activity during these transitions was modulated by the duration of the drowsiness period. Additionally, we observed distinct temporal characteristics of hemodynamic activity across AAN regions, such as variations in the number of peaks and troughs, their latency, and width, suggesting local neuromodulatory influences on fMRI signals.
Conclusion: These results offer valuable insights into the complex interactions between cortical and subcortical circuits that regulate attentional lapses following sleep restriction. This research represents a crucial step toward understanding the neural circuit dynamics underlying sleep disorders such as hypersomnolence and insomnia, and provides a scientific foundation for future clinical studies exploring diagnostics, disease mechanisms, and therapeutic targets.
Support (if any): AASM Strategic Research Grant 317-SR-23

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0281

TRAIT EXTRAVERSION PREDICTS PSYCHOMOTOR VIGILANCE PERFORMANCE AND CHANGES IN FUNCTIONAL CONNECTIVITY DURING SLEEP DEPRIVATION

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Introduction: Individual differences in resilience to sleep deprivation may be influenced by personality type. Previous research indicates a relationship between the NEO Personality Inventory's (NEO-PI) Extraversion measure and decline in Psychomotor Vigilance Test (PVT) performance over a period of sleep deprivation. Here, we examined the association between resilience to sleep deprivation, as measured by PVT performance, and Extraversion subscores on the NEO-PI. We further examined their relationship to the underlying functional connectivity within the brain to elucidate neural components of resilience.
Methods: Healthy participants (n=20; Age=23.1, SD=3.7) underwent a 39-hour sleep deprivation period in which PVT,

and functional magnetic resonance imaging (fMRI) scans were conducted every 6 hours to measure alertness and functional connectivity, respectively. A week prior to the in-lab visit, the NEO-PI was administered as a baseline personality inventory. To determine how Extraversion personality traits relate to sleep deprivation task performance, we calculated the difference in mean PVT reaction time from baseline to the most sleep deprived states and correlated this with individual Warmth scores. A covariate of interest analysis correlated fMRI connectivity with each participant's PVT difference scores. The medial prefrontal cortex (mPFC) was chosen as the primary seed region based on its role in personality traits such as Extraversion.

Results: We found a significant positive correlation between Warmth personality scores and change in mean PVT response time ($P = 0.049$, $R = 0.38$). Functional connectivity analysis showed the personality trait of Warmth was associated with reduced functional connectivity between mPFC and anterior cingulate cortex (ACC) when comparing baseline fMRI scans to scans at the end of the sleep deprivation period.

Conclusion: Consistent with prior research, individuals with higher scores on the Warmth component of Extraversion were less resilient to sleep loss, as evident by their slowing of PVT reaction time. This change was also associated with decreased functional connectivity between mPFC and ACC. Given the mPFC's role in emotional regulation and the ACC's role in error monitoring and decision making, these results suggest that future research explores emotional resilience to sleep loss, connecting both top-down cognitive functioning and behavior adjustment.

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0282

NEURAL CORRELATES OF PUTAMEN CONNECTIVITY AND ITS ASSOCIATION WITH COGNITIVE OUTCOMES FOLLOWING SLEEP DEPRIVATION

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Introduction: Sleep deprivation (SD) is known to impair cognitive functions, particularly attention and vigilance, but these effects often vary widely across individuals and the neurobiological substrates underlying these individual differences remain to be elucidated. The psychomotor vigilance test (PVT) is commonly used to measure lapses in attention, which are often reflected in reaction time. The putamen, a key region in motor control and attention, is hypothesized to play an important role in cognitive fatigue during SD. This study examines the relationship between resting-state functional connectivity (RSFC) of the putamen and attentional lapses following SD.

Methods: Forty-four participants (22 males, 22 females; ages 21–43, mean = 25.1, SD = 5.6) underwent a 24-hour period of SD. Attentional lapses were assessed using the PVT, administered hourly for a total of 17 sessions. The total number of lapses across all 17 sessions was calculated for each participant, and the square root of this value (Sqrt_Lapse) was used as a single measure of cognitive decline during SD. Resting-state fMRI scans were conducted at baseline to analyze RSFC using the putamen as the seed region. Correlations between RSFC and Sqrt_Lapse were explored. Structural analyses were performed using Freesurfer to assess the volume and surface area of relevant regions.

Results: Sqrt_Lapse was positively correlated with RSFC between the putamen and lateral orbitofrontal cortex (OFC; voxel-wise threshold $p < .001$, cluster-wise corrected $p < .03$). This suggests that higher connectivity in this network was linked to increased attentional lapses. Structural analysis showed no significant correlation between putamen volume and Sqrt_Lapse ($p = 0.867$), but there was a significant negative correlation between lateral OFC surface area and Sqrt_Lapse ($p = 0.001$), indicating that individuals with a smaller lateral OFC surface area exhibited more cognitive lapses.

Conclusion: These findings suggest that increased putamen-lateral OFC connectivity may indicate a compensatory or inefficient response to SD, while reduced lateral OFC surface area represents a structural vulnerability to vigilance declines during acute sleep deprivation. These results highlight the importance of fronto-striatal networks in understanding individual differences in cognitive resilience during SD.

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0283

STRUCTURAL CHANGES IN VISUAL CORTEX AND COGNITIVE DECLINE DURING SLEEP DEPRIVATION

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Introduction: Sleep deprivation (SD) significantly impairs visual processing and attention. While these declines in function are often attributed to changes in brain activity measured by functional-neuroimaging or electroencephalography. Whether there are morphological changes in the cortex that correspond to these impairments remains relatively unexplored. Visual cortices, critical for interpreting and processing visual stimuli, may exhibit structural changes under SD conditions, reflecting decreased neural efficiency. This study examined the relationship between sleep deprivation, surface area changes in the visual cortices, and their implications for visual cognitive performance.

Methods: Structural T1-weighted-MPRAGE images were collected from 12 subjects, each undergoing seven MRI scans over time during a 39-hour sleep deprivation protocol. Freesurfer was used to calculate surface area metrics for the cuneus and occipital regions from each scan. For each time point, Freesurfer-derived structural values and attentional lapse values, measured via the psychomotor vigilance task (PVT), were averaged across all subjects and normalized. Correlation analyses were performed to examine the relationship between structural metrics and attentional lapses across time points.

Results: A significant negative correlation was observed between changes in cuneus surface area and increased attentional-lapses ($r=-0.88$, $p=0.009$). Similarly, surface area in the occipital region showed a significant negative correlation with lapses ($r=-0.864$, $p=0.012$). These findings suggest that structural changes in visual cortices are closely associated with cognitive decline in attention and visual task performance during sleep deprivation.

Conclusion: Acute sleep deprivation induced significant structural changes in the visual cortex, with reductions in the surface area of the cuneus and occipital regions strongly associated with declines in attention and visual task performance. The observed

changes suggest that prolonged wakefulness may disrupt the brain's normal functioning, potentially reflecting both short-term adjustments and long-term negative effects in the cortex. The mechanisms potentially underlying these changes remain to be elucidated, but likely candidates include neuroinflammatory responses, synaptic pruning, or altered glymphatic clearance. Future studies should examine the reversibility of these structural alterations with recovery sleep and investigate their broader implications for chronic sleep deprivation and associated neurocognitive deficits, potentially identifying novel targets for therapeutic interventions and preventive strategies.

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0284

TRANSCRANIAL DIRECT CURRENT BRAIN STIMULATION IS WELL TOLERATED DURING SLEEP DEPRIVATION

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Introduction: Transcranial direct current stimulation (tDCS) applied to the prefrontal cortex (PFC) improves performance in well-rested individuals. We assessed the tolerability of this technology during sleep loss, associated with a reduced pain threshold, to ensure its usefulness during extended periods of wakefulness.

Methods: During a four-night stay healthy participants were given a two hour sleep opportunity at 2300 the first night followed by 46 hours of sleep deprivation (SD). There were a total of four stimulations for 10 min during the SD period (1.5, 2.75, 25.25, and 26.5 hours into SD). The tDCS group received 9 min of sustained 2mA stimulation following a 30 sec ramp up and ending with a 30 sec ramp down, and the sham group received only the 30 sec ramp up and down at beginning and end of the stimulation period. Participants rated the sensation of stimulation (from 0-9) on the Thermal Sensation Scale (TSS) at 30 sec into stimulation and after stimulation termination. Stimulation was immediately stopped if a rating was seven or higher.

Results: Analysis of 17 healthy individuals (nine in the tDCS group, eight in the sham group) revealed that stimulation was well tolerated across all four stimulation sessions for both groups (average TSS score during stimulation = 3.00 ± 1.60, after stimulation = 1.72 ± 1.34). TSS scores during stimulation increased with repeated stimulation sessions and longer extended wakefulness (main effect of session $p=0.02$), but consistently remained well below the cutoff for stimulation termination within each session (average TSS score during stimulation for 3rd and 4th sessions = 3.06 ± 1.48 and 3.82 ± 1.38, respectively). TSS scores did not differ between groups (effect of group during stimulation $p=0.07$ and after stimulation $p=0.72$).

Conclusion: These findings indicate that PFC tDCS during SD is well tolerated by healthy individuals. Although TSS scores increased with sleep loss, these ratings remained low and comparable for the tDCS and sham groups (suggesting that participants remained blinded during the study). These findings demonstrate that PFC tDCS can be administered safely and comfortably during sleep loss.

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0285

THE EFFECT OF CHRONIC TRAZODONE ADMINISTRATION ON SLEEP IN THE APPNL-F MOUSE MODEL OF ALZHEIMER'S DISEASE

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Introduction: Sleep disturbances are prevalent among individuals diagnosed with Alzheimer's disease (AD), typically manifested as low levels of slow-wave sleep (SWS; N3 stage). Restoring SWS has been suggested as an intervention to slow AD progression. Trazodone is a licensed antidepressant also commonly prescribed to manage sleep disturbances due to its hypnotic effects, safety, and tolerability. However, there is limited preclinical research on the effects of trazodone beyond the antidepressant effects. We investigated the effect of voluntary oral trazodone administration at doses 0mg, 10mg, 40mg, and 60 mg/kg on sleep in C57BL/6J mice (n=15; age 10-13 months). We found that a single dose of trazodone hydrochloride (HCL) has a dose-dependent effect on the duration of non-rapid eye movement (NREM) and delta power; 60 mg/kg caused an increase in NREM compared to the baseline (mean increase = 1.54 h ± 0.40 SEM; mixed-design ANOVA dose x vigilance state $F(6, 36) = 17.89$, $p < 0.0001$).

Methods: We then investigated the effect of chronic trazodone administration on sleep in a mouse model of AD (APP NL-F) in a younger (n=16, 9 months-old) and older (n=18, 14 months-old) cohort. Trazodone was administered orally at 60mg/kg through voluntary intake for 60 days. Mice were implanted with EEG/EMG headmounts and were recorded for 7 sessions, each lasting 48 h over the 60-day treatment period. Our results show that the mice reliably consumed trazodone throughout the treatment period, with n=30/34 mice fully consuming the trazodone on all 60 days. The EEG/EMG data were manually scored for wake, NREM, and rapid eye movement (REM).

Results: Preliminary analysis for 9 months-old cohort showed a significant effect of treatment on NREM sleep (repeated measures ANOVA, $F(4, 12) = 21.433$, $p < 0.001$). Post hoc analysis confirmed increased NREM sleep after 60 days, compared to the baseline ($p = 0.0205$).

Conclusion: Together, these studies demonstrate for the first time that trazodone dose-dependently increases SWS in mice and that trazodone can enhance NREM sleep in a mouse model of AD, even after 60 days of treatment.

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0286

ALTERATIONS IN SLEEP ARCHITECTURE FOLLOWING DUAL GABAERGIC NEURONAL ABLATION IN THE PARAFACIAL ZONE AND PREOPTIC AREA

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Introduction: GABAergic neurotransmission plays a pivotal role in sleep regulation. Key sleep-promoting centers in the mammalian brain, such as the medullary parafacial zone (PZ) and the hypothalamic preoptic area (POA), rely on GABA to mediate their function. Both regions have sleep active GABAergic neurons and modulation of their activity can affect sleep patterns. This study investigates the combined effect of GABAergic neuronal ablation in these two regions on sleep architecture.
Methods: To selectively ablate GABAergic neurons, Vgat-Cre mice were injected bilaterally with an adeno-associated virus (AAV) expressing diphtheria toxin A (DTA) in the POA and/or the PZ. Control mice received AAV-GFP injections, resulting in green fluorescent protein (GFP) expression. Electroencephalography (EEG) screws were implanted in the frontal and parietal cortices, along with an electromyography (EMG) pad. Baseline EEG/EMG activity was recorded continuously for 48 hours, two weeks post-ablation. To evaluate homeostatic regulation, mice underwent behavioral sleep deprivation followed by two days of recovery sleep monitoring.
Results: Preliminary findings indicate that mice with dual GABAergic ablation in the PZ and POA spent less time in rapid eye movement (REM) and non-REM (NREM) sleep compared to control mice and single-region ablation groups. Dual-region ablated mice also exhibited shorter sleep episodes compared to control mice and a blunted sleep rebound response following sleep deprivation.
Conclusion: Initial results indicate that dual GABAergic neuronal ablation in the POA and PZ disrupts sleep architecture by reducing NREM and REM sleep time, increasing sleep fragmentation, and potentially impairing homeostatic regulation. Further investigation is needed to confirm these findings, elucidate underlying mechanisms and uncover the potential involvement of other sleep and/or wake-promoting regions.
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0287

THE CORTEX AND PARAFACIAL ZONE OF INFANT RATS EXHIBIT PARALLEL HOMEOSTATIC RESPONSES TO SLEEP DEPRIVATION

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Introduction: Beginning around postnatal day 12 (P12) in rats, quiet sleep (QS, or NREM sleep) increases at the expense of active sleep (AS, or REM sleep). The developmental increase in QS is accompanied by the sudden emergence of cortical delta (0.5-4 Hz). We recently discovered a novel delta rhythm in a medullary structure, the parafacial zone (PZ), a region implicated in regulating QS in adults. At P12, PZ delta was generated locally and was highly coherent with cortical delta. We hypothesized that if PZ delta is a homolog of cortical delta, then the two rhythms should exhibit parallel homeostatic responses to sleep deprivation.
Methods: P12 rats (n=8) were deprived of sleep for 30 minutes while recording from the PZ and frontal cortex. Cold stimuli were applied to the snout to induce arousal whenever cortical delta was observed. After deprivation, pups were allowed to sleep undisturbed for an additional 60 minutes for recovery. Control pups (n = 8) were matched for sex and age and were left undisturbed for 90 min. PZ and cortical LFP, PZ unit activity, respiration, and behavioral measures (EMG, video) were obtained for each pup.
Results: Sleep deprivation produced intense sleep pressure, as operationalized by the need to increase the rate of arousing stimulations over the 30-minute deprivation period. Over the recovery period, PZ and cortical delta showed parallel homeostatic responses consisting of initially increased delta power that decreased in lock-step toward baseline over time. The durations of QS and AS showed a similar pattern. Brief arousals (< 10 s) occurred more often during the recovery period; these arousals elicited simultaneous decreases in delta power in PZ and cortex. Surprisingly, pups breathed more deeply at the start of the recovery period, providing additional evidence of a link between respiration and delta power at this age.
Conclusion: These results support the notion that PZ and cortical delta are closely linked components within the sleep-regulatory system. Also, the findings suggest intimate connections between delta- and respiration-generating structures in the brainstem, a possibility that is currently being investigated.
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0288

WAKEFULNESS BY OPTOSTIMULATION OF BASAL FOREBRAIN VGLUT2+ NEURONS TRIGGER DIFFERENT PATTERNS OF BRAIN ACTIVITY AND RECOVERY SLEEP FROM GENTLE HANDLING

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Introduction: Prolonged wakefulness induces a homeostatic sleep response (HSR) with increases in non-REM sleep time and delta power. The quality of wakefulness impacts the magnitude and form of the HSR but little is known about the neural mechanisms. Opto-stimulation of basal forebrain (BF) glutamatergic neurons (stim) leads to arousal and avoidance behavior. Here we compared the HSR following 4 hr of prolonged wakefulness induced by opto-stimulation of BF glutamate neurons and compared to sleep deprivation (SD) induced by gentle handling (GH). Finally, we compared the c-Fos activation pattern of the whole brain after 4hr of opto-stimulation compared to 4hr SD induced by GH.
Methods: Mice (vGlut2-Cre or C57BL6) were implanted with microdialysis/optodialysis probes targeting the BF and EEG/EMG electrodes. Unilateral opto-stimulations of BF vGluT2 (20Hz, 5s On-55s Off) neurons and SD were performed during ZT3-ZT7 with or without the administration of ionotropic glutamate receptor antagonists (DNQX + D-AP5) and allowed 3h of recovery sleep. For cFos mapping whole brains were collected after 4hr of stim or SD with time-matched undisturbed controls, and analyzed for activated cFos (Lifecanvas, Inc).
Results: BF vGluT2 stimulation caused rapid arousal and, compared to baseline day, mice stayed awake (93.3 ±1.2%. N=10) during the 4 h of stimulation, comparable to that noted for SD (~95%) by GH. Stim conditions showed a significant hourly decrease in wakefulness from 2-4h which was further decreased by optodialysis of the ionotropic glutamate receptors antagonists, effects not seen in SD condition. Unlike SD group, the recovery NREM sleep remained unaltered following BF vGluT2

stim. SD increased NREM delta (0.5-4Hz) but the stim group showed a selective increase in 2.5-3.5Hz range. The whole brain c-Fos mapping revealed different activation patterns between stimulation and SD groups for multiple brain regions including the habenula and hypothalamus.
Conclusion: Our data suggests a differential pattern of arousal and HSR following BF vGluT2 stimulation, and resulting activation of aversive brain circuits, when compared to that of GH-induced SD.
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0289

CEREBLON DEFICIENCY INCREASES AMP-ACTIVATED KINASE AND HOMEOSTATIC SLEEP RESPONSE MICE

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Introduction: Energy homeostasis and sleep have a bidirectional relationship. Cereblon (CRBN), a substrate receptor of the CRL4 E3 ubiquitin ligase complex, regulates energy levels by ubiquitinating AMP-activated protein kinase (AMPK), a master energy sensor. While CRBN's role in energy regulation is established, its involvement in sleep remains unclear. Thalidomide, a pharmacological modulator of CRBN, has shown to improve sleep quality, particularly by increasing slow-wave sleep (SWS) and overall sleep efficiency. This study explores the impact of CRBN deletion on sleep-wake patterns and examines parallels to thalidomide's effects.
Methods: Sleep-wake patterns were analyzed in Crbn+/+ and Crbn-/- mice under three conditions: 24-hour baseline, 6-hour sleep deprivation (SD), and 6-hour recovery sleep (RS). EEG/EMG recordings quantified sleep architecture, with a focus on slow-wave activity as an indicator of homeostatic sleep drive. Stress-associated proteins, including phospho-Tau, phospho-α-Synuclein, DNAJA1 (DJ2), DNAJB1 (DJ1), and Heat Shock Protein 70 (HSP70), were measured via immunoblotting.
Results: At baseline, sleep architecture was similar between Crbn+/+ and Crbn-/- mice. Sleep deprivation reduced CRBN expression in Crbn+/+ mice and elevated stress markers such as phospho-Tau, phospho-α-Synuclein, DJ2, and DJ1 in both genotypes. Crbn-/- mice showed a blunted increase in phospho-Tau and phospho-α-Synuclein but higher levels of HSP70, DJ2, and DJ1. During recovery sleep, Crbn-/- mice exhibited significantly increased slow-wave activity, suggesting heightened homeostatic sleep pressure, likely due to AMPK hyperactivation in the absence of CRBN.
Conclusion: CRBN plays a critical role in regulating sleep homeostasis and recovery sleep, likely through its modulation of AMPK activity and stress protein responses. Interestingly, thalidomide, a CRBN modulator, has been shown to enhance slow-wave sleep and overall sleep quality in clinical studies. This improvement in slow-wave activity parallels the increased SWA observed in Crbn-/- mice during recovery sleep. However, while thalidomide's effects appear beneficial, the heightened sleep drive in CRBN-deficient mice likely reflects underlying AMPK hyperactivation. This highlights a dual role for CRBN in both promoting energy balance and regulating sleep architecture. Thalidomide or related CRBN modulators could offer therapeutic benefits for improving sleep quality and mitigating neurodegeneration associated with disrupted sleep, while careful attention is needed to avoid unintended effects related to CRBN deficiency.
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0290

A HIGH-FAT DIET INCREASES NEURODEGENERATION IN THE LOCUS COERULEUS AND WORSENS SLEEP DISTURBANCES INDUCED BY CHRONIC SLEEP RESTRICTION IN RATS

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Introduction: Chronic sleep restriction (CSR) and overeating are factors that affect human health and are primarily related to lifestyle. Both these factors are widespread in modern society. It can also mutually reinforce each other's negative health effects. Just as sleep restriction can lead to metabolic disorders and obesity, obesity can also cause sleep disorders. We studied the effects of a high-fat diet (HFD) on sleep and neurodegenerative changes in the locus coeruleus after CSR in rats.
Methods: Wistar rats were kept on a HFD from two months of age. For CSR, 7-8-month-old rats underwent cycles of 3 h of sleep deprivation using an orbital shaker and 1 h of sleep opportunity (SO) continuously for 5 days. Control rats were maintained in standard dry rat chow. Sleep was recorded before, during CSR, after two days, and two weeks. Neurodegeneration in the locus coeruleus was assessed by Nissl staining.
Results: Rats fed HFD had a 30% greater body weight than control rats before the start of CSR. There were no differences in sleep between the HFD and control groups before CSR. During CSR, slow-wave sleep (SWS) and REMS were reduced by 60% and 55%, respectively, in both groups. SWS EEG delta power during the SO period decreased gradually from the first to the fifth CSR day for both groups, but the last dark time of day that decline was greater in HFD rats. We observed the same decrease in EEG delta power of the SWS during the light (inactive) time of day in both groups during two days after CSR. After two weeks, EEG delta power returned to baseline in the control group, whereas it remained suppressed in HFD rats. We also found that CSR-induced neurodegeneration of monoaminergic neurons in the locus coeruleus was greater in HFD rats than in control rats.
Conclusion: We consider HFD to be a factor leading to longer lasting suppression of homeostatic mechanisms of sleep regulation caused by CSR. The greater dysfunction of the noradrenergic pathways of the locus coeruleus in HFD may make some contribution to these mechanisms.
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0291

INCREASED AB DEPOSITION FOLLOWING CHRONIC SLEEP DISRUPTION CORRELATES WITH ALTERED GLIOSIS AND AQP4 IN 5XFAD MICE

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Introduction: Chronically dysregulated sleep is increasingly recognized as a risk factor in the development and progression of neurodegenerative disease states, including Alzheimer's disease (AD). Despite this known association, the mechanism connecting dysregulated sleep, particularly over chronic timescales, and downstream AD pathology remains unclear. This study investigates the impact of chronic sleep disruption on amyloid beta (A□) accumulation, glymphatic aquaporin 4 (AQP4) alteration, and gliosis in a 5xFAD mouse model. We hypothesized that chronic sleep disruption leads to an increased A□□burden, and that this increase would be correlate with markers of glymphatic function and inflammation.

Methods: Female and male 5xFAD+ and wildtype (WT) littermate controls underwent chronic sleep disruption using Lafayette sleep fragmentation cages from 10 to 18 weeks of age (n = 9-12 in each group). Glymphatic clearance was assessed via regional distribution of fluorescent CSF tracer into brain tissue after cisternal magna injection in WT mice, while amyloid deposition (NAB228) was evaluated in 5xFAD+ animals. Subsequently, regional immunofluorescent evaluations of AQP4, GFAP, and Iba1 expression and localization were performed. Correlation analyses were conducted to assess relationships between glymphatic clearance markers and measures of AQP4 and gliosis.

Results: Chronic sleep disruption significantly increased A□burden, altered changes in AQP4 expression and localization, and increased gliosis. Notably, the strongest correlations were observed between measures of tracer distribution and amyloid deposition with both gliosis and AQP4 were in the sleep disrupted mice. Together, these findings underscore the role chronic sleep disruption plays in pro-inflammatory glial activation and glymphatic impairment.

Conclusion: Our study demonstrates that chronic sleep disruption exacerbates amyloid pathology, alters AQP4 expression, and increases pro-inflammatory glial response in the 5xFAD mouse model. Additionally, the correlations observed between markers of glymphatic clearance, gliosis, and AQP4 expression are stronger in the chronically sleep disrupted mice compared to sham controls. These findings emphasize the critical role sleep health plays in neurodegenerative disease and suggest that preserving glymphatic function and mitigating proinflammatory glial responses could be important therapeutic targets in AD progression. Future research should explore interventions aimed at restoring sleep health to enhance glymphatic efficiency and reduce neuroinflammatory activation.

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0292

POORER ACTIGRAPHIC SLEEP HEALTH IN ADOLESCENCE PREDICTS LOWER CARDIOVASCULAR HEALTH SCORE IN YOUNG ADULTHOOD

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Introduction: Short sleep duration among middle-aged and older adults predicts worse cardiovascular health (CVH) later in life. It is unclear whether adolescent sleep health predicts young adult CVH, particularly using objective sleep measures. We examined whether several dimensions of actigraphic adolescent sleep health predicted young adult CVH among a diverse, longitudinal sample from 20 U.S. cities.
Methods: Data were derived from sub-studies of the Future of Families and Child Wellbeing Study (FFCWS; n=307; 57%F), a diverse birth cohort. At age 15y, adolescents wore wrist-actigraphy for ~1 week (6.8±1.9 nights). At age 22y, CVH was assessed from the FFCWS Cardiovascular Health Among Young Adults sub-study using the seven non-sleep factors from the American Heart Association's Life's Essential 8—diet, physical activity, nicotine exposure, body mass index (BMI), blood lipids, blood glucose, and blood pressure—that were averaged into a composite score (0, poor–100, ideal). Separate linear regression models assessed whether age 15 average actigraphic total sleep time (TST; linear and quadratic), sleep timing, sleep maintenance efficiency, and variability (SD) of these measures predicted age 22 CVH composite score, adjusting for age 22 sociodemographic characteristics and age 15 self-reported BMI, diet, and physical activity.
Results: Earlier age 15 average sleep onset (b=−1.11, p=.023, β=−.12) and offset (b=−1.08 p=.015, β=−.12) and higher sleep maintenance efficiency (b=+0.66, p=.008, β=+.14) predicted higher (i.e., better) age 22 CVH score. Lower variability in TST (b=−1.97, p=.042, β=−.11) and in sleep onset (b=−1.93, p=.035, β=−.11) predicted higher age 22 CVH score. Lower age 15 variability in sleep maintenance efficiency marginally predicted higher age 22 CVH score (b=−1.19, p=.057, β=−.10). Age 15 average TST (linear and quadratic) and variability in sleep offset did not significantly predict age 22 CVH score (p≥.10).
Conclusion: Adolescent TST did not significantly predict young adult CVH in the present study. Instead, earlier, more efficient, and less variable adolescent sleep predicted higher young adult CVH scores, even after adjusting for adolescent lifestyle factors and other confounders. Interventions aiming to protect future CVH should consider improving adolescent sleep health across multiple dimensions.
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0293

MATURATIONAL TRAJECTORIES OF SLOW WAVE ACTIVITY ARE ASSOCIATED WITH EXTERNALIZING PSYCHOPATHOLOGY

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Introduction: Declines in non-rapid eye movement (NREM) sleep slow wave activity (SWA) in the transition to adolescence are indicative of maturational brain structural and functional changes. However, whether abnormal maturational trajectories of SWA are associated with psychopathology have lacked replication in population-based studies with multiple time points across the lifespan.
Methods: A total of 673 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 16y. We extracted SWA power during NREM sleep using sleep FFT software and log-transformed it. First, growth mixture models for clustering of longitudinal data series were used to identify latent classes of log-SWA, while adjusting for sex. Next, mixed-effects models were fitted to test the association of log-SWA classes with externalizing behaviors, as measured by Achenbach System of Empirically Based Assessment, and working memory, as measured by Wechsler Intelligence Scale's Digit Span Backward Test, while adjusting for sex, race/ethnicity, insomnia symptoms, and body mass, apnea/hypopnea, and periodic limb movements indices.
Results: SWA showed three maturational trajectories, of which two were cubic and one was linear. There were significant associations between SWA trajectories and rate of change in externalizing behaviors (p=0.052) and working memory (p=0.028). Compared to the shallowest SWA cubic trajectory (n=342, Group 3), the SWA trajectory with the greatest cubic slope (n=114, Group 2) experienced faster worsening in externalizing behaviors (p=0.056) and slower improvement in working memory (p=0.067), while the linear SWA trajectory (n=217, Group 1) experienced slower improvement in working memory over the 16y follow-up (p=0.017).
Conclusion: Our data provide evidence linking developmental trajectories of SWA with externalizing psychopathology. Youth with abnormal developmental declines in SWA are associated with worse externalizing behaviors and underlying working memory deficits.
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0294

CHILDHOOD SLEEP SPINDLE DENSITY AND FREQUENCY ARE ASSOCIATED WITH ADOLESCENT WORKING MEMORY AND NONVERBAL ABILITY

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Introduction: Sleep spindles are an underlying mechanism of cognition. Prior research was primarily cross-sectional or conducted in experimental studies of highly selective samples of

youth. We aimed to clarify the longitudinal relationship between sleep spindles and cognition in the transition from childhood to adolescence in both typically developing (TD) and unmedicated youth diagnosed with psychiatric/learning disorders.
Methods: We leveraged 836 sleep EEGs from 9-hour in-lab polysomnography recordings of the Penn State Child Cohort, a longitudinal population-based sample (N=418). We analyzed 261 TD youth who were 5-12y (median 8y) at baseline and 12-23y at follow-up (median 16y) as well as 88 unmedicated youth with psychiatric/learning disorders, including attention deficit/hyperactivity disorder comorbid with learning disorders (ADHD/LD), of the same baseline and follow-up ages. Medicated youth were excluded (n=69). We calculated sleep spindle density (SSD; number of spindles/minute) and peak spindle frequency (PSF; 10-16 Hz range) at central derivations during stage N2 using MSS software. Wechsler intelligence testing assessed working memory (WM), verbal and non-verbal (NVIQ) IQ. Linear regression models examined the longitudinal association of SSD and PSF with cognitive outcomes, while adjusting for age, sex, race/ethnicity, PSG system, insomnia symptoms, body mass and apnea/hypopnea indices.
Results: In TD youth, higher childhood SSD (B=0.937, SE=0.443, p=0.036) and a smaller change in PSF from childhood to adolescence (B=-3.561, SE=1.732, p=0.041) were longitudinally associated with better NVIQ; neither childhood SSD (B=0.157, SE=0.139, p=0.261) nor change in SSD (B=0.171, SE=0.127, p=0.179) were longitudinally associated with WM in TD adolescents. In youth diagnosed with ADHD/LD, lower childhood PSF (B=-2.621, SE=1.005, p=0.012) and a smaller change in PSF from childhood to adolescence (B=-2.188, SE=0.750, p=0.005) were longitudinally associated with better WM; neither childhood SSD (B=-0.263, SE=0.279, p=0.350) nor change in SSD (B=0.033, SE=0.245, p=0.893) were associated with WM (or NVIQ, p=0.070) in unmedicated adolescents.
Conclusion: Sleep spindles may serve as a biomarker for neural and cognitive maturation in TD adolescents, with higher childhood density and lower frequency supporting NVIQ. While this relationship is altered in youth with unmedicated psychiatric/behavioral disorders, low-frequency spindles may serve as a protective mechanism supporting WM in adolescents with ADHD/LD.
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0295

SLEEP-STAGE MODULATION OF TWITCHES AND SLEEP SPINDLES IN INFANTS AT 6 MONTHS OF AGE

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Introduction: Twitches are discrete movements that contribute to the self-organization of the sensorimotor system. At 3 months of age, infants begin to twitch during both NREM and REM sleep, and twitches during NREM occur in synchrony with sleep spindles. In the present study, we examine in 6-month-olds how the specific stage of NREM sleep (i.e., N2 vs. N3) modulates the characteristics of twitches and their coupling with spindles.
Methods: EEG and video were recorded during daytime naps in 21 infants (7F, 6.19 ± 0.10 months). Twitches of the arms, legs, and face, and rapid eye movements, were visually identified by two independent raters. EEG was scored in 30-s epochs using AASM scoring criteria. Spindles were identified in the C3 electrode during artifact-free periods using an automated detection algorithm. Differences in twitch rate (twitches/min) between sleep stages (i.e., REM vs. NREM) and substages (i.e., N2 vs N3) were analyzed. Paired t tests were used to assess differences in spindle rate (spindles/min) and twitch-spindle co-occurrences between NREM substages.
Results: The rate of twitching in NREM was not significantly different from that during REM (NREM: 9.13 ± 1.16, REM: 13.70 ± 2.68; N = 18 infants; Z = -1.24). During NREM, infants twitched significantly more in N2 than in N3 (N2: 13.45 ± 1.95; N3: 5.68 ± 0.77; N = 20 infants; Z = - 3.21, p = 0.001), but the spindle rate was the same across the substages (N2: 3.28 ± 0.27; N3: 3.03 ± 0.33; N=20 infants; t(19)=.904). Regardless of substage, there was a high probability that a spindle occurred at the onset of a twitch. Moreover, the proportion of twitches with co-occurring spindles was not different between substages (N2: 0.26 ± 0.03; N3: 0.24 ± 0.03; N=17 infants; t(16) = 0.80).
Conclusion: These results indicate that 6-month-old infants twitch more during N2 than N3, but exhibit similar rates of spindle production. Regardless of NREM substage twitches are equally likely to co-occur with spindles. Thus, it may be that it is the presence of slow waves during N3 that is incompatible with the production of twitches. This possibility is currently being examined.
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0296

FRONTAL AND CENTRAL SPINDLE DENSITY AND DEVELOPMENTAL OUTCOMES IN INFANCY

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Introduction: Spindle density, frequency, and topography change from infancy through adolescence as spindles bifurcate into subtypes: fast in the central regions and slow in the frontal regions. Changes in spindle characteristics may reflect underlying cortical maturation and neural plasticity. Spindles are related to behavioral outcomes across multiple domains, including fine and gross motor ability, working memory, and perceptual reasoning. The present research aimed to examine emerging longitudinal relationships between frontal and central spindles and motor, language, and cognitive development.
Methods: Thirteen infants participated in a cross-lagged longitudinal design. Two timepoints were separated by 3 months and infants began participating when they were 9- or 12- months old. At each timepoint, they took a morning and afternoon nap. Trained sleep technicians identified sleep stages and sleep spindles across channels. Spindle density was calculated as the number of spindles out of N2/N3 sleep and averaged by region and across the two naps. A series of linear mixed effects models tested the impact of time, starting age, and change in frontal and central spindle density (Time 2 – Time 1) on scaled Bayley scores (Fine/Gross Motor, Expressive/Receptive Language, Cognition).
Results: Fine Motor scores were not significantly predicted by the model. Gross Motor (β=7.61, p<.01), Expressive Language (β=8.09, p<.01), Receptive Language (β=5.94, p<.01), and Cognitive (β=4.26, p<.05) scores were all significantly predicted by change in central spindle density. The regression model on cognitive scores also had significant interactions between starting

age and both central (β=1.84, p<.05) and frontal (β=2.34, p<.01) change in density.
Conclusion: We found change in central spindle density had a consistent main effect on all but one developmental domain. Increased central spindle density from infants' first to second timepoint was related to better Gross Motor, Expressive Language, Receptive Language, and Cognitive scores, independent of age at start. Changes in frontal spindle density were only significant as an interaction in predicting Cognitive scores, though the direction of the effect was the same. Our results add to literature reporting unique roles of frontal and central spindles and earlier maturation of central vs. frontal spindles.
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0297

ACTIGRAPHY-ESTIMATED REST-ACTIVITY RHYTHM CHARACTERISTICS OF ADOLESCENTS BY SOCIO-DEMOGRAPHIC FACTORS

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Introduction: Characterizing 24-hour rest-activity rhythm (RAR) patterns in adolescents is critical, as this developmental period is marked by developmental and social changes that may impact circadian regulation. This study aimed to characterized 24-hour RAR patterns among adolescents transitioning from middle to high school, with a focus on variations across socio-demographic factors, pubertal status, and season of measurement.
Methods: Baseline and follow-up data in the Sleep and Growth Study were analyzed (N=107; 45.8% female; Mage 13.9 years [baseline] and 14.9 years [follow-up]). Wrist actigraphy (ranging from 3-14 days) was used to collect movement profiles (Philips Actiwatch 2) and proprietary count data were further processed using ActCR and GGIR (g.getM5L5) packages to derive RAR parameters. Non-parametric (i.e., interdaily stability [IS], intradaily variability [IV], relative amplitude [RA], most active 10-hour midpoint [M10], least active 5-hour midpoint [L5]), and parametric (i.e., mesor, amplitude, acrophase) RAR metrics were estimated. Data on socio-demographic factors (sex, race, parental education level, household income), and pubertal status were obtained through self/parental-report; and season of measurement was based on measurement (Nov-Apr, May-Oct). Linear mixed effect modeling was used to examine the impacts of grade, socio-demographic factors, and season.
Results: Compared to 8th grade, adolescents in 9th grade exhibited less stable RAR (IS: β=-0.03, p=0.001) and more fragmented patterns (IV: β=0.07, p=0.000). Male sex, compared to female, was associated with lower amplitude (β =-30.37, p=0.013) and earlier acrophase (β=-0.36, p=0.025). Adolescents in lowest household income category, compared to those in the highest, had earlier midpoint for the least active 5-hour period (L5 midpoint: β=-1.12, p=0.004). Post-pubertal, compared to pre-pubertal adolescents, exhibited lower IS (β=-0.03, p=0.024), lower amplitude (β=-40.89, p=0.000), lower mesor (β=-18.25, p=0.006), earlier acrophase (β=-0.36, p=0.025), and delayed daily activity midpoint (M10 midpoint: β=0.41, p=0.018). No associations were observed between any RAR metrics and sex, household income, parental education level, or season of measurement.
Conclusion: Advancing grade level, male, lower socioeconomic factors, and pubertal maturation were associated with less stable, more fragmented, reduced amplitude and mesor, and shifts in activity timing. These findings underscore the developmental and socio-demographic influences on circadian rhythms during adolescence.
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0298

ASSOCIATIONS BETWEEN SLEEP, MENSTRUAL PROBLEMS, AND AFFECTIVE, SOCIAL, AND COGNITIVE FUNCTIONING IN ADOLESCENT GIRLS

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Introduction: Menstrual pain and premenstrual symptoms are known to influence affective, social, and cognitive functioning in adult women. However, these associations are less studied in adolescence—a sensitive developmental period when sleep is undergoing key changes and menstrual-related disorders emerge. This study examined the effects of sleep and menstrual problems, as well as their interaction, on daily psychosocial functioning in adolescent girls.
Methods: Data from 2,131 post-menarcheal girls (Mean age=13.09 years, range=12–15 years) in the ongoing Adolescent Brain and Cognitive Development (ABCD) Study® were analyzed. Sleep behavior was assessed with the Munich Chronotype Questionnaire (youth self-report), and menstrual problems were evaluated through self-reported menstrual cycle characteristics. Affective, social, and cognitive functioning outcomes were measured using the Child Behavior Checklist (caregiver-report). Linear mixed effect models examined associations between sleep, menstrual problems, and functioning outcomes, with age, time since menarche, BMI, hormonal contraceptive use, and socio-demographic factors as covariates.
Results: More severe premenstrual symptoms were associated with higher levels of anxiety and depressive symptoms (p<.01), stress (p<.01), somatic symptoms (p<.01), social problems (p<.01), sluggish cognitive tempo (p=.001) and attention problems (p=.002). Menstrual pain and its impact on daily life were positively associated with anxiety and depressive symptoms (p<.01 and p<.01, respectively), stress (p<.01 and p<.01), somatic symptoms (p<.01 and p<.01), and social problems (p=.042 and p=.003), but not with cognitive outcomes. Sleep behavior moderated multiple associations. Adolescents with later bedtimes and more pain impact had higher anxiety and depressive symptoms (p=.033) and more social problems (p=.007). Later bedtimes combined with greater pain intensity or higher impact of premenstrual symptoms on daily life had more social problems (p=.005 and p=.008). Those with shorter sleep duration and high pain impact or severe premenstrual symptoms had higher sluggish cognitive tempo scores (p=.021 and p=.019). Additionally, later bedtimes were associated with more attention problems in those experiencing greater pain intensity (p=.031).
Conclusion: Menstrual pain and premenstrual symptoms are associated with poorer affective, social, and cognitive functioning in adolescent girls, and sleep behavior moderates these associations. Addressing both sleep and menstrual health could

enhance our understanding of female adolescent well-being during this critical developmental stage.
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0299

SLEEP TIMING AND SOCIAL JET LAG ARE ASSOCIATED WITH CIRCADIAN GENE EXPRESSION: A CROSS-SECTIONAL STUDY IN MEXICO CITY ADOLESCENTS

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Introduction: Circadian disruption has been linked to adverse metabolic health, potentially mediated through altered expression of circadian genes. Adolescents are particularly susceptible to circadian disruptors, such as delayed sleep onset and social jetlag. This study of adolescents during peri-puberty investigated associations between circadian disruption and circadian gene expression, independent of sleep duration, and potential sex differences in the associations.
Methods: The analytic sample included 203 adolescents (96 boys, 107 girls) from the ELEMENT longitudinal cohort in Mexico City. Sleep was assessed via 7-day wrist actigraphy, and a fasted blood sample was collected during a study visit between 8:00 AM and 12:00 PM. Sleep midpoint was calculated as the midpoint between bed and wake times, and social jetlag as the difference in sleep midpoint on weekends versus weekdays. RNA was isolated from blood leukocytes, and RNA sequencing was performed to determine the relative expression of genes. We conducted differential gene expression analysis, in relation to weekday sleep midpoint and social jetlag, for 12 core clock genes using the DESeq2 package (R), adjusting for sleep duration and other potential confounders. A Bonferroni-corrected statistical significance (0.05/12 genes) was considered.
Results: Participants had a median age of 14 years (interquartile range: 12–16). Later sleep midpoint (per 1-hour increase) was associated with reduced mid-morning expression of four circadian genes: RORA (log2 fold change [LFC]: -0.190; P value: 0.001), RORC (LFC: -0.147; P value: 0.039), CLOCK (LFC: -0.141; P value: 0.019), and NR1D2 (LFC: -0.093; P value: 0.029). In sex-stratified analysis, later sleep midpoint was significantly associated with lower RORA expression in girls only (LFC: -0.255; P value: 0.002). Greater social jetlag was linked to increased expression of PER1 (LFC: 0.275; P value: 0.017) in girls, but no associations were found in boys or the combined sample. The associations with RORA met a more stringent Bonferroni-corrected statistical significance (P< 0.004).
Conclusion: Later weekday sleep midpoint and greater social jetlag were associated with altered expression of some core clock genes collected in mid-morning, particularly among adolescent females. Future studies are needed to evaluate the potential impact of differential clock gene expression, especially for RORA, on cardiometabolic health.
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0300

ABERRANT MELATONIN SECRETION PATTERN IN SMITH-MAGENIS SYNDROME - AND ITS IMPLICATION ON SLEEP

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Introduction: Smith-Magenis Syndrome (SMS OMIM 182290) is a rare developmental disorder that results from an interstitial deletion of human chromosome 17p11.2, and in rare cases from a point mutation in the RAI1 gene. Majority of the SMS patients harbor a recurrent 3.7 Mb microdeletion of 17p11.2, yet some cases harbor point mutations in the retinoic acid-induced gene 1 (RAI1). Haploinsufficiency of RAI1 is considered the cause of SMS.
Methods: It has been documented that the vast majority of SMS patients have an aberrant diurnal melatonin secretion pattern although a small minority have demonstrated normal or near to normal patterns. The functional mechanisms of this phenomenon are yet to be delineated. In this observational study, eight patients with genetically confirmed diagnosis of SMS had their sleep behaviors characterized through surveys and actigraphy as outpatients. In addition, the patients were admitted to clinic on three separate occasions and had hourly serum melatonin levels sampled for 36 hours.
Results: In this study, 6 of the patients resembled abnormal melatonin pattern whereas 2 of these patients exhibited closer to normal melatonin secretion pattern. Behavioral analysis revealed that these two patients initiated sleep more quickly (as determined by actigraphy and questionnaire) than the remaining six. Time-frequency analysis of the melatonin time series revealed a relationship between sleep onset and the timing/frequency range of the melatonin peak. Melatonin circadian rhythm was shifted to an abnormal phase with peak secretion occurring during the daytime. This analysis suggests that the frequency as defined by the shape of the melatonin rise affects sleep in addition to phase in the SMS patients. These individuals with SMS have normal cortisol rhythms but abnormal daytime production of melatonin.
Conclusion: Therapies that target circadian disruptions in melatonin production are beneficial for the treatment of sleep disruptions in individuals with RAI1 haploinsufficiency.
Support (if any):

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0301

EXPLORING THE RELATIONSHIP BETWEEN CHRONOTYPE AND HEALTH CONDITIONS IN BLACK ADULTS LIVING IN THE U.S

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Introduction: Chronotype, an individual's preference for morning (morningness) or evening (eveningness) activity, may influence the likelihood of developing certain diseases. Previous studies have suggested that chronotype could contribute to

disease susceptibility, but few have examined chronotype as a potential risk factor, especially in Black American populations. This study explores the relationship between chronotype and the prevalence of diseases including hypertension, diabetes, sleep apnea, anxiety, dyslipidemia, and depression in Black Americans living in New York City (NYC) and South Florida (Miami-Dade County, Broward County, and Palm Beach County).
Methods: Data were collected from 599 Black American participants (385 females, 214 males; mean age = 44.2 ± 15.3 years) enrolled in the NIH sleep studies ESSENTIAL and MOSAIC. Participants, residing in NYC or South Florida, were analyzed to examine the association between chronotype and specific health conditions, including hypertension, diabetes, sleep apnea, anxiety, dyslipidemia, and depression. Chronotype was assessed using the validated Munich Chronotype Questionnaire (μMCTQ) or the Morningness Eveningness Questionnaire (MEQ), categorizing participants as morning (0), intermediate (1), or evening (2) based on sleep and wake preferences. The health conditions were designated as binary variables (0 = no, 1 = yes). A one-way ANOVA was performed to compare the intermediate chronotype to both morningness and eveningness.
Results: One-way ANOVA results indicated that participants' chronotype was associated with significant differences in prevalence of hypertension, diabetes, sleep apnea, and anxiety ($p< 0.05$). Tukey's HSD post-hoc analysis showed that morningness had higher prevalence of disease compared to the evening and intermediate chronotypes ($p< 0.05$).
Conclusion: This study suggests that morning chronotype may be associated with a higher prevalence of hypertension, diabetes, anxiety, and sleep apnea, compared to intermediate chronotype, in Black Americans living in NYC and South Florida. These findings highlight the complex role of chronotype in disease risk among Black adults. Further research is needed to clarify causal pathways, explore mechanisms linking chronotype to health conditions, and develop prevention and management strategies tailored to Black American communities.
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0302
HOUSEHOLD CHAOS IN DIVERSE FAMILIES: DOES IT INFLUENCE FAMILY SLEEP OR CIRCADIAN ALIGNMENT?

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Introduction: A series of studies document associations between high levels of household chaos and less optimal sleep for infants and parents; although most of these studies have included well-resourced, predominantly white samples. An objective of the Sleep and Health in the Home (SHH) study is to examine associations between household chaos and family circadian/sleep patterns in Latine and Black families.
Methods: Thirty-seven mothers and their infants, M(SD) = 4.90(.70) months of age, were enrolled in an observational study focused on sleep and health in the home. All enrolled mothers self-identified as Black, Latine, or both (n = 17, 19, 1, respectively). Mothers completed the Confusion, Hubbub and Order Scale (CHAOS) and a 24-hour recall diary for seven days. Sleep estimates for child and mother bedtime, morning rise time, nighttime sleep duration, and night wakings were estimated from averaging diary data across 7 nights. Additionally, alignment between infant-parent bedtime and morning risetime were calculated to explore family circadian alignment. Considered covariates included breastfeeding status, sleep location, and maternal race/ethnicity.
Results: Household chaos was not significantly associated with parent or infant sleep (all $p >.05$), nor with alignment between infant and maternal bed or morning rise times. However, mother bedtimes, $r(34) =-.73$, $p <.001$, and child bedtimes, $r(34) = -.44$, $p =.005$, were correlates of sleep duration; wherein, earlier bedtimes for mothers and infants were associated with more sleep for mothers. Additionally, mothers who were more closely aligned with their infant's bedtime, $r(34) = -.70$, $p <.001$, and morning rise times, $r(34) =.38$, $p =.01$, reported more sleep.
Conclusion: Unlike previous studies in minimally diverse samples, household chaos was ultimately not associated with maternal or infant sleep. Rather, earlier bedtimes and more tightly aligned maternal-infant circadian patterns were associated with greater sleep duration for mothers. Study findings highlight the role of early and aligned sleep schedules and can inform future interventions aimed at promoting infant and maternal sleep in Black and Latine families.
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0303
EVALUATING SLEEP QUALITY AND CIRCADIAN RHYTHMS IN YOUNG AUTISTIC CHILDREN USING ACTIGRAPHY: A FEASIBILITY STUDY

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Introduction: Sleep problems affect up to 81% of autistic children. Studies suggest a link between sleep quality, sleep-wake rhythms, and language development in early childhood, highlighting the need for objective sleep measures. However, obtaining which measures is challenging in young autistic children, particularly due to their sensory sensitivities. Actigraphy, a less invasive tool, shows promise for autism. However, autism is a highly heterogenous condition, and to date, no study has explored which individual characteristics predict effective actigraphic monitoring. The present study assesses the feasibility of actigraphy in autistic children and identifies profiles that support long-term monitoring.
Methods: Data were collected for the multi-site BeLAS (Belgian 'Language in Autism' Study) project (Université Libre de Bruxelles, KU-Leuven, Ghent University). A cohort of 214 autistic children (2-6 years, 155 boys, mean age = 53.35 months) were instructed to wear an actigraph wGT3X-BT for 14 days. Parents completed a sleep diary and the Children's Sleep Habits Questionnaire (CSHQ). Valid recordings required at least 5 days for sleep quality or 7 consecutive for circadian rhythm analysis, along with correct diary completion (with a ≤ 30 min discrepancy

between diary and actimetric sleep start and end times). Logistic regression was used to predict actimetry wearability with age, IQ, total-CSHQ and ADOS-2 (Autism Diagnostic Observation Scale) comparison scores as predictors. Odds ratios (OR) and their 95% confidence intervals (CI) were calculated.
Results: Actigraphy was completed by 54% of participants. Data loss occurred due to intolerance (42%), technical issues (2%), and lost devices (2%). Logistic regression identified higher non-verbal IQ (OR=1.03, CI [1.01; 1.06]), lower ADOS comparison scores (OR=0.80, CI [0.63; 0.99]), and fewer sleep issues (as indicated by the total-CSHQ) (OR= 0.95, CI [0.90; 0.99]) as significant predictors of successful actigraphy recordings, with no age or site effect. Among participants who wore the actimeter, 85% provided usable data for sleep quality, and 71% for circadian rhythms analysis.
Conclusion: Continuous actigraphy is feasible in preschool-aged autistic children, despite a significant data loss rate (46%). Successful actigraphy recordings were predicted by higher non-verbal intelligence, fewer sleep issues and less autistic characteristics.
Support (if any): The FNRS-FWO Excellence of Science EOS grant No. 40007492

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0304
SEX DIFFERENCES IN SLEEP MEASURED IN YOUNG ADULTS WITH POLYSOMNOGRAPHY AND WEARABLE DEVICES

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Introduction: Sleep patterns and their variability across time are influenced by biological and behavioral factors. Sex differences in sleep, including variability potentially influenced by hormonal fluctuations during the menstrual cycle in females, remain poorly understood. This study compared sleep and its monthly variability between females with ovulatory menstrual cycles and males, using polysomnography (PSG) and wearables.
Methods: We compared 14 males and 14 females (age range:18-32 Years). Ovulation was confirmed with urine. Data included four in-lab PSG recordings, scheduled for males at 1-week intervals and for females specifically targeting 4 menstrual windows:1) menses, 2) ovulation, 3) mid-luteal, 4) late-luteal. Oura ring gen2 data were collected through the study. The means and monthly variability of each sleep variable (monthly ranges for PSG data and standard deviations for wearable data) were calculated within each participant. These individual averages and variability measures were compared by sex were performed using Wilcoxon tests, and results are presented as the median ± half the interquartile range.
Results: In PSG measures, sleep latency to stage N2 was longer in females (2.44 ± 1.06 min) compared to males (1.33 ± 0.46 min, $p = 0.045$). Fewer awakenings were observed in females (20.5 ± 2.83) than in males (23.5 ± 3.00, $p = 0.042$). In wearable measures, the time awake at night was shorter in females (63.55 ± 12.00 min) than in males (83.00 ± 7.64 min, $p < 0.01$). Wearable-derived sleep efficiency was higher in females (87.79 ± 2.66%) compared to males (82.70 ± 1.56%, $p < 0.01$). Wearable-detected deep sleep was also higher in females (136.14 ± 18.66 min) than in males (89.89 ± 15.15 min, $p < 0.01$). No sex differences were found in the monthly variability for any of the PSG and wearable sleep measures.
Conclusion: Using multiple nights of PSG data and a continuous month of wearable data, we found sex differences in sleep measure levels, with indications of more objective sleep disturbances in males than in females. However, no sex-differences in monthly variability was observed. These findings highlight the importance of considering sex-specific factors when assessing and interpreting sleep patterns and variability.
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0305
AGE & SEX TRAJECTORIES IN HEART RATE & VARIABILITY: LINKS TO SLEEP & ACTIVITY FROM LARGE-SCALE WEARABLE DATA

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Introduction: Heart rate variability (HRV), once confined to research settings, is now widely accessible through wearable technology, offering unprecedented insights into autonomic nervous system function and overall health. This study leverages wearable-derived data to explore sleep-related HR and HRV trajectories across age and sex, while examining the influence of sleep duration and physical activity on these key health metrics.
Methods: The sample comprised 25,759 Oura Ring users, evenly distributed by age (20–85 years in 5-year increments) and sex (1:1 ratio). One month of de-identified sleep HR and HRV data (i.e., the root-mean-square of successive differences between heartbeats, reflecting parasympathetic autonomic activity) were analyzed using generalized linear model (GLM) regression, with age, sex, sleep duration, physical activity, and their interactions as categorical factors.
Results: Women exhibit higher HR than men across the lifespan, averaging 7.5 bpm more, with HR peaking at 65.2 bpm in women aged 50–54 and slightly declining to 62.8 bpm by 80–85 ($p<.001$). Men's HR peaks later, at 62.0 bpm in the 55–59 age group, with a greater variability range (56.6–62.0 bpm) compared to women (62.8–65.2 bpm) ($p<.001$), across the lifespan. HRV shows an asymmetric U-shaped pattern, declining from early life to mid-adulthood and slightly increasing in older age, with women showing lower HRV in early to mid-adulthood (20–44 years) ($p<.001$). Sleep duration and physical activity strongly influence HR and HRV: shorter sleep (< 6 hours) and low activity levels (< 5000 steps/day) are linked to higher HR and lower HRV, while longer sleep duration and higher activity level (>12,500 steps/day) have the opposite effect ($p<.001$). These dose-dependent patterns are significant and consistent across age and sex.
Conclusion: Scientific knowledge of HR and HRV reference values across the lifespan is limited. These findings enhance our understanding of sleep-related HR and HRV dynamics by age, sex, sleep duration, and physical activity. Future research should explore temporal relationships to uncover causal pathways.
Support (if any):

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0306
ACTIGRAPHY-DETERMINED CHRONOTYPE IS MORE SIMILAR BETWEEN CLOSE FRIENDS

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Introduction: Friends often show similarities in health-related behaviours, which may contribute to the spread or reinforcement of poor sleep health within social networks. Here, we investigated the relationship between friendship and sleep behaviour in university students. We hypothesized that closer friendships would be associated with greater similarity in sleep timing (i.e., chronotype) and duration.
Methods: Friend pairs of undergraduate students (n=300, 150 pairs) simultaneously wore actigraphy watches and completed daily sleep diaries for 2 weeks during the school semester. Friendships were classified as either close (78 pairs) or casual (72 pairs) based on independent survey responses from each friend. Absolute differences in actigraphy-derived sleep variables (onset, offset, midpoint, and duration) were calculated each day for a given friend pair. Linear mixed models were used to test for associations between closeness of the friendship (close versus casual) with friend-pair differences in sleep outcomes, adjusting for covariates.
Results: On non-school nights, friend-pair differences in sleep onset, sleep offset, and sleep midpoint were about 30 minutes smaller for close friends, reflecting more similar sleep timing compared to casual friends (onset: β=-0.48 h, 95% CI=-0.86 to -0.11 h, P=0.016; midpoint: β=-0.54 h, 95% CI=-0.94 to -0.15 h, P=0.011; offset: β=-0.50 h, 95% CI=-0.95 to -0.05, P=0.039). Friend-pair differences in sleep duration did not reach statistical significance (β=-0.20 h, 95% CI=-0.45 to 0.06 h, P=0.145). On school nights, friend-pair differences in sleep behaviour were primarily determined by whether they had similar class start times, rather than closeness of the friendship (P>0.05 for all comparisons).
Conclusion: Closer friends exhibited more similar sleep timing (i.e., chronotype) when their sleep behaviour was not constrained by school start times. The relationship between friendship and chronotype could be attributed to homophily or peer influence. Our findings highlight the need to consider both the strength of social ties and the impact of social schedules (e.g., school or work start times) when assessing the role of social networks in sleep health.
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0307

EVENING SUNGLASSES PROTECT DAYTIME ATTENTION IN SLEEP RESTRICTED ADOLESCENTS

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Introduction: Staying awake late and rising early for school produces partial sleep deprivation and circadian misalignment in adolescents. We tested whether wearing sunglasses when staying up later than usual can help with daytime performance on reaction time tests that measure attention.
Methods: Adolescents (n=74, 36F; 14.1-18.0 years-old) completed a 14-day protocol. On days 1-7 (baseline), participants slept at home on individualized 10-h sleep/dark schedules. On days 8-14, they lived in the laboratory. Sleep opportunity remained at 10h (n=11) or was restricted to 8.5h (n=19), 7h (n=23), or 5.5h (n=21) by delaying bedtime 1.5h, 3.0h, or 4.5h, respectively on days 9 and 10. Thirty-three participants wore amber-lensed glasses (transmit ~14% visible light) during the extra 1.5-4.5h time awake before bed; 41 remained in room light without glasses. Participants completed simple reaction time tests on day 5 (baseline) and on day 11 after the two sleep restriction nights. Daily difference-from-baseline scores for lapses (≥ 500 msec), median reaction time, and mean response rate were calculated. Two (glasses vs no glasses) by four (sleep opportunity groups) analyses of variance were completed for each outcome; post hoc t-tests compared outcomes between glasses groups within each sleep opportunity.
Results: For all reaction time measures, attention deficits increased as sleep opportunity shortened [sleep opportunity main effect: p's< 0.01]; however, when participants wore the amber-lensed glasses these deficits were no longer observed and remained close to baseline levels [glasses main effect: p's< 0.001]. With 8.5-h, 7-h and 5.5-h sleep opportunities and amber-lensed glasses, adolescents showed fewer lapses, faster reaction times and greater throughput (mean response rate) compared to no glasses (p values ranged from 0.001 to 0.009).
Conclusion: Reducing the intensity of evening light when staying up later by wearing amber-lensed glasses protected against daytime attention deficits in adolescents. Evening light has a delaying effect on the circadian clock. Reducing the intensity of this light may reduce phase delays and, in turn, circadian misalignment. Therefore, this simple intervention has potential to improve academic performance and enhance safety during the school commute. Whether these improvements are maintained after more than two nights of sleep restriction is to be determined.
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0308

ASSOCIATIONS BETWEEN ACTIGRAPH-DERIVED SLEEP MEASURES AND PSYCHOSIS-RISK SYMPTOMS IN 22Q11.2 DELETION SYNDROME

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Introduction: 22q11.2 Deletion Syndrome (22q11DS) is a recurrent copy number variant with a wide range of impacts on neurodevelopment. Sleep disturbances are common among 22q11DS, a population at greatly elevated risk for psychosis. Prior studies in 22q11DS report a positive association between psychosis-risk symptoms and sleep disturbances. However, these findings are limited by the use of a single sleep rating from a structured clinical interview. Here, we use an objective sleep measure, wrist actigraphy, to examine whether psychosis-risk symptoms are related to sleep duration and wake after sleep onset (WASO) in 22q11DS.
Methods: 22q11DS participants (n=25 [10 male], Mage=17.1±7.3 years) and typically developing (TD) controls (n= 26 [12 male], Mage=18.3±5.4 years) completed approximately one week of

actigraphy (Axivity AX6). Average sleep duration and WASO were derived from accelerometer data processed using the van-Hees 2018 algorithm implemented using the GGIR R package. A clinical assessment of psychosis-risk symptoms (Structured Interview of Psychosis-Risk Syndromes; SIPS) gave indices of positive, negative, and disorganized symptom severity. Using linear regression, we tested a group-by-sleep interaction to determine if the relationship between symptoms and sleep differed between groups. If there was no significant interaction, we reported the effect of sleep on symptoms across groups. Age and sex were included as covariates in all models.
Results: 22q11DS participants exhibited increased sleep duration (m±sd: 7.6±1.0 hours) compared to TD participants (m±sd: 6.9±0.9 hours; b=-0.70, p=0.011). They demonstrated more severe negative symptoms compared to controls (b=-0.77, p=0.006), but there was no significant difference between groups in positive (b=-0.33, p=0.228) and disorganized symptoms (b=-0.51, p=0.057). Across groups, increased sleep duration was associated with increased positive (b=0.31, p=0.049) and disorganized symptoms (b=0.34, p=0.028). Group did not moderate the association between sleep duration and positive or disorganized symptoms. There were no other significant relationships between sleep and psychosis-risk symptoms (all p's>0.083).
Conclusion: 22q11DS participants exhibited increased sleep duration and negative symptoms. Our findings support prior research reporting associations between sleep and psychosis-risk symptoms. Future research utilizing measures of sleep neurophysiology is required to further understand the mechanistic relationship between sleep and psychosis-risk.
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0309

NEIGHBORHOOD PERCEPTIONS AND SLEEP HEALTH IN PREGNANT AFRICAN AMERICAN WOMEN OF LOW SOCIOECONOMIC STATUS

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Introduction: Poor sleep health is associated with pregnancy complications. Perceptions of neighborhood likely affect sleep in pregnant women. African American women of low socioeconomic status (SES) often live in neighborhoods with disproportionally high crime and traffic. The aim of this study was to evaluate the relationship between perceptions of neighborhood environment and sleep health in pregnant women of African American race and low SES. We hypothesized that higher crime and traffic would be associated with poorer sleep health.
Methods: Baseline data obtained from pregnant women of African American race and low SES (assessed by Medicaid status) who were participants in one site of The Lifestyle Interventions for Expectant Moms Consortium were analyzed. Perceptions of neighborhood crime and traffic were determined by questions from the Physical Activity Neighborhood Environment survey. Components of sleep health measured included self-reported sleep duration, latency, and wake after sleep onset (WASO) and objective sleep duration assessed by 7-day wrist actigraphy (Actigraph GT3X+). Participants were divided into four groups based on their perception of neighborhood crime and traffic (dichotomized as "strongly agree/agree" versus "disagree/strongly disagree" that neighborhood crime rate makes it unsafe and traffic makes it difficult to walk). Sleep characteristics in each group were compared by Kruskal-Wallis tests.
Results: Two hundred and sixty two women (BMI 32.3±5.1kg/m2 [mean±SD]; age 25.8±5 years; gestational age 14.0±1.8 weeks) completed baseline assessments, 169 women had at least 5 nights of actigraphy data. Self-reported sleep duration was shorter in those who perceived high level of neighborhood traffic (7.2±1.6 vs. 7.9±2.0 hours/night, p=0.03). Self-reported sleep latency was longer and WASO was higher in those who perceived a high level of neighborhood crime (32.1±37.8 vs. 24.8±28.9min, p=0.03; 38.7±48.9 vs. 21.5±29.2min, p< 0.01 respectively). Objective sleep duration tended to be shorter in those who perceived high crime in their neighborhoods (7.8±0.9 vs. 8.1±1.0 hours/night, p=0.06).
Conclusion: Perceptions of neighborhood crime and traffic are related to shorter sleep and higher WASO in pregnant African American women of low SES. Larger studies with more robust measures of neighborhood and sleep are needed to better understand the impact of neighborhood environment on sleep health.
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0310

PARENTAL CHILDHOOD EXPERIENCES AS A SOCIAL DETERMINANT OF SLEEP HEALTH IN OFFSPRING

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Introduction: The Social Determinants of Health theory posits that social and community context, or the social environment of an individual, including their developmental history, contribute to individual health outcomes. Recent literature has highlighted the intergenerational transmission of social determinants, such that parental experiences can undermine (or support) health outcomes in offspring. During infancy, sleep is critical in promoting health, including brain connectivity and immune health. Identifying correlates of parental social determinants and infant sleep is critical to better understand and support infant sleep health during this critical time. The current study aimed to examine the associations between parental early adversity and positive experiences from childhood in relation to infant sleep.
Methods: Participants (N=262) of 4- to 12-month-old infants were recruited from the Nanit Lab userbase. Participants completed questionnaires on their adverse (Adverse Childhood Experiences Scale; ACEs) and positive childhood experiences (Protective and Compensatory Experiences Scale; PACEs) and provided up to 2 weeks of objective sleep metrics from the autovideosomnography algorithms. Using multi-level modeling to account for the nested nature of the data, we tested the association between infant age (in days), ACEs, and PACEs, and the two- and three-way interactions on total sleep (TST), number of wakings (NW), and parent visits to crib (PV).
Results: Using hierarchical MLM, we found a significant interaction between infant age and PACEs (β=.18, SE=.09, p=.036). Simple slope analyses at one standard deviation above and below the mean suggested that caregivers who reported higher PACEs had a stronger

positive slope between infant age and TST (β=.47, SE=.09, p<.001), suggesting that parents who had more supportive experiences from childhood have infants who increase in TST faster compared to parents who do not have as many supportive experiences. Additionally, ACEs were positively associated with NW (β=.19, SE=.09, p=.001), indicating that infant sleep was more frequently disrupted.
Conclusion: Findings from the current study highlight the importance of understanding the intergenerational effects of social determinants of health and the critical need to identify mechanisms by which parental childhood experiences impact infant sleep.
Support (if any):

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0311
SEX-SPECIFIC CHANGES IN CARDIOPULMONARY COUPLING CALCULATED SLEEP QUALITY IN ADULTS

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Introduction: Many physiological functions change with age and show sex differences. Women report less sleep quality and greater frequency of sleep disturbances while having better polysomnography (PSG) defined sleep quality than men. The aim of this analysis was to better understand sex-specific changes in objective sleep quality across the adult human life span based on cardiopulmonary-coupling (CPC) sleep quality index (SQI); metric heavily weight by stable-sleep (high-frequency-coupling).
Methods: De-identified data derived from the SleepImage-system (MyCardio LLC, Denver, CO, USA) was analyzed. The system analyses changes in signals (heart rate variability and breathing) modulated by the autonomic nervous system using CPC to derive sleep stages and states, andcalculate proprietary SQI. One-million nights of sleep recording of >6-hours in duration and >4-hours of total sleep time, with good signal quality (>80%) from individuals >18-years of age were included in the analysis. Average nights of recordings/person were 2-nights.
Results: Age groups were defined as 18-30-years (46%-women), 31-40-years (42%-women), 41-50-years (43%-women), 51-60-years (47%-women), 61-70-years (49%-women) and >71-years (47%-women). In all age groups, women had on average higher SQI compared to men (average[standard deviation], 58.9[19.4] vs. 58.3[19.2] p< 0.003; 53.2[19.1] vs. 52.8[19.2,] p< 0.06; 47.5[18.3] vs. 45.8[18.3],p< 0.001; 43.2[17.4] vs. 39.1[16.8], p< 0.001; 39.2[16.8] vs. 34.1[15.2], p< 0,001; 37.9[16.3] vs. 33.3[16.3], p< 0.001 but lower sleep efficiency (SE), 84.3[10.1] vs. 84.5[10.6], p< 0.001; 84.6[10.6] vs. 85.9, p< 0.001; 84.8[10.8] vs. 86.7[10.6], p< 0.001; 83.7[12.1] vs. 85.2[11.4], p< 0.001; 80.7[13.4] vs. 81.8[12.5], p< 0.001 respectively. The apnea hypopnea index (AHI3%) was lower in women that men in all age groups, 7.8[9.3] vs.11.4[12.5], 10.6[12.0] vs.16.9[16.6],13.5[14.1] vs.21.4[18.4], 17.8[15.7] vs. 23.2[18.4], 19.6[15.7] vs. 22.6[17.8] and 20.9[16.7] vs. 22.0[16.5]. Regression analysis demonstrated that SQI was negatively correlated with AHI, with a higher correlation coefficient in men comapred to women 0.33 vs. 0.29; 0.33 vs. 0.21; 0.34 vs. 0.16; 0.30 vs. 0.17; 0.22 vs. 0.15; 0.20 vs. 0.14, and gradually decreasing after 40-years in women and 50-years in men.
Conclusion: In adults, with increasing age, both SQI and SE gradually decline and AHI increases. Sleep quality evaluated with CPC is higher in women than men in all age-groups, similar to that reported with PSG.
Support (if any):

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0312
INFANT SIBLING DEVELOPMENTAL MONITORING: EARLY SLEEP AND LANGUAGE ASSOCIATIONS

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Introduction: Toddler sleep is linked with early word learning and some aspects of early language. Findings vary by sample/population (e.g., typically developing, neurodevelopmental disabilities, low sociodemographic resources) but elements of sleep duration, variability, and timing are noted as influential. Within this study, toddlers (infant siblings) at low and high likelihood for language delays (based on a family history of autism) are prospectively followed from 18 to 30 months of age with assessments of language and sleep to assess their associations across early development.
Methods: One hundred and one toddlers contributed data to this study with assessments at 18, 24, and/or 30 months of age. Toddler data were excluded if they received an autism or another major neurodevelopmental disorder diagnosis (e.g., global developmental delay). Expressive and Receptive language skills were assessed using the Mullen Scales of Early Learning. Actigraphy sleep estimates included nighttime, daytime, and 24-hour sleep durations, sleep variability, and bedtime. All analyses included adjustments for child sex and maternal education.
Results: As expected, receptive and expressive language were consistent across early development; wherein, toddlers with higher language scores at 18 months continued to have higher language scores at 24 and 30 months (all p <.01). Nighttime sleep duration followed a similar pattern – toddlers who slept more at night at 18 months continued to sleep more at night at 24 and 30 months (all p ≤.05). Associations between sleep parameters and language were sporadic with no robust patterns emerging although all significant findings were in the expected directions. For example, at 30 months of age, more daytime sleep was associated with higher expressive language scores, r(22) =.37, p <.05.
Conclusion: A wide variety of factors influence child language development with notable differences based on infant sex, maternal education, and previously mastered skills. Although sleep is important for several developmentally consequential skills, its associations with language development appear nuanced and not as robust as other factors (as noted above). Within this study, the unique nature of our sample could contribute to this – as their language-related risks likely include a genetic loading.
Support (if any):

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0313
PREDICTORS OF SLEEP SATISFACTION IN FIRST YEAR UNIVERSITY STUDENTS

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Introduction: Sleep satisfaction is a component of sleep health that is not well-captured by objective measures. To advance understanding of sleep satisfaction in student groups, we examined its correlates with habitual sleep behaviors, modifiable habits, environmental factors, mental health, and educational experiences.

Methods: First-year undergraduate students (N=488, 72.1% female, 46.3% white) completed questionnaires pertaining to sleep behaviors, modifiable habits, mental health, and educational experiences. Sleep satisfaction was measured from 1-4 (very good to very bad) with the single question "During the past month, how would you rate your sleep quality overall?" Following preliminary and conceptual analysis, we examined sleep satisfaction in relation to five composite scores: sleep habits (sleep onset latency, prior night sleep duration, weekday sleep duration and bedtime, and morningness-eveningness score), modifiable behaviors (TV use in and out of bed, social media use in bed, time management, efficiency, and procrastination), environmental factors (trouble sleeping due to noise and light), mental health (life satisfaction, mental well-being, resilience, perceived stress, trait anxiety, and depression), and educational experiences (discrimination experiences, imposter syndrome, and other negative experiences).
Results: 26% of first year students indicated fairly bad or very bad sleep satisfaction. The composite scores explained 27.3% of the variance in sleep satisfaction $F(5,374)=28.36$, $p<.001$. Sleep habits explained the largest variance, $\beta=.302$, $p<.001$, followed by mental health, $\beta=.270$, $p<.001$, and environment factors, $\beta=.171$, $p<.001$. Modifiable behaviors and educational experiences did not explain unique variance (ps>.10). Further analysis indicated that the composite effects were driven by difficulties with sleep onset latency $\beta=.149$, $p<.001$, short prior night sleep duration $\beta=-.100$, $p=.046$, short weekday sleep duration $\beta=-.318$, $p<.001$, evening circadian preferences, $\beta=-.102$, $p=.043$, exposure to disruptive noises $\beta=.249$, $p<.001$, and depression symptoms, $\beta=.283$, $p<.001$.
Conclusion: Sleep dissatisfaction is common amongst university students. Improving sleep satisfaction may require multifactorial approaches that address environmental and mental health contributors alongside sleep restriction behaviors.
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0314
PARENTAL BEHAVIORS AND CHILD'S CARDIAC VAGAL FLEXIBILITY PREDICT INFANT' SLEEP QUALITY

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Introduction: Biological and environmental factors shape and impact infant's sleep development from the first months of life (Sadeh et al., 2010). In a sample of African American infants (Mage = 6.53 months, 45% female) and their caregivers (n = 86), the current study examined the links between parental behaviors (sensitive and harsh parenting behaviors), child's parasympathetic functioning to stress, and sleep quality. Cardiac vagal flexibility is a physiological index of social-emotional sensitivity in young children (Miller et al., 2013; Shakiba et al., 2023), with children with greater vagal flexibility tend to be responsive and influenced by their familial environmental cues, either positive or negative cues (Muhtadie et al., 2015). The study further explored whether the effects of parenting behaviors on a child's sleep quality may vary, in part, depending on the child's physiological responsiveness and regulation in response to stressors.
Methods: Mothers and their 6-month-olds were observed during a free-play task at the home visit. The parent-child interaction was coded based on various subscales assessing caregiving sensitivity and harshness. Children's parasympathetic functioning, indexed by the respiratory sinus arrhythmia (RSA), was assessed during the Face-to-Face Still Face Paradigm (FFSFP; Tronick et al., 1978). Child's vagal flexibility (Miller et al., 2013) represents the non-linear and dynamic patterns of RSA change over the course of the task and was modeled by using the latent basis growth curve modeling approach. Infant's sleep was objectively measured using videosomnography and actigraphy. Structural equation modeling approach was performed to test the study's questions.
Results: We found that the effects of parenting on children's sleep efficiency, defined as the ratio of sleep interval to rest interval, differed across children and depended upon their levels of vagal flexibility to stress. High-sensitive caregiving predicted greater sleep efficiency only in infants who exhibited high vagal flexibility or adaptive patterns of parasympathetic regulation across the FFSFP. Similarly, for infants with high (but not low) vagal flexibility, high levels of harsh parenting predicted lower sleep efficiency.
Conclusion: The findings highlight the importance of considering the interplay between biological and environmental factors to better understand individual differences in infants' sleep development and patterns.
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0315
ASSOCIATIONS BETWEEN PARENTAL BEDTIME BEHAVIORS AND SLEEP QUALITY IN TODDLERS

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Introduction: In early childhood, helping children develop healthy sleep habits is paramount. Much attention is placed on ensuring children develop good sleep hygiene practices, largely through encouraging consistent bedtime routines. There is, however, a lack of consensus on what bedtime behavior strategies are best to encourage optimal child sleep. Thus, we aimed to explore how parental bedtime behaviors relate to sleep quality in toddlerhood. We hypothesized that greater use of interactive bedtime behaviors (e.g., cuddling, feeding, reading before bed) would relate to poorer quality sleep in toddlers, as evidenced by longer sleep latency, shorter nighttime sleep, and less consistent sleep timing. Conversely, more frequent parental encouragement to self-soothe to sleep would relate to better sleep quality.
Methods: Toddlers (n=53, M age=22.7 mos) wore actigraph watches on their ankle for up to 14 nights. Primary caregivers (98% mothers) completed sleep diaries as well as the Parental Interactive Bedtime Behavior Scale (PIBBS). The PIBBS allowed us to determine the frequency with which caregivers employ common bedtime behavior strategies, including Active Comfort, Passive Comfort, Movement, or Encouraging Autonomy. Actigraph data was scored according to accepted standards and averaged across all nights of wear (M=9.3 nights).
Results: Partial Pearson's correlations were used to determine relations between parental bedtime behaviors and toddler's objective sleep measures. We controlled for SES as it was significantly associated with most bedtime behaviors. Nighttime sleep duration was negatively associated with Active Comfort ($r=-.478$, $p<.001$), Passive Comfort ($r=-.359$, $p=.01$), and Movement ($r=-.323$, $p=.02$) strategies, while it was marginally positively

associated with Encouraging Autonomy (r=.266, p=.06). Sleep midpoint was positively associated with parental use of Active Comfort (r=.415, p=.003). Lastly, variability in sleep midpoint was negatively associated with Encouraging Autonomy (r=-.516, p<.001). Sleep latency was not related to any bedtime behaviors.
Conclusion: Overall, greater parental tendency to encourage autonomy as part of their toddler's bedtime routine was associated with longer sleep duration and more consistent sleep timing. When parents used more interactive strategies such as Active Comfort, toddlers tended to have shorter overnight sleep and later sleep timing. Future analyses will explore to what extent parent bedtime behavior strategies relate to pre-existing child sleep problems.
Support (if any):

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0316

DAY-TO-NIGHT SLEEP RATIOS AND GUT MICROBIOME COMPOSITION IN INFANCY: A LONGITUDINAL ANALYSIS

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Introduction: Infancy is a critical period for neurodevelopment and long-term health. Emerging evidence suggests that sleep-wake circadian rhythms and the gut microbiome (GM) are interlinked and influence these outcomes, yet this relationship remains underexplored. This study examines whether day-to-night sleep duration ratios in infancy are associated with GM community structure and species abundance during the first year of life.
Methods: A subset of mother-infant dyads from the Snuggle Bug / Acurrucadito cohort was analyzed. In total, 80 full-term infants provided 24-hr actigraphic sleep recordings and fecal samples at six time points (3 and 8 weeks, 3, 6, 9, and 12 months). The primary sleep variable included in the gut microbiome analysis was the average proportion of nocturnal total sleep (NTST) relative to 24hr TST (24TST). Fecal microbial DNA was extracted using DNeasy Pro kits and analyzed via PacBio's full-length16S rRNA gene sequencing, processed with the HiFi-16S Nextflow pipeline to generate high-quality amplicon sequence variants (ASV). Beta diversity, based on Aitchison distance, was assessed using ADONIS in QIIME2 while adjusting for individual and age effects. A linear mixed-effect model with Maaslin2 (q-value≤0.25) was employed to identify differentially abundant species.
Results: From 80 participants, 196 valid actigraphy and fecal samples were provided. The NTST/24TST significantly increased with age (β±SE=0.02±0.01, p=0.033, range: 0.57-0.99). NTST/24TST was significantly associated with gut microbial community structure after adjusting for time and individual effects (R2=0.014, p=0.016). While the interaction between the age of the infant and NTST/24TST was not significant (p=0.07), the effect size was notable (R2=0.22). Four species were differentially abundant: Anaeroglobus massiliensis (β=-0.05, p=0.0002, q=0.08), Enterobacter cloacae (β=-0.23, p=0.002, q=0.20), and Haemophilus D. sp. 001915335 (β=-0.034, p=0.002, q=0.20) were associated with lower NTST/24TST, with the latter species being an opportunistic pathogen. Conversely, Mediterraneeibacter faecis (β=0.62, p=0.002; q=0.20), a short-chain fatty acid producer, was associated with higher NTST/24TST.
Conclusion: Day-to-night sleep duration ratio differentiated gut community structures in infancy. Although these findings are preliminary, lower NTST/24TST may reflect a microbiome profile with reduced beneficial microbe abundances. Together, these findings highlight the need for further investigation into the connection between sleep-wake rhythms and gut microbiome composition.
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0317

MEASUREMENT CONSISTENCY OF HABITUAL SLEEP PATTERNS OF CHILDREN AND ADOLESCENTS IN THE MOTRPAC STUDY

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Introduction: Characterizing habitual sleep patterns in children and adolescents is challenging due to the well-documented variability inherent in standard assessment methods, which often yield poor to moderate internal consistency. This quality control study aimed to evaluate the internal consistency of habitual sleep assessment methods (questionnaire, sleep diary, and accelerometry) using data from the Interacting Mechanisms of SLeep and Endurance Exercise in Pediatrics (iSLEEP) study, an ancillary project of the UCI pediatric Molecular Transducers of Physical Activity Consortium (MoTrPAC). Additionally, it examined whether incorporating sleep/wake pattern parameters into sleep continuity measures improve internal consistency.
Methods: Seventy-seven healthy children and adolescents (Mage=15.0±2.3 years, 62.3%f) completed the iSLEEP MoTrPAC ancillary study including questionnaire [School Sleep Habit Survey (SSHS)] and 7-14 days of accelerometry (Actiwatch) with daily sleep diaries. Sleep continuity variables [i.e., sleep onset/offset times, midsleep time, total sleep time (TST), and sleep efficiency (SE)], were derived from SSHS, diary, and accelerometry (using standardized scoring approaches that include the diary). Behavioral sleep/wake patterns were estimated using UP/DOWN times/slopes, deriving from Shape Language Modeling (SLM) using minute-by-minute activity counts. Internal consistency (Cronbach's alpha) and reliability coefficients were computed. Factor analyses identified latent structures which were correlated between measurement approaches, and the contribution of sleep/wake pattern correlation metrics to traditional sleep continuity measures from accelerometry was evaluated.
Results: Sleep continuity measures from diaries (α=0.63) and accelerometry (α=0.65) demonstrated similar moderate internal consistency, while questionnaire showed expected poor consistency (α=0.21). Behavioral sleep/wake pattern variables (UP/DOWN times/slopes) showed good and acceptable internal consistency (α=0.78). Factor analyses identified two key components solutions for sleep continuity measures in diaries and accelerometry: Factor 1: sleep timing (onset, offset, midsleep; p's< 0.001) and Factor 2: TST and SE (p's< 0.001). Factors were significantly correlated between the measurement approaches (timing factor, r=0.87; TST/SE factor, r=0.50, p's< 0.001). Integrating behavioral sleep/wake pattern variables with the traditional accelerometry-derived sleep continuity measures resulted in strong internal consistency (α=0.83).

Conclusion: Diary and accelerometry exhibited comparable internal structure and validity of habitual sleep pattern characterization in children and adolescents. Incorporating behavioral sleep/wake activity patterns alongside traditional sleep continuity measures enhances validity measures.
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0318
LONGITUDINAL STUDY OF SLEEP DURATION AND VARIABILITY ACROSS EARLY CHILDHOOD

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Introduction: Sleep is critical to early physical, cognitive, and psychomotor growth. Sleep patterns, including duration, timing, and quality, change drastically across early childhood. Most previous work has relied on caregiver-reported sleep times, who typically overestimate their child's sleep duration, and data is often cross-sectional. Here we used a staggered longitudinal design to examine objectively-measured changes in sleep across early childhood.
Methods: 65 infants and toddlers (36 females; 9-31 months) wore actigraph watches for up to 16 days. Infants < 26 months wore the actigraph on their left ankle, while older toddlers wore the actigraph on their left wrist. Caregivers completed a sleep diary detailing sleep onset and offset times for all sleep bouts. Actigraphy was scored in Philips Actiware by trained scorers. Children were assessed at 9, 12, 15, 16, 21, and/or 26 months. Data include children with data at 1-3 ages.
Results: Not surprisingly, total 24-hour sleep duration decreased with age ($F(6,58)=4.581$, $p< 0.0001$). Tukey posthoc tests identified significant differences between 12 and 21 months ($p< 0.05$), and 12 and 26 months ($p< 0.05$). While the impact of age on overnight sleep duration was not significant ($F(6,58)=2.009$, $p=0.0789$), we found a significant effect of age on nap duration ($F(6,58)=3.776$, $p< 0.005$) with significant differences between 12 to 26 month groups ($p< 0.05$) and 15 to 26 month groups ($p< 0.05$). There was also a significant effect of age on nap efficiency ($F(6,58)=2.437$, $p< 0.05$), but not night sleep efficiency. We found no significant effect of age on overnight sleep midpoint variability ($F(6,58)=0.442$, $p=0.848$).
Conclusion: We will provide a rare view of sleep changes in this critical window when sleep is thought to change drastically in duration and consolidation. These data are useful for identifying critical points of sleep changes which is essential for considering interventions on sleep for children at-risk. Moreover, these transition points will also be useful for further research seeking to identify underlying mechanisms for changes in sleep.
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0319
DOES SLEEP PHYSIOLOGY PREDICT LANGUAGE AND LITERACY DEVELOPMENT IN EARLY CHILDHOOD?

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Introduction: Sleep is essential for cognitive and emotional development, influencing key processes such as memory consolidation and emotional regulation. This exploratory research investigates the relationship between sleep parameters and literacy engagement behaviors, including children reading independently, being read to, and family participation in reading and writing tasks. We hypothesized that greater engagement in these activities would be associated with greater N3 sleep due to literacy-related learning and plasticity.
Methods: Participants were 15 3-5-year-old children (8 female). Parents completed a questionnaire probing home, language, and literacy activities. Polysomnography was recorded for both nap and overnight sleep either in-lab or in-home. Sleep parameters included percentage of time spent in each sleep stage (%N1, %N2, %N3, and %REM) as well as total sleep time (TST).
Results: Positive associations were observed between the frequency of children engaging with books at home (e.g., looking at books, asking to be read to) and %N3 during overnight sleep ($r(13)=0.53$, $p=0.04$), but not time spent in other sleep stages or TST. There was no significant relationship between language acquisition measures and other sleep stages, nor nap sleep physiology.
Conclusion: These findings suggest that N3 may play a role in processing home-based literacy-related learning in children. The strength of this relation relative to other literacy behaviors may be related to in-home literacy activities occurring close to bedtime. These results are consistent with other literature on sleep's role in language acquisition and may point to learning experiences prior to bedtime being prioritized in sleep, a focus for future research.
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0320
SCREEN TIME IS ASSOCIATED WITH SUBOPTIMAL ACTIGRAPHIC SLEEP IN SIX-MONTH INFANTS

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Introduction: Screen time is linked to sleep problems in young children, but few studies have examined this in infants using actigraphy. We aimed to assess infant screen time in association with actigraphy-assessed sleep patterns at six months of age among an active, ongoing cohort.
Methods: Fifty-six, full-term (≥37wk), singleton infants with normal weight (2.5-4kg) and without major medical problems were recruited from Phoenix, Arizona. At 6 months, infants wore an actigraph to capture five 24hr sleep periods (i.e., 24hr total sleep time [TST, hh:mm], nocturnal TST [hh:mm], bedtime [AM/PM], sleep onset latency [min], number of long wakes [>5min], nocturnal longest sleep bout [min], nocturnal time-in-bed [hh:mm]). Mothers reported on typical daily infant attentive screen time, and the time spent watching or in the presence of screens in the hour before bedtime. Infant weight was collected via digital scale and weight-for-age z-score (WAZ) by sex was computed. Multivariate ANOVA models for all sleep variables by daily infant screen time (median split: < 10 vs. ≥10min) and by infant screen exposure before bedtime (median split: < 20 vs. ≥20min) adjusted for infant sex and WAZ were conducted.

Results: At six months, infant's mean 24hrTST, nocturnal TST, bedtime, sleep onset latency, long wakes, nocturnal longest sleep bout, and nocturnal time-in-bed were 11:47±1:15, 9:33±0:58, 20:20±1:14 PM, 19.6±14.6min, 3.2±1.6 wakes, 2:50±1:07, and 10:51±1:00, respectively. Daily screen time ≥10min, relative to < 10min, was significantly associated with less 24hrTST (M±SE: 11:17±0:16 vs. 12:13±0:15, F[1,37]=6.00, p=0.019), less nocturnal TST (M±SE: 9:16±0:11 vs. 9:50± 0:12, F[1,51]=4.3, p=0.04), later bedtime (M±SE: 20:47±0:14 vs. 19:52± 0:15 PM, F[1,51]=7.2, p=0.01), and less nocturnal time-in-bed (M±SE: 10:34±0:12 vs. 11:10±0:12, F[1,51]=4.3, p=0.04). There were no differences in any sleep quality measures. In models of infant screen exposure before bedtime, ≥20min was trending toward longer sleep onset latency (M±SE: 23.6±2.8 vs. 16.0±2.7min, F[1,51]=3.8, p=0.056, ηp2=0.07). There were no other significant or trending differences in sleep outcomes.
Conclusion: Greater daily attentive infant screen time at six months of life was associated with compromised sleep opportunity, quantity, and later bedtimes but not sleep quality. Screen exposure before bedtime may be related to potential delays in sleep onset.
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0321

THE OVERLAP OF SLEEP AND SCREEN USE: PATTERNS OF SMARTPHONE USE BEFORE AND AFTER SLEEP ONSET IN ADOLESCENTS

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Introduction: Sleep is important for emotional, behavioral, and cognitive development in adolescents. Prior research shows that smartphone use, particularly around bedtime and during the night, can interfere with sleep, however, findings mostly rely on self-reported measures. Here, we address this gap by combining objective smartphone usage and sleep measures to examine smartphone use around sleep onset and during the sleep period.
Methods: Participants included 653 adolescents (Mean age=14.09 years) from the Adolescent Brain Cognitive Development (ABCD) Study. Smartphone use was recorded over three weeks using the Effortless Assessment Research System (EARS) app, which logged the last engagement in multiple app categories. Sleep onset and sleep period were measured with Fitbit Charge 2 wearables. Screen use events were categorized as daytime usage; usage near sleep onset: for one hour before and one hour after sleep onset, nighttime usage (overlapping sleep); and after-sleep morning usage.
Results: Screen activity within one hour before sleep onset occurred in 91.0% of participants, with 81.8% showing this pattern on more than half the days. Usage in the hour after sleep onset was observed in 45.7% (20.1% on more than half the days), while 56.0% had nighttime screen activity (29.9% on more than half the days). Significant weekday vs. weekend differences emerged in daytime usage categories. Daytime usage within one hour before sleep onset was higher on weekdays (6.8%) than on weekends (6.1%, t=2.54, p=0.011), as was overall daytime usage (66.4% vs. 61.0%, t=4.59, p<.001). Nighttime usage showed no significant weekday-weekend differences. Social networking apps were most frequently used across all categories. Significant correlations were observed between daytime usage within one hour before sleep onset and nighttime usage one hour after sleep onset (r=0.48, p<.001) and between daytime usage and nighttime usage (r=0.35, p< 0.001).
Conclusion: Screen use around sleep onset and during the night is highly prevalent among adolescents, with social media app usage dominating at all times of the day. Associations between daytime and nighttime proximity to sleep onset usage suggest persistent screen habits, highlighting the need for interventions promoting healthier use patterns, especially near sleep onset.
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0322

BODY COMPOSITION AND DIETARY INTAKE ASSOCIATES WITH SLEEP MACRO-ARCHITECTURE IN YOUNG ADULTS

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Introduction: Insufficient sleep is associated with excess body fat and daytime sleepiness in adults. Prior work has also shown that body fat percentage associates with increased rapid-eye movement sleep (REM) and that fiber intake associates with increased slow wave sleep (SWS). Here we aimed to examine relationships between body composition and sleep macro-architecture in young adults, who are at increased risk for insufficient sleep.
Methods: Participants were 55 students enrolled at a large public university (20.3±1.68y, 35 female) who completed the Epworth Sleepiness Scale (ESS) and dietary screening questionnaire (DSQ), wore an actigraph on their non-dominant wrist 24/7 for 14 days and completed at-home polysomnography on a night where they were instructed to remain in bed for 9h. Body composition and bone metrics were measured by dual X-ray absorptiometry. Pearson's and Spearman's correlations analyzed relationships between body composition and sleep variables.
Results: Higher BMI associated with poorer actigraphy-measured sleep efficiency (ρ = -0.425, p < 0.01) and greater wake after sleep onset (ρ=0.34, p< 0.01). Greater fat mass associated with less total sleep time (actigraphy: r=-0.32, p< 0.05; PSG: r=-0.27, p< 0.05), poorer sleep efficiency (PSG: r=-0.28, p< 0.05) and greater daytime sleepiness (r=0.29, p< 0.05). Greater bone mineral content (BMC) was associated poorer sleep efficiency SE (r=-0.26, p< 0.05). In n=25 with completed DSQ, calcium (ρ=-0.45, p< 0.05) and dairy (ρ=-0.401, p< 0.05) intake also associated with poorer sleep efficiency.
Conclusion: Findings contribute to growing evidence demonstrating bidirectional relationships between sleep health and body composition, particularly fat mass.
Support (if any):

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0323

STOP MAKING TEENS GO TO BED BEFORE THEIR DLMO! IT'S HURTING THEIR FEELINGS!

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Introduction: Most adolescents experience chronic sleep restriction and circadian misalignment due to delayed sleep propensity combined with early school start times. The present analysis aims to examine adolescent mood under conditions of sleep restriction and circadian misalignment.

Methods: 74 (37 female) adolescents (14.1-18.0 years) completed a 15-day study. Participants spent days 1-7 (baseline) at home following individualized 10-h sleep schedules. Participants lived in the laboratory on days 8-14. On days 9-13, sleep was restricted by delaying bedtime 1.5h (n=20), 3h (n=23), or 4.5h (n=20). Between baseline bedtime and delayed bedtime, 34 participants wore amber-lensed glasses (16±2 lux), and 29 participants remained in room light without glasses (104±11 lux). Eleven participants continued the 10-h sleep opportunity followed during baseline. On day 11, sleep/dark shifted 1.5h earlier. On days 12-13, sleep/dark shifted 1h earlier each day. All participants received 1.5h of bright light (8595±834 lux) within 5 minutes of waking on days 12-14. Circadian phase (dim light melatonin onset (DLMO)) was measured on days 8 and 14. The protocol produced a wide distribution of day 14 DLMOs (17:30–4:10). Throughout the study, participants completed visual analog scales before bed to assess mood. An individual's mood on day 13 (after 2.5-h sleep/dark advance) was subtracted from their baseline week average. Mood change scores were compared between participants with day 14 DLMOs before (n=43; "aligned") or after (n=31; "misaligned") day 13 scheduled bedtime. Day 14 DLMOs ranged from 4.5h before to 3.3h after day 13 bedtime.

Results: Misaligned teens reported feeling more tense (p=0.02), less energetic (p=0.02), and less calm (p=0.03) than aligned teens. The use of amber-lensed glasses only impacted feelings of calmness; participants wearing glasses were calmer than individuals without (p=0.05). Sleep duration only impacted feelings of sleepiness; the 10-h group felt less sleepy than the 8.5-h (p=0.05), 7-h (p=0.08), and 5.5-h (p=0.02) groups. Changes in happiness, temper, irritability, and concentration did not differ in any analyses.

Conclusion: These results indicate that circadian misalignment plays a role in adolescent mood. Subsequent analyses will expand the current focus beyond the evening by evaluating mood at different times of day.

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0324

LIGHT AFTER LUNCH: AFTERNOON BRIGHT LIGHT IS NOT EFFECTIVE FOR ADVANCING CIRCADIAN PHASE OF ADOLESCENTS

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Introduction: Morning bright light is most effective in shifting circadian phase earlier; however, our adolescent PRC to bright light unexpectedly showed phase advances in response to bright light timed in the afternoon (Crowley & Eastman, JBR 2017 32(4):334-344). The current ongoing study is examining phase shifts in response to three bright light schedules: morning bright light (MBL), afternoon bright light (ABL), and a combination of morning and afternoon bright light (MBL+ABL) compared to a room light (RL) control.

Methods: So far, 51 adolescents (27F) aged 18.3-20.9 years completed a two-week study. During the first week, participants followed a rigid individualized 9-hour sleep schedule at home. On days 8-13, participants lived in the lab. On day 8, participants completed initial phase assessments to determine Dim Light Melatonin Onset (DLMO). On day 9, they followed their baseline sleep schedule. On days 10-12, their sleep (dark) advanced 1-hour earlier each day. DLMO was measured again on day 13. Three groups received bright light from light boxes (8542±820 lux, 45-min exposures totaling 3h/day) on days 10-13 at the following times: all 4 exposures started 5h after wake (ABL; n=18), all 4 exposures started within 5 minutes of wake (MBL; n=7), or 2 exposures started within 5 minutes of wake and 2 exposures started 7 h after wake (MBL+ABL; n=8). A fourth group (RL; n=17) completed the same protocol but remained in room light (45±22 lux).

Results: DLMO advanced in all groups (RL: 0.8±0.5h; ABL: 0.9±0.6h; MBL: 1.9±0.9h; MBL+ABL: 0.9±0.6h). A main effect of group ($F(3,46)=5.86$, $p=.002$) was explained by the MBL group showing larger phase advances compared to all other groups (p's<.02).

Conclusion: Gradually advancing the sleep (dark) schedule by 1h/day for 3 days advanced the circadian clock of adolescents by ~1h. Adding 3h of morning bright light increased the advance to ~2h. Afternoon bright light, even when combined with morning light, did not significantly change the phase advance obtained by advancing sleep (dark) only.

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0325

ASSESSMENT OF THE IMPACT OF PUBERTAL DEVELOPMENT AND WORK OR STUDY SHIFTS ON THE SLEEP HABITS OF ADOLESCENTS

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Introduction: Puberty involves physiological changes in circadian oscillatory processes that impact circadian preferences and sleep-wake patterns. During this stage, individuals tend to have an eveningness preference and this circadian clock delay peaks at the end of adolescence. However, excessive exposure to light at night and social demands, such as school schedules, can lead to accumulated sleep debt, negatively impacting health and performance

Methods: A cross-sectional study was conducted at the Premature Outpatient Clinic of UNIFESP/EPM, involving 58 preterm children and adolescents aged 10 years and older. School or work shift schedules and pubertal status were self-reported. The Morningness-Eveningness Scale (M/E) and the Munich Chronotype Questionnaire were evaluated. Linear

regression analyses were performed to evaluate the impact of school or work shifts and pubertal development on sleep habits. The significance level adopted was 5%

Results: Our sample consisted of 65.5% females and 34.5% males, with a mean age of 14.3±2.9 years. 44.7% studied or worked in the morning, 23.7% in the afternoon, 7.9% at night; 18.4% in full-time shifts, and 5.3% had undefined schedules. The average score of the M/E questionnaire was 31.4±5.06, indicating a stronger preference for morningness. Participants who work or study in the morning woke up earlier (5:54a.m.±0:30) than the night group (8:48a.m.±2:00) and afternoon group (08:45a.m.±01:32) during weekdays. Those who study or work in the morning slept less (07:44±01:26h) than the night (10:00±2:17h) and afternoon (10:18±1:30h) groups on weekdays. Regarding pubertal development, for each additional point on the pubertal scale, there was a 6-minute reduction in wake-up time and a 9-minute reduction in sleep duration during weekdays

Conclusion: The results indicated that social demands such as study or work shifts greatly impacted sleep habits. Even individuals with more advanced pubertal development, marked by a greater tendency to be an evening person, woke up earlier, had shorter sleep durations on weekdays, and expressed preference for morningness

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0326

HOW THE TIMING OF PHYSICAL ACTIVITY IMPACTS SLEEP QUALITY IN ADOLESCENTS

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Introduction: Moderate-to-vigorous physical activity (MVPA; exercise that elevates heart rate and breathing), generally has positive effects on sleep outcomes, such as improved sleep efficiency, reduced sleep onset latency (SOL), and increased total sleep time (TST). Less is known about the ideal time of day to exercise for benefits towards sleep, though preliminary evidence suggests that late-evening MVPA can worsen sleep efficiency and increase SOL. This study aims to investigate how the timing of physical activity across various times of day influences same-night sleep outcomes in adolescents.

Methods: We analyzed sleep and activity pattern data from adolescents (ages 14–18; N = 100) across three separate studies. Sleep and physical activity were collected across a 7-10 day monitoring period using Actiwatch 2 devices to assess for sleep, and Actigraph GT3x+ devices to assess for physical activity. Daily activity was broken down into three distinct periods of the day: After waking (within 2 hours of waking), during the day (after 2 hours of waking until 2 hours before bedtime), and before sleep (< 2 hours before bedtime). A linear mixed-effects model was performed to analyze how MVPA during these three time periods impact same night sleep, including: wake after sleep onset (WASO), SOL, sleep period length, and sleep efficiency.

Results: We observed that MVPA before sleep predicted increased WASO (p=<.01). In addition, we found that MVPA before sleep predicted decreased SOL (p=<.001). Activity after waking and during the day did not positively or negatively predict any sleep variables, and sleep efficiency was not predicted by any activity timing.

Conclusion: These findings suggest that a more nuanced approach to physical activity recommendations, specifically tailored to specific types of insomnia, may be beneficial. For adolescents with sleep onset insomnia, engaging in physical activity right before bed may help reduce the time it takes to fall asleep, while those with maintenance insomnia may benefit more from morning or daytime activity to improve sleep throughout the night. Future research could explore how physical activity timing impacts adolescents' sleep when misaligned with their chronotype. Additionally, studies could identify which activity types and intensities are most effective for improving sleep outcomes.

Support (if any):

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0327

SEASONAL AND CONTEXTUAL EFFECTS ON HABITUAL SLEEP PATTERNS IN MOTRPAC'S CHILDREN AND ADOLESCENTS

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Introduction: Adolescence involves well-known changes in sleep and circadian patterns, further influenced by contextual variations (seasons and school/vacation). Using both subjective (sleep diaries) and objective (accelerometry) data from the Interacting Mechanisms of SLeep and Endurance Exercise in Pediatrics (iSLEEP) study, an ancillary project to the UCI pediatric Molecular Transducers of Physical Activity Consortium (MoTrPAC), this study evaluated contextual factors as a quality control measure. The aim was to assess whether the data reflect expected seasonal and contextual variability, confirming the need for adjustments for these confounding factors to ensure data integrity in future analyses.

Methods: Seventy-seven healthy children and adolescents (Mage=15.0±2.3yrs, 62.3%f) who completed the iSLEEP Pediatric MoTrPAC Ancillary study underwent 7–14 days of accelerometry (Actiwatch) alongside daily sleep diaries. Assessed sleep parameters included sleep onset/offset times, midsleep time, total sleep time (TST), and sleep efficiency (SE). Circadian metrics included UP/DOWN times and slopes, deriving from Shape Language Modeling (SLM) using minute-by-minute activity counts. Non-parametric one-way ANOVAs, adjusted for age and sex, were conducted to assess whether sleep and circadian data showed expected patterns across seasons and school/vacation periods, validating the need for contextual adjustments.

Results: Significant seasonal and contextual variability was observed in sleep offset, midsleep, and UP times, with later timing during summer and no-school periods compared to spring and school periods (p's< 0.05). In contrast, no significant variations were found in sleep onset time, TST, SE, or DOWN time/slope. Consistent findings were observed in subjective and objective methods, enhancing confidence in data integrity.

Conclusion: Consistent with prior research, certain sleep and circadian parameters (sleep offset, midsleep, and UP times) reliably reflect seasonal and school-related variability, highlighting their sensitivity to contextual changes between school and vacation periods that were also reflected in the summer season. In contrast, parameters like sleep onset and TST appear less

responsive. The complementary use of subjective and objective methods enhances methodological rigor and provides insights for optimizing data interpretation. These findings underscore the need for context-specific adjustments in data analyses and emphasize the importance of robust data quality and validity assessment in pediatric sleep research.
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0328

THE ASSOCIATION BETWEEN SLEEP ARCHITECTURE AND WHITE MATTER MICROSTRUCTURE DURING EARLY ADOLESCENCE

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Introduction: Sleep plays a vital role in brain development during adolescence. However, the relationship between sleep architecture and white matter remains poorly understood. Additionally, little is known about how puberty influences these associations, despite adolescence being a period of significant sleep and white matter changes. We investigated the association between sleep architecture and white matter integrity during early adolescence and examined whether these relationships vary with puberty. The uncinate fasciculus was selected due to its association with sleep and its role in emotion and memory, making it particularly relevant for studying sleep-related effects.
Methods: A total of 455 adolescents (Female=217; Age range=10.75-13.41 years; Mean age[SD]=11.97[0.65]years) from the Adolescent Brain Cognitive Development (ABCD) study with good quality diffusion MRI and Fitbit wrist monitoring were included. Sleep architecture (light, deep, and REM) was estimated from Fitbit data. Neurite Orientation Dispersion and Density Imaging (NODDI) metrics were derived from diffusion MRI: Neurite Density Index (NDI) to measure neurite density and Orientation Dispersion Index (ODI) to assess neurite organization. Linear regressions tested cross-sectional associations between sleep stages and white matter. Pubertal status (136 prepubertal vs. 319 undergoing puberty) was included as an interaction. Age and sex at birth were covariates.
Results: Longer duration of REM sleep was associated with greater uncinate fasciculus NDI (β=0.27,P=.003). Shorter duration of light (β=-0.21,P=.008) and deep (β=-0.14,P=.005) sleep were associated with greater uncinate fasciculus ODI. While the effect of deep sleep was consistent across puberty groups, prepubertal adolescents showed stronger effects of REM sleep on NDI (β=0.24,P=.006) and light sleep on ODI (β=-0.20,P=.017) relative to those already undergoing puberty.
Conclusion: This analysis highlights the role of sleep in white matter development during early adolescence, with stage-specific and puberty-dependent associations between sleep architecture and white matter. REM sleep enhance neurite density (↑NDI), potentially supporting axonal growth. In contrast, light and deep sleep improve white matter organization (↓ODI), crucial for efficient brain network connectivity. These findings provide new insights into sleep's associations with white matter structure and imply differential importance of specific sleep physiological features for white matter development by developmental stage.
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0329

RELATIONS BETWEEN SLOW OSCILLATION SPINDLE COUPLING AND HIPPOCAMPAL SUBFIELDS IN DEVELOPMENT

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Introduction: Non-REM (nREM) sleep features, particularly slow oscillations (SO) and spindle activity, are associated with cognitive development in early childhood. These hallmarks of nREM sleep support memory consolidation, with SO-spindle coupling proposed as a key mechanism. Meanwhile, the developing hippocampus has been shown to support memory abilities in young children. Within the hippocampus, the CA1 subfield plays a unique role in memory processes, particularly replay and the integration of new information. The development of the hippocampus and its subfields coincides with changes in sleep morphology, such as increased spindle density and refinement of SO-spindle coupling, which are predicted to reflect maturing memory systems. Investigating the interplay between these sleep features and the hippocampus during early childhood is essential for understanding how memory is supported during this critical developmental period.
Methods: Preschool-aged children (N = 26; M= 4.26 years, SD=0.65 years, Range=3.43-5.82 years) underwent ambulatory polysomnography during a daytime nap. Expert scorers and a custom MATLAB program (PSGPower) delineated individual sleep states, sleep spindles, and SOs in 30s epochs. A T1-weighted magnetic resonance imaging (MRI) scan was used to delineate hippocampal subfield volumes, quantified by volumetric analysis using Freesurfer 6.0.
Results: When controlling for age and total sleep time, the number of coupled SOs and spindles within the central areas during slow wave sleep as well as between the central and frontal areas correlated with the size of the CA1 (right: r(24)=.41, p=.05; left: r(24)=.34, p=.10), but not the dentate gyrus/CA2-4, or the subiculum.
Conclusion: The relation between CA1 volume and central SO-spindle coupling during slow wave sleep underscores the burgeoning functional specialization of hippocampal subfields during early childhood development, as well as the memory-supporting significance of slow wave sleep. With the CA1 developing earlier than other subfields, it may lead the charge for consolidation of long-term memories. As such, increased coupled SOs and spindles may occur more when the CA1 is further developed. Subsequent analyses will explore phase amplitude coupling specifically in relation to hippocampal subfield volumes, elucidating the importance of both for memory and neuroplasticity.
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0330

ASSOCIATION BETWEEN ACTIGRAPHY-ESTIMATED REST ACTIVITY RHYTHMS AND ADIPOSITY OUTCOMES IN ADOLESCENTS

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Introduction: Rest-activity rhythms (RAR), a behavioral manifestation of circadian rhythms, represent the patterns of activity and rest/sleep across a 24-hour period. However, little is known about how changes in RARs during adolescence may influence adiposity outcomes. We examined the associations between RAR and body composition measures in adolescents. We hypothesized that disrupted RAR patterns are associated with adverse adiposity outcomes.
Methods: Baseline and follow-up data were collected from participants in the Sleep and Growth Study. Movement profiles were recorded using wrist-worn actigraphy devices (Philips Actiwatch 2); proprietary count data were analyzed using ActCR and GGIR packages to calculate RAR metrics. These included non-parametric (interdaily stability, intradaily variability, relative amplitude, most active 10-hour midpoint, least active 5-hour midpoint) and parametric (mesor, amplitude, acrophase) metrics. Body composition measures were assessed via dual-energy x-ray absorptiometry (DXA) scans: fat mass index (FMI, kg/m^2, and z-score) and visceral fat area (cm^2). Quantile regression was used to test for associations between RAR and specific percentiles (i.e., 5th, 25th, 50th, 75th, 95th) of the body composition outcomes, that represent the lower, middle and upper ranges of the frequency distributions.
Results: The sample consisted of 107 adolescents (mean age: 13.9 years at baseline and 14.9 years at follow-up), with 54.2% male and predominantly non-Hispanic White participants. Associations between RAR metrics and FMI were first examined. No significant associations were observed between any RAR metric and FMI (kg/m2, and z-score) across the 5th, 25th, 50th, 75th, and 95th percentiles. We then examined the associations between RAR metrics and visceral fat area. Similarly, no significant associations were identified between RAR metrics and visceral fat area across any percentiles.
Conclusion: In this relatively small longitudinal dataset with robust assessments of RAR and body composition, we found no evidence to support associations between RAR metrics and obesity-related outcomes in adolescents. Further research with larger sample sizes and additional cardiovascular data is needed to better understand the potential links between RAR and obesity-related health outcomes.
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0331
SOCIAL CONNECTEDNESS AS PREDICTOR OF SLEEP IN ADOLESCENTS: PROSPECTIVE ANALYSIS OF ABCD DATA IN COVID-19 PANDEMIC

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Introduction: The COVID-19 pandemic disrupted adolescents' social interactions through lockdowns and distancing measures, altering the quality, quantity, and type (in-person vs. online) of social connections. It also affected sleep patterns, providing a unique opportunity to examine the relationship between social connectedness and sleep.
Methods: Data from 4,996 children (8.9–11 years old; 48.42% female; 62.5% white) in the Adolescent Brain Cognitive Development (ABCD) Study who completed at least two COVID-19 surveys (T1 = May and T2 = August 2020) were analyzed. Social connectedness variables at T1 included family conflicts, habits such as eating together, relationships with friends and family, neighborhood activities, and technology-mediated socializing. Sleep duration (from caregiver reports) was measured at T1 and T2. Mixed-effects models examined associations between social connectedness variables and sleep duration, with covariates for sex, age, race, household income, and site as random effect. Clustering analysis explored differences in adequate sleep duration (9–11 hours/night) at T2 rates across groups sharing similar social connectedness characteristics at T1.
Results: Family conflict, household distancing, and technology-mediated connections were predictive of shorter sleep at T1 (all $p< 0.01$) and T2 ($p=0.02$, $p< 0.01$, $p< 0.01$, respectively). Conversely, eating dinner with family (T1 and T2, $p< 0.01$) and participating in neighborhood activities (T1, $p=0.05$; T2 n.s.) predicted longer sleep. Five social connectedness clusters at T1 were identified. The lowest rates of adequate sleep at T2 were in clusters characterized by high technology-mediated relationships (40.39%) or by poor family/friend relationships and little parental engagement (42.07%, $p=0.59$). Clusters characterized by high parental engagement, such as eating together and discussing plans for the following day, had significantly higher rates of adequate sleep (50.85%, $p< 0.01$; 47.57%, $p=0.03$; 47.52%, $p< 0.01$).
Conclusion: Social connectedness significantly predicted adolescent sleep duration during the pandemic, with family conflict and high technology-mediated relationship predictive of shorter sleep, while family meals and parental engagement were associated with longer sleep. Clusters with stronger parental involvement had higher rates of adequate sleep, whereas those with high technology-mediated relationships had the lowest, even lower than those with poor relationships. These findings highlight the importance of supportive family interactions and balanced technology use for healthy adolescent sleep.
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0332
INTERACTION BETWEEN SLEEP DISTURBANCE AND INFLAMMATION IN PREDICTING SUBSEQUENT RISK OF FRAILTY AMONG OLDER ADULTS

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Introduction: Sleep disturbances can disrupt various physiological processes, potentially leading to increased vulnerability to frailty. Similarly, chronic low-grade inflammation can negatively impact muscle function, immune response, and tissue repair, all of which are crucial for maintaining physical health and preventing frailty. While sleep disturbances and elevated inflammatory markers have been identified as potential contributors to frailty, the interaction between these factors remains understudied. We examined the associations of sleep disturbances, inflammatory biomarkers and their interactions with physical frailty among older adults.

Methods: We included 3,571 community-dwelling older adults age 65 years and above from the two waves of the National Aging and Health Trends Study (2017-18) who provided blood samples in 2017. We assessed frailty using Fried's phenotype, and the inflammatory biomarkers included C-reactive protein (CRP), interleukin-6 (IL-6), cytomegalovirus (CMV) infection, and hemoglobin A1c. We used multinomial logistic regression models to examine the individual and interactive associations of sleep disturbances and the inflammatory biomarkers with the subsequent risk of pre-frailty and frailty.
Results: After adjusting for baseline frailty, socio-demographics and chronic conditions including hypertension, diabetes, heart attack, heart disease, stroke, lung disease, arthritis, and cancer; older adults with difficulty initiating sleep (RR: 1.71, 95% CI: 1.32, 2.22) and maintaining sleep (RR: 1.41, 95% CI: 1.09, 1.83) had higher risk of developing frailty. Higher levels in inflammatory biomarkers such as CRP (RR: 1.43, 95% CI: 1.22, 1.67), CMV (RR: 1.25, 95% CI: 1.07, 1.47) and hemoglobin A1c (RR: 7.54, 95% CI: 2.16, 26.28) were each associated with increased risk of frailty. Having sleep maintenance difficulties and higher levels of hemoglobin A1c was associated with more pronounced pre-frailty and frailty, with significant interaction effects (p-values: 0.017 and 0.039).
Conclusion: Difficulty with sleep initiation and maintenance, as well as elevated inflammatory markers, increased the risk of frailty. The combination of sleep maintenance difficulties and higher hemoglobin A1c levels, a marker of long-term blood glucose control, further amplified frailty. Improving sleep health and managing inflammation, either through behavioral interventions, or pharmacological treatments, may help reduce the risk of frailty among older adults.
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0333

EFFECTS OF TIME-OF-DAY AND CIRCADIAN MISALIGNMENT ON BLOOD-BASED ALZHEIMER'S BIOMARKERS

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Introduction: The human blood proteome has been found to vary with time-of-day and in response to circadian misalignment (daytime sleep, nighttime wakefulness). Efforts to develop blood-based biomarkers for Alzheimer's disease have largely ignored such factors. We identified plasma candidate biomarkers for Alzheimer's disease by a literature review of current proteomic studies and examined if the biomarkers were influenced by time-of-day and/or circadian misalignment during an in-laboratory study.
Methods: A systematic literature review using keywords including but not limited to, "Alzheimer's", "mild cognitive impairment", "proteomics" and "plasma biomarker" was performed to find relevant studies. Biomarkers were chosen based upon their presence in three or more studies or cohorts. Identified proteins were analyzed using the SomaLogic Inc platform in six healthy men aged 26.2±5.6y (mean±SD) that completed a 6 day in-laboratory simulated night-shift protocol. We compared proteins analyzed every four hours during baseline circadian alignment and circadian misalignment conditions with mixed model ANOVA.
Results: From the literature review, we identified 28 proteins that appeared in three or more studies or cohorts. Of the 28 proteins, 14% varied with time-of-day (main effects of time-of-day, $p < 0.05$; angiopoietin-2, apolipoprotein B, insulin-like growth factor-binding protein 2, myoglobin), and 17% were influenced by circadian misalignment (main effect of study day, $p < 0.05$; beta-2-microglobulin, insulin-like growth factor-binding protein 2, immunoglobulin M, brain natriuretic peptide, vascular cell adhesion molecule-1). Furthermore, 17% showed study day by time-of-day interactions ($p < 0.05$; alpha-1-antitrypsin, apolipoprotein E, beta-2-microglobulin, myoglobin, pancreatic polypeptide) such that the time-of-day variation of these proteins depended on whether the participants were circadian aligned or misaligned.
Conclusion: The current findings suggest that the time-of-day modulates concentrations of some protein biomarkers of Alzheimer's disease, and that circadian misalignment also impacts such biomarkers. These findings have implications for the further development of plasma biomarkers for Alzheimer's disease, Alzheimer's disease risk, the potential implementation of such biomarkers, as well as precision medicine efforts.
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0334

CHRONOTYPE, SLEEP TIMING, SLEEP REGULARITY, AND CANCER RISK: A SYSTEMATIC REVIEW

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Introduction: Sleep is a multidimensional modifiable lifestyle factor related to cancer risk. Prior research has primarily focused on sleep duration, despite the increasing importance of sleep timing and sleep regularity in the health research field. The objective of this systematic review was to synthesize the existing literature on the relationship of chronotype, sleep timing, and sleep regularity with cancer risk.
Methods: We searched four databases (PubMed, CINAHL, PsychInfo, and Embase) in October 2024. The sleep exposures of interest included sleep timing, sleep regularity, sleep midpoint, social jetlag, chronotype, and weekend catch-up sleep, and the outcome of interest was cancer incidence (overall or site-specific).
Results: A total of 22 studies were included, of which 18 investigated chronotype, two investigated social jetlag, two investigated sleep midpoint, and one investigated weekend catch-up sleep as the sleep exposure. The majority of studies assessed sleep using self-reported questionnaires (95%) and investigated site-specific cancer incidence (91%). We found no consistent evidence linking late chronotype, later sleep midpoint, increased social jetlag, or weekend catch-up sleep to elevated risk of cancer.
Conclusion: This review highlights the heterogeneity in how sleep timing and sleep regularity are assessed. Future research should standardize measures on how to quantify sleep timing and sleep regularity and replication studies in diverse populations are

needed. Current evidence remains inconclusive on the direction of the potential relationship of sleep timing and sleep regularity with cancer risk.
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0335

BEYOND SLEEP STAGING: POPULATION-LEVEL SLEEP DYNAMICS THROUGH WEARABLE SENSING ACROSS AGE AND SEX

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Introduction: Understanding normative age-related changes is essential for distinguishing normal from abnormal sleep trajectories. This study examines age- and sex-related variations in sleep and circadian patterns using large-scale data from consumer wearables.
Methods: One month of sleep data was evaluated from 25,918 Oura Ring users, equally distributed across age groups (spanning 20y to 85y, in increments of 5y and an equal male-to-female ratio (1:1). Standard sleep parameters (total sleep time, time spent awake, percentage of time in 'light', 'deep', and REM sleep), circadian factors (sleep midpoint, chronotype), and 30-second epoch-to-epoch transition probabilities (a measure of within-night sleep stability) were analyzed via generalized linear model (GLM) regression with age, sex, and age*sex as factors.
Results: Overall, women slept longer than men (+16.2 min; p<.000). Total sleep time peaked in the 20–25-year-old group (441±78 min) and declined to 403±68 min in the 80–85-year-old group (p<.000). Deep sleep percentage halved with age, while REM sleep showed smaller decreases beginning after 35 years (p<.000). Light sleep increased steadily, comprising 70–75% of total sleep in the oldest group (p<.000). The sleep midpoint slightly decreases with age, with chronotype showing advancement as people age. Sleep stability declined with age, with deep-to-deep and REM-to-REM transitions decreasing, particularly from 35 years onward (p<.000). Men experienced earlier stability declines around 40–45 years, while in women, these began around 55–60 years. Deep-to-light transitions rose from 3.4% in young adults to 8.4% in older adults (p<.000), with men showing earlier changes. REM-to-awake transitions increased with age, and REM-to-light transitions accelerated after 35 years, becoming most pronounced after 60 years. Significant differences were also observed in the interaction between age and sex on several other aspects of sleep dynamics.
Conclusion: This study highlights the impact of aging and sex on sleep dynamics, with wearable data offering powerful insights into previously inaccessible patterns. By leveraging these findings, wearables have the potential to transform our understanding of sleep health and its role in disease progression, paving the way for targeted interventions and personalized solutions.
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0336

SWEET DREAMS ARE MADE OF EEG: REVISITING THE FIRST NIGHT EFFECT BY EXAMINING DIFFERENCES IN POLYSOMNOGRAPHY AND AN EEG HEADBAND

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Introduction: Polysomnography (PSG) is the gold standard for objective sleep measurement, but may not represent habitual sleep due to the first-night effect (FNE). This study quantified FNE by comparing total sleep time (TST) and wake after sleep onset (WASO) from one night of home-based PSG to contiguous measures from an electroencephalography (EEG)-measuring headband averaged over multiple nights.
Methods: Sixty-three community-living adults ≥55 years with symptoms of insomnia and/or daytime sleepiness ≥once/week completed an eight-day home-based protocol with one night of PSG (NOX Medical) and seven nights of EEG-headband (Beacon Biosignals). For the current analyses, we excluded 7 participants (6 had TST < 4 hours on PSG; 1 had < 4 nights of headband use). Among 56 participants, objective measures of TST and WASO from PSG were compared to averages from the headband (calculated from all nights of headband use or from nights prior to PSG). Two-sample paired T-tests examined mean differences in TST and WASO between PSG and the headband.
Results: Participants had a mean age of 75.7 (±7) years, 69.6% were women, 27% were minority race/ethnicity, and mean Insomnia Severity Index and Epworth Sleepiness Scale scores were 12.3 (±4) and 7.4 (±5), respectively. Excluding the PSG night, participants wore the headband for 5.5 (±0.7) nights overall and 4.1 (±1.4) nights pre-PSG. TST was significantly longer on PSG nights compared to non-PSG and pre-PSG nights (differences of 28.2 [8.9, 47.5] and 19.9 [1.4, 38.5] minutes, respectively; p values ≤0.04). WASO was significantly longer on PSG nights compared to non-PSG and pre-PSG nights (differences of 34.0 [15.7, 52.3] and 34.9 [16.8, 53.0] minutes, respectively; p values < 0.01).
Conclusion: Contrary to expectations, we found that TST was longer on PSG nights, possibly due to protocol-driven earlier bedtimes. WASO increased by approximately 30 minutes on average on PSG nights. These findings highlight how PSG protocols might alter sleep patterns and suggest we should be cautious when assuming that PSG-measured sleep metrics represent habitual sleep patterns.
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0337

OBJECTIVE SLEEP AND MICROVASCULAR ENDOTHELIAL FUNCTION IN POSTMENOPAUSAL FEMALES

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Introduction: Menopause, the cessation of sex-hormone production from the ovaries, is associated with an accelerated rate of cardiovascular disease (CVD). Sleep disturbance, a common and debilitating menopausal symptom, can increase CVD risk. Further, low endothelial function is associated with increased CVD risk. However, the link between objective sleep measures and microvascular endothelial function in otherwise healthy postmenopausal females is unclear. The goal of this ongoing study is to test the hypothesis that short sleep duration and low

sleep quality, quantified by actigraphy, would be associated with attenuated microvascular endothelial function.
Methods: Eleven healthy females [menopause completed at 52±2years (mean±SD)] completed two study visits, 7-days apart. Informed consent was obtained at Visit 1 and participants were given the Actiwatch Spectrum Plus to track their sleep-wake cycle for the next 7 days. Prior to Visit 2, participants fasted and abstained from caffeine, alcohol and exercise for 12 hours. During this visit, we assessed endothelial function using endothelial peripheral arterial tonometry (EndoPAT) to quantify reactive hyperemia index (RHI) and its natural log (LnRHI). Resting hemodynamic parameters were also obtained via EndoPAT. Pearson's correlation was used to probe the association of sleep duration and sleep efficiency with RHI and LnRHI. Independent sample t-tests were used to compare mean RHI and LnRHI between short- and long-sleepers. The two "sleepers" groups were determined using a median split of the sleep duration (7.81 hours).
Results: The study participants were 62±3years with a body mass index of 25.5±3.2kg/m2. Average sleep duration was 7.48±0.96hours and mean sleep efficiency was 81.4±6.3%. Average blood pressure was 126±8mmHg and 80±7mmHg for systolic and diastolic, respectively, while mean heart rate was 60±7beats/min. Our preliminary analyses revealed that endothelial function was not associated with sleep duration (RHI: r=0.21, p=0.54; LnRHI: r=0.09, p=0.80) or sleep efficiency (RHI: r=0.10, p=0.76; LnRHI: r=-0.14, p=0.68). No differences were observed in endothelial function between the short- (RHI: 1.79±0.36; LnRHI: 0.63 ±0.13) and long-sleepers (RHI: 2.01±0.54 a.u., p=0.47; LnRHI: 0.67±0.29 a.u., p=0.77).
Conclusion: Albeit a small sample size, preliminary analyses did not reveal an association between objective sleep and endothelial function in healthy postmenopausal females.
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0338

SELF-REPORTED MULTIDIMENSIONAL SLEEP HEALTH IS NOT ASSOCIATED WITH COGNITIVE DECLINE AND THE RISK OF DEMENTIA IN TWO POPULATION-BASED COHORT STUDIES

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Introduction: The links between sleep disturbances, cognitive decline, and dementia are increasingly recognized, but few studies have considered that sleep health is multidimensional. We evaluated how multidimensional sleep health relates to cognitive decline and the risk of dementia in middle-aged and elderly populations.
Methods: Self-reported sleep health indicators (satisfaction, alertness, timing, efficiency, and duration) were measured in 7892 participants in the Rotterdam Study (RS) (median [Q1-Q3] age: 68.5 [61.6-76.1] years, 58.2% female) and 1601 participants in the Rush Memory and Aging Project and Minority Aging Research Project (MAP/MARS) (79.2 [73.8-85.3] years, 77.3% female). A multidimensional sleep health score was calculated as the number of adverse sleep health indicators. Latent class analysis identified three multidimensional sleep health profiles: average sleep, inefficient sleep, and poor sleep. Sleep health scores, profiles, and individual indicators were related to five cognitive tests measured repeatedly over time (linear mixed effects models) and to risk of dementia (Cox proportional hazards models).
Results: In RS, 1148 (14.5%) participants developed dementia during a median of 11 (7.7-14.3) years. In MAP/MARS, 287 (17.9%) participants developed dementia during a median of 5.0 (3.0-8.0) years. Multidimensional sleep health scores and profiles were not associated with accelerated cognitive decline or the risk of dementia in either sample (Hazard Ratios [HRs] between 0.72-1.15). The individual indicators early timing (RS: HR 1.60; 95%CI [1.23-2.09]; MAP/MARS: HR 1.37 [0.95-2.00]) and long sleep duration (RS: HR 1.61, [1.34-1.94]; MAP/MARS: HR 1.23 [0.81-1.88]) were associated with a higher risk of dementia. Long sleep duration was associated with accelerated cognitive decline on word learning, substitution, and category fluency tasks in MAP/MARS.
Conclusion: Self-reported multidimensional sleep health was not associated with cognitive decline and the risk of dementia in two samples of middle-aged and elderly persons. Individual sleep health indicators might be more informative than aggregate measures for predicting cognitive decline and dementia. Future research should consider more complex combinations of self-reported sleep health features and objective measures of sleep.
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0339

SEX HORMONES AND SLEEP IN PERIMENOPAUSE: A CROSS-SECTIONAL STUDY

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Introduction: Perimenopause is a transitional phase marked by significant fluctuations in sex hormones and vasomotor symptoms such as sleep disturbances and night sweats, which may negatively affect cardiovascular health. Understanding the association between sex hormones and sleep disturbances in perimenopausal women is critical for improving their quality of life. This study aimed to evaluate the association of sex hormone levels and sleep disturbances in perimenopausal women with a focus on identifying hormonal patterns associated with sleep disturbances.
Methods: This cross-sectional study involved 200 women, aged between 40-55 years, with perimenopausal symptoms. Data on anthropometric measures, medical history, vasomotor symptoms (sleep disturbances and night sweats), menstrual history, and exercise habits was collected. Blood samples were analysed for level of estrogen, FSH, DHEA-S, SHBG and Testosterone using electrochemiluminescence immunoassay (ECLIA) on

Roche Cobas analysers. Data was analysed using. Association between hormone levels and sleep disturbances were analysed by Pearson correlation test using SPSS 21 IPM software. P< 0.5 was considered as statistically significant.

Results: The mean age of the participants was 43.31± 4.10 years. The mean hormonal levels were: Estradiol (EII) 96.73± 53.15 pg/ml, FSH 40.26 ± 14.57 mIU/ml, testosterone 11.64 ± 3.81 mIU/ml, SHBG 57.74 ± 16.78 nmol/ml and DHEA-S 70.77 ± 21.15 µg/dl. Sleep disturbance was present in 90 (45%) women while night sweats were present in 125 (62.5%) women. Estradiol level was significantly lower in women with both sleep disturbances (P=0.005) night sweats (P=< 0.0001). Testosterone was also lower in women with night sweats (P=0.046). DHEA-S levels were lower in women without night sweats (p=0.037). There were significant negative correlations between estradiol and SHBG levels with frequency and duration of vasomotor symptoms (P< 0.0001, P=0.028 and P 0.032 respectively). No significant correlation was found with FSH, and DHEA-S levels.

Conclusion: Reduced estradiol, testosterone and SHBG levels are significantly associated with sleep disturbances and night sweats in perimenopausal women. These findings suggest that hormonal management strategies could improve sleep related problems in perimenopausal women which may improve their cardiovascular health.

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0340

APOE-4 STATUS INDEPENDENTLY AFFECTS SLEEP ARCHITECTURE AND CHOLESTEROL CLEARANCE

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Introduction: Poor sleep can contribute to elevated LDL cholesterol levels, and high cholesterol can exacerbate sleep fragmentation. Individuals carrying the ApoE ε4 allele, a known genetic risk factor for Alzheimer's disease, typically have higher LDL cholesterol levels and fragmented sleep, though the exact relationship between ApoE status and sleep remains unclear. This study addressed two main questions: (1) Is ApoE allele status associated with altered cholesterol levels and sleep architecture? (2) Does altered sleep architecture in ApoE ε4 carriers mediate the relationship between ApoE status and high cholesterol, or is the reverse true?

Methods: Data (N = 997, ages 22-78, 52 male) was obtained through the National Sleep Research Resource, from a study on Sleep Disordered Breathing, ApoE, and Lipid Metabolism at Stanford University. It included polysomnography (PSG) results, demographic information, sleep disorder diagnoses, metabolic panel results, and Epworth Sleepiness Scale scores. Of the 997 individuals, 647 had complete data and were included in the analysis: 409 were homozygous for the ε3 allele, 129 were heterozygous (ε3/ε4), and 13 were homozygous for the ε4 allele, with the remaining carried the ε2 allele. Only untreated patients suspected of sleep-disordered breathing were included; patients using CPAP therapy were excluded. We performed linear regression analysis to examine the association of ApoE status with LDL cholesterol levels and the N3/REM duration ratio. A subsequent mediation analysis assessed whether ApoE status influenced LDL cholesterol via N3/REM duration duration, or if LDL cholesterol influenced sleep architecture.

Results: Regression analysis revealed that both LDL cholesterol levels and the ratio of N3/REM duration increased significantly in a dose-dependent manner with ApoE ε4 status. REM duration remained mostly unchanged, except in homozygous ε4 carriers. Total sleep time also did not differ and increased N3 duration was observed at the expense of reduced N2 duration. No significant mediation effect was detected.

Conclusion: Our findings align with previous research showing higher LDL cholesterol levels in ε4 carriers. Studies have theorized that increased N3 duration in this group is associated with memory complaints likely due to synaptic overpruning. Finally, the ε4 isoform independently affects both sleep architecture and cholesterol levels.

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0341

MAPPING THE RELATIONSHIPS BETWEEN STRUCTURAL BRAIN MRI CHARACTERISTICS AND SLEEP EEG PATTERNS

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Introduction: While brain morphology is well-established as a key factor influencing overall brain function, little is known about how brain structural properties are associated with oscillatory activity, particularly during sleep.

Methods: In this study, we analyzed whole-night sleep EEG and brain structural MRI data from a subset of 621 individuals in the Multi-Ethnic Study of Atherosclerosis to explore the relationship between brain structure and sleep EEG properties. Sleep EEG data were preprocessed and analyzed using the open-source software Luna (https://zzz.bwh.harvard.edu/luna/).

Results: We found that larger total white matter (WM) volume was associated with higher absolute broad-band power, regardless of sleep stage (the strongest effects in the beta band during R, bst = 0.45, p = 3x10-6), likely reflecting WM contribution to enhanced synchronization across cortical regions and reduced activation attenuation via long-range myelinated fibers. Additionally, both WM fractional anisotropy and thalamus volume showed negative association with relative slow power and positive association with delta power during non-rapid eye movement sleep (strongest effect with corpus callosum FA, bst = –0.22, p = 2x10-6 for slow and bst = 0.15, p = 1x10-4 for delta band). This was mirrored in the duration of slow oscillations (SOs), both overall and when divided into slow-switching and fast-switching types, with their ratio additionally linked to total WM volume. Furthermore, we observed strong but largely independent effects of age and sex on sleep EEG and structural MRI metrics, suggesting that sleep EEG captures aging processes and sex-specific features that extend beyond the macro-scale brain morphology changes examined here.

Conclusion: Overall, these findings deepen our understanding of how structural brain properties influence sleep-related oscillatory activity.

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0342

CHARACTERIZING HUMAN SLEEP SPINDLE TEMPORAL DYNAMICS ACROSS HEALTH, DISORDERED CONDITIONS, AND AGING

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Introduction: Sleep spindles, transient brain waveforms of ~12 Hz oscillatory activity that define NREM stage 2 sleep, have been linked to memory consolidation, sleep stability, neurological disorders, and aging. While spindles are known to be influenced by multiple factors including sleep depth, cortical up/down states, breathing, and temporal clustering, most studies examine spindles in isolation without examining how these mechanistic influences interact and contribute to spindle dynamics. Without a systematic characterization of spindle dynamics, our ability to identify biomarkers for aging and disordered conditions remains critically limited.

Methods: We develop a statistical modeling framework based on point process theory to quantify spindle temporal dynamics and mechanistic influences as an integrated system. This framework models the relative impact of multiple factors (e.g., sleep stage/depth, slow oscillation, spindle history, respiration) to the moment-to-moment probability of spindle activity. In doing so, we can quantitatively evaluate the relative contribution of each factor, their interactions, and test mechanistic hypotheses across individuals, healthy and disordered populations, and aging.

Results: We applied this framework to a large cross-sectional dataset from the Cleveland Family Study (CFS, 735 participants, male/female: 329/406, 5 to 95 years) and a clinical database of pediatric Trisomy 21 (T21) patients (100 T21 patients and 100 age- and sex-matched controls, male/female: 54/46, 0 to 31 years). In both datasets, most participants showed a characteristic timing pattern that involves a refractory period followed by an excitatory period. Across the lifespan, older participants exhibited greater variability in spindle timing, suggesting age-related impairment in spindle production. In T21 patients, spindle timing patterns showed a lower excitatory peak compared to controls, indicating less predictable and disrupted spindle generation that may contribute to altered sleep architecture and cognitive deficits. Additionally, we revealed that spindle activity is modulated by normal breathing, with distinct temporal associations between obstructive sleep apnea/hypopnea events and spindles.

Conclusion: Overall, by characterizing spindle temporal dynamics across diverse populations, we provide novel mechanistic insights into aging, neurodevelopmental disruptions in T21 patients, and the effects of sleep-disordered breathing.

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0343

CHARACTERIZING BROAD CLASSES OF SPINDLE-LIKE TRANSIENT EVENTS ACROSS THE LIFESPAN

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Introduction: Sleep spindles, transient oscillatory events linked to memory consolidation, vary in neurodegenerative disorders and healthy aging. Understanding spindle activity changes across the lifespan aids in distinguishing healthy from pathological aging, improving diagnosis and tracking of age-related pathologies. While many previous studies analyze spindle features across the lifespan, they typically rely on detection algorithms with ad-hoc frequency and rarity constraints, leading to inconsistent results. Recent work shows that agnostic transient event detection can reveal multiple spindle-like classes without these assumptions. This study characterizes spindle-like activity dynamics across the lifespan, providing an objective lens for viewing brain development and aging, creating a more accurate framework for understanding age-related pathologies.

Methods: We examined tens of thousands of 2-16 Hz spindle-like events from the C3 electroencephalogram (EEG) in each of 712 subjects from the Cleveland Family Study (7-88 years, 55% F) during NREM sleep using the DYNAM-O toolbox. We characterized events as a function of their frequency, sleep depth, and slow oscillation (0.5-1.5Hz) phase, identifying clusters of distinct classes of transient oscillatory activity and their dynamics across the lifespan.

Results: Population analyses identified four distinct classes of transient oscillations, quantifying their multidimensional longitudinal dynamics with age. Beyond confirming previous spindle findings, we provide several novel insights. Specifically, fast spindle range (12-16 Hz) event phase-coupling becomes less frequency-dependent with age. Events in the slow-spindle range (10-12 Hz) tend to appear at ~20 years and move earlier in sleep depth with age. We identified a class of events that rises from 6 Hz to 9 Hz between 7 and 25 years old, serving as a new potential neurodevelopmental biomarker. A class of delta (2-4 Hz) events increases in density with age but decreases in frequency and sleep depth. Additionally, we identified different subgroups of individuals with specific combinations of event classes.

Conclusion: These results reveal the complex multidimensional dynamics of a broad range of spindle-like activity across the lifespan. In doing so, this work enhances our understanding of traditional spindle events and suggests new classes of events that can be leveraged for improved identification of biomarkers of age and disorder in the sleep EEG.

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0344

ASSOCIATION BETWEEN SLEEP REGULARITY AND COGNITIVE FUNCTION IN OLDER ADULTS

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Introduction: Sleep changes are common as people age, with nearly 50% of older adults experiencing sleep-related difficulties. Poor sleep quality negatively impacts cognition; however, much of the existing research has relied on self-reported sleep questionnaires instead of objectively assessing different sleep characteristics and has utilized only global cognitive screening tools. The primary aim of this study is to investigate the association between sleep regularity (i.e., the consistency of sleep timing across multiple nights) assessed by actigraphy and cognitive function in older adults. The secondary aim is to explore the association between wake after sleep onset (WASO) and cognitive function in this population.
Methods: Fifty-seven older adults with no clinically identified cognitive impairment diagnosis (mean age = 70±7.3 years, 56.3% female, mean years of education = 16.1±3.4) participated in the study. Sleep parameters, including sleep regularity and WASO (mean ± SD = 44.16±24.01 minutes), were objectively measured using actigraphy over a 14-day period. A clinical neuropsychological battery was administered to assess cognitive function across multiple domains, including immediate memory, delayed memory, visual spatial ability, executive function, attention, and processing speed. Multiple regression analyses, adjusted for age, gender, and education, were conducted to examine the association between each sleep parameter and cognitive performance on the six domains.
Results: No significant associations were found between sleep regularity and any cognitive domain. In line with previous research emphasizing sleep quality and continuity, lower WASO was associated with improved immediate memory performance (β = -0.118, p = 0.006).
Conclusion: These findings indicate that sleep regularity was not significantly associated with cognitive functions in older adults. Consistent with previous research, sleep continuity indicators appear to be more closely linked to cognitive functions. These results highlighted the importance of prioritizing interventions that improve sleep quality and continuity over regularity for cognitive benefits in aging populations.
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0345

LIFE COURSE SLEEP DURATION TRAJECTORIES AND RISK AND AGE AT ONSET OF PARKINSON'S DISEASE

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Introduction: Sleep disturbances may be prodromal signs or risk factors for Parkinson's disease (PD). This study aims at characterizing life course sleep duration trajectories and examining their associations with PD risk and age at onset (AAO).
Methods: Participants in Parkinson's Progression Markers Initiative (PPMI)-Online (started in 2021) and Fox Insight (FI, started in 2018) reported long term sleep duration: ages 18 to 80+ (PPMI-Online), and ages 12 to 66+ (FI). Latent class growth analysis was used to characterize sleep duration trajectories. Associations between sleep duration trajectories and PD diagnosis or AAO were examined using logistic regression and linear regression, respectively.
Results: The 17,834 participants were 54.6% female and aged 67.2 (7.83).The discovery cohort (PPMI-Online) included 5,660 people with PD (PwPD) and 10,245 without PD, and the replication cohort (FI) included 1,929 PwPD. The study sample included 5,660 people with PD (PwPD) and 10,245 without PD. Sleep trajectories from PPMI-Online remained stable during early adulthood (<=6, 6-7, 7-8, >8 hours/day) but showed varying trends (stable, increasing, decreasing) during midlife. After adjusting for demographics, lifestyle, depression, anxiety, and RBD screening, midlife decreases in sleep (from 6-7 hours/day: OR = 1.90, 95% CI 1.61-2.24, P <.001; from 7-8 hours/day: OR = 1.64, 95% CI 1.40-1.91, P <.001) and consistently short sleep (<=6 hours/day throughout adulthood: OR = 1.41, 95% CI 1.19-1.67, P <.001) were linked to increased risk. Low sleep in early adulthood and midlife was also associated with earlier AAO, with the most pronounced effect in those with consistently short sleep across adulthood (β = -2.45 years, 95% CI -3.33 to -1.56, P = <.001). The findings with AAO were validated in FI.
Conclusion: Self-reported shorter sleep in early adulthood and decreasing sleep in midlife are associated with increased PD risk and earlier AAO. Midlife sleep reduction may mark future PD. Further studies should explore their links with RBD. Persons with life-course short sleep may be candidates for preventive intervention.
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0346

EXPLORING THE SEX-DEPENDENT ASSOCIATION BETWEEN NAPPING AND CARDIOVASCULAR FUNCTION AMONG OLDER ADULTS

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Introduction: The link between poor nighttime sleep and cardiovascular dysfunction is established, with known sex differences in both factors. The relationship between daytime sleep behaviors like habitual napping and cardiovascular function remains unclear, particularly in aging populations. Given that cardiovascular disease is the leading cause of death, it is crucial to assess how nighttime sleep, napping, and cardiovascular function interact in aging populations most affected by the disease. This study evaluated whether the association between habitual napping and resting autonomic functioning is influenced by sleep efficiency, and whether this relationship is moderated by sex in older adults.

Methods: Older adults (N=66, Mage=68.6±5.4 years, 37 women; NCT04282642, AASM:256-FP-21, PI:Curtis) completed 2-weeks of sleep diaries assessing napping frequency/duration, and sleep efficiency %. Participants also completed an in-lab 5-minute resting echocardiogram (Holter monitor). Multiple linear regressions and simple slope analyses tested if sex, sleep efficiency, napping (frequency and duration), or their interactions were associated with cardiovascular function (heart rate and heart rate variability metric root mean squared of standard deviation of normal-to-normal heartbeats (RMSSD)), controlling for age.
Results: The interaction of sex, sleep efficiency, and napping duration was associated with resting RMSSD (R2-change=.11, p=.01). Specifically, for women, longer nap duration was associated with lower resting RMSSD measures at higher levels of sleep efficiency (~81%; B=-0.30, p=.03). In men, longer nap duration was associated with lower resting RMSSD at moderate sleep efficiency levels (~59%; B=-0.43, p=.02), and this was exacerbated (1.6-fold) at lowest sleep efficiency levels (~40%; B=-0.68, p=.02).
Conclusion: Present findings suggest the relationship between sleep efficiency, daytime napping and cardiovascular functioning in older adults is sex dependent. Consistent results support current recommendations in insomnia behavioral interventions (e.g., cognitive behavioral therapy for insomnia) to avoid napping. This may be particularly important for men with moderate-to low sleep efficiency and women with higher (but sub-optimal) sleep efficiency, to mitigate cardiovascular risks. Findings highlight the importance of investigating whether behavioral sleep treatments that reduce napping duration also reduce CVD risk, especially among older men.
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0347

THE RELATIONSHIP BETWEEN PHYSIOLOGICAL ARTERIAL FUNCTION AND SLEEP-RELATED FACTORS IN YOUNG ADULT WOMEN AND MENOPAUSAL WOMEN

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Introduction: In menopausal women, ovarian function declines several years before menopause, causing a rapid decrease in the secretion of female hormones and the flexibility of blood vessels. Previous studies have reported that up to 60% of menopausal women complain of sleep problems, and sleep problems have been found to contribute to arteriosclerosis. In the current study, we investigated the relationship between physiological arteriosclerosis indicators and lifestyle habits in young and menopausal women.
Methods: Twenty-three healthy adults (11 young women and 12 menopausal women) participated in the experiment. Mean intima-media thickness (IMT), peak-systolic velocity, end-diastolic velocity, resistance index, and pulsatility index were measured using carotid artery ultrasound. Ankle brachial index, pulse wave velocity (PWV), blood pressure, as well as new indices of arteriosclerosis, arterial velocity pulse index (AVI) and arterial pressure volume index were then measured. Participants completed the PSQI and morningness-eveningness questionnaire, a questionnaire on lifestyle habits, Epworth sleepiness scale(ESS), and Simplified Menopausal Index. This study was approved by the Ethical Committee of Saitama Prefectural University.
Results: Menopausal women had significantly higher blood pressure, AVI, IMT, and PWV compared with young women (all $p < 0.05$). Strong correlations were observed between irregular bedtime and AVI, and between subjective sleep latency and PWV in young women (Rho = 0.742, p = 0.009; Rho = 0.892, $p < 0.001$, respectively). The time spent using a mobile phone and frequency of sleepiness were significantly positive corelated with IMT values (Rho = 0.669, p = 0.024; Rho = 0.626, p = 0.039). In menopausal women, a significant positive correlation was observed between ESS scores and AVI (Rho = 0.680, p = 0.015). Moreover, ankle brachial index in menopausal women was positively correlated with evening-type and frequency of eating out (Rho = 0.669, p = 0.024; Rho = 0.580, p = 0.048, respectively).
Conclusion: In young women, irregular bedtimes, subjective sleep latency, and prolonged use of electronic media is associate with arteriosclerosis. In menopausal women, a nocturnal lifestyle and frequent eating out are associated with arteriosclerosis, and the progression of arteriosclerosis may be related to sleepiness.
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0348

JOINT ASSOCIATIONS OF SLEEP DURATION AND QUALITY WITH DAILY RUMINATION AND MEMORY LAPSES: DIFFERENCES BY AGE GROUPS

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Introduction: The association between sleep and cognitive functioning is well documented. However, less is known about the distinct roles of sleep duration and sleep quality in shaping day-to-day subjective cognitive experiences, such as rumination and memory lapses. Additionally, it remains unclear whether these two sleep dimensions interact—either compensating for one another or amplifying adverse effects. Understanding age-related variations in such interactions warrants attention, given age-linked shifts in sleep patterns and cognitive resilience.
Methods: Data were drawn from 964 adults (Mage=60.59, SDage=9.20) who took part in the MIDUS III main survey and an 8-day diary study. Each day, participants reported the previous night's sleep duration and quality, followed by measures of rumination and memory lapses. Multilevel models examined both between-person (habitual) and within-person (daily fluctuation) effects of sleep duration and quality, as well as their interaction, on next-day cognition, adjusting for socio-demographics, physical health, and daily covariates.
Results: Independent of sleep duration, poorer sleep quality was linked to more frequent rumination, both at the between-person (B=-0.14, SE=0.02, p <.001) and within-person (B=-0.05, SE=0.01, p <.001) levels. In this model, shorter sleep duration predicted greater rumination only at the within-person level (B=-0.01, SE=0.004, p=.045). For memory lapses, poorer sleep quality was associated with more lapses at the between-person level

(B=-0.37, IRR=0.69, SE=0.09, p <.001), while sleep duration had no independent relation. Longer sleep duration attenuated the negative association of poorer sleep quality with rumination both at the between-person (B=0.02, SE=0.01, p=.018) and within-person (B=0.02, SE=0.01, p=.007) levels. No significant interaction emerged for memory lapses. The compensatory effect of sleep duration on the sleep quality—rumination link was evident only among adults aged 60–67, but for adults aged 43-59, or 67-83.
Conclusion: Findings highlight the independent and joint roles of sleep duration and quality in daily subjective cognition. Longer sleep may help offset poor sleep quality's detrimental cognitive effects, particularly in early old adulthood, offering insights for tailored interventions.
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0349
AGE-RELATED DIFFERENCES IN THE RELATIONSHIP BETWEEN OBJECTIVE AND SUBJECTIVE MEASURES OF SLEEPINESS

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Introduction: Daytime sleepiness may be used to assess the quality and quantity of the previous night's sleep. We investigated whether there were age-related differences between objective and subjective measures of sleepiness during the day, and the previous night's sleep duration. The Multiple Sleep Latency Test (MSLT) is an in-lab test that utilizes polysomnography (PSG) to provide objective measures of sleepiness; the Karolinska Sleepiness Scale (KSS) is a 9-point scale for subjective sleepiness levels.
Methods: 35 Younger (Y) (18-32, 18 F) and 18 Older (O) (60-76, 6 F) healthy participants were studied using PSG in an in-lab protocol. During night 1 (BL), participants were scheduled to sleep at a time and duration based on their sleep schedules. Five sessions of an MSLT were conducted the following day (MSLT1). Participants then had 4-7 consecutive days with 16 hrs (12 hrs at night and 4 hrs nap) sleep opportunities per day, followed by a second MSLT (MSLT2). The sleep episode before MSLT2 was scheduled for 12 hours (Long). Total sleep time (TST) for the nighttime sleep episodes prior to both sets of MSLTs was calculated. The median sleep latency of each MSLT session and the percentage of the time individuals fell asleep within MSLT1 and MSLT2 were calculated. Tobit regression models assessed relationships between KSS scores and sleep latency on the MSLTs.
Results: There was no relationship between sleep latency and KSS score for each MSLT nap. Percent slept for MSLT1 and MSLT2 were positively correlated in Y (Pearson R = 0.49, p=0.002) and O (Pearson R = 0.59, p= 0.009) despite the Y sleeping longer than O on the night before MSLT1 (Yave=7.88 hrs, Oave = 6.58, p< 0.001) and MSLT2 (Yave=8.18 hrs, Oave = 6.06, p< 0.001). MSLT1 correlates with prior sleep only in Y after BL (Pearson R=0.35, p=0.049); MSLT2 is not correlated with prior sleep in either group.
Conclusion: Subjective measures of sleepiness as measured by the KSS are not correlated with objective measures of sleepiness as measured by sleep latency on the MSLT in both age groups. These data suggest that sleep latency may have trait-like, state-dependent, and age-dependent relationships.
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0350
OBJECTIVELY-ASSESSED NAPPING BEHAVIORS PREDICT MORTALITY IN MIDDLE-TO-OLDER AGED ADULTS

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Introduction: Self-reported daytime napping is associated with various adverse health outcomes. We examined whether actigraphy-measured objective daytime napping behaviors predict all-cause mortality in middle-to-older aged adults in the UK Biobank.
Methods: We studied 86,565 participants (baseline age=63 years, SD=8, range: 43-79; 57% female) in the UK Biobank who did not have shiftwork history, completed a 7-day actigraphy monitoring, and had data linked to mortality registeries. We implemented the Cole-Kripke algorithm to identify daytime sleep episodes from actigraphy and computed the following nap metrics: (1) mean nap duration between 9am-7pm; (2) intra-individual variability across days (individual SD) in nap duration; (3) timing of naps quantified as the percentage of nap duration in each 2-h bin between 9am-7pm (i.e., 9-11am, 11am-1pm, 1-3pm, 3-5pm, 5-7pm). Nap variables were square-root transformed to correct for right skewness and standardized for interpretation. Cox proportional hazards models were performed to test the associations between napping metrics and all-cause mortality, adjusting for demographics, BMI, smoking, alcohol consumption, comorbidities, nighttime sleep duration, and chronotype.
Results: Median nap duration was 0.40 hours/day (IQR=0.19-0.77), and intra-individual variability of nap duration was 0.39 hours (IQR=0.19-0.69). Thirty-four percent (IQR=12%-52%) of the naps were taken between 9-11am, 10% (IQR=0%-17%) between 11am-1pm, 14% (IQR=0%-22%) between 1-3pm, 19% (IQR=1%-29%) between 3-5pm, and 22% (IQR=4%-32%) between 5-7pm. During an up to 8-year follow-up, 2,950 (3.4%) participants died, and among them, the average survival time was 4.19 (range: 0.03-8.15) years after baseline. Longer nap duration (for 1-SD, HR=1.20, 95%CI: 1.16-1.24, p< 0.0001), greater intra-individual variability (for 1-SD, HR=1.14, 95%CI: 1.10-1.18, p< 0.0001), and higher percentage of naps between 11am-1pm and between 1-3pm were associated with mortality (for 1-SD, 11am-1pm: HR=1.07, 95%CI: 1.03-1.11, p=0.0005; 1-3pm: HR=1.07, 95%CI: 1.03-1.12, p=0.0002).
Conclusion: Longer naps, greater intra-individual variability in daytime nap, and higher percentages of naps around noon and in the early afternoon are associated with greater mortality risks. These findings highlight the potential importance of considering napping behaviors in risk stratification of mortality in middle-to-older aged adults. Incorporating actigraphy-based nap assessments into clinical and public health practices may provide novel opportunities for early risk identification and personalized interventions to promote longevity.
Support (if any): Alzheimer's Association, AASM

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0351
BIOLOGICAL VALIDATION OF LIFESPAN MODELING IN DROSOPHILA MELANOGASTER

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Introduction: Sleep is an evolutionary conserved function across species, indicating that it is a necessary function for life. Inadequate sleep promotes several disease states across a variety of systems that reduce lifespan, leading us to hypothesize that there must be a general underlying mechanism affected by sleep. To discover this mechanism, our interdisciplinary team has developed unique mathematical models to predict lifespan in chronologically identical Drosophila melanogaster, based on their sleep characteristics. Proteostasis, oxidative stress, and energy homeostasis are all associated with aging and thus make sense to pursue first in lifespan model validation.
Methods: Sleep is monitored for 30-days using the Trikinetics DAM system. Those data are used to make lifespan predictions, and flies are then binned into two groups – predicted long life (PLL) and predicted short life (PSL) for subsequent experimentation. To validate the models, we used a variety of molecular techniques. Overall soluble protein was quantified using a standard Bradford assay protocol. Metabolites were quantified using standard LC-MS/MS methods. MALDI-TOF imaging was used to examine energy metabolism, oxidative stress, and lipids. MALDI-TOF imaging was done using 9-Aminoacridine (9-AA) matrix with a target range between 50 m/z -1000 m/z. All statistical analyses were done using a Student's T-test, with α=0.05.
Results: Our predictions successfully binned the flies into two groups, with 26.7% of PSL flies dying between lifespan prediction and experimentation, compared to only 11.8% of PLL flies. We found evidence of proteome collapse, with overall soluble protein concentration significantly higher in PLL flies than PSL flies ($p< 0.05$). Our PSL flies had a significantly higher GSSG/GSH ratio, indicating oxidative stress ($p< 0.0001$). Furthermore, we found elevated AMP in PSL flies, indicating trouble maintaining the energy required for proteostasis and appropriate oxidative stress response. MALDI imaging showed localization differences of AMP/ATP/ADP and GSSG/GSH in abdomens of PLL and PSL flies ($p< 0.05$). Furthermore, MALDI-TOF imaging found free fatty acids and acylcarnitines to be significantly decreased in PSL flies ($p< 0.05$).
Conclusion: Our models can successfully separate our flies into distinct, biologically different groups, based on sleep characteristics. This allows us to make inferences between sleep and molecular function.
Support (if any):

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0352

ALTERED GLYMPHATIC ACTIVITY IS ASSOCIATED WITH SLEEP PROBLEMS AND REDUCED COGNITIVE FUNCTION IN MIDDLE-AGED AND OLDER AUTISTIC ADULTS

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Introduction: The glymphatic system is crucial for removing waste products from the brain, particularly during sleep. Atypical glymphatic function, quantified non-invasively from functional magnetic resonance imaging (fMRI) as the coupling between the global gray matter blood-oxygenation level dependent (BOLD) signal and cerebrospinal fluid (CSF) flow has been associated with cognitive decline in neurodegenerative disorders like Alzheimer's and Parkinson's Disease. Reduced BOLD-CSF coupling has also been linked to insomnia in depression. Sleep disturbances are common in autism spectrum disorder (ASD) but it is unclear whether glymphatic function is impacted. Examination of the potential sleep-glymphatic link is especially relevant in aging autistic adults as it might contribute to cognitive decline.
Methods: Resting state fMRI (12 min., TR=800ms) was acquired from 40 neurotypical (NT) and 27 autistic adults (40-70 year-olds). The global BOLD signal was extracted from gray matter masks and the CSF inflow signal derived from the central canal inferior to the cerebellum. The cross-correlation between BOLD and CSF fluctuations at a 2.4s lag quantified BOLD-CSF coupling, as in previous studies. Group differences were tested with a general linear model (GLM) controlling for age, fMRI quality and time of scan. Participants also completed standardized neuropsychological assessments (e.g., the California Verbal Learning Test [CVLT]) and were subtyped by reported sleep problems. Associations between BOLD-CSF coupling, sleep and cognitive function were tested with a GLM and partial correlations.
Results: The ASD and NT groups did not differ on age, gender, or non-verbal IQ. However, autistic adults were more likely to have sleep disturbances (69% vs. 35%; p=.01). BOLD-CSF coupling was significantly reduced in autistic compared to NT adults (p=.03) and, specifically, was lower in autistic adults with sleep problems (p<.001). BOLD-CSF coupling was not associated with executive function in autistic adults, but correlated negatively with short (r=-.49, p=.03) and long delay (r=-.51, p=.02) cued recall on the CVLT.
Conclusion: Our results suggest glymphatic system dysfunction in autistic adults that is associated with frequently co-occurring sleep problems and reduced verbal learning and memory. These findings highlight the importance of future longitudinal studies to better understand the impact of disrupted sleep on aging in autism.
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0353

RELATIONSHIP BETWEEN SELF-REPORTED OR OBJECTIVE PHYSICAL ACTIVITY MEASURES AND SLEEP AMONG OLDER PERSONS WITH SLEEP DISTURBANCES

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Introduction: The relationship between physical activity (PA) and sleep among older persons with sleep disturbances is unclear, possibly due to biases in self-reported measures. We examined the association of physical activity, measured by self-reported or objective measures, with objective measures of sleep among older persons.
Methods: This was a cross-sectional analysis among 64 community-living older persons with symptoms of insomnia and/or daytime sleepiness ≥once/week. Participants completed a medical interview and an 8-day home-based protocol with 7 days and

nights of actigraphy and one night of polysomnography. Self-reported PA measures were assessed over the previous month and included taking a walk for exercise ≥once/week (SRW) or doing vigorous activities that increased the heart rate ≥once/week (SRVA). Objective PA measures were assessed by moderate-to-vigorous activity (MVPA; the proportion of activity counts >1040 over 24 hours) and averaged over 7 days. Measures of sleep were assessed by polysomnography and included total sleep time (TST) and wake-after-sleep onset (WASO). Linear regression analyses examined the association of self-reported (SRW, SRVA) or objective (MVPA) physical activity measures with TST or WASO.

Results: The average age was 63 (10) years; 64% identified as White and 64% were females. Forty-three percent of participants said they performed SRW ≥once/week, while 19% said they did so for SRVA. Average TST and WASO were 370 (93) min and 90 (64) min, respectively. In regression models, increases in self-reported PA were not significantly associated with TST or WASO (p values > 0.05). Among participants with a higher proportion of MVPA, there was a trend for increased TST (p= 0.11), but no significant differences in WASO.

Conclusion: Among older persons with sleep disturbances, increases in self-reported or objective PA were not associated with increases in TST or decreases in WASO. These results need to be confirmed in a larger, longitudinal study but suggest factors other than the method of measurement for PA may explain the relationship between PA and sleep amongst an older population with sleep disturbances.

Support (if any):

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0354

SEX DIFFERENCES IN THE ASSOCIATION BETWEEN SLEEP AND NEURODEGENERATIVE BIOMARKERS: RESULTS FROM THE EINSTEIN AGING STUDY

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Introduction: Sleep health is crucial in physiological restoration and has been associated with an increased risk of cognitive decline. The glymphatic system, which removes toxins associated with Alzheimer's disease (AD) pathology during sleep, can be negatively affected by suboptimal sleep. Neurodegenerative biomarkers (NDBMs) in blood plasma are cost-effective indicators of AD risk. We explored associations between objectively measured sleep health characteristics and NDBMs and investigated sex differences in these associations in a diverse sample of older adults.

Methods: Participants without dementia (N=262, Mean age=77 years, 69% women; 46% White, 41% Black, 13% Hispanic/other) were from the Einstein Aging Study. Actigraphy (2 weeks) yielded wake-after-sleep onset (WASO), total night sleep time (TST), and midpoint night sleep. NDBMs included Amyloid-Beta (Aβ42/40 ratio), neurofilament light (NFL), and phosphorylated Tau181 (pTau181, log-transformed). Bayesian variability models evaluated associations of NDBMs with mean and variability of sleep measures, adjusted for sex, age, race, ethnicity, literacy level, hypoxemia, oxygen desaturation index (ODI), and mild cognitive impairment status. Models for pTau181 were additionally adjusted for the estimated glomerular filtration rate. Models were stratified by sex.

Results: Average later nighttime sleep midpoint was associated with higher levels for NFL and pTau181 in the full sample. Sex-stratified analyses showed different associations between NDBMs and sleep variables for men and women, even though men and women did not differ in sleep variables in this sample. Among men, later average sleep timing was associated with higher levels of pTau181 and greater Aβ42/40 ratios. Among women, analysis suggests a possible positive association between average sleep timing and levels of NFL (credible interval: [-0.025,3.981]). Variability of sleep timing was not credibly associated with any NDBMs in this sample. We did not find associations of mean or variability of TST and WASO with NDBMs among men or women.

Conclusion: In stratified analyses, we observed different associations between NDBMs and sleep timing for men and women. This study emphasized the importance of understanding sex differences in studying pathways to AD.

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0355

WEAPON-CARRYING IN US HIGH SCHOOLS IS ASSOCIATED WITH INSUFFICIENT SLEEP: 2009-2023

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Introduction: Most United States (US) high schools prohibit the possession of weapons on school property and consider weapon-carrying as misconduct. Insufficient sleep is associated with impulsivity, lack of self-control, and other adverse emotional and mental health outcomes, which may contribute to risk-taking behaviors. The role of sleep in influencing risk-taking behaviors, such as weapon carrying, among adolescents has been underexplored. We examined whether insufficient sleep on school days was associated with the risk of teenagers carrying weapons at school. Furthermore, we explored whether race/ethnicity would modify this association.
Methods: The study utilized repeated cross-sectional data from the Youth Risk Behavior Surveillance System Survey (YRBSS, 2009-2023) from nationally representative samples of high school students ages 16-18 (n=88,044). Weighted multivariable logistic regression models assessed the association of self-reported insufficient sleep (< 8 hours/night on school days) with weapon carrying on school properties (the dependent variable), adjusting for survey years and sociodemographic variables (age, biological sex, and race/ethnicity). Race/ethnicity was further explored as an effect modification to identify subgroup differences in this association. Adjusted Wald test was used to assess the statistical significance of effect modification. All descriptive and regression analyses accounted for the YRBSS complex survey design.
Results: An estimated 5% of high school students reported carrying weapons on school property. Seven in ten teenagers (70%) reported sleeping less than eight hours. Insufficient sleep (< 8 hours) was associated with greater odds of carrying weapons on school property (AOR: 1.14; 95% [CI: 1.02; 1.27]). More specifically, reported sleep for 4 hours/night (8.4% of participants) tripled the odds of weapons-carrying (AOR: 3.14; 95% CI: 2.67; 3.70]. Although the odds of weapon-carrying were greater among American-Indian/Alaska Native and Native Hawaiian/other Pacific Islander adolescents (AOR: 1.76; [1.07; 2.91] and 2.04 [1.19; 3.48]) than among their White peers, the association between insufficient sleep (< 8 hours) and weapon-carrying was not modified by race/ethnicity F(6,536) = 0.57; p=0.76).
Conclusion: Findings underscore the potential risks associated with having sleep-deprived students on school property. Policies that promote sufficient sleep during school days (e.g., later school start time) could help mitigate some of the risks of carrying weapons to school.
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0356

ADOLESCENT SOCIO-ECOLOGICAL PREDICTORS OF MEETING SLEEP GUIDELINES ON WEEKDAYS IN ADOLESCENCE AND YOUNG ADULTHOOD

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Introduction: Introduction: Inadequate and poor-quality sleep are associated with several leading causes of death (e.g. heart disease, accidents, and diabetes) as well as poor mental health. Understanding determinants of poor sleep may highlight avenues for interventions that could prevent the development of sleep problems. We aimed to explore how factors during adolescence, at all levels of the socio-ecological framework, relate to meeting sleep recommendations both concurrently and later in young adulthood.
Methods: Methods: Participants (n=1559) were recruited from Twin Cities, MN schools as part of Project EAT. They completed baseline surveys in 2009-2010 (mage=14.5) and follow-up surveys in 2017-2018 (mage=22.0). Logistic regression was used to examine whether adolescent socio-ecological factors (i.e., depression, screen time, parental connectedness, neighborhood safety, etc.) related to odds of meeting sleep guidelines in adolescence and young adulthood. Models were adjusted for age, sex, socioeconomic status, and race/ethnicity.
Results: Results: Multiple individual-level and interpersonal-level factors were relevant to adolescents' sleep. For instance, for each one-point increase in depression score adolescents' odds of meeting sleep guidelines lowered 8%. Although other individual-level factors in adolescence no longer predicted young adult sleep, adolescent depression remained a predictor of subpar sleep in young adulthood (OR=0.92; CI: 0.88-0.97). At the interpersonal-level, experiencing sexual harassment or harassment based on socioeconomic status, weight, or appearance, during adolescence predicted 25% lower odds of meeting sleep guidelines as adolescents (OR=0.75; CI: 0.60-0.93) and the effect extended into young adulthood (OR=0.70; CI: 0.52-0.94). However, other characteristics of adolescents' families that had concurrently predicted sleep in adolescence (such as family functioning and parental monitoring) did not predict meeting young adult sleep recommendation. At the environmental-level, increased safety in the adolescents' neighborhoods predicted higher odds of adolescents meeting sleep recommendations (OR=1.08; CI: 1.02-1.15) but the safety of one's adolescent neighborhood was not associated with sleep in young adulthood.
Conclusion: Conclusion: Adolescent factors at all levels of the socio-ecological framework related to sleep in adolescence and some effects persisted into young adulthood. There are multiple familial factors that could be enhanced through intervention that may improve sleep; meanwhile societal factors such as adolescent discrimination and harassment can negatively affect sleep and deserve attention.
Support (if any):

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0357

SCHOOL CONNECTEDNESS AND SLEEP HEALTH DURING ADOLESCENCE

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Introduction: Poor sleep health is prevalent among adolescents. Schools are an important environment where adolescents spend

a considerable amount of time. School connectedness, one's sense of being cared for and closeness to school staff and peers, has been found to be a protective factor for adolescent health. Less is known about school connectedness and sleep, particularly among adolescents experiencing health inequities. This study leveraged the Future of Families and Child Wellbeing Study (FFCWS) to examine the relationship between school connectedness and sleep health and whether race, socioeconomic status (SES), and caregiver education moderated these relationships in adolescents.

Methods: The sample included 690 adolescents with completed surveys and 7 days of actigraphy. Linear regression models were conducted to assess the relationship between school connectedness and sleep (total sleep time [TST], wake after sleep onset [WASO], sleep efficiency [SE], naps, and day-to-day variability in TST, WASO, SE, naps) with race, SES, and caregiver education entered as moderators.

Results: Adolescents had a mean age of 15 years; 53% were female, and 47% were non-Hispanic Black. Significant negative associations were found between school connectedness and nap duration ($r = -0.18$, $p < 0.001$) and variability ($r = -0.15$, $p < 0.001$), even after accounting for covariates ($B = -6.23$, $p = 0.004$; $B = -6.02$, $p = 0.03$), respectively. Among adolescents whose families lived 100 – 199% below the poverty threshold, every unit increase in school connectedness was associated with lower variability in TST ($B = -25.13$, $p = 0.007$) and WASO ($B = -0.83$, $p = 0.017$) compared to those living 0-49% below the poverty level. Among adolescents whose families lived 50-99% and 300% below the poverty threshold, every unit increase in school connectedness was associated with an increase in mean SE ($B = 1.36$, $p = 0.049$) and variability of SE ($B = -0.62$, $p = 0.018$), respectively, compared to those living 0-49% below the poverty level.

Conclusion: Our findings support the importance of school connectedness as a protective factor for good sleep health in adolescents despite their risk of health disparities.

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0358

RACIAL/ETHNIC DISPARITIES IN SLEEP VARIABILITY AND IRREGULARITY IN ADOLESCENTS: IMPACT OF SCHOOLING

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Introduction: While prior research has shown sleep health disparities as a function of race/ethnicity, most studies do not account for the impact of entrainment to the academic school schedule. We hypothesize that adolescents who identify as a racial/ethnic minority, compared to non-Hispanic whites, have greater sleep variability (amount) and irregularity (timing) when evaluated while attending school.

Methods: We analyzed 365 adolescents from the Penn State Child Cohort (median 16y; 46% female; 19% racial/ethnic minority, of which 67% were Black/African American and 33% Hispanic) who had at least 3 nights of actigraphy. Sleep midpoint was defined as the intra-individual mean middle point of the sleep period. Sleep irregularity was defined as the intra-individual standard deviation of sleep midpoint. Social jetlag was defined as the absolute difference between sleep midpoint on weekdays vs. weekends. Sleep duration was defined as the intra-individual mean total sleep time. Sleep variability was defined as the intra-individual standard deviation of total sleep time. Self-reported circadian preference was assessed via Morningness-Eveningness Questionnaire. Subjects reported race/ethnicity and were re-categorized into "Black/African American", "Hispanic/Latinx", "non-Hispanic/Latinx white" or "Other" for analytical purposes. ANOVAs were stratified by "in-school" and "on-break" to examine mean differences on each sleep duration and timing metric between non-Hispanic whites and minoritized adolescents.

Results: Adolescents evaluated while having to entrain to the school schedule and who identified as a racial/ethnic minority showed 12 minutes greater sleep variability ($p = 0.042$) and 15 minutes greater sleep irregularity ($p = 0.011$) compared to non-Hispanic/Latinx whites evaluated under the same entrainment conditions. Specifically, Black/African American adolescents showed 17 minutes greater sleep variability ($p = 0.030$) and Hispanic/Latinx adolescents showed 21 minutes greater sleep irregularity ($p = 0.021$) compared to non-Hispanic/Latinx whites. There were no significant racial/ethnic differences in sleep metrics when adolescents were evaluated while on-break.

Conclusion: Racial/ethnic disparities in sleep duration and circadian timing are aggravated by entrainment to the academic school schedule. Studies should identify the upstream determinants of these inconsistencies in the timing and amount of sleep when attending school. Additionally, interventions should target the observed sleep health inequalities in order to reduce their downstream effects in historically minoritized racial/ethnic groups.

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0359

LATER AGE OF MENARCHE IS ASSOCIATED WITH BETTER ACTIGRAPHIC SLEEP QUALITY AND FEWER SELF-REPORTED INSOMNIA SYMPTOMS IN ADOLESCENT GIRLS

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Introduction: Early age of pubertal onset is associated with increased sleep disturbances in girls; however, little is known about whether age of menarche is associated with sleep health in adolescent girls, particularly using objective sleep measures such as actigraphy. We examined whether age of menarche is associated with both actigraphic and self-reported sleep health among adolescent girls in a large, diverse population. Given the literature showing earlier age of menarche in Black and Hispanic girls, we also examined whether race/ethnicity moderated this relationship.

Methods: Data from 1,558 female participants who had experienced menarche (range: 8-16y) and had self-reported sleep outcomes were obtained from the age 15 wave of the Future

of Families and Child Wellbeing Study. Self-reported sleep outcomes included trouble falling and trouble staying asleep, bedtimes, wake times, and sleep duration on school days and weekends. Actigraphic sleep measures, including sleep onset, sleep duration, sleep maintenance efficiency, and wake after sleep onset (WASO), were collected in a subsample of 403 female adolescents (range: 8-14.7y) who participated in the sleep substudy. Multiple linear regression analyses examined the association between age of menarche in years and dimensions of sleep health adjusting for age at survey completion, race/ethnicity, family structure, household income, and parental education.

Results: Among the full sample, 1 year later age of menarche was associated with.18 fewer nights/week having trouble falling asleep (p<.001) and.14 fewer nights/week staying asleep (p<.001). Among the actigraphy sub-sample, 1 year later age of menarche was associated with.20 fewer nights/week having trouble staying asleep (p=.016),.22% higher nightly sleep maintenance efficiency (p=.045), and 1.5 fewer minutes WASO/night (p=.010). Race/ethnicity moderated some results such that the association between later age of menarche and fewer insomnia symptoms was stronger in White adolescent girls compared to Hispanic adolescent girls and not significant among Black adolescent girls.

Conclusion: Later age of menarche is associated with better actigraphic sleep quality and fewer self-reported insomnia symptoms at age 15, particularly among White girls. Future research should examine whether age of menarche predicts sleep health later in life.

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0360

ASSOCIATIONS OF SLEEP AND ORAL MICROBIOME AMONG ADOLESCENTS AND YOUNG ADULTS IN THE UNITED STATES

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Introduction: The human mouth is densely colonized by microbial species. Evidence suggests reduced microbial diversity has been associated with chronic physical and mental health conditions; however, most of these small-scale studies have implicated the gut microbiome and involved children or adults. We examined associations of oral microbiome diversity with self-reported sleep duration among a representative sample of adolescents and young adults ages 16-26 years in the United States.

Methods: This study used cross-sectional data from the National Health and Nutrition Examination Survey (NHANES, 2011-2012). Outcome variables: Oral microbiome alpha (α) diversity measures of richness and evenness: (1) Observed operational taxonomic units (OTU), (2) Faith's phylogenetic diversity (FPD), (3) Shannon-Weiner index (SWI), and (4) Inverse Simpson index (ISI). Sleep exposure variables: self-reported sleep hours on weekdays or school/work days were categorized as very short, short, healthy, and long sleep according to AASM recommendations. Four separate Generalized Linear Models (GLM) were fitted to the sample to investigate associations between each α diversity measure and sleep duration, controlling for covariates. All descriptive and regression analyses adjusted for NHANES complex survey design.

Results: The sample included 1,332 participants, of whom 463 were ages 16-18 years, and 869 were ages 19-26 years. The mean age was 20.9 years, and 50.4% were females. Five in ten teenagers (50.6%) reported the recommended hours of sleep (8-10 hrs), while six in ten young adults (61.2%) had the recommended hours of sleep (7-9 hrs). OTU mean was 128.0 [95% CI:122.35–133.64]; FPD mean was 14.24 [13.87–14.62]; SWI mean was 4.61 [4.54–4.67]; and ISI mean was 0.90 [0.89–0.90]. Findings from GLM estimates showed that compared to those with healthy sleep duration, teenagers and young adults with long sleep duration (3% of participants) had significantly higher oral microbiome diversity, according to OTU, FPD, and SWI indicators: 43.0 [22.3–63.72]; 2.96 [1.16–4.76]; and 0.64 [0.07–1.21], respectively. No significant association was found between ISI and self-reported sleep duration.

Conclusion: Oral microbiome diversity is positively associated with longer sleep duration among teenagers and young adults. Further research needs to determine the potential mechanisms behind the associations observed in this study.

Support (if any): NIGMS grant #P20GM139743.

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0361

SOCIAL MEDIA USE AND SLEEP IN COLLEGE: DIFFERENTIAL IMPACT FOR WOMEN

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Introduction: Recent research reveals significant impacts of social media use on students' sleep patterns and quality. Many young adults stay up late engaging with social media, affecting their physical and mental health, and academic performance. Frequent social media use is associated with delayed bedtimes, difficulties falling asleep, shorter sleep duration, and poorer sleep quality. Female college students who spend more time on social media report higher levels of anxiety and depressive symptoms compared to males. However, less is known about how social media use may directly or indirectly impact sleep differentially by gender.

Methods: Survey data was collected from four cross-sectional cohorts of college students from Psychology classes at a large Southeastern Research University in Fall 2020 (n=589), Fall 2021 (n=323), Fall 2023 (n=698), and Spring 2024 (n=445). Participants (n=2055) received partial course credit for completing a Qualtrics survey addressing fear of missing out (FoMO), social media use frequency, anxiety, depression, perceived stress, sleep quality (PSQI), and other sleep-related questions.

Results: A one-way MANOVA compared differences in mental health, FoMO, sleep quality, social media use, and texting habits by sex. Women reported higher levels of FoMO, anxiety, depression, and stress than men (ps <.01). Women also checked social media more frequently and spent over 35 minutes more per day on social media. Sleep satisfaction was similar between

genders (p >.05), but women reported slightly more sleep (M = 7.94 hours) than men (M = 7.73), p =.03. FoMO and social media use were negatively correlated with depression, anxiety, stress.
Conclusion: Results suggest female college students may struggle more with mental health and quality sleep. Future research should explore whether social media use predicts poor sleep quality and low well-being, or if mental health struggles increase social media appeal. Additionally, interventions to decrease social media use could be investigated for potential improvements in sleep quality and mental health factors.
Support (if any): none

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0362
RACIAL DISPARITIES IN PERCEIVED DISCRIMINATION AND SLEEP QUALITY AMONG COLLEGE STUDENTS

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Introduction: Insufficient sleep is a public health problem among college students. Approximately 71% of college students sleep less than eight hours per night, and one-third of students have trouble falling asleep at least once a week. Discrimination has been posited as a contributor to sleep disturbances. This study aims to determine whether perceived discrimination correlates with sleep quality among college students and whether these relationships differ by racial group.
Methods: This is an observational, cross-sectional survey study. Traditional college-age students (18-23 years) who attend a large, public university were recruited in the lobbies of classroom buildings and student centers, Sunday through Saturday. Participants completed the Perceived Ethnic Discrimination Questionnaire and the Pittsburgh Sleep Quality Index (PSQI) on a tablet. Descriptive statistics, chi-square tests, and Spearman's rho correlations were conducted.
Results: A total of 296 participants were enrolled in this study (51.7% White, 24.3% Asian, 24.0% Black). The mean age was 19.6 (SD=1.3). Most participants were female (63.8%), non-Hispanic (88.2%), and lived on campus (55.7%). Most participants shared a room (58.4%), were on financial aid (59.8%), and were unemployed (51.9%). Black and Asian students had significantly higher perceived discrimination compared to White students (mean scores=2.5, 1.9, and 1.5, respectively; p<.001) and Black students had significantly higher perceived discrimination than Asian students (p<.001). Perceived discrimination was associated with poorer sleep quality, as measured with the global PSQI score, in Black students (r=0.35, p=0.01) but not Asian (r=0.16, p=0.21) or White students (r=0.14, p=0.12). Black students were also significantly less likely to report sleeping at least 7 hours/night than Asian and White students (25.7% vs 40.0% vs 47.9%, respectively; p=0.002).
Conclusion: This study highlights significant racial disparities in perceived discrimination and its association with sleep quality among college students. Black students reported the highest levels of perceived discrimination, which correlated with poorer sleep quality compared to their Asian and White peers. These findings highlight the importance of studying discrimination as a potential contributor to sleep disparities and developing interventions to improve sleep health in Black student populations.
Support (if any):

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0363
SLEEP DISTURBANCE AMONG BLACK COLLEGE STUDENTS: THE ROLE OF FOOD AND HOUSING INSECURITY

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Introduction: Experiencing food and housing insecurity have been linked to adverse health outcomes, and disproportionately affect marginalized populations. Among Black college students, these insecurities have been linked to poor physical and mental health, including sleep disturbances. Given the significant role of sleep in overall well-being and academic success, it is essential to examine how food and housing insecurity contribute to sleep disturbance in this population.
Methods: The sample consisted of Black students attending a large predominantly White institute (n = 263, 82.37% female, Mage = 20.3 years, 19.4% low SES). Sleep disturbance was measured using the Pittsburgh Sleep Quality Index (PSQI), with 81.4% of participants classified as having poor sleep based on the established 5-point cutoff. Food insecurity was measured with the Food Insecurity Experience Scale (FIES), and housing insecurity was measured by 6 items of the USDA Housing Security Scale. A multiple linear regression model was conducted to examine the relationship between housing and food security status and sleep disturbance.
Results: The model explained 8.55% of the variance in sleep disturbance (R2=.085, p <.001). Housing insecurity was significantly associated with greater sleep disturbance (B=1.25, p <.05), indicating that housing-insecure participants reported higher sleep disturbance scores compared to their housing-secure peers. Among food security levels, participants classified as moderately food insecure reported significantly higher sleep disturbance scores (B=4.38, p <.05) compared to food-secure participants. Mildly food insecure (B=3.54, p =.104) and severely food insecure (B=2.74, p =.154) participants also reported higher sleep disturbance scores, though this was not statistically significant. In terms of gender, compared to male participants, those identifying as "other" reported significantly higher sleep disturbance scores (B=3.68, p <.01), while females showed higher sleep disturbance scores (B=1.27) approaching statistical significance (p=0.087).
Conclusion: This study highlights the significant impact of housing insecurity, varying levels of food insecurity on sleep disturbance, and gender-based disparities in sleep health among Black college students. Comprehensive interventions targeting these insecurities are essential to improving sleep outcomes and promoting overall well-being in this population.
Support (if any): n/a

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0364
RATES OF INSUFFICIENT SLEEP IN UNIVERSITY STUDENTS FROM 2000 TO 2023

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Introduction: Sleep is critical to health and functioning, but many university students habitually obtain insufficient sleep. We examined trends in sufficient sleep amongst university students across a 23-year period using data from a large, nationwide survey.

Methods: We conducted a secondary analysis of data from the American College Health Association–National College Health Assessment surveys (ACHA-NCHA). These surveys evaluated health behavior trends in university students across the United States. We analyzed data from fully-enrolled undergraduate students at four-year institutions across five surveys, including ACHA-NCHA I (2000 to Spring 2008), ACHA-NCHA II (Fall 2008 to Spring 2011), ACHA-NCHA IIb (Fall 2011 to Spring 2015), ACHA-NCHA IIc (Fall 2015 to Spring 2019), and ACHA-NCHA III (Fall 2019 to Spring 2023). Each survey asked participants "On how many of the past 7 days did you get enough sleep so that you felt rested when you woke up in the morning?"
Results: The sample averaged N=1,597,993 students across 47 semesters. The students averaged 20.74 years (SD=3.85) and the sample included 66.5% females (33.1% males, 0.4% transgender, non-binary, or other), and included 70.9% non-Hispanic White students (5.3% Black or African American; 8.6% Hispanic or Latino/a; 10.6% Asian or Pacific Islander; 1.5% American Indian, Alaskan Native, or Native American; 3.1% Biracial or Multiracial; 0.1% Other). There was a significant decline in sufficient sleep over time (F=305.90, p<.001), dropping from M=3.07 days/week in 2000 to M=2.42 days/week in 2023. During the earliest study wave, 39.5% of students indicated obtaining sufficient sleep ≤2 days/week (i.e., likely only on weekends); two decades later, this prevalence worsened to 59.8%. The decline over 23 years was larger in female students than male students (F=15.28, p<.001). Insufficient sleep was more common amongst BIPOC students than non-Hispanic White students (mean difference=0.314), but these groups showed similar rates of decline over time.
Conclusion: In contrast to sleep duration trends seen in the general U.S. adult population (Bureau of Labor Statistics), sleep has worsened amongst university students during the past two decades. Potential causes and consequences of these sleep changes will be discussed.
Support (if any): National Science Foundation (1920730 and 1943323)

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0365

EARLIER SCHOOL START TIMES COMPROMISE SLEEP OPPORTUNITY IN KINDERGARTENERS

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Introduction: Shifting elementary school start times earlier to accommodate later high school schedules may impact children's sleep and health. While younger children lack adolescents' circadian delays, earlier starts could still misalign their sleep needs with external demands like parental work schedules.
Methods: We used data from the nationally representative Early Childhood Longitudinal Study-Kindergarten (ECLS-K) 2011 cohort, with descriptive and bivariate statistics, including ANOVA (for continuous variables) and chi-square (for categorical) to test for differences in outcomes across start times. Linear regression was used to examine the impact after adjusting for potential confounders while taking into account non-independence at the school level. School start times were divided into four categories: < 7:45, 7:46-8:15, 8:16-8:45, and >8:46.
Results: This analysis included 11,877 kindergarten children with a mean age of 6.1(SD 0.4) years, with start times before 7:45 AM being disproportionately likely in children who are Black, attend a Title I school, have a household income below $30K, and/or live in a rural area. Although earlier school starts are associated with somewhat earlier bedtimes (8:22PM for students with pre-7:45 AM starts vs. 8:33PM for students with starts post-8:46AM), the sleep opportunity potential (time from bedtime to school start) is still significantly less among students with the earliest start times by 77 minutes (95%CI [71-82]). There is also a statistically significant trend between school start time and the likelihood of having breakfast (whether at school or home), with 53.27%, 65.02%, 73.12%, and 77.27% of children respectively having breakfast each day across earliest to latest start times groups ($p < 0.001$).
Conclusion: Children with earlier school start times experience a greater mismatch between their sleep needs and schedules. After accounting for time to get ready and commute to school, the 11.2 (SD 0.6) hours sleep opportunity ceiling in the earliest start time group likely results in less than the recommended 10-11 hours. Especially given the overlap between known sleep disparities and those above in school start time assignments, this likely further disadvantages young students already at risk.
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0366

SCHOOL START TIMES, SLEEP OPPORTUNITY, AND ASTHMA IN ELEMENTARY SCHOOL CHILDREN

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Introduction: School start times influence the window of sleep opportunity in childhood. Inadequate sleep is a known risk factor for multiple chronic health conditions, including asthma. However, data linking school start times, especially in early childhood, with specific medical conditions are not well explored at the population level.
Methods: We utilized data from the nationally representative ECLS-K 2011 longitudinal cohort study. Metrics included annual school-reported school start times starting in kindergarten, and parent-reported diagnosis of asthma starting the year after kindergarten and annually for the subsequent 5 years. Unadjusted chi-squared tests and multivariate logistic regression analyses were used to evaluate the impact of kindergarten school start times on parent report of asthma diagnosis in subsequent years. Kindergarten school start times were grouped as 7:45 or earlier [group A], 7:45 to 8:15 [group B], 8:15 to 8:45 [group C], or after 8:45 AM [group D].
Results: 7,940 students were included. 17.6% had a kindergarten school start time that begins at 7:45 AM or earlier. Asthma prevalence was 15.4% and 17.2% at one and five years after kindergarten, respectively. In unadjusted analyses, asthma at 5 years after kindgergarten was significantly associated with earlier kindergarten school start times: 20.1% in group A, 17.1% in group B, 16.6% in group C, 14.5% in group C ($p< 0.01$). After adjusting for potential confounders (child sex, household income, urban location, and Title 1 school at the kindergarten baseline), early school start times remained a statistically significant predictor of parent-reported child asthma four and five years later (OR=1.31, 95%CI 1.02–1.69 and OR=1.47, 95%CI 1.14-1.88, respectively),

but was no longer statistically significant at the first three follow-up time points (with ORs of 1.22, 1.19, and 1.29 and p-values of 0.11, 0.15, and 0.05 respectively).
Conclusion: Kindergarten start times may influence both development and persistence of chronic childhood conditions such as asthma. Health problems associated with earlier kindergarten start times may be linked to shorter sleep duration/opportunity, or circadian timing of disease-related processes, such as airways inflammation in asthma.
Support (if any):

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0367
OCCUPATIONAL PRESTIGE AS A STRUCTURAL DETERMINANT OF SLEEP HEALTH AMONG YOUNG AFRICAN AMERICAN WOMEN

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Introduction: Structural determinants such as job strain and long work hours contribute to sleep health disparities. Relatedly, Black women in professional occupations report short sleep more than other women, including their non-professional counterparts. Therefore, Black women professionals may not experience the expected sleep health benefits of higher occupational prestige (OP), defined as the perceived social value of their occupation within society. Notably, the OP-sleep relationship remains uninvestigated.
Methods: We assessed cross-sectional and longitudinal associations between OP and sleep health among Black women in the Detroit, MI area who enrolled (2010–2012) in the Study of Environment Lifestyle and Fibroids. Participants were followed until 2014–2018. Baseline OP was measured using the Nakao-Treas Prestige Score (range: 0—100) and categorized into quintiles (Q1low–Q5high). Self-reported sleep dimensions (baseline and three follow-up collections) were dichotomized (yes vs. no): short sleep duration (< 7 hours), non-restorative sleep (well-rested < 4 days/week), insomnia symptoms (difficulty falling/staying asleep ≥10 days/month), and diagnosis of sleep apnea (at Follow-up 3). Adjusting for sociodemographic characteristics, we used Poisson regression with robust variance to estimate prevalence ratios (PRs) and confidence intervals (95%CIs) and applied generalized estimating equations to determine risk ratios (RRs) and 95%CIs.
Results: Among 1,053 participants working ≥10 hours/week, mean age was 28.9 (SD=3.4) years. Unadjusted prevalence ranges of short sleep (57% [Q4]—67% [Q1low]), non-restorative sleep (59% [Q5high]—69% [Q1low], insomnia symptoms (15% [Q1low]—21% [Q4]), and sleep apnea (3% [Q5high]—6% [Q1low]) were comparable across OP quintiles (p>0.05). High vs. low OP was marginally associated with lower prevalence of short sleep (PR-Q5 vs.Q1=0.93; 95%CI:0.87–1.00) and, conversely, with a marginally higher prevalence of non-restorative sleep (PR-Q5 vs.Q1=1.06; 95%CI:1.00–1.12). Longitudinally, women with high vs. low OP had lower risk of short sleep (RR-Q5 vs.Q1=0.70; 95%CI:0.58-0.85) and non-restorative sleep (RR-Q5 vs.Q1=1.14; 95%CI:1.03–1.27). OP was not associated with the remaining sleep disturbances.
Conclusion: Poor sleep health was highly prevalent. High vs. low OP was associated with a lower risk of short sleep, but a higher prevalence and risk of non-restorative sleep. Future research should leverage higher-income, nationally-representative cohorts of Black women and consider potential mediators (e.g., goal-striving work stress) of the OP-sleep relationship.
Support (if any):

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0368
ASSOCIATIONS BETWEEN ACTIGRAPHY SLEEP AND OBESITY MARKERS IN BLACK EMERGING ADULTS; INITIAL RESULTS FROM SHOW STUDY

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Introduction: Short sleep duration, poor sleep efficiency, later sleep timing and greater day-to-day sleep variability are associated with greater obesity risk. Few studies have comprehensively assessed sleep and obesity markers in Black emerging adults (ages 18-28 years), despite higher risks of short sleep and obesity in this population. We examined preliminary, cross-sectional associations between actigraphy-assessed sleep (duration, efficiency, timing midpoint, and day-to-day variability calculated as coefficients of variation) with obesity markers (body weight, waist circumference and fat mass) in Black emerging adults from the Sleep, Health Outcomes and Body Weight (SHOW) study.
Methods: The SHOW study aims to recruit 150 Black emerging adults. Baseline data on 7-day actigraphy-assessed sleep and obesity markers are currently available in 48 participants (35 females; age, 20.1±1.8 years; weight, 78.7±23.0 kg; fat mass, 25.4±17.9 kg; sleep duration, 6h9min±1h12min; sleep efficiency, 71.2±9.3%; sleep timing midpoint, 5h32AM±1.1hrs), and these results are presented herein. Given the exploratory nature of these analyses, Spearman correlations assessed associations between sleep variables with obesity markers in all participants, and in males and females separately.
Results: In all participants, mean sleep duration (rs= -0.31, P= 0.03) and sleep timing (rs= 0.29, P= 0.04) were associated with body weight. Sleep duration variability was associated with body weight (rs= 0.30, P= 0.04), waist circumference (rs= 0.38, P= 0.01) and fat mass (rs= 0.36, P= 0.01). In females, mean sleep duration was associated with body weight (rs= -0.38, P= 0.02), waist circumference (rs= -0.41, P= 0.01) and fat mass (rs= -0.34, P= 0.04). Sleep duration variability was also associated with body weight (rs= 0.38, P= 0.03), waist circumference (rs= 0.42, P= 0.01) and fat mass (rs= 0.38, P= 0.02) in females. In males, mean sleep timing was associated with waist circumference (rs= 0.62, P= 0.02) and fat mass (rs= 0.64, P= 0.02).
Conclusion: These preliminary findings suggest that shorter sleep duration, later sleep timing and greater sleep duration variability are associated with higher obesity markers in Black emerging adults. Sex-based differences also emerged, with sleep duration and sleep duration variability being stronger risk factors in females, whereas sleep timing was a stronger risk factor in males.
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0369

ASSOCIATIONS OF POLYSOMNOGRAPHY-ASSESSED SLEEP WITH HEMODYNAMIC BURDEN IN BLACK EMERGING ADULTS

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Introduction: Black emerging adults (ages 18-28) have the highest prevalence of short sleep and cardiovascular disease (CVD) risk factors (e.g., hypertension) compared to age-matched individuals from other racial groups. Poor sleep architecture (e.g., lower proportion of slow wave sleep (SWS)) is associated with a greater risk of CVD. However, in Black emerging adults, data on sleep architecture and hemodynamic burden, a key clinical predictor of CVD risk, is limited. We examined preliminary, cross-sectional associations between polysomnography-assessed sleep architecture with hemodynamic burden in Black emerging adults.
Methods: Data collection for the Sleep, Health Outcomes and Body Weight (SHOW) study is ongoing. This analysis includes 10 Black emerging adults (age=20.76±1.01 years; body mass index (BMI)=28.72±8.42 kg/m2; 8 females). Home-based polysomnography-assessed sleep architecture included stage 2 sleep, SWS, and rapid-eye-movement (REM) sleep over 2 nights. Hemodynamic measures included resting brachial systolic, mean, and diastolic blood pressure (BP), resting estimated central (i.e., aortic) systolic, mean, and diastolic BP, pulse pressure, resting heart rate, carotid-femoral pulse wave velocity, central augmentation pressure (AP), and augmentation index) are presented herein. Spearman correlations assessed associations between sleep architecture and hemodynamic burden given the exploratory nature of these analyses.
Results: Participants' mean relative time in each sleep stage was stage 2: 49.8±9.4%, SWS: 20.1±8.0%, and REM sleep: 29.3±8.5%. Stage 2 sleep was positively associated with central systolic BP (ρ= 0.683, p=0.042), mean BP (ρ= 0.770, p=0.015), AP (ρ= 0.898, p< 0.001), and augmentation index (ρ= 0.849, p=0.004). SWS was inversely associated with brachial mean BP (ρ= -0.686, p=0.041), diastolic BP (ρ= -0.672, p=0.047), heart rate (ρ= -0.700, p=0.036), central diastolic BP (ρ= -0.817, p=0.007) and augmentation index (ρ= -0.723, p=0.028). No significant associations were noted between REM sleep duration with hemodynamic measures.
Conclusion: These preliminary findings suggest that more SWS and less stage 2 sleep is cross-sectionally associated with lower hemodynamic burden and may therefore be protective against CVD risk in Black emerging adults. Additional analyses with a larger sample size are planned for the SHOW study, with an aim of further exploring potential subgroup differences in these associations (e.g., biological sex and sociodemographic factors).
Support (if any): NIH Grant R01HL163804

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0370

ASSOCIATIONS BETWEEN RACIAL SEGREGATION & SLEEP HEALTH IN CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS STUDY

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Introduction: Black adults in the US have shorter sleep duration, lower sleep efficiency, and worse sleep quality compared to Non-Hispanic White adults. Racial segregation may be a contributing factor to sleep disparities as individuals living in disadvantaged communities may have greater exposure to bright lights, noise, and poor air quality and may have more difficulties accessing resources. This study examines the cross-sectional associations between racial segregation and sleep health (sleep duration, efficiency, and quality) among middle-aged Black adults.
Methods: The sample included 366 Black adults who participated in the Coronary Artery Risk Development in Young Adults (CARDIA) Sleep Health Ancillary Study. The Sleep Health Ancillary study was conducted during the Y35 CARDIA examination (2020-2024). Racial segregation was measured using the Getis-Ord Gi* statistic, a measure of standard deviation (SD) between the neighborhood's racial composition and the surrounding area's racial composition. Sleep measures included sleep duration and efficiency (derived from actigraphy data using Actiware Software [version 6.2.0.39]) and subjective sleep quality (measured by the Pittsburgh Sleep Quality Scale [PSQI]). Linear regression models were fitted to examine associations between racial segregation and sleep health parameters.
Results: Participants were 68.8% female and a mean age of 60.7 years (SD=3.9). Mean G-scores were 2.4 (SD=2.8), suggesting greater racial segregation among Black adults. Mean sleep efficiency, duration, and quality values were 80.0% (SD=8.3), 384.6 min (SD=64.4), and 7.1 (SD=4.3), respectively. In univariate analysis, racial segregation was associated with significantly lower sleep efficiency (B=-0.45, 95% CI=-0.76 to -0.14), but there were no associations with sleep duration or subjective sleep quality. The association between racial segregation and sleep efficiency remained significant after adjusting for age, gender, education, and marital status (B=-0.37, 95% CI=-0.72 to -0.03) but was attenuated (B=-0.32, 95% CI=-0.68 to 0.04) after adjusting for cardiovascular risk factors (body mass index, diabetes, hypertension) and depressive symptoms.
Conclusion: There is an association between racial segregation and sleep efficiency among middle-aged Black adults in the CARDIA cohort. This association was not independent of cardiovascular risk factors or depressive symptoms. Future studies should evaluate the specific features of racially segregated neighborhoods that are strongly related to worsening sleep health.
Support (if any):

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0371

PSYCHOSOCIAL AND BEHAVIORAL CORRELATES OF SLEEP OUTCOMES AMONG LESBIAN, GAY, AND BISEXUAL WOMEN

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Introduction: Sleep is an essential dimension of good physical and mental health. However, lesbian, gay, bisexual (LGB) women report worse sleep than heterosexual women, heterosexual men, and gay men. Bisexual women report more sleep problems and shorter sleep duration than LG and heterosexual

women. Multiple systematic reviews document the associations between psychological and social factors, health behaviors, and sleep outcomes, however, much less is known about how these factors relate to sleep among LGB women. We focused on six specific psychosocial factors known to be associated with sleep outcomes: social strain, social function, social support, optimism, negative emotional expressiveness, and hostility. Understanding more about the relationship between psychosocial factors and sleep duration and disturbances among LGB women could facilitate the development of efficacious interventions to improve sleep outcomes for this highly understudied group.
Methods: Data for this project were provided by the Women's Health Initiative (WHI). The sample size for this project was 38,100; 884 LG women, 552 bisexual women, and 36,664 heterosexual women. Sleep duration and sleep disturbance were the outcome variables. Associations between psychosocial characteristics and sleep outcomes were tested using multivariable, hierarchical, nested, linear regression models, calculated by sexual orientation group.
Results: Hours per sleep nightly varied by sexual orientation with bisexual women reporting the most sleep on average. Across hierarchical models, social strain, social function, optimism, and negative emotional expressiveness were significantly associated with sleep outcomes for LGB women, respectively. Psychosocial factors were not consistently nor strongly associated with sleep for heterosexual women. Health behaviors were not consistently nor strongly associated with sleep outcomes for LGB women but were for heterosexual women.
Conclusion: LGB women's sleep is an understudied area and lacks consideration of psychosocial factors as promising contributors to sleep. Our findings point to the importance of social strain, social function, negative emotional expressiveness, and optimism in LGB women's sleep. It is possible that LGB women's sleep could be improved by implementing evidence-based interventions that use our findings to support LGB women in coping with multi-level sources of discrimination and stigma.
Support (if any):

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0372

RACE/ETHNICITY AND NATIVITY DIFFERENCES IN SLEEP DISORDER AMONG WORKERS AND RETIREES: A MULTILEVEL MODELING STUDY

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Introduction: Sleep disorder is a common problem seen in middle-aged and older adults. Poor sleep can lead to comorbidities, such as heart disease, obesity, and depressions, in later life. Work-related stress can also impact people's sleep quality, yet differences between working and retired older adults' sleep quality is unclear.
Methods: This longitudinal study examines the relationships between work, retirement, and sleep health, including their intersection with race/ethnicity and nativity, among 34,765 Americans aged 50 and older. We used the Health and Retirement Study samples (2014 – 2020) and multilevel linear regression to examine the associations between working/retirement status, race/ethnicity, birthplace, and sleeplessness, controlling for age, gender, birthplace, assets, education, marital status, smoking habits, exercise, and self-reported health.
Results: The mixed-regression model without interaction terms demonstrated that compared to retirees, older workers had a significantly higher likelihood of sleep disorder (95% CI 0.010, 0.119; $P < 0.05$). Markedly, non-Hispanic Black race (95% CI 0.155, 0.344; $P < 0.01$), assets, education, and age had positive and significant relationships with sleep problems, whereas martial loss (divorced, widowed, and never-married) and female gender had a significantly lower likelihood of poor sleep. In the model examining the intersection of race/ethnicity and nativity – interacted with work status – revealed that compared with US-born non-Hispanic White adults, US-born non-Hispanic Black adults (95% CI 0.112, 0.333; $P < 0.001$) and foreign-born non-Hispanic Black populations (95% CI 0.120, 0.933; $P < 0.05$) had a significantly higher risk of insomnia. In contrast, non-native Hispanic workers (95% CI 0.152, 0.525; $P < 0.001$) and foreign-born non-Hispanic Other workers (95% CI 0.082, 0.872; $P < 0.05$) had a significantly higher prevalence of sleep disturbances than US-born non-Hispanic White workers.
Conclusion: Multilevel findings suggest that the intersectionality of race/ethnicity and nativity plays a decisive role in the association of work status and sleep health outcomes among midlife and older adults in the US.
Support (if any):

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0373

SUSTAINED IMPACTS OF NEIGHBORHOOD INVESTMENT ON SLEEP HEALTH IN BLACK AMERICANS: RESULTS FROM A NATURAL EXPERIMENT

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Introduction: Neighborhood disinvestment is a downstream impact of structural racism, especially afflicting minoritized communities. Thus, neighborhood reinvestment may serve as a policy-level intervention to mitigate sleep and other health disparities. This study builds on previous work by leveraging a natural experimental design to evaluate the 5-year effects of neighborhood investments on residents' sleep.
Methods: Data are from the PHRESH Zzz study, a natural experiment conducted in two low-income, predominantly Black, urban neighborhoods, with a randomly selected cohort (n=567; mean age=54.8; 77.6% female). Sleep duration, wakefulness after sleep onset (WASO) and sleep efficiency were assessed via actigraphy and sleep quality via survey in 2013, 2016, and 2018. All publicly funded neighborhood investments between 2013 to 2016 were recorded and geocoded to calculate the distance from each respondent's residence to the investment. The primary exposure variable was residents' proximity to neighborhood investments (< 0.1 of a mile).
Results: The overall pattern of results showed worsening sleep over time, regardless of exposure to investments. However, over the 5-year period, those who lived physically close to investments (< 0.1 mile) experienced significantly smaller decreases in sleep efficiency and smaller increases in WASO, relative to those who lived farther away.
Conclusion: Previously we found that living near a neighborhood investment improved sleep outcomes over a short-term period of 3 years. Current results indicate that improvements were partially sustained over 5 years. Findings have implications

for policy initiatives targeting upstream, structural determinants of sleep health disparities.
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0374

HOUSING CONDITIONS AND SLEEP HEALTH: FINDINGS FROM THE PERSONALIZED ENVIRONMENT AND GENES STUDY

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Introduction: Adverse housing conditions can contribute to, for instance, psychological stress and poor air quality, thereby worsening sleep health and related outcomes (e.g., asthma). Of the few prior studies of the housing-sleep relationship, investigations across demographically heterogeneous populations are sparse despite the disproportionate burdens of both adverse housing conditions and poor sleep health among socially and economically vulnerable groups.
Methods: Therefore, we used data collected from eligible adults residing primarily in North Carolina who were enrolled (2002 to present) in the Personalized Environment and Genes Study (PEGS) to investigate adverse housing conditions in relation to multiple sleep dimensions and to determine effect modification by sex, race and ethnicity, and housing type. Beginning in 2017, participants reported (yes vs. no) five adverse housing conditions, including no central heating system; no cooling/air conditioning; moisture, mildew, and/or mold; pests; and renovations in the home. Self-reported sleep dimensions included short sleep duration (< 7 hours), long sleep onset latency (≥20 minutes), difficult sleep maintenance, diagnosed insomnia, diagnosed sleep apnea, daytime dysfunction, and sleep medication use. Adjusting for sociodemographic and residential characteristics, we used Poisson regression with robust variance to estimate prevalence ratios (PRs) and 95% confidence intervals (CIs). We used interaction terms to test for effect modification.
Results: Among 3,070 adults (mean±SD age=53±15 years), 69% were women; 81% identified as White, 10% Black, 3.0% Hispanic, and 6.0% another race/ethnicity. Most participants (75%) resided in detached houses. Moisture, mildew and/or mold (44%); Pests (44%); and renovations (29%) were the most frequently reported while no central heating (7%) and no cooling (4%) were the least frequently reported. Moisture, mildew, and/or mold was associated with difficult sleep maintenance (PR=1.14 [95% CI:1.02-1.26]). Overall, participants who reported pests vs. no pests had a higher prevalence of short sleep duration (PR=1.12 [1.02-1.23]), diagnosed sleep apnea (PR=1.25 [1.03-1.51]), and sleep medication use (PR=1.35 [1.11-1.64]). Additionally, pests–sleep medication use associations were of higher magnitude among Black (PR=3.99 [1.35-11.78]) compared to White (PR=1.28 [1.04-1.57]) participants (p-interaction=0.03). There was little evidence of effect modification by sex and housing type.
Conclusion: Pests were consistently associated with poorer sleep health and may contribute to sleep health disparities.
Support (if any): NIEHS Z1AES103325

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0375

SUBOPTIMAL SLEEP DURATION PREDICTS GREATER METABOLIC SYNDROME IN NHANES 2011-2014: DIFFERENCES BY NATIVITY STATUS

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Introduction: Both short and long sleep have been associated with risk for metabolic syndrome (MetS). However, this association has yet to be assessed among immigrants, whose health profiles and risk/protective factors differ from the U.S.-born population. We examined whether the association between suboptimal sleep duration and MetS severity score (MetSSS) varied by nativity status (foreign vs. U.S.-born) in a representative sample of U.S. adults.
Methods: We analyzed data from the National Health and Nutrition Examination Survey (NHANES) 2011-2014 cycles. We included adults (≥20 years) with complete data on sleep, sociodemographic, and MetS-related variables (N = 3,245). A composite MetSSS was created using waist circumference, fasting glucose, blood pressure, HDL cholesterol, and triglycerides. Actigraphy-measured sleep duration was obtained from 7 days of accelerometer data. Self-reported sleep duration was obtained using a one-time questionnaire. Suboptimal sleep duration was defined as sleep duration < 7 or >9 hours/day. The association between self-reported sleep duration (model 1) and actigraphy-measured sleep duration (model 2) with MetSSS, and the moderating role of nativity status were examined using multiple linear regression models adjusting for age, sex, race, income, and food security.
Results: In model 1, suboptimal self-reported sleep duration was associated with greater MetSSS (b = 0.27, p =.001). Nativity status was associated with MetSSS: compared to U.S.-born people, immigrants had lower MetSSS (b = -0.31, p < 0.001). The interaction between self-reported sleep duration and nativity status was not statistically significant (b = -0.19, p = 0.159). In model 2, the interaction between actigraphy-measured sleep duration and MetSSS was statistically significant (b = -0.32, p = 0.014), such that the relationship between suboptimal sleep duration and MetSSS was significant only among U.S.-born individuals (b = 0.22, p < 0.001).
Conclusion: Our results align with the immigrant paradox of health: suboptimal sleep duration was associated with metabolic syndrome in U.S.-born individuals but not immigrants. As an individual acculturates to the U.S., their health risks may increase. Immigrants may experience protective factors that buffer the effects of poor sleep on cardiometabolic risk. Future studies should examine potential protective factors (e.g., exercise, diet, social support) among immigrants.
Support (if any):

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0376

RELIGIOSITY AS A STRESSOR AND A STRESS RELIEVER IN RELATION TO SLEEP HEALTH AMONG AFRICAN AMERICAN WOMEN

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Introduction: Religious/spiritual beliefs and practices may positively or negatively influence sleep through myriad bidirectional pathways. For instance, religion could reduce psychosocial stress by providing social support or amplify it through religious conflict. Coincidently, Black/African American (AA) women are highly likely to attend religious services, experience substantial stress, and be burdened by poor sleep health. However, religion-stress-sleep relationships are understudied, especially among Black/AA women.
Methods: We investigated associations between religiosity, stress, and sleep using data collected during enrollment (2010-2012) and over three follow-ups (2014-2018) in the Study of Environment, Lifestyle, and Fibroids. At baseline, participants self-reported importance of faith ('very-to-somewhat' vs. 'not at all'), religiosity/spirituality as a source of strength/comfort ('very-to-somewhat' vs. 'not at all'), and prayer/meditation frequency ('everyday', 'every week', or '≥ once/month' vs. '< once/month'). We defined self-reported sleep as: short sleep duration (SSD) < 7-hours, non-restorative sleep (NRS) as 'yes' vs. 'no' to waking up rested < 4 days/week, and insomnia symptoms (IS) as 'yes' vs. 'no' to difficulty falling or staying asleep. Day-to-day stress was dichotomized as 'very high/moderate' vs. 'mild/not at all.' Adjusting for sociodemographic and clinical characteristics, we estimated prevalence ratios (PRs) and 95% confidence intervals (CIs) using Poisson regression with robust variance and applied general estimating equations to estimate risk ratios. Interaction terms for religiosity/spirituality and stress were tested.
Results: Among 1,614 Black/AA women, mean age ± SD was 29.2 ± 3.4 years, 69.5% reported faith is of importance, 55.8% perceived religion/spirituality as a source of strength/comfort, 58.9% engaged in everyday prayer/meditation, and 43.4% reported very high or moderate day-to-day stress. Baseline prevalence of SSD was 54.6%, NRS 9.5%, and IS 17.9%. Compared to women who did not consider religion/spirituality a source of strength/comfort, women who did and reported very high/moderate day-to-day stress had higher prevalence of restorative sleep (PR=6.25 [95% CI:1.23-33.33]). Everyday prayer/meditation vs. < once per month/never was associated with higher prevalence of NRS (PR=3.11 [95% CI:1.15-8.41]). Religiosity/spirituality was not longitudinally associated with sleep.
Conclusion: Religion/spirituality as a source of strength was associated with restorative sleep among highly-stressed women while everyday prayer/meditation was associated with non-restorative sleep. Longitudinal studies are needed to address potential reverse causation.
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0377

CHRONIC PAIN AND SLEEP HEALTH AMONG A NATIONALLY REPRESENTATIVE SAMPLE OF US ADULTS

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Introduction: Chronic pain is bidirectionally associated with sleep. Pain increases psychological stress and inflammation, thereby impairing sleep, and poor sleep increases pain sensitivity. Studies including diverse populations are sparse, although older adults, women, and minoritized racial and ethnic groups are disproportionately affected by, for instance, internalized stigma along with biased pain assessments and mismanagement by healthcare providers.
Methods: Therefore, we investigated chronic pain and sleep among adults in the 2013-2018 National Health Interview Survey. Participants self-reported chronic pain over the past three months ('everyday'/'most days'=yes vs. 'some days'/'never'=no), short sleep duration (SSD; < 7 vs. ≥7 hours), insomnia symptoms (IS; difficulty falling or staying asleep ≥3 vs. < 3 times/week), and nonrestorative-sleep (NRS: waking feeling rested < 4 vs. ≥4 days/week). Adjusting for sociodemographic, health behavior, and clinical characteristics, we used survey-weighted Poisson regression with robust variance to estimate prevalence ratios (PRs) and 95% confidence intervals (CIs), stratifying by age, sex/gender, and race/ethnicity after testing for interaction.
Results: Among 90,810 participants, mean age±SE was 48±0.11 years and 53% were women, 24% of participants reported chronic pain. Adults aged ≥50 years had higher prevalence of chronic pain (64%) than adults 31-49 (27%) or 18-30 years (9.8%). Women (56%) reported chronic pain more than men (44%). By race and ethnicity, Non-Hispanic (NH)-American Indian/Alaska Native (35%), NH-multiple race (29%), and NH-White (27%) adults most reported pain. The chronic pain-lower prevalence of SSD association was stronger among younger (PR31-49years=0.78 [95% CI:0.75-0.81]) versus older adults (PR≥50years=0.86 [0.85-0.88]). Conversely, the chronic pain-higher prevalence of NRS association was stronger among older adults (PR≥50years=1.73 [1.67-1.79] vs. PR31-49years=1.48 [1.43-1.53]). Associations with IS (PRmen=1.82 [1.75-1.89] vs. PRwomen=1.57 [1.52-1.61]) and NRS (PRmen=1.75 [1.69-1.82] vs. PRwomen=1.59 [1.55-1.63]) were stronger among men than women. Associations with IS were stronger among Hispanic/Latine (PR=1.84 [1.70-1.99]) and NH-Black/African American (PR=1.79 [1.66-1.92]) adults than NH-White adults (PR=1.63 [1.58-1.67]).
Conclusion: Chronic pain was associated with higher prevalence of both IS and NRS overall and most strongly among men. Associations with IS were strongest among Hispanic/Latine and NH-Black/African American adults. Chronic pain was associated with lower SSD prevalence, and strongest among younger adults. Future longitudinal design studies with objective sleep measures are warranted.
Support (if any):

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0378

SLEEP BELIEFS ASSOCIATED WITH SLEEP HEALTH IN A NATIONAL SURVEY OF NIGERIAN ADULTS

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Introduction: Despite its critical role in population health and well-being, sleep remains understudied in Africa and other developing regions, where unique cultural and contextual factors likely shape sleep outcomes. The beliefs individuals hold about their sleep may influence their sleep health-related behaviors (e.g., time in bed), yet little is known about these beliefs in low- and middle-income countries. This study addresses this critical

imbalance by examining the relationship between Theory of Planned Behavior (TPB)-based sleep beliefs and overall sleep health in a national survey of Nigerian adults (n = 1,046; Mean age = 33.64, SD = 9.29). We hypothesized that positive sleep attitudes, stronger subjective norms in support of healthy sleep behavior, and greater perceived behavioral control would be associated with adequate sleep duration and better overall sleep health.

Methods: In this cross-sectional study, participants completed TPB-based measures and the RU-SATED Questionnaire.

Results: Descriptive analysis revealed that Nigerian adults generally held positive attitudes towards sleep, while subjective norms showed varied responses, and perceived behavioral control over sleep was moderate to high. Multiple linear regression analysis revealed that belief factors explained a modest but significant portion of the variance in sleep health (R^2 =.027, p <.001). Both bivariate and multivariate relationships consistently showed that subjective norms (r =.101, p =.001; β =.084, p =.006) and perceived behavioral control (r =.136, p <.001; β =.134, p <.001) were positively associated with overall sleep health, while attitudes showed no significant relationship in either analysis.

Conclusion: Results suggest that while Nigerian adults hold generally positive sleep beliefs, these beliefs have limited association with overall sleep health. Western-held beliefs about sleep may not fully translate to better sleep outcomes, where broader socio-cultural and environmental factors likely play an important role. Future research should examine how cultural values, economic conditions, and social structures interact with sleep beliefs to influence sleep health in non-Western contexts.

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0379

EXPLORING SLEEP BELIEFS, ATTITUDES AND BEHAVIORS IN WOMEN OF COLOR THROUGH THE LENS OF COMMUNITY HEALTH WORKERS

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Introduction: Community health workers (CHWs) are vital in bridging the gap between healthcare systems, researchers, and underserved communities. Due to their trusted roles, cultural familiarity, and ability to deliver accurate health information, CHWs offer great promise in sleep health promotion. We aim to understand perceptions of healthy sleep, barriers to sleep, and beliefs, attitudes, and behaviors in communities of color.

Methods: We conducted eight focus groups (N=77) with female CHWs ages 18-75 using community-matched CHW facilitators who also served as co-researchers. CHWs provided information about themselves and their communities. Community groups included Black/African American, Hispanic/Latinx, Native Hawaiian/Pacific Islander, and African Immigrant/Refugee. Focus groups were conducted in English and Spanish. A semi-structured topic guide was developed in collaboration with CHWs. Discussion topics included sleep routines, barriers and enablers to healthy sleep, knowledge and attitudes about sleep, socio-cultural context, and CHW roles in sleep health. Audio recordings were transcribed, translated, and uploaded to Dedoose for analysis. We thematically coded transcripts once, followed by subsequent emergent coding using deductive grounded theory approach.

Results: Within the CHWs and their respective communities, there was variability in sleep routines and attitudes about sleep. It was common to prioritize caregiving, household family members and extended family, and community obligations over good sleep, and participants identified strongly with their roles as matriarch and community leader. Cultural barriers include adjusting to the 'hustle' U.S. culture, communicating with family across time zones, and for some, either the cultural loss of naps or a strong cultural belief that napping is lazy. Sleep health was discussed as being a taboo topic in some communities. Barriers in accessing sleep-related healthcare included a fragmented approach at the primary care level, limited sleep health information, and cost, long waits for appointments, and access to specialty care. Other notable barriers included language, transportation, and health literacy gaps in both sleep health and navigating the healthcare system.

Conclusion: CHWs can effectively link community members to sleep health resources and offer insights into cultural beliefs, attitudes, and behaviors related to sleep practice, barriers, and social determinants that impact sleep.

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0380

RACIAL AND ETHNIC SLEEP DISPARITIES IN ADOLESCENTS: THE ROLE OF ACCULTURATION AND DISCRIMINATION

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Introduction: Adolescence is a critical developmental period marked by identity formation and heightened exposure to stressors, including discrimination. Acculturative stress and discrimination can negatively affect sleep, with adolescents' cultural identity influencing their experiences of these stressors. This study explored the relationship between discrimination, acculturative stress, and sleep duration in a diverse sample of youth.

Methods: Data was drawn from the Adolescent Brain Cognitive Development (ABCD) study, a ten-year longitudinal examination of youth (N = 8632, mean age = 12, 47.66% girls). Self-report measures assessed acculturation, discrimination, sleep duration, and demographics.

Results: Discrimination significantly predicted shorter weekday (B = -0.15, 95% CI [-0.20, -0.11], p < 0.001) and weekend sleep duration (B = -0.06, 95% CI [-0.11, -0.02], p = 0.008). Ethnic differences were observed, with Black/African (weekday: B = -0.24, 95% CI [-0.31, -0.16], p < 0.001; weekend: B = -0.22, 95% CI [-0.31, -0.14], p < 0.001) and MENA youth (weekday: B = -0.38, 95% CI [-0.71, -0.05], p = 0.023) sleeping less than White youth. Interactions between discrimination and ethnicity indicated that higher discrimination was associated with greater reductions in weekday sleep for Black/African (B = 0.15, 95% CI [0.09, 0.22], p < 0.001) and Latino/Hispanic youth (B = 0.11, 95% CI [0.05, 0.17], p = 0.001). An interaction between acculturation and ethnicity was found for weekend sleep, where higher acculturation predicted shorter sleep for Black/African youth (B = -0.20, 95% CI [-0.32, -0.08], p = 0.001).

Conclusion: These results emphasize the role of social determinants, such as discrimination and acculturative stress, in shaping sleep health during adolescence. OR The findings suggest that discrimination and acculturative play crucial roles in shaping adolescent sleep patterns. Implementing culturally informed interventions to address identity-related stressors may be a promising approach to support youth sleep health, with the potential to reduce sleep disparities.
Support (if any):

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0381

RACIAL SLEEP DISPARITIES IN THE UNITED STATES: A SYSTEMATIC REVIEW OF LABOR PRACTICES AND SLEEP HEALTH ACROSS THE LIFESPAN

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Introduction: Black Americans, compared to other social groups, disproportionately experience poor sleep outcomes throughout their lifespan. In this systematic review, we examined how labor conditions in the US may contribute to sleep inequities among Black Americans.
Methods: We conducted keyword combination searches using sleep, age, labor, and race in university and publicly available databases, including Google Scholar and PubMed. We organized the resulting articles into six categories that identified fairness, safety, and health of the work environment (i.e., pay, work hazards, work hours, work accessibility, benefits, and hiring practices) and determined how each impacted the following sleep outcomes: duration, dysregulation/dysfunction, short/long sleep, sleep quality. We further categorized each article by lifespan category, adolescence, young and mid -adulthood, and older adulthood. Articles that took place outside of the US and review articles were excluded.
Results: Thirty-six articles met the criteria for the systematic review. One article examined the impact of pay inequity on sleep-related pregnancy outcomes, and six articles assessed the impact of parental labor on children/adolescents' sleep behavior. Twenty-eight articles focused on sleep and working conditions in young and mid-adulthood, whereas fifteen articles examined similar outcomes in older adults. Of these 28 articles, laborers who experienced inequitably lower pay also experienced shorter sleep durations in fifteen studies, increased sleep dysfunction in five studies, and reported higher incidence of sleep disorders in seven studies. Additionally, laborers who experienced unsafe working conditions experienced shorter sleep durations in two studies and worse sleep quality in two additional studies. In two studies, working in unsafe working conditions coincided with shift work. Workers with long work hours had decreased sleep durations in 7 studies and increased sleep disorders in 3 studies. In three studies, short sleep and sleep dysfunction increased for adults and older adults experiencing a lack of work.
Conclusion: Literature suggests that improving safe and healthy working conditions can promote sleep and reduce existing racial sleep inequities. Important gaps in the literature remain as few studies examined the impact of working and labor practices on pregnancy and infancy and few studies examined the longitudinal impacts of poor working conditions on sleep in retirees.
Support (if any):

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0382

A COMMUNITY-ENGAGED QUALITATIVE STUDY OF FACTORS AFFECTING SLEEP AMONG HISPANIC/LATINOS WITH SHORT SLEEP DURATION

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Introduction: Despite having high prevalence of short sleep duration, poor sleep quality, and sleep disorders in adult Hispanics living in the US, there is limited understanding of the underlying barriers to sleep and effective interventions in these groups. This study aimed to increase understanding of sleep duration and attitudes toward sleep interventions among Hispanic adults.
Methods: We conducted 5 online focus group discussions with male and female participants aged 18-65 recruited from the Hispanic community who reported sleeping < 7 hours per night. Interviewers utilized a semi-structured interview guide to assess attitudes and beliefs about sleep and sleep interventions. Focus groups were conducted in Spanish, recorded, transcribed, and coded to elicit common themes.
Results: Focus groups included 31 participants (19=women) from 12 Hispanic nationalities. Coders identified three main topics: 1) Sleep perceptions, 2) External and internal factors that affect sleep, and 3) Feedback about sleep interventions. Participants discussed the importance of sleep and factors related to stress, family, environment, and acculturation. Sleep interventions were viewed as desirable, and the group discussed a variety of topics of interest. The use of consumer sleep technology was considered a favorable intervention despite few participants having experience with consumer sleep-tracking devices.
Conclusion: Results demonstrated that participants were aware of the importance of sleep and sleep duration recommendations. The discussion identified unique issues affecting sleep health in Hispanics as well as enthusiasm for sleep interventions, including interventions using consumer sleep trackers.
Support (if any): Google Health Equity Award

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0383

ASSOCIATIONS BETWEEN DIGITAL TECHNOLOGY AND SLEEP HEALTH BY COUNTRY, AGE, AND SEX

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Introduction: We investigated whether the widely-observed association between digital technology use and sleep health varied by country, age, and/or sex in a global sample of adults.
Methods: We used 2023 survey data from 35 countries (n=35,018, ~1000/country) to characterize the self-reported effects of digital technology on physical health, sleep quality,

and tiredness (see https://sync.ithra.com/research). We examined whether responses varied by country, age, and sex.
Results: Participants from 35 countries (52.2% male) ranged from 18-99 years old (mean=38); 18.7% of respondents were between 18-24, and 8.0% were 65+. Unadjusted analyses showed that across all participants, 31.7% reported that digital technology reduced their physical health. Respondents in China had the lowest prevalence (11.8%) of digital media worsening physical health, while respondents in Estonia had the highest prevalence (56.4%). Younger respondents (18-24) were more likely to report that digital technology worsened physical health than older (65+) respondents (38.5% vs. 21.9%). Females were slightly more likely (33.7%) than males (30.0%) to report that digital media worsened physical health. When asked which physical conditions were experienced after using digital technology for longer than usual, 40.5% reported tiredness, and 39.0% reported decreased sleep quality. Out of all 35 countries, prevalence was lowest in Italy for both the symptoms of tiredness (22.1%) and decreased sleep quality (19.7%), while they were highest in Ghana (60.6%) for tiredness and Malaysia (57.3%) for decreased sleep quality. Among the youngest age group (18-24-year-olds), 48.4% and 47.1% reported tiredness and decreased sleep quality, respectively, compared to 22.4% and 16.1% for 65+. Females were more likely to report tiredness (42.3%) and decreased sleep quality (40.9%) as symptoms compared to males (38.8% and 37.8%, respectively).
Conclusion: These novel global results show that over one-third of adult respondents believe heavy use of digital technology leads to sleep-related symptoms, with larger effects for younger and female adults. Variation by country suggests that cultural factors may affect the association between digital technology use and sleep health.
Support (if any): Aramco

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0384
REM EEG EVENTS ARE MODULATED BY MENSTRUAL CYCLE AND SEX HORMONES

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Introduction: Studies have reported that NREM sleep, specifically spindle activity (12-15Hz), varies across the menstrual cycle. However, menstrual-related changes to REM sleep or its electrophysiological markers remain unclear. Animal studies suggest that periods of high estrogen and low progesterone may reduce low-frequency EEG activity (≤7Hz) via their effects on GABA. We recently investigated EEG burst activity during REM sleep within the theta (4-8Hz) and alpha (8-16Hz) frequency bands ('REM bursts') in relation to sleep-dependent memory. Here, we examined whether changes in sex hormones across the menstrual cycle affect REM burst activity. We hypothesize decreased theta burst activity during the high-estrogen, low-progesterone phase (pre-ovulation) compared to other menstrual phases.
Methods: 35 healthy women (18-35yrs) slept in-lab with polysomnography during four phases of their menstrual cycle: menses(low hormones), pre-ovulation(high estrogen), mid-luteal(high progesterone and estrogen), and late-luteal(decreasing hormones). At each visit, we collected hormone levels (estrogen/progesterone/testosterone) via saliva samples. Using a validated REM burst detection algorithm, we identified REM theta and alpha bursts and normalized each burst metric across the four visits to measure their relative levels for each individual. We used linear-mixed-models, with pre-ovulation as the reference phase, to assess menstrual phase differences in burst characteristics and performed Pearson's correlations between sex hormone levels and burst features.
Results: We successfully identified REM alpha and theta bursts in human scalp EEG, replicating prior findings of these events. Additionally, we showed menstrual cycle differences in REM sleep and REM burst characteristics. During pre-ovulation, we found 1) fewer alpha and theta burst occurrences, 2) greater alpha and theta burst power, 3) greater theta burst density, and 4) reduced REM sleep. Additionally, independent of menstrual phase, progesterone levels negatively predicted theta and alpha density, and testosterone positively predicted time in REM. In late-luteal, testosterone positively predicted theta power. No significant correlations with estrogen were found.
Conclusion: This study replicated the finding of discrete EEG events during REM sleep, i.e., theta and alpha bursts. Furthermore, we show that REM bursts are modulated by menstrual phases and hormonal fluctuations across the cycle. Next steps will be to examine how these REM sleep changes affect cognition.
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0385
GENDER AND RACE DISPARITIES IN SLEEP DISORDER DIAGNOSIS AND TREATMENT

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Introduction: Significant racial and gender disparities have been observed among several health outcomes, including sleep. Previous research supports, for example, that the prevalence of sleep disorders among racial minorities is higher than the general population, even when controlling for other variables (e.g. socioeconomic status). The prevalence of sleep disorders is also higher among women. Despite this, racial minorities and women are treated in sleep disorder clinics at a significantly lower rate. The present study aimed to further explore racial and gender differences in sleep disorder diagnosis and treatments.
Methods: Participants (N = 2,975) from across the United States were surveyed using CloudResearch Connect and asked to respond to questions about their demographic information and history with and knowledge about sleep disorders and treatments. This sample was diverse with the participants being 33.6% BIPOC and 50% female.
Results: A chi-square test of independence was conducted to compare white and BIPOC participant responses. Compared to BIPOC participants, white participants reported higher rates of diagnosis of a sleep disorder ($X2(1) = 4.498$, $p = .034$), use of prescription sleep medications ($X2(1) = 20.817$, $p < .001$), and use of over-the-counter sleep medications ($X2(1) = 36.296$ $p < .001$).

Compared to men, women reported higher rates of diagnosis of a sleep disorder (X2(1) = 7.576, p =.006), use of prescription sleep medications (X2(1) = 15.995, p <.001), and use of over-the-counter sleep medications (X2(1) = 32.554, p <.001). There were no significant associations found between race or gender and previous experience with CBT-I.
Conclusion: Results suggest that there are significant race and gender differences in diagnosis of sleep disorders, as well as treatment using prescription and OTC medications. Findings support previous findings that racial minorities experience lower rates of sleep disorder diagnosis and treatment. Further research is needed to understand the specific sleep medicine experiences of racial and gender minorities.
Support (if any):

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0386

PRISTINE INTERNAL TIME AND ITS DISCREPANCY FROM ACTUAL SLEEP: A POPULATION-BASED STUDY

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Introduction: Chronotype is commonly assessed using questionnaires such as Munich Chronotype Questionnaire (MCTQ). However, while the MCTQ accounts for sleep debt, it may not fully reflect individual's inherent chronobiological preferences due to external influences. Pristine internal time, defined as internal time free from external influences such as work and social obligations, offers an alternative perspective on individual's chronobiological preferences. This study aimed to characterize pristine internal time and evaluate its discrepancy from actual sleep behavior within the Korean adult population.
Methods: Data from the Korean Sleep Headache Study in 2018 were analyzed, involving 2,237 participants aged 19-92 years (48.1 % men). Pristine internal time was assessed through participants' responses to the following scenario, "Imagine you have two weeks just for yourself, free from obligations such as work, care responsibilities, or appointment. What would be your ideal sleep schedule at the end of the perfect day?" Actual sleep behavior was assessed using midsleep on free days corrected for sleep debt (MSFsc), derived from MCTQ.
Results: The mean(± standard deviation [SD]) sleep duration of pristine internal time was 509.5(± 85.6) minutes. The mean time of falling asleep was 11:03 p.m(± 01:10, SD), and the mean waking time was 7:33 a.m(± 01:31). The mean midsleep time of pristine internal time was 03:18 a.m(± 01:07). Women exhibited earlier midsleep times of pristine internal time than men(03:15a.m±01:03 vs. 03:22a.m±01:11, p=0.009), though sleep duration did not differ significantly. Participants with anxiety reported longer sleep duration than those without anxiety (p=0.036). Participants with excessive daytime sleepiness (EDS) reported earlier midsleep time than those without EDS (p< 0.001). Comparing pristine internal time and MSFsc, pristine midsleep time was 20.4(± 71.4) minutes earlier. The discrepancy was more pronounced in men than in women (24.6±76.2 min vs 16.8±67.2 min, p=0.010), while no significant discrepancy associated with mood symptoms and day sleepiness was observed.
Conclusion: This study provides insights into the characteristics of pristine internal time and its discrepancy with actual sleep behaviors. These findings suggest the need for further research to evaluate whether aligning external schedules with intrinsic chronobiology could improve mood symptoms, reduce daytime sleepiness, and enhance overall well-being.
Support (if any):

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0387

STRUCTURAL RACISM PREDICTS AIR POLLUTION AND SLEEP QUALITY AMONG BLACK AMERICANS LIVING IN THE CONTIGUOUS UNITED STATES

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Introduction: Past socioeconomic and legal norms and policies have had a lasting impact on the environments that Black Americans sleep in today. For example, redlined neighborhoods from the 1950s currently experience suboptimal environmental conditions, including increased exposure to air pollutants. High rates of sleep deficiency and disorder in Black Americans may be due to the influence of these socioenvironmental determinants, but more investigation is needed. We assessed how structural neighborhood factors interact with air quality to influence sleep behavior in a geographically diverse sample of Black Americans.
Methods: 1,903 Black participants (N=883females, 1020males) aged 18-80 completed daily assessments of sleep behavior for up to 21 days (5,935observations) using a phone application. Participants reported sleep behavior, including duration, latency, wake after sleep onset, and sleep quality, which was rated on a Likert scale - 1 not all refreshed to 5 extremely refreshed. Participant-provided zipcodes were linked to geospatial tools to assess air pollution indicators (e.g., sulfur dioxide (SO2), ozone (O3), nitrogen dioxide (NO2), carbon monoxide (CO), and particulate matter (PM2.5 and PM10) and to the Structural Racism Effect Index (SREI), which uses publicly available census data to determine the impact of structural racism on neighborhoods (e.g., rates of building vacancy, incarceration, unemployment, poverty, etc.). Mixed effects linear regressions examined the impact of air pollution and structural racism on sleep features.
Results: Participants slept 6 hours a night (SD=1.65), with an average sleep latency of 21 minutes (SD=23.41), woke up 2 times per night (SD=1.74), spent 18 minutes awake after falling asleep (SD=23.81), and reported 3.22 (SD=1.11) for sleep quality. SREI was negatively associated with CO(ß=-.0001,p<.001) and NO2(ß=-.01,p<.001), and positively associated with PM2.5(ß=.003,p<.001) and SO2(ß=.0001,p<.001). Higher SREI scores (i.e., greater impact of structural racism) correlated with longer sleep latency (ß=.03,p=.03). PM10 was associated with lower sleep quality (ß=-.23,p=.02). PM10 and higher SREI predicted lower refreshed ratings (ß=-.21,p=.04). However, lower concentrations of CO(ß=.06,p=.03), NO2(ß=.0007,p=.03), and O3(ß=.0005,p=.01) interacted with higher SREI yielding shorter sleep durations.

Conclusion: We observed air pollutants and structural racism to have individual and interactive associations with poor sleep. Further investigation into the effects of neighborhood factors may improve interventions aiming to curb sleep inequities.
Support (if any):

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0388

CHRONOTYPE ASSOCIATED WITH SOCIODEMOGRAPHICS, SLEEP HEALTH, AND MENTAL HEALTH AT THE US-MEXICO BORDER: DATA FROM THE NOCHES STUDY

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Introduction: Chronotype (circadian preference) has been associated with a wide range of health variables but has not yet been explored in populations at the US-Mexico Border. Associations may inform public health efforts and sleep/circadian health interventions.
Methods: Data were obtained from N=983 adults age 24-60 years at the US-Mexico border, obtained in-person by promotoras (community health workers) during interviews and standardized questionnaires in English and Spanish. Chronotype was assessed using a single item to assess whether the participant was definitely morning type, more morning than evening, more evening than morning, or definitely evening type. This was assessed as an ordinal variable for eveningness. Sociodemographics (also included as covariates) were age, gender, ethnicity, socioeconomic status, education, acculturation (Mexican and Anglo, assessed via the ARSMA-II), survey language, language spoken at home, household size, immigration, and living situation. Additional variables explored were the Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), weekend and weekday sleep latency, wake after sleep onset, and sleep duration, PHQ9 depression and GAD7 anxiety scales, Perceived Stress Scale (PSS), and Social Vigilance Questionnaire (SVQ). Results expressed as Ordinal Odds Ratios (oOR) of more delayed type.
Results: Increased likelihood of later chronotype was associated with female gender (oOR=1.43, p=0.020), speaking mostly Spanish at home (oOR=1.44, p=0.036), ISI score (oOR=1.08, p< 0.0005), PSQI score (oOR=1.07, p=0.026), weeknight (oOR=1.12, p< 0.0005) and weekend sleep duration (oOR=1.21, p< 0.0005), weeknight (oOR=1.01, p< 0.0005) and weekend sleep latency (oOR=1.01, p=0.003), PHQ9 score (oOR=1.08, p< 0.0005), GAD7 score (oOR=1.08, p=0.001), and SVQ score (oOR=1.02, p< 0.05). Decreased likelihood of later chronotype was associated with older age (oOR=0.97, p< 0.0005), less than high school (oOR=0.44, p< 0.0005) or high school education (oOR=0.65, p< 0.0005), completing survey in Spanish (oOR=0.45, p< 0.0005), living in an apartment or rented room (oOR=0.93, p=0.024), and larger household size (oOR=0.93, p=0.024).
Conclusion: Later chronotype was associated with worse sleep and mental health overall, consistent with previous studies. Sociodemographic associations should be explored to delineate risk pathways, especially cultural (e.g., language) and structural (e.g., household) factors.
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0389

ACCULTURATION AND SLEEP HEALTH AT THE US-MEXICO BORDER: PRELIMINARY DATA FROM THE NOGALES CARDIOMETABOLIC HEALTH AND SLEEP (NOCHES) STUDY

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Introduction: Previous studies have shown that sleep health is associated with social and environmental factors that may influence health behaviors. Acculturation has emerged as a possible factor that influences sleep health, including at the US-Mexico Border.
Methods: Data from N=991 US citizen community members (mean age 43.1, 79% women) from the area around Nogales, AZ were recruited. Data were collected by promotoras de salud in community clinics. These data reflect self-reported questionnaires, including the Acculturation Rating Scale for Mexican Americans (ARSMA; Anglo and Mexican acculturation), Bicultural Involvement Questionnaire (BIQ; Americanism, Hispanicism, Biculturism), Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), Multivariable Apnea Prediction Index (MAP), Brief Index of Sleep Control (BRISC), and habitual weeknight and weekend sleep duration. Linear regression analyses were adjusted for age, sex, education level, and duration of family residence in the US.
Results: In this sample, mean ISI score was 6.4 (SD=3.9), mean PSQI score was 9.4 (SD=2.1), mean MAP score was 1.2 (SD=1.4), mean BRISC score was 2.5 (SD=1.1), mean weeknight sleep duration was 6.8 hours (1.5 hours), and mean weekend sleep duration was 7.5 hours (SD=1.8 hours). Mean ARSMA scores were 1.98 (SD=0.94) for Anglo and 3.20 (SD=0.58) for Mexican acculturation, and mean BIQ scores were 50.3 (SD=16.9) for Americanism, 63.8 (SD=9.0) for Hispanicism, and 13.6 (SD=21.1) for Biculturism. In regression analyses, none of the acculturation measures were associated with ISI, PSQI, MAP scores, or sleep duration. Increased perceived control over sleep (BRISC) was associated with greater ARSMA Anglo acculturation (B=0.140, 95% CI [0.057, 0.224], p=0.001), ARSMA Mexican acculturation (B=0.184, 95% CI [0.067, 0.302], p=0.002), BIQ Americanism (B= 0.007, 95% CI [0.003, 0.011], p=0.002), and lower BIQ Biculturism (B=-0.004, 95% CI [-0.008, -0.001], p=0.018).
Conclusion: In the present analyses, self-reported sleep duration and quality were not associated with acculturation. However, the degree to which individuals perceive control over their sleep was associated with cultural identification, both Mexican and American acculturation levels.
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0390

SOCIAL, EMOTIONAL, STRUCTURAL, AND FINANCIAL DETERMINANTS OF HEALTH IN THE US POPULATION ASSOCIATED WITH SLEEP HEALTH

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Introduction: The development of sleep health interventions requires a better understanding of social and environmental determinants. Yet, little population-level data extends beyond simple metrics such as education and income.
Methods: Data from the 2022 Behavioral Risk Factor Surveillance System were used, the largest national survey conducted by the CDC. N=193,225 provided data on sleep and health determinants. Sleep duration was categorized as <=4, 5, 6, 7, 8, 9, or 10+ hours. Health determinants included availability of emotional support, social isolation, food insecurity, use of food stamps, housing insecurity, inability to pay utility bills, employment insecurity, lack of transportation, household income, education, and employment status. Additional covariates included age, sex, race/ethnicity and body mass index. Population-weighted multinomial logistic regression analyses with sleep duration (relative to 7h) as dependent variable were examined, with age, sex, race/ethnicity, income, education, employment and body mass index as covariates in all models.
Results: Those who "never" receive emotional support were more likely to experience <=4h, 5h, 6h, and 10+h. Those reporting social isolation "always" were more likely to report <=4h, 5h, 6h, and 10+h. Those who accessed food stamps were more likely to report <=4h, 5h, 6h, 8h, and 9h. Those with high food insecurity were more likely to report <=4h, 5h, 6h, and 10+h. Those reporting housing insecurity were more likely to report <=4h, 5h, 6h, and 10+h. Those were unable to pay utility bills were more likely to report <=4h, 5h, 6h, and 10+h. Those with employment insecurity were more likely to report <=4h, 5h, 6h, and 10+h. Those without access to transportation were more likely to report <=4, 5h, 6h, and 10+h. Replicating previous work, lower income, less education, and unemployment were also associated with short and 10+h sleep. In a forward stepwise model, unique variance was contributed by (in order) income, isolation, emotional support, age, body mass index, food insecurity, education, losing utilities, transportation, housing insecurity, sex, and food stamps.
Conclusion: Sleep health interventions should recognize real-world determinants, including social, environmental, and financial stressors that contribute to poor sleep.
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0391

RACIAL/ETHNIC DIFFERENCES IN PSYCHEDELIC USE AND SLEEP SATISFACTION: PRELIMINARY FINDINGS FROM THE HERBAL HEART STUDY

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Introduction: Research on psychedelic use and sleep satisfaction remains unclear despite increased use. This study examines the psychedelic use and sleep satisfaction among 18-to-35-year-olds enrolled in the Herbal Heart Study.
Methods: The exposure variables were lifetime self-reported use of any psychedelic (LSD, psilocybin, peyote, mescaline, ayahuasca/DMT) and psilocybin-alone. Sleep satisfaction was assessed via the WHO Quality of Life, "How satisfied are you with your sleep" (satisfied, dissatisfied, or neutral). Chi-squared tests compared psychedelic use across sleep satisfaction categories. Multinomial logistic regression adjusted for demographics, cannabis history, anxiety, and depression assessed associations between psychedelics and sleep satisfaction using "neutral" as the reference.
Results: Of the sample (N=200; mean age: 25.2 years, SD = 4.8), 65% were female, 54.5% identified as Hispanic/Latino, 18.5% non-Hispanic White (NHW), 17.5% non-Hispanic Black (NHB). Psychedelic use was reported by 39.5% of participants (49.5% Hispanics/Latinos, 21.6% NHW, 25.1% NHB, 42.1% Other p< 0.01); 32.8% of participants reported psilocybin use (40.8% Hispanics/Latinos, 19.4% NHW, 18.7% NHB, 28.9% Other; p=0.03). Overall, 54.5% of participants were satisfied with sleep, 23.0% were dissatisfied, and 22.5% neutral. No differences in sleep satisfaction were observed in the overall sample; however, race/ethnic differences emerged. Among Hispanics/Latinos, 33.9% of psychedelic consumers reported sleep dissatisfaction vs 17.2% of non-consumers (p=0.03). Similarly, 41.9% of Hispanic/Latino psilocybin-alone users reported sleep dissatisfaction vs 15.6% of non-consumers (p=0.005). Hispanic/Latino psychedelic consumers had higher odds of sleep dissatisfaction (AOR: 4.4; 95% CI: 1.1-18.1) and satisfaction (AOR: 4.4; 95% CI: 1.2-14.7) compared to being neutral. Psilocybin-alone consumers had higher odds of sleep dissatisfaction (AOR: 9.2; 95% CI: 1.9-43.9) than non-consumers. There were no associations among NHW/NHB/Other groups.
Conclusion: Findings indicate a complex association between psychedelic use and sleep satisfaction, particularly among Hispanics/Latinos. Further research should investigate underlying mechanisms, cultural, and bio-physiological factors that may mediate the association between psychedelic use and sleep satisfaction.
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0392

INVESTIGATING THE ASSOCIATION BETWEEN DIURNAL SALIVARY CORTISOL AND DISPARITIES IN SLEEP HEALTH

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Introduction: Prior research in the Multi-Ethnic Study of Atherosclerosis (MESA) suggests a link between the stress biomarker, cortisol, and sleep health. However, research investigating cortisol's impact on sleep among subpopulations who may be susceptible to stress and poor sleep health is lacking. We examined the association between cortisol and objective sleep measures, stratified by gender, race, and ethnicity.
Methods: MESA is a longitudinal study of 6,814 Americans recruited in 2000-2002. Between 2010 and 2012, saliva samples were collected to measure diurnal cortisol curve features including: wakeup cortisol, peak cortisol, cortisol awakening response (CAR, wakeup to 30 minutes post-awakening), early decline slope (30 minutes to 2 hours post-awakening), late decline slope (2 hours post-awakening to bedtime), overall decline slope (awakening to bedtime), bedtime cortisol, and area under the curve. Participants also completed 1-week wrist actigraphy to measure sleep health characteristics, including sleep duration (minutes), sleep efficiency, and sleep irregularity. Using linear regression, we estimated separate multivariable associations between each cortisol feature and sleep outcome, overall and within strata of gender, race and ethnicity among 557 participants with available data.
Results: Overall, a 1-unit increase in wakeup and peak cortisol were associated with longer sleep duration (beta=8.91, 95% CI 1.03, 16.78; beta=9.80, 95% CI 2.42, 17.17, respectively) and higher sleep efficiency (beta=0.42, 95% CI 0.01, 0.83; beta=0.43, 95% CI 0.05, 0.81, respectively). Higher wakeup cortisol was also associated with reduced sleep irregularity (beta=-4.49, 95% CI -8.62, -0.37). Associations persisted across race and ethnicity. Additionally, we observed associations between early decline slope and sleep duration among Black participants, and between overall decline slope and sleep efficiency and CAR and sleep irregularity among White participants. Associations did not vary by gender.
Conclusion: In this study, favorable diurnal cortisol curve features (e.g., higher wakeup cortisol) were associated with better sleep health. However, associations may vary by race and ethnicity. Given racial and ethnic differences in stress, cortisol may contribute to sleep health disparities.
Support (if any): Support for MESA is provided by contracts and grants HHSN268201500003I, N01-HC-95159, N01-HC-95160, N01-HC-95161, N01-HC-95162, N01-HC-95163, N01-HC-95164, N01-HC-95165, N01-HC-95166, N01-HC-95167, N01-HC-95168, N01-HC-95169, UL1-TR-000040, UL1-TR-001079, UL1-TR-001881, and DK06349 from the NHLBI. Grant HL098433 supported the MESA Sleep exam.

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0393

PILOT TESTING OF A CULTURALLY ADAPTED BEDTIME ROUTINE QUESTIONNAIRE AMONG BLACK FAMILIES WITH YOUNG CHILDREN

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Introduction: Black children in the United States disproportionately experience sleep health disparities compared to Whites. Yet, existing pediatric sleep measures are largely developed and tested among White populations. We aimed to pilot test a new culturally tailored questionnaire, the Bedtime Routine Questionnaire for Black families with Young Children.
Methods: To develop the bedtime routine questionnaire, we apply the social-ecological framework of sleep to consider contextual factors in the home, via human-centered design empathy interviews with parents, developed from our previous qualitative study. We utilized three bedtime routine measures: The Parent-Child Sleep Interaction Scale (12items; sleep reinforcement, sleep conflict and sleep dependence constructs), Bedtime Routines Questionnaire (26 items; bedtime behaviors and routine environment, adaptive and maladaptive behavior constructs) and Child Routines Inventory Scale (21items; daily living and discipline routine constructs) tailored and adapted for Black families. Survey items were further selected and modified after formative research. A total of 75 items were finalized that captured 16 constructs (59 items from the 3 scales aforementioned, 6 additional questions on maladaptive behavior, sleep timing and independent sleep, 2 questions about family structure, and 9 new items about knowledge about child sleep were added. Next, we pilot test the new measure with 29 Black parents. To study measurement reliability, Chronbach's alphas for all aforementioned subscales were examined. Construct validity was examined by assessing the association between subscales and sleep outcomes.
Results: A sample of 29 Black parents (25 mothers and 4 fathers) completed the questionnaire. Parents self-identified as African American (52%), Jamaican (14%), and Haitian (10%). Children were 5 years old on average. The adapted new Bedtime Routine measure had adequate reliability for 8 subscales. Cronbach's alpha internal consistency across all measures was above acceptable level ranging from 0.69 to 0.86.
Conclusion: Our findings suggest a new measure is a promising tool that can be used for future sleep epidemiology research to understand underlining mechanisms between bedtime contextual and sleep health outcomes in Black families. A survey tailored with Black families, that captures the contextual factors in the home around sleep, is likely to better reflect participant behaviors.
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0394

SEX HORMONES SHAPE SPINDLE ACTIVITY ACROSS THE MENSTRUAL CYCLE

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Introduction: Studies examining how the female menstrual cycle and fluctuating sex hormones affect sleep have demonstrated a significant increase in non-rapid eye movement sigma frequency band (12-15Hz) in the luteal phase. However, existing literature often falls short by relying on small sample sizes, not employing within-subject designs, or failing to comprehensively evaluate multiple menstrual phases. The goal of our study was to conduct a comprehensive, within-subject, investigation of sleep and

sex hormones across the menstrual cycle (menses, pre-ovulation, mid-luteal, and late-luteal) in young, healthy women.
Methods: Thirty-five young, healthy women participated in a study to monitor their menstrual cycles for several months. We collected four in-lab, high-density electroencephalography sleep recordings during each of the four phases of their menstrual cycle, plus measured sex hormones. At each phase, we calculated the EEG power density ratio (PDR) in frequency bins 1-29Hz as power density ($\mu V^2/Hz$) divided by mean power density across the four phases. We extracted sigma PDR for frequencies between 12-15Hz, and detected spindles. Sigma PDR and spindle density were compared across menstrual phases using repeated-measures-ANOVAs, with Bonferroni-corrections plus Pearson's correlations between sleep/sex hormones.
Results: Across phases, sigma PDR varied significantly, lowest during pre-ovulation (p=0.005) and highest during mid-luteal (p=0.004). Results were similar for spindle density (p=0.005). Topographically, frontal regions showed greater cycle-related modulation in sigma power and fast spindle density compared to central, parietal, and occipital regions. Sex hormones impacted spindles. During pre-ovulation, progesterone negatively associated with sigma PDR (p=0.038), while during mid-luteal both progesterone (p=0.023) and estrogen (p=0.005) positively correlated with sigma PDR. Testosterone did not significantly predict sigma (p>.05). Spindle density correlated with progesterone in all phases except menses (pre-ovulation:p=0.34; mid-luteal:p=0.045; late-luteal:p=0.008), with especially strong correlations in the central channels (pre-ovulation:p=0.019; mid-luteal:p=0.043; late-luteal:p=0.008).
Conclusion: Our results demonstrate a significant shaping of sigma/spindle activity by the modulation of sex hormones across the menstrual cycle. Given the importance of spindles for sleep-dependent memory consolidation, future research should examine how these changes affect cognitive functioning and underlying brain networks.
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0395

ANTICIPATING RACISM IS ASSOCIATED WITH POORER SLEEP

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Introduction: Racism has deleterious effects on general health, including sleep health. Higher interpersonal discrimination is associated with lower sleep duration and poorer sleep quality (i.e., poor sleep) in adults who are racialized as Black. Proposed mechanisms between discrimination and poor sleep among those racialized as Black include the stress of anticipating, ruminating over, or otherwise mentally preparing for future racist experiences. With accumulating racial discrimination across the life course, preparing for racist experiences may be associated with poorer sleep, but that association is understudied across the adult lifespan. Here, we hypothesized higher racism-related vigilance is associated with poorer sleep quality and lower sleep duration in women and men.
Methods: We used a subsample of the Offspring Study of Racial and Ethnic Disparities of Alzheimer's Disease, a community-based cohort study. In adults across the adult lifespan racialized as Black (n=265, 63% women, mean age = 57, SD = 11, range: 27 to 91), we measured racism-related vigilance with a questionnaire. The items involved how often participants prepared for possible insults, avoided certain social situations and places, and felt they had to be careful about their appearance to avoid harassment on a scale from (1) at least once a week to (5) never. To measure sleep duration and sleep quality, we used a modified version of the Pittsburgh Sleep Quality Index, which included items about the frequency of sleep disturbances (e.g., temperature, pain, bad dreams). We evaluated associations between vigilance and sleep with age-adjusted, linear regression models stratified in women and men.
Results: Higher racism-related vigilance was associated with poorer sleep quality. Associations between higher racism-related vigilance and poorer sleep quality were similar among men and women. We observed no reliable associations between vigilance and sleep duration.
Conclusion: Anticipatory experiences of racism are associated with poorer sleep quality. Specifically, the threat of racist experiences is associated with poorer sleep in men and women racialized as Black. Future research and policies should aim to reduce racism-related vigilance by intervening on negative environments that trigger vigilance responses to improve sleep health in adults racialized as Black.
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0396

EXPLORING THE IMPACT OF TRANSPORTATION MODES ON SLEEP

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Introduction: Many workers struggle to achieve enough sleep due to demands of work, caregiving, and other commitments. Prior research has found that increased commute time is associated with decreased sleep, with the assumption that this is largely due to the time burden. However, the mode of commute – driving, carpooling, mass transit, biking, or walking – likely differ in terms of stress, physical activity, ability to multi-task, scheduling flexibility, etc., which may affect sleep as well. This study explores the relationship between commute time, transportation mode, and their impact on sleep duration.
Methods: This study utilizes data from the 2021 to 2023 American Time Use Survey (ATUS), which includes 24-hour time use diaries on a representative sample of adults in the United States. This analysis was restricted to those with at least two instances of commuting to or from work, and excluding those with airplane as a transportation mode. We categorized time use into five groups: commute, sleep, work, leisure, and non-discretionary activities (eating, household chores, caregiving, etc.), and used linear regression to examine the association between commute time and sleep duration, adjusting for potential confounders (work schedule, age, sex, and rural/urban location.)
Results: Each one minute increase in commute times was associated with a decrease in sleep time during the same 24-hour period, including 0.32 minutes (95%CI 0.24 to 0.40) for each

minute of driving, 0.26 minutes (95%CI 0.12 to 0.41) for sedentary non-driving commutes (such as bus, train, and carpooling), and 0.59 (95%CI 0.16 to 1.02) for active commute modes (such as walking or biking).
Conclusion: Contrary to expectations, the benefits of active commutes did not decrease the impact of commute time on sleep duration. However, we do see a decreased effect of non-driving sedentary commuting vs. driving, and hypothesize that this may be due to the ability to multi-task while a non-driver on a sedentary commute, potentially having a less stressful commute than those driving, and/or needing to stick to a stricter schedule on when to leave work. Further research is needed to better understand these differences, and to translate them into actionable strategies for urban planning and transportation policies.
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0397

SLEEP ON IT: HOW BASELINE SLEEP HEALTH INFLUENCES CIRCADIAN HEALTH INTERVENTION OUTCOMES--A PILOT EXPLORATION

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Introduction: Adolescents face unique risks to circadian health, leading to poor sleep and mental health. Sleep interventions, such as the Transdiagnostic Intervention for Sleep and Circadian Dysfunction (TranS-C), have been shown to improve adolescent sleep. However, less is known about whether factors influence the effectiveness of TranS-C. This study evaluated whether demographic, psychological, sleep, and emotional factors predicted intervention success for adolescents who completed a TranS-C intervention.
Methods: Night-owl adolescents (ages 14-18; N = 31) participated in a six-week TranS-C study. Before and after the intervention, participants provided basic demographic information and completed the Depression-Anxiety Stress Scale-21, Difficulties in Emotion Regulation Scale-18, Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Morningness-Eveningness Questionnaire (MEQ). Furthermore, participants monitored their sleep for one week via actigraphy (Actiwatch 2). Six hierarchical regression analyses examined the contribution of baseline demographics (Step 1: sex, income, race, BMI), psychological and sleep factors (Step 2: anxiety, depression, and sleep regularity), and emotional factors (Step 3: stress, emotional regulation difficulties) on changes in sleep outcomes—sleep quality, daytime sleepiness, chronotype, sleep midpoint, and weekend sleep onset/offset.
Results: Across all outcomes, baseline demographics (Step 1) explained a small proportion of variance (R^2 range =.03–.37) but none emerged as significant predictors of success (p's>0.05). The addition of psychological predictors (Block 2) significantly improved the models (ΔR^2 range =.21–.45), with sleep regularity, depression, and anxiety significantly predicting differences in weekend sleep offset. The inclusion of emotion regulation and stress (Block 3) provided minimal additional variance (ΔR^2 range =.04–.00) and, in some cases, reduced model efficiency (adjusted R^2 decreasing); no emotional factors emerged as significant predictors of success (p's>0.05).
Conclusion: Overall, psychological predictors consistently accounted for the largest proportion of variance in TranS-C intervention success across all outcomes, while baseline demographics and emotion regulation factors contributed relatively less. Specifically, higher levels of depression/anxiety and greater sleep regularity both significantly predicted changes in weekend sleep offset times. As such, sleep clinicians may consider evaluating adolescent sleep regularity at baseline to assess for individuals who may need additional support to increase odds of intervention success.
Support (if any):

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0398

THE IMPACT OF EVERYDAY DISCRIMINATION ON SLEEP DISTURBANCE IN PERINATAL WOMEN OF COLOR

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Introduction: Perinatal women of color often navigate the effects of everyday discrimination and poor sleep health at a vulnerable time, when their mental and maternal health are essential for both their well-being and that of their developing baby. While racial discrimination during the maternal period is well documented, the relationship between this psychosocial stressor and sleep quality has been ignored in research. This study explores the interplay between perceived discrimination and sleep disturbances in perinatal women of color, using virtual reality (VR).
Methods: A pre-and post-design study, Nurturing Moms, assessed the effectiveness of a maternal health and wellness VR program on maternal stress among expectant (0-36 weeks gestation) and postpartum (up to 12 months) Black and Latina and/or Hispanic women. Twenty-three expectant (29.3±4.8 years) and twenty-three postpartum (31.6±5.1 years) women completed baseline surveys using REDCap. Surveys included the Everyday Discrimination Scale (EDS) - Short Version and Patient Reported Outcomes Measurement Information Systems (PROMIS) Short Form v1.0 – Sleep Disturbance 4a, measuring subjective perceived discrimination frequency and perceptions of sleep quality, respectively. To investigate the relationship between discrimination and sleep we performed Spearman correlation and linear Regression analysis (adjusting for race, age, and income level) using the bootstrap method.
Results: A statistically significant correlation was observed between EDS scores and PROMIS scores (r_s= 0.318, $p < 0.05$), indicating that higher baseline everyday discrimination was associated with greater sleep difficulties. While the overall regression model was not significant, $F(4,41) = 1.53$, $p > 0.05$, frequent discrimination experiences were identified as a

significant predictor of sleep disturbance (β =.705, p =.020, 95% CI [.12, 1.29]), among perinatal women of color.
Conclusion: The analyses revealed a significant correlation between greater levels of discrimination and poor sleep quality among perinatal Black and Latina mothers, emphasizing the detrimental effects of psychosocial stressors on maternal sleep health. The overall regression model was non-significant, likely due to limited sample size and reduced statistical power, frequent discrimination experiences remained a key predictor. Future research should explore intersecting socio-determinants of health, on a larger and more diverse scale.
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0399

RISK AND PROTECTIVE FACTORS FOR SLEEP DISTURBANCES AMONG BLACK REPRODUCTIVE-AGED WOMEN IN THE US

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Introduction: Black women disproportionately experience sleep disturbances often linked to chronic stress including racial discrimination. Limited research explores both the risk and protective factors affecting sleep quality amongst Black reproductive-aged women. Understanding these factors is crucial for advancing sleep equity and health in this population.
Methods: A retrospective design was used. Data was collected at the 2024 Essence Festival using a tech-based platform. A total of 769 Black women who had given birth in the past 10 years consented to participate. The survey included measures of demographics (e.g., education, marital status), adverse experiences (e.g., domestic violence, adverse childhood experiences), mental health (e.g., perinatal depression/anxiety), coping levels, social support, the Everyday Discrimination Scale, and the PROMIS Sleep Disturbance Short Form. Descriptive statistics and regression analyses were conducted.
Results: Among participants, 95% self-identified as non-Hispanic Black, with 48% from New Orleans. The average age was 35.8 years (SD = 6.5). Approximately 43% graduated high school or had some college, while 55% obtained a bachelor's or graduate degree; 43% were married; 36% (n=274) reported adverse experiences and 43% (n=432) reported perinatal depression/anxiety. Notably, 85% reported sleep problems: 70% woke up tired, 65% did not get enough sleep, 52% had trouble staying asleep, 47% had difficulty falling asleep, and 33% snored. Adjusting for covariates, regression analysis identified that greater racial discrimination (β = 0.14, p< 0.001), adverse experiences (β = 0.10, p=0.005), and perinatal depression/anxiety (β = 0.12, p=0.001) were associated with higher sleep disturbances. Conversely, higher coping ability (β = -0.20, p< 0.001) and social support (β = -0.11, p=0.003) were associated with lower sleep disturbances.
Conclusion: This study highlights chronic stressors (racial discrimination, social adversity, and perinatal mental health challenges) are risk factors for sleep disturbances, whereas higher coping ability and social support serve as critical protective factors amongst Black reproductive-aged women. Our findings emphasize the need for multi-level interventions that enhance individual coping mechanisms, increase social support networks, and address systemic discrimination and adversity. Such interventions may advance sleep equity and overall health of Black reproductive-aged women.
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0400

MARITAL STATUS MATTERS: EXAMINING SEX DIFFERENCES IN REM SLEEP PERCENTAGE AMONG BLACK AMERICANS

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Introduction: Rapid Eye Movement (REM) sleep plays a vital role in memory consolidation, emotional regulation, and overall well-being. REM Sleep Percentage (REM%), the proportion of sleep spent in REM, is a key marker of sleep quality due to its role in physiological recovery. Despite the critical importance of REM%, there is a notable lack of research exploring how social and demographic factors, such as marital status and sex, influence this measure of sleep architecture among Black Americans. Addressing this gap, the present analysis investigates the relationship of marital status with sex and REM% in a cohort of Black Americans (BA), offering insights into potential sex-specific patterns that may inform interventions to promote equitable sleep health.
Methods: The study analyzed 139 participants from the NIH-funded sleep studies, ESSENTIAL and MOSAIC, focusing on BA. Marital status was categorized as Married/Living with Partner, Separated, Widowed, Never Married, Divorced, and Single. REM% was analyzed by marital status using one-way ANOVA, separately for males and females. Tukey's HSD post hoc tests identified significant pairwise differences.
Results: For females (n = 93), significant differences in REM% were observed across marital status groups ($F(5, 87) = 3.232$, $p = 0.010$, $\eta^2 = 0.157$). Tukey's HSD showed that females in the Widowed group had significantly higher REM% than those in the Divorced ($p = 0.020$) and Single ($p = 0.020$) groups. Females in the Married/Living with Partner and Widowed groups had higher mean REM% than other groups. For males (n = 46), no significant differences were found ($F(5, 40) = 1.085$, $p = 0.383$, $\eta^2 = 0.119$).
Conclusion: This study highlights sex-specific patterns in the relationship between marital status and REM%. Among females, being Widowed was associated with the highest REM%, while Divorced and Single groups had the lowest. In contrast, males showed no significant differences. These findings suggest marital status may exert a stronger influence on REM% among females, reflecting potential psychosocial factors like partner support or stress from being unmarried. Future research should explore mechanisms behind these sex-specific associations to

inform interventions aimed at improving sleep health in Black Americans.

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0401

DISCRIMINATION IS ASSOCIATED WITH INSOMNIA SEVERITY IN HISPANIC COMMUNITIES

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Introduction: Socioeconomic determinants of health include ethnic and racial discrimination, with traditionally marginalized communities found to experience poorer health outcomes. Research has consistently reported an increased frequency of poor sleep among individuals experiencing perceived discrimination. Despite these findings, there remains a notable gap in understanding the effects of discrimination on insomnia severity within the urban-rural Hispanic population. This study addresses this gap by exploring the associations between discrimination and insomnia severity in a South Florida Hispanic adult cohort.

Methods: For this study, 231 (80 male, 151 female) Spanish-speaking participants from rural and urban areas of Florida were surveyed using the Williams Everyday Discrimination Scale (EDS) as part of the Determinants, Outcomes, Responses, and Markers of Insufficient Sleep in Rural-Urban (DORMIR) study. Higher scores on the EDS indicate worse discrimination. Insomnia was measured using the insomnia severity index (ISI) score, with higher scores reflecting more severe insomnia. Linear regression analyses were conducted to evaluate the association of EDS with ISI with the adjustment of age, sex, race/ethnicity, marital status, employment, income, and Body Mass Index.

Results: A significant correlation between EDS and ISI was observed. A one-unit increase in the EDS was associated with a -0.24 decrease in ISI scores (□ [95% Confidence Interval (CI)] = -0.24 [-0.37, -0.11]; $p < 0.001$). Among the components of the EDS scale, the categories “Treated as not smart”, “Treated with courtesy”, “Others felt superior”, “Treated as dishonest”, and “Poor service” showed the largest association with ISI scores.

Conclusion: Perceived discrimination could be significantly associated with insomnia severity in Hispanic communities. While male individuals reported overall higher discrimination experience than female individuals, the overall ISI score was lower in males than in females, indicating that women may be more susceptible to insomnia under stressors such as discrimination. Future studies should examine the relationship between insomnia and discrimination by sex as well as using longitudinal data collection.

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0402

MICE CARRYING A MATERNAL UBE3A DELETION ASSOCIATED WITH ANGELMAN'S SYNDROME DISPLAY ALTERED SLEEP ONTOGENESIS

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Introduction: Sleep problems are frequent in Angelman's syndrome (AS), a neurodevelopmental disorder caused by maternal deletion of the Ube3a gene (Ube3a m-/p+). AS is characterized by a high prevalence of autism and intellectual disability. While sleep issues significantly impact individuals and caregivers, their precise nature varies across clinical studies, which are predominantly based on non-objective measures using questionnaires in children and adolescents. Studies using the Ube3a m-/p+ mouse model use objective measures but are so far limited to adult animals and show variable agreement beyond a reduction in REM sleep. The goal of this study was to examine the effects of Ube3a maternal deletion on sleep architecture and homeostasis in juvenile mice.
Methods: Juvenile male and female Ube3a m-/p+ mice (n= 12) and wildtype littermates (n=11-12) were implanted with EEG/EMG electrodes at postnatal day 18 (P18). Mice underwent 24-hour baseline recording, 3-hour sleep deprivation (SD) via gentle handling, and 19-hour recovery sleep at P23/P24 and P29/P30. Vigilance states (REM and NREM sleep, wake) were assigned using SPINDLE and manually corrected with SleepSign. Statistical analysis was performed using ANOVAs with age and genotype as main effects, with Benjamini-Hochberg corrected post-hoc t-tests using MATLAB.
Results: Our data shows that Ube3a m-/p+ mice exhibit baseline REM sleep reduction from P23 to P29, driven by decreased REM bout duration, alongside increased NREM sleep, with a significant genotype-age interaction. Despite similar sleep pressure accumulation, Ube3a mutants showed reduced sleep latency after SD, with genotype differences more pronounced in REM and NREM sleep post-SD compared to baseline levels.
Conclusion: Our findings support Ube3a's role in sleep regulation, showing REM reduction and NREM increase. Thus, the mutation may impact REM sleep function earlier in life when REM quantities are greater. While sleep pressure accumulation remained unchanged, juvenile Ube3a mutant animals demonstrated reduced onset sleep latency post-SD. The sleep pressure and sleep onset results suggest that maternal Ube3a deletion induces abnormal REM/NREM sleep patterns in young ages.
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0403

DIFFERENTIAL OUTCOMES OF SLEEP AND COGNITION IN A GENETICALLY DIVERSE MOUSE PANEL OF ALZHEIMER'S DISEASE

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Introduction: Alzheimer's Disease (AD) is known to contribute towards changes to sleep, including decreased sleep duration and increased sleep fragmentation. While significant advances have been made in characterizing these changes, the contribution of individual genetic makeup on the initiation and progression of AD-related sleep dysfunction and pathogenesis is yet unknown. As such, we decided to use a forward genetic approach to identify genes controlling sleep in AD in a panel of genetically diverse mice (AD-BXDs).
Methods: Female mice from 47 strains in the AD-BXD panel carrying the 5xFAD transgene (n=214) and non-transgenic (Ntg) littermate controls (n=216) completed sleep testing in the PiezoSleep Tracking System at 6 and 14 months of age. The percent of time spent sleeping was calculated over 4 testing days by automated sleep/wake scoring. After sleep phenotyping, animals were tested for learning and memory functions using contextual fear conditioning (CFC) at both ages – 6 and 14 months.
Results: At 14 months of age, 5xFAD mice sleep less over a 24-hour period than their non-transgenic (Ntg) and 6-month 5xFAD counterparts ($p< 0.0001$). This difference is particularly enhanced in the dark phase (ZT12-24), where the difference in sleep quantity between Ntg and 5xFAD animals is magnified by increased sleep in Ntg animals with age and a significant decrease in sleep in 5xFAD carrying animals with age ($p< 0.0001$ and $p< 0.05$ respectively). Further, mid-life sleep is positively associated with memory performance in genetically diverse 5xFAD mice, but not Ntg counterparts (Pearson's $R=0.54$, $p=0.0019$; Pearson's $R=0.036$, $p=0.85$). Heritability estimates for total sleep duration, the 12-hour light and dark period at 6 and 14 months of age were between 0.64-0.76 for both Ntg and 5xFAD animals. These results suggest that genetic background may largely explain the observed changes to sleep and its differential associations with cognition in AD.
Conclusion: Genetic background modulates the effect of AD and age on sleep in the AD-BXD panel. Since sleep is vital for memory consolidation, future work aims to map the genes modifying sleep in AD, identifying the mechanisms through which sleep causally influences cognitive decline in AD and age-related dementias.
Support (if any): NIH-R01-AG076129, Chan Zuckerberg Collaborative Pairs Initiative.

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0404

SLEEP CHARACTERIZATION IN THE APP/NL-F MOUSE MODEL OF ALZHEIMER'S DISEASE AFTER REPETITIVE MILD TRAUMATIC BRAIN INJURIES

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Introduction: Sleep disturbances, such as insomnia and hypersomnia, are often reported by people who have experienced mild traumatic brain injuries (mTBIs). TBIs and sleep disturbances are both risk factors for neurodegenerative diseases, such as Alzheimer's disease (AD). The long-lasting effects of repetitive mTBIs (rmTBIs) on sleep outcomes and whether post-TBI sleep is an effective therapeutic target for reducing the risk of neurodegenerative disease are not yet well understood. Therefore, our study aims to characterize intracranial EEG activity during sleep and wake 3 and 9 months after rmTBIs in APPNLF mice.
Methods: We used the closed-head impact model of engineered rotational acceleration (CHIMERA) method to deliver 3 rmTBIs 48hr apart to female and male APPNL-F mice (n=42), at 6 and 12 months of age. At 15 months old, we implanted EEG cortical electrodes and recorded 72 continuous hours of EEG. Using the Sirenia Sleep Pro software and an in-house R code, we quantified sleep-wake patterns. Unpaired Welch t-tests with Holm-Šídák correction for multiple comparisons was used to compare the sleep-wake patterns between the rmTBI and sham groups. Additionally, the partial least squares regression method was used to analyze the spectral power data.
Results: Our results show no differences in the time spent in each vigilance state between the TBI and sham groups at either 3- or 9-months post-injury. There were no differences in the number of transitions between states, bout counts, or bout lengths between the experimental groups. However, in the power spectra analysis, we observed a statistically significant decrease in power at the lower frequencies (3-8Hz) and an increase in the power at the higher frequencies (18-30Hz) in the TBI group during wake at 9 months post-injury. There were no significant changes in the power spectra after 3 months post-injury, although there was a trend towards higher power in the TBI group in the lower frequencies during NREM.
Conclusion: This is the first study, to our knowledge, presenting the chronic effects of repetitive closed-head mTBIs on sleep and EEG power spectra.
Support (if any):

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0405

MINERALOCORTICOID RECEPTOR BLOCKADE MITIGATES CARDIOVASCULAR DYSFUNCTION IN OBESE MICE EXPOSED TO CHRONIC INTERMITTENT HYPOXIA

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Introduction: Obstructive sleep apnea (OSA) is common in obesity, characterized by cycles of intermittent hypoxia (IH), and promotes the risk of cardiovascular disease (CVD) and mortality. Mineralocorticoid receptor antagonists (MRAs) improve cardiovascular outcomes in CVD. Here, we examine whether MRAs, specifically spironolactone (SPL) and the more selective finerenone (FIN), mitigate coronary and cardiac dysfunction in mice subjected to chronic IH.
Methods: Male and female C57Bl/6J mice were fed a high-fat diet (HFD) or a low-fat diet (LFD) for 10 weeks, followed by exposures to IH (FiO2 cycles of 21% for 90s and 6% for 90s) or room air (RA, 21%) for 12 hours/day over 16 weeks. Animals were treated with SPL, FIN, or placebo. Key measures, including mean arterial pressure (MAP), echocardiography-derived ejection fraction (EF) and E/A ratio (diastolic function), and coronary flow velocity reserve (CFVR), were assessed. Left anterior descending coronary and renal arteries were examined in vitro for vascular reactivity (acetylcholine (ACh) and thromboxane A2 receptor agonist U46619).
Results: SPL and FIN treatments effectively normalized elevated MAP in male mice on HFD and those exposed to IH with LFD or HFD. Systolic function (EF) improved with both SPL and FIN in male mice exposed to IH with LFD but not in those on HFD or HFD-IH. Diastolic function (E/A ratio) did not improve post-MRA treatment in groups with reduced diastolic function, notably HFD-IH. FIN uniquely improved CFVR in HFD-fed males exposed to IH, indicating selective superiority. In coronary arteries, MRAs decreased vasoconstriction in IH with LFD but not in HFD or HFD-IH males. Endothelium-dependent relaxation was restored by FIN in both LFD and HFD mice exposed to IH, showing superior efficacy compared to SPL. In female mice, neither MRA altered elevated vasoconstrictive responses or impaired vasodilation following HFD-IH.
Conclusion: Chronic IH and diet-induced obesity impair cardiac and coronary function, particularly in males. MRA therapy, notably with the selective FIN, ameliorates dysfunction associated with IH and obesity in a diet- and sex-specific manner, highlighting its potential for targeted therapeutic interventions in CVD risk management among OSA patients.
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0406

BILATERAL TRANSECTION OF STYLOPHARYNGEUS MUSCLE ALTERS INSPIRATORY AIRFLOW IN CONSCIOUS RATS

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Introduction: Upper airway patency is lost in obstructive sleep apnea (OSA). Research has primarily focused on the role of genioglossus muscle on maintaining airway patency. The stylopharyngeus muscle is an upper airway dilator muscle that supports the lateral pharyngeal wall. Its role in maintaining upper airway patency and effects on respiratory airflow is theoretical (Dewald, 2022) but functionally understudied. We hypothesize that bilateral transection of the stylopharyngeus muscles disrupts normal breathing. This study aims to assess the impact stylopharyngeus muscles have on respiratory airflow in conscious freely moving adult rodents.
Methods: Adult male Sprague Dawley rats were divided into two groups: 1) bilateral stylopharyngeus muscle transection (n=4) and 2) sham (muscle was exposed) surgery (n=2). Respiratory airflow was acquired using whole- body plethysmography before and 1 day after surgery. Epochs of stable breathing (minimum of

1 min) were selected from the airflow tracings for analysis using SPIKE CED.
Results: Significant alterations in respiratory airflow and tracings, particularly a flattening (plateau) in inspiratory flow, were observed on the first post-operative day in the transection group versus an early peak seen in the pre-operative airflow tracings. The average length of the inspiratory plateau among the transection group (0.23 ± 0.12s) was a 9-fold increase compared to the pre-operative values (0.02 ± 0.12s). The sham group did not exhibit a plateau and showed no significant changes in inspiratory airflow.
Conclusion: Bilateral stylopharyngeus muscle transections disrupt airflow in a conscious rodent model. The transections produce a flattening of the inspiratory airflow similar to inspiratory flow limitation traces seen in humans with upper airway resistance and OSA. Our results support the hypothesis that stylopharyngeus muscle plays a vital role in shaping respiratory airflow.
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0407

BEHAVIORAL AND PHARMACOLOGICAL INTERVENTIONS TO IMPROVE SOCIAL AFFILIATION IN PRAIRIE VOLES EXPOSED TO EARLY LIFE SLEEP DISRUPTION

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Introduction: Rapid eye movement (REM) sleep peaks early in life and may represent a sensitive period for proper maturation of the neurobiological systems underlying the development of complex social behaviors. Prairie voles (Microtus ochrogaster) are a highly social rodent species that show affiliative behaviors throughout life and form pair bonds with opposite sex mates as adults. We have previously shown that experimentally reducing REM sleep early in life leads to long lasting impairments in both social affiliation and sleep in the prairie vole, characteristics similarly seen in autism spectrum disorder (ASD). Here we explored two different potential interventions: pharmacological treatment with donepezil hydrochloride, an acetylcholinesterase inhibitor that has been found to increase REM sleep in children with ASD, or behavioral intervention with environmental enrichment, shown to increase REM sleep in rodents.
Methods: Early life sleep disruption (ELSD) occurred via gentle home cage agitation from postnatal day (p) 14-21. Control animals were housed in the same room, but their home cages were left undisturbed. Pharmacological intervention occurred by daily intraperitoneal injections of donepezil or saline from p14-p40. Environmental enrichment (EE) intervention consisted of increased bedding, toys and nestlets starting at p21 and lasting until behavioral testing in adulthood. All animals underwent social behavioral testing as adults.
Results: Both of our interventions improved affiliative social outcomes in adults. Animals treated with donepezil early in life displayed increased affiliative social behavior as measured by side-by-side huddling compared to saline treated controls. This effect was present in both ELSD and Control groups. By contrast, animals exposed to EE did not have increased amounts of affiliative social behaviors but did show improved preference for a pair bonded mate after ELSD.
Conclusion: Our experiments describe two promising interventions for the impaired social phenotype produced by early life sleep disruption in the prairie vole. Future work will explore the sleep phenotype of these animals before and after these interventions to appreciate the significance of REM sleep on the development of affiliation.
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0408

SELF-REPORTED SLEEP METRICS ARE ASSOCIATED WITH THE COMPOSITION AND DIVERSITY OF THE GUT MICROBIOME IN YOUNG ADULTS

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Introduction: Sleep has been associated with compositional alterations of the human gut microbiome. However, relationships between sleep variables and the gut microbiome have yet to be comprehensively described. This study investigates associations between self-reported sleep variables and the gut microbiome in young adults.
Methods: The composition of the gut microbiome of 83 young adults from the Southern California Meta-AIR study was characterized using 16S rRNA sequencing. Participants' self-reported sleep characteristics included: snoring, workday and free-day bed and wake times. From this, sleep debt, average sleep duration, workday mid-sleep time (MSW) and free-day mid-sleep time (MSF) were calculated. Associations between sleep characteristics with alpha-diversity metrics at the genus level and the relative abundance of gut bacteria were examined using multivariable linear regression. These models adjusted for age, sex, body mass index, and diet via the healthy eating index (HEI). Benjamini-Hochberg Procedure adjusted p-values (FDRBH) are reported.
Results: MSF and snoring were positively associated with Shannon diversity (all FDRBH < 0.2) while work-day sleep duration reflected a negative association (FDRBH = 0.05). Average sleep duration was negatively associated with abundance of the phylum Bacteroidota and the class Bacteroidia (all FDRBH < 0.2) and negatively associated with abundance of the class

Negativicutes (FDRBH = 0.15). At the family level, work-day sleep duration was positively associated with Lactobacillaceae (FDRBH = 0.08) and Thermaceae (FDRBH = 0.14). Within the class level, free-day sleep duration was negatively associated with Negativicutes (FDRBH = 0.16). At the order level, MSW was positively associated with Enterobacterales (FDRBH = 0.08).
Conclusion: This study presents associations of specific sleep characteristics with the composition and diversity of the gut microbiome in young adults. Few studies have evaluated these associations within the young adult population; however, those evaluating children to middle-aged adults have found sleep characteristics to be associated with the phylum Bacteroidota and its taxa. These results suggest that certain sleep habits, particularly related to sleep duration, may alter the gut microbiome.
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0409

SLEEP DISCREPANCY IN ADULTS WITH ELEVATED BLOOD PRESSURE AND SELF-REPORTED SHORT SLEEP DURATION

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Introduction: Nearly half of adults do not achieve the recommended 7 hours of sleep per night, a pattern associated with increased cardiovascular and metabolic health risks. However, sleep discrepancy—the difference between subjective and objective sleep duration—may indicate a bias in risk perception, as individuals may underestimate their sleep deficits. The goal of this study was to examine sleep discrepancy in self-reported short sleepers (< 7 hours) screened to participate in a sleep extension intervention.
Methods: Data were drawn from persons screened to participate in a randomized study of sleep extension among individuals with elevated blood pressure recruited from primary care clinics, online, and community sources. Participants had self-reported sleep < 7 hrs and standardized office blood pressure □120 mmHg systolic and/or 80 mmHg diastolic. Participants completed 7 days of wrist actigraphy, questionnaires including Insomnia Severity Index (ISI), Perceived Stress Scale (PSS), Epworth Sleepiness Scale (ESS), and PROMIS Sleep Disturbance and Sleep-Related Impairment scales. Sleep discrepancy was calculated as reported sleep minus objectively measured actigraphy sleep. Data were analyzed using regression models, including a full model (all predictors) and individual models (each predictor separately). Covariates included age, sex, and race.
Results: We included 195 participants with mean age of 42 years (SD=11); 36% were female. Average sleep discrepancy was -0.5 hrs (indicating self-report was 0.5 hr less than objective) and 54% was correctly identified as a short sleeper based on self-report (both self-report and objective sleep were < 7 hrs). Higher perceived stress (PSS) was significantly associated with sleep underestimation in both models, with the full model showing a negative association (b=-0.0948, 95% CI [-0.165, -0.025], p=.008). Sleep disturbance (PROMIS) was linked to underestimation in both models (b=-0.0420, 95% CI [-0.072, -0.012], p=.007). Insomnia severity (ISI) was associated with sleep underestimation in only the individual model (b=-0.0497, 95% CI [-0.086, -0.013], p=.008).
Conclusion: This study highlights the psychological significance of sleep perception among self-identified short sleepers. Higher perceived stress, sleep disturbance, and insomnia severity were linked to underestimating sleep duration and psychological distress. Screening data offered insights, emphasizing the need for combined subjective-objective assessments to address misperceptions.
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0410

CARDIOVASCULAR DISEASE INCIDENCE DIFFERS BY PATIENT CLUSTER BASED ON RAW POLYSOMNOGRAPHY DATA FOUNDATIONAL MODEL

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Introduction: Traditional sleep measures are not consistently associated with incident cardiovascular events in observational studies. We hypothesized deep learning approaches could uniquely identify distinct patient groups with varying cardiovascular disease (CVD) incidence, independent of traditional measures.
Methods: We used artificial intelligence to analyze N=10,000 polysomnograms completed at Cleveland Clinic (1/2012-12/2022) enriched with underrepresented populations. We created a time-series foundational model guided by sleep macro-architecture and respiratory annotations, generating embeddings to cluster patients into risk groups using k-means. Follow-up time was from polysomnogram until death or last follow-up. Propensity scores were estimated using multinomial logistic regression on age, sex, body mass index (BMI), and years of available data, then inverse probability weighted, stabilized, and trimmed at 1st and 99th percentiles to minimize bias introduced by extreme values. Cox proportional hazards regression examined risk groups as predictors adjusted for age, sex, BMI, and apnea hypopnea index (AHI) with comorbidities included per outcome. Patients with baseline disease were excluded.
Results: The cohort [age 50.4±24.7 years, 50% male, 44% White, 34% Black, 5.3% Asian, 14.8% multiracial] had follow-up of 4.4[2.0-7.5] years. A 5-cluster solution provided the best stratification: Risk Group 1 (RG1) was reference. RG5 (highest AHI and arousal index, lowest mean and minimum SaO2 and total sleep time(TST)) had the highest CVD incidence (major adverse cardiovascular events(MACE): HR=1.60, 95%CI=1.13-2.28, myocardial infarction: HR=1.75, 95%CI=1.07-2.88, atrial fibrillation: HR=1.83, 95%CI=1.15-2.93) and all-cause mortality (HR=2.76, 95%CI=1.98-3.84). RG4 (highest %time SaO2< 90%) had elevated incidence to a lesser degree than RG5. RG3 (intermediate) had the highest stroke (HR=1.38, 95%CI=1.13-1.69) and ischemic heart disease (HR=2.01, 95%CI=1.37-2.94) incidence, second highest MACE incidence (HR=1.34, 95%CI=1.12-1.60) and lowest all-cause mortality (HR=1.47, 95%CI=1.14-1.90). RG2 (lowest AHI and %time SaO2< 90%, highest mean and

minimum SaO2 and TST) had the lowest CVD incidence but not all-cause mortality (HR=1.47, 95%CI=1.14-1.90).
Conclusion: We created a large language model of raw polysomnogram data which identified groups that differed in CVD incidence after propensity score analysis. Risk groups were associated with adverse cardiovascular outcomes, thus supporting enhanced utility of a novel deep learning model over traditional approaches for CVD risk stratification. Future directions include validation with external data sources.
Support (if any): IBM Discovery Accelerator, AIM Award

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0411

IMPACT OF SEX AND DIET ON CARDIOVASCULAR DYSFUNCTION FROM INTERMITTENT HYPOXIA IN OBSTRUCTIVE SLEEP APNEA

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Introduction: Obstructive sleep apnea (OSA) is prevalent in obese individuals and is characterized by intermittent hypoxia (IH), a condition strongly associated with cardiovascular disease (CVD) and increased cardiovascular mortality. However, few studies have examined how diet-induced obesity and sex differences influence cardiac and coronary outcomes in OSA. This study tested the hypothesis that long-term IH differentially impacts cardiovascular outcomes in a sex- and diet-specific manner.
Methods: Male and female C57Bl/6J mice were fed a high-fat diet (HFD) or low-fat diet (LFD) for 10 weeks, followed by exposures to IH (FiO2 cycling between 21% for 90s and 6% for 90s) or room air (RA, 21%) for 12 hours/day over 16 weeks. Mean arterial blood pressure (MAP) and coronary flow velocity reserve (CFVR) were measured using the tail-cuff method and Doppler imaging, respectively. Cardiac function was assessed via echocardiography to determine ejection fraction (EF) and E/A ratio (diastolic function). Left anterior descending coronary arteries were analyzed in vitro for vascular reactivity using dose-response curves to acetylcholine (ACh) and thromboxane A2 receptor agonist U46619.
Results: MAP was significantly elevated only in male mice exposed to IH, HFD, HFD-IH, while MAP remained unaffected in females. In males, diet-induced obesity, IH exposure, or their combination resulted in significantly reduced systolic (EF) and diastolic (E/A ratio) functions, as well as decreased CFVR. Enhanced coronary vasoconstriction and impaired endothelium-dependent relaxation were observed in male mice exposed to IH, HFD, or HFD-IH. In females, enhanced vasoconstriction was observed only in IH-HFD, while endothelium-dependent relaxation was impaired by IH alone or in combination with HFD.
Conclusion: Cardiovascular dysfunction induced by intermittent hypoxia and diet-induced obesity exhibits substantial sexual dimorphism, with male mice showing greater susceptibility as evidenced by elevated blood pressure, impaired cardiac function, and altered coronary reactivity. These findings highlight the critical need for sex-specific approaches when assessing cardiovascular risks and therapeutic interventions in OSA, particularly among obese patients.
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0412

BETTER OBJECTIVE SLEEP IN HEALTHY ADULTS IS MARKED BY INCREASED BIFIDOBACTERIUM BREVE AND SAGUINI

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Introduction: Taxa level associations of the human gut microbiota have been reported in relation to sleep health; however, which taxa are associated with good sleep has yet to be determined. Many study methodologies rely on self-reported sleep metrics, 16S rRNA gene-amplicon sequencing or statistical methodologies not designed for gut microbiome assessments, which have limitations. We examined the association between sleep measures assessed by actigraphy followed by one night of in-laboratory polysomnography (PSG) and whole genome sequencing (WGS) gut microbiome taxa.
Methods: Fifteen healthy participants aged 26±4.0(SD) were instructed to maintain a consistent 8h sleep schedule for fourteen days at home. Wrist actigraphy and time stamped call-ins were assessed for adherence. Following fourteen days of monitoring, participants underwent 8h overnight in-laboratory PSG. Fecal microbiome samples were collected at PSG visit. WGS at the operational genomic unit (OGU) were then referenced against Web of Life 2 for taxonomic assignment. Differential abundance testing (ANCOM-BC) was performed to detect the OGUs associated with individuals with high (≥85%) or low (< 85%) sleep efficiency (SE) assessed via actigraphy. Following, linear regression associations between SE, sleep onset latency (SOL) and wake after sleep onset (WASO) from PSG were tested against these differentially abundant OGUs to determine: 1) whether these associations were maintained with PSG SE and; 2) whether these taxa were associated with SOL or WASO.
Results: ANCOM-BC determined Bifidobacterium breve and Bifidobacterium saguini species were increased in the high SE wrist actigraphy group (log fold change 2.2, q=0.002 and log fold change 2.0, q=0.006, respectively). Linear regression indicated increased breve and saguini were associated with higher PSG SE (β=0.0003, p=0.03, R^2=0.18 and β=0.0013, p=0.02, R^2=0.46, respectively). Further investigation into PSG SOL and WASO indicated that the higher SE was due to these strains being associated with decreased WASO, specifically (β=–0.09, p=0.04, R^2=0.38 and β=–0.58, p=0.04, R^2=0.40, respectively).
Conclusion: We find that higher SE, specifically by decreased WASO, is associated with higher levels of two Bifidobacterium species, breve and saguini. Bifidobacterium, commonly found in probiotics, may improve subjective sleep quality. Therefore, Bifidobacterium breve and saguini may be specific targets for improving human sleep.
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0413

EFFECT OF TRANSCUTANEOUS VAGAL NERVE STIMULATION (TVNS) ADMINISTERED DURING THE FIRST AND SECOND HALF OF THE NIGHT ON SLEEP STAGE ARCHITECTURE

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Introduction: Transcutaneous vagal nerve stimulation (tVNS) may improve sleep quality. The impact of tVNS on specific sleep stages—NREM and REM sleep—remains under-explored. Here, in two separate in-lab, within-subject, sham-controlled, and counterbalanced studies, we investigated the impact of tVNS on NREM and REM sleep when administered during the first and second half of the night.
Methods: The Institutional Review Board of the University of Kentucky approved all experimental procedures. Seventy-five healthy adults aged between 18-40 (Mage = 23) completed two nights of polysomnographic recordings with either active tVNS or sham stimulation – counterbalanced across visits. For study 1 (N=50), stimulation was administered at the onset of NREM Stage 2/N2 sleep and continued for the first 90 minutes of the 8-hour sleep period. For Study 2 (N = 25), stimulation began in the third quartile of sleep (~3:30 AM) and continued for 90 minutes. Data collection for Study 2 is still ongoing. Repeated measures ANOVAs were conducted, with sleep stages as dependent outcomes, stimulation (sham vs active) as within-subject factors, and study as a between-subject factor.
Results: Active stimulation induced a 2% reduction in N3 sleep (p=0.02), which corresponded to an 8-minute difference in N3 sleep between active and sham stimulation conditions (p=0.05). N3 sleep reductions were more pronounced for the active vs. sham visits in Study 2 (p=0.03) compared to Study 1 (p=0.61). In Study 2, active stimulation during the second part of the night resulted in 5.5% less N3 sleep (p=0.03) and a reduction of nearly 16 minutes (p=.0.02). No other reliable statistical effects were detected.
Conclusion: tVNS applied during the second half of the night can cause N3 sleep reductions. The planned statistical analyses for this project include determining the impact of stimulation on 1) stage-specific oscillatory components and 2) temporal coordination of NREM spindles and slow oscillations.
Support (if any):

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0414

THE INTERACTION OF HISTORICAL PSYCHEDELIC USE AND TIME SPENT IN BED ON SLEEP ARCHITECTURE

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Introduction: Approximately 12% of U.S. adults report having used any type of psychedelic at some point in their lives, making it one of the most widely used recreational drugs. There exists a need for a better understanding of the consequences of use on objective sleep habits. Research on psychedelics effects on sleep indicate increased sleep duration, increased REM latency, and decreased slow wave sleep occur during and immediately after the post trip phase. The purpose of this study was to determine if psychedelic use was predictive of changes in total sleep time, time spent in each stage of sleep (REM, light, deep), and time spent awake and to describe sleep differences in users vs. non-users
Methods: Data were obtained from the All of Us research data base (n=21,076; Mean age = 56.55; Female= 67.3%). Participants indicated any type of psychedelic use and were grouped into users and non-users based on a yes (n=7,799) or no (n=13,277) response. Objective sleep measures included Fitbit sleep data to include number of minutes spent in each stage of sleep (REM, light, deep), minutes spent awake, and total sleep time in minutes.
Results: Data suggest that the interaction of history of psychedelic use and minutes spent in bed (users = 406 minutes; non-users = 405 minutes) predicts more time spent asleep (t=230.119, p<.001), less time spent in REM sleep (t=-256.7, p<.001), greater time spent in light sleep (t=176.58, p<.001), and increased time spent in deep sleep (t=177.71, p<.001). Additionally, small group differences were found between users and non-users on measures of total sleep time in minutes (t=19.075, p<.001; ES= 0.0087), minutes spent in REM sleep (t=-8.725, p<.001; ES= -0.0052), minutes spent in light sleep (t=30.262, p<.001; ES= 0.018), minutes spent in deep sleep (t=-33.701, p<.001; ES= -0.020) and minutes spent awake (t=7.43, p<.001; ES= 0.0044), however effect sizes were negligible.
Conclusion: Data suggests changes in objective sleep habits occur in those who use psychedelic drugs regardless of time of use. Differences in sleep staging among users was negligible.
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0415

DAY-TO-DAY RELATIONSHIPS BETWEEN ALCOHOL DRINKING AND ACTIGRAPHIC SLEEP PARAMETERS AMONG YOUNG ADULTS WHO REPORT HEAVY EPISODIC DRINKING

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Introduction: The impact of alcohol on sleep is complex and nuanced, often (but not always) showing initial sedation followed by later disruption alongside other more subtle changes, as demonstrated in both laboratory- and home-based studies. However, prior naturalistic work has relied on subjective measures, small samples, and/or participants with co-occurring sleep problems, limiting generalizability. Additionally, retrospective designs constrain fine-grained, day-to-day analyses. Here, we leverage real-time ecological momentary assessment (EMA) reports of alcohol consumption to examine its relationship with actigraphically measured daily sleep among young adults reporting episodic heavy drinking.
Methods: Young adults aged 21-30 years (N=88) engaging in episodic heavy drinking (4+/5+ drinks/night at least weekly) participated in a two-phase, 9-day EMA study assessing naturalistic alcohol consumption and sleep. Sleep was objectively measured by wrist-worn actigraphy devices. Linear mixed-effects models assessed day-to-day associations between drinks consumed and actigraphic sleep outcomes, adjusting for covariates including

age, sex assigned at birth, race, ethnicity, and baseline alcohol use.
Results: On average, participants consumed 5.3±0.2 drinks per drinking day (over 3.0±0.1 drinking days) in each 9-day EMA period. Higher alcohol consumption was associated with shorter sleep onset latency (SOL; square-root-transformed; ß_std=-0.13, p< 0.001) and later midsleep time (log-transformed; ß_std=0.12, p< 0.001). No significant associations were found with total sleep time (TST), sleep efficiency (SE), wake after sleep onset (WASO), sleep fragmentation, or snooze time (all p>0.05). All relationships were unaffected by sex assigned at birth.
Conclusion: This study extends prior work investigating day-to-day alcohol–sleep relationships, replicating alcohol-related delayed sleep timing and revealing shorter SOL with increased drink consumption, a finding previously only seen in laboratory-based studies. We did not observe expected disruptions in sleep continuity, which may reflect the complexity of within-night changes (initial sedation followed by later disruption) that our methods do not fully capture. Furthermore, delayed sleep timing may exacerbate alcohol-related morbidity if morning obligations constrain adequate rest. Future analyses will incorporate within-night changes, next day functioning, and consider co-use of cannabis, nicotine, caffeine, and other substances to fully elucidate these complex interactions.
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0416

SELF-SUPERVISED LEARNING AS A TOOL TO GRANULARLY PARSE THE STRUCTURE OF SLEEP

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Introduction: An individual's sleep architecture encodes an abundance of health information. At the same time, there is likely a wealth of information embedded within polysomnographic (PSG) signals that is not captured by these high-level summaries. To explore this, we pretrained two models: one foundation model (FM) using self-supervised learning (SSL) techniques to directly internalize sleep structure from different combinations of PSG signals, and a second model using traditional supervised learning techniques to perform 5-class sleep staging on the same data. We then performed a series of fine-tuning experiments to probe what health information could be extracted from these two models. We also tested different subsets of PSG signals. Finally, we examined the latent space encoded by the SSL FM and compared its structure, and individuals' trajectories through that state space, to the 5-state space of traditional sleep staging.
Methods: We pretrained two models (one FM, one supervised) on >10k overnight PSG recordings from 7 publicly available datasets, using full PSG, EEG-only, or EEG+EOG inputs. Each model was fine-tuned to predict cognition, mood, and health scores from the APPLES dataset, with Bayesian information criteria used to identify optimal state space mappings in the FMs' final embeddings.
Results: Using all PSG signals, SSL and supervised FMs performed similarly for WASI [r=.34, r=.31], POMS [r=-.02, r=-.07], SWMT [r=.14 vs..10], ESS [r=.09, r=.06], and sex classification [acc=79%, acc=78%]. The SSL FM significantly outperformed on HAMD [r=.20, r=.13], AHI [r=.68 vs..28], and BMI [r=.59 vs..46]. Across all nights, 25 states optimally described the SSL FM state space (optimal BIC), while 8 states best captured individual nights.
Conclusion: Our fine-tuning experiments suggest that the SSL FM not only retained information captured by the supervised model trained on 5-class sleep staging, but also captured more information on multiple dimensions (ex. cognition, general health, sleep health). Examining the structure of sleep internalized by the SSL FM revealed that, on any given night, an individual was most likely to traverse approximately 8 distinct physiological states rather than the 5 we expected. This hints at the possibility of more granular classification schemas for sleep.
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0417

PRECLINICAL MODEL TO TEST POTENTIAL THERAPEUTICS TO PREVENT PHENOCONVERSION OF REM SLEEP BEHAVIOR DISORDER TO PARKINSON'S DISEASE AFTER NEUROTRAUMA

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Introduction: Neurotrauma, including traumatic brain injury (TBI) and/or post-traumatic stress disorder (PTSD), often results in persistent sleep disturbances and impaired neurological function. This includes an increased frequency for REM sleep behavior disorder (RBD), characterized by abnormally elevated skeletal muscle activity (i.e., REM sleep without atonia; RSWA) and overt dream enactment during REM sleep. RBD is one of the earliest clinical manifestations of synucleinopathies, including Parkinson's Disease (PD). Furthermore, the presence of both TBI and PTSD are significantly associated with an increased risk for later development of PD and related synucleinopathies. As the synucleinopathies progress, patients can develop parkinsonism characterized by impaired movements as well as a decline in cognition. No disease-modifying therapeutics to date have been successful in synucleinopathies. To address this gap, we designed a preclinical pipeline for evaluation of potential therapeutics using a mouse model of neurotrauma, RBD, and PD.
Methods: Mice underwent Single Prolonged Stress (SPS) and Controlled Cortical Impact (CCI) to model PTSD and TBI, respectively. Gait, sleep, and cognitive outcomes were evaluated across various cohorts and at three different time points following neurotrauma (2, 4 and 12 weeks) to assess the specific time course of biomarkers and disease progression.
Results: Our results reveal that SPS and CCI results in increased rates of EMG activity during REM sleep, consistent with RBD. REM sleep EMG activity was positively correlated with cognitive impairments as early as 2 weeks following neurotrauma. Furthermore, neurotrauma mice revealed gait and cognitive impairments consistent with a PD phenotype.
Conclusion: In summary, our preclinical pipeline for evaluation of potential therapeutics holds face validity to the

human conditions of neurotrauma, RBD, and PD, resulting in time-dependent changes in gait and cognition. This model will be useful for future studies investigating potential therapeutic interventions, to attenuate synuclein pathogenesis associated with neurotrauma.
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0418
INCREASED INTRA-THALAMIC AND THALAMO-CORTICAL FUNCTIONAL CONNECTIONS DURING REM SLEEP: A TWO-NIGHT EEG-FMRI STUDY

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Introduction: Rapid Eye Movement (REM) sleep, characterized by vivid dreaming and muscle atonia, raises fascinating questions about how such immersive experiences occur without external sensory input. Building on a previous REM-locked fMRI study that reported concurrent activation in multiple sensory cortices and the thalamus following eye movements during REM sleep, we hypothesized that during REM sleep, particularly during vivid dreaming, thalamic subnetworks are simultaneously functionally connected to multiple sensory cortices, a pattern not observed during wakefulness.
Methods: We analyzed data from a state-of-the-art whole-night EEG-fMRI concurrent recording dataset collected in our lab. Twelve non-sleep-deprived participants completed two 8-hour whole-night experiments, reaching all sleep stages during the second night. The first night served as an adaptation night, so only data from the second night were included in the analysis. Dynamic functional connection (FC) was calculated using a sliding window approach (step size: 1 TR or 3 seconds, window length: 30 TR) for sleep episodes with a consistent sleep score lasting at least three epochs (90 seconds). The Seitzman 300-region brain atlas was used to define 14 cortical networks and five thalamic subnetworks.
Results: Supporting our hypothesis, REM sleep engages all five thalamic subnetworks to simultaneously connect with multiple sensory-related cortical networks, including visual, motor, auditory, and action-planning networks—connections that are not observed during wakefulness. For example, the thalamus-default mode subnetwork was not functionally connected to auditory and motor networks during wakefulness but established FCs with these networks during REM sleep. We found significantly higher intra-thalamic FC during REM sleep compared to wakefulness across all 11 participants with high-quality fMRI data during REM. Building on these findings, we further hypothesized that increased thalamus-related FC is specifically associated with phasic REM compared to tonic REM, as phasic REM is often linked to vivid dreaming. Using the Hidden Markov Model from our previous study to differentiate phasic and tonic REM states, we found that phasic REM exhibited significantly greater intra-thalamic and thalamo-cortical FCs than tonic REM.
Conclusion: These results suggest that thalamic subnetworks act collectively during phasic REM to distribute internally generated sensory information to sensory-related cortical networks, potentially underlying the neural mechanisms of vivid dreaming.
Support (if any):

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0419
MORPHOLOGICAL DIFFERENCES IN SLEEP SPINDLES CHALLENGE CROSS-SPECIES COMPARISONS

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Introduction: Sleep spindles have been identified as key potential biomarkers for numerous neurological and psychiatric disorders, as well as for aging. Thus, studying spindle mechanisms provides valuable insight into the pathophysiology of various disorders. In addition to translatable human studies, animal model studies can more directly and invasively probe and systematically alter spindle networks. While various animal studies have shown distinct morphological differences between human and animal model spindles, the assumptions underlying approaches to spindle detection remain relatively unchanged across species. To assess the generalizability and validity of existing studies, it is crucial to understand how spindle activity and detection assumptions vary across species. Recently, new quantitative approaches have identified broader classes of human spindle-like transient events that are more informative than traditionally detected spindles. In this study, we extend these approaches to non-human primates and rodents to characterize spindle activity across species, validate signal processing assumptions, and understand implications for past and future studies.
Methods: We analyzed sleep period electroencephalogram (EEG) recordings of central electrodes from adult humans and mature macaques (N=5), rats (N=8), and mice (N=4) from baseline or control data from previously published studies. For each record, we used the DYNAM-O toolbox to quantify and visualize the dynamics of thousands of spindle-like transient oscillatory peaks across the night.
Results: We find distinct morphological and distributional differences in spindles between species. With increasingly lower-order species, spindles become markedly less morphologically distinct and more variable in their dynamics. In humans, fast spindles (12-16Hz) appear on spectrograms as distinct events in clear, narrow-band frequency. In primates, spindles are less separable and fall within a wider frequency range (8-14Hz). In rats, we observe one diffuse mode (6-16Hz) with little separability in events. Mice (6-20Hz) possess the least separable events and the most variability.
Conclusion: Given the diffuse morphology and high variability of spindles in animal models relative to humans, traditionally detected spindles likely represent a very small fraction of the underlying activity. Thus, caution should be taken, particularly in rodents, in the interpretation of studies focusing on individual spindles and their relationship to other waveforms.
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0420
NREM SLEEP SIGNATURES OF BIPOLAR DISORDER

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Introduction: Sleep disruptions are ubiquitous across psychiatric diseases, and abnormalities in specific aspects of sleep architecture can provide insight into neurocircuit dysfunction. Prior work demonstrated specific disruptions in NREM sleep in schizophrenia that could reflect circuit-level disruptions. Bipolar disorder (BP) is a mood disorder characterized by episodes of mania and depression. Here, we expand our prior work to identify NREM biomarkers of BP, and determine whether they are shared with SCZ or disease-specific.
Methods: Overnight sleep polysomnography was performed with 64-channel high-density EEG at Wuxi Mental Health Center in Wuxi, China. Macroarchitecture measures as well as power spectral analysis, sleep spindle detection, connectivity measurements, and extraction of ultradian rhythm measures were performed with Luna, an open-source software for analyzing polysomnographic recordings.
Results: BP patients exhibited decreased N1 and sleep onset latency. Power spectral density analysis demonstrated decreased delta (0-4 Hz) and fast sigma frequency (13-15 Hz) band power in BP compared to controls, similar to what was observed in SCZ. Compared to controls, BP additionally exhibited increased power in the slow sigma frequency band (10-12 Hz) that was not present in SCZ. BP cases had increased duration of slow sleep spindles and decreased fast spindle density in both N2 and N3. Inter-channel connectivity as measured by the phase slope index was increased in BP in the 10-12 Hz range. Finally, we demonstrated distinctions in BP ultradian rhythm trajectories (i.e., changes in sleep architecture across the night) in spectral power across the night compared to controls in theta (4-8 Hz) and fast sigma frequency ranges.
Conclusion: We find distinct changes in BP NREM sleep that may reflect sleep-specific signatures of disease and neurocircuit changes. Specifically, increased power in the slow sigma frequency range in BP was reflected in increased duration of slow sleep spindles and inter-channel connectivity in this range. Specific measures of ultradian rhythms were additionally different in BP, suggesting abnormalities in sleep progression across the night. Together, our results suggest there are specific NREM sleep changes associated with BP. Ongoing work aims to utilize EEG-derived biomarkers to differentiate across psychiatric diseases, with a focus on BP and SCZ.
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0421

DETECTING CENTRAL SLEEP APNEA USING A MULTI-DIAGNOSTIC CHEST-WORN MONITOR

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Introduction: Identifying central sleep apnea (CSA) during home sleep apnea testing is important to guide appropriate treatment for sleep-disordered breathing (SDB) and underlying cardiovascular conditions, including heart failure and atrial fibrillation. SANSA (Huxley Medical, Inc.) is a multi-diagnostic chest-worn monitor capable of detecting SDB, cardiac arrhythmias, and heart function. Using polysomnography (PSG) as a reference, we developed a machine learning (ML) method to classify respiratory events from this monitor as central or obstructive.

Methods: Data was analyzed from ninety-five subjects with suspected SDB who wore the chest monitor simultaneously with PSG overnight. To address known scoring heterogeneity of CSA, PSG records were scored for central apneas by two core laboratories (Core 1 and Core 2). Core 1 annotations from twenty-eight records were first used to train a random forest classifier to differentiate obstructive (N=680) and central events (N=388). The model used oximetry, respiratory effort, and snoring to classify events based on effort, duration, and other features. A five-fold cross validation was used to evaluate event-level performance. The model was then used to estimate subject-level CAI for all subjects and compared with Core 2 scores.

Results: Algorithm event-level sensitivity and specificity to detect central events was 72.7% and 81.0%. Subject-level CAI for all records between the chest monitor and Core 2 had a correlation coefficient of 0.90 and root mean squared error (RMSE) of 4.6 events/hour, versus 0.82 and 4.7 events/hour comparing Core 1 and Core 2. Sensitivity and specificity to detect CAI≥10 events/hour was 80.0% (4/5) and 98.9% (89/90), compared to 100% (3/3) and 98.9% (91/92) for CAI≥15.

Conclusion: An ML algorithm to differentiate obstructive and central events collected from the chest-worn monitor demonstrated favorable event-level performance and comparable CAI agreement to that between two PSG core laboratories. Home-based CSA detection alongside cardiac monitoring could identify high risk patients for expedited therapy, cardiology referral, or follow-up PSG. These results motivate further validation in a larger cohort as well as investigation of outcomes related to time to evaluation and management.

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0422

TEMPORAL RELATIONSHIPS BETWEEN SLEEP APNEA AND AROUSAL PREDICT ALL-CAUSE AND CARDIOVASCULAR MORTALITY

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Introduction: Apnea-hypopnea index (AHI) considers only the rate of sleep apnea events, providing an incomplete view of sleep apnea and its adverse health outcomes. In contrast, this study considers temporal interactions among events from different organ systems. We analyzed novel temporal relationships between sleep apnea (from the respiratory system) and arousal (from the brain), thereby generalizing the concept of respiratory effort-related arousal (RERA).

Methods: We studied 3,502 participants in the Sleep Heart Health Study (SHHS) Visit 1. The temporal relationships between apnea and arousal were characterized using peri-event time histograms (PETHs) of arousals time-aligned to the end of sleep apnea. Binomial tests were utilized to identify the significant time regions compared with the null distribution independent of sleep apnea. Cox regression models adjusted for common covariates were used to test the associations between the characteristics of the PETHs vs. CVD mortality and all-cause mortality. We also compared the hazard ratio (HR) to that of AHI and hypoxic burden.

Results: For participants with arousals significantly enriched at certain time regions of apnea, the peak time of the PETH curves (i.e., time from the end of apnea to the following most arousal-intense time point) showed associations with both all-cause and CVD mortality. In females, the adjusted HRs per one-second increase in peak time were 1.04 [95% CI: 1.01–1.08, p=0.013] for all-cause mortality and 1.06 [1.01–1.12, p=0.019] for CVD mortality, which were more significant than those of AHI for all-cause mortality [HR=1.00 (1.00-1.01), p=0.373] and CVD mortality [HR=1.00 (0.99-1.01), p=0.991], and those of hypoxic burden (log-transformed and standardized) for all-cause mortality [HR=1.05 (0.94-1.18), p=0.344], and CVD mortality [HR = 0.97 (0.80-1.19), p=0.797]. Similar patterns were observed in males, with stronger associations than those for conventional indices.

Conclusion: These preliminary results suggest that, at the event level, temporal relationships between sleep apneas and arousals are important predictors for all-cause and CVD mortality. Future studies will extend the study-population to larger-scale sleep cohorts and incorporate additional sleep microstructure events, forming a network of multiple organ systems dynamically interacting with each other during sleep.

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0423

LEVERAGING LARGE LANGUAGE MODELS TO DEVELOP NATURAL LANGUAGE PROCESSING CODE FOR EXTRACTING SLEEP STUDY DATA

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Introduction: Research involving big data depends on structured data, but most patient information exists in unstructured formats like clinical notes. Traditional natural language processing (NLP) methods take substantial development time and must be tailored to specific tasks, while Large Language Models (LLMs) often perform well "off the shelf" but face privacy and cost barriers. We developed two novel hybrid approaches leveraging LLMs to generate NLP regex code and tested their performance in extracting apnea-hypopnea index (AHI) and Epworth Sleepiness Scale (ESS) values.
Methods: Sleep study reports (2008–2023) from Kaiser Permanente Southern California were exported in a format that included MRN, CPT code (95800, 95806, 95810), and free-text narratives. Manually de-identified "sample" reports were used to develop three NLP regex algorithms for extracting AHI and ESS: 1) "Targeted" LLM algorithm--free-text segments containing AHI or ESS were pre-selected and used to instruct the LLM (ChatGPT-4o, OpenAI) to develop regex code in Python; 2) "General" LLM algorithm--entire sleep study "sample" reports were input into the LLM without pre-selecting segments, with instructions to generate regex code; 3) "Traditional" algorithm--regex code was manually programmed. These algorithms extracted AHI and ESS from a test dataset of 427 reports; accuracy was compared to manually confirmed ground truth values for AHI and ESS. Performance for both LLM algorithms was compared to the Traditional algorithm (Fisher's Exact Test.)
Results: Both LLM("Targeted" and "General") algorithms perfectly extracted MRN and Procedure Dates, while "Traditional" algorithm produced 34 errors (1 missed, 33 incorrect extractions). "Targeted" and "General" also outperformed "Traditional" algorithm in extracting AHI and ESS (AHI: 99.1% and 98.6% vs. 94.1% accuracy; both $p< 0.001$. ESS: 100% and 97.7% vs. 88.5% accuracy; both $p< 0.001$.) Not all 427 reports contained AHI or ESS values; among the 119 reports with AHI and the 87 reports with ESS, "Targeted" and "General" again demonstrated superior accuracy versus "Traditional" (AHI: 96.6% and 95.0% vs. 79.8%; both $p< 0.001$. ESS: 100% and 97.7% vs. 88.5%; $p=0.002$ and 0.03).
Conclusion: LLM-generated NLP algorithms demonstrated superior accuracy compared to a traditional approach. This scalable method can potentially support multi-center large-scale research, enabling advanced epidemiologic exploration of sleep disorder outcomes.
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0424

CLOSING THE GENDER GAP IN SLEEP APNEA DIAGNOSIS: AI-ENHANCED HOME SLEEP TESTING

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Introduction: Home sleep testing (HST) is the primary method for diagnosing sleep apnea. However, traditional HST cannot measure sleep stages and arousals, leading to the systematic underdiagnosis of patients who predominantly experience hypopneas that terminate in arousals. This issue disproportionately affects women. In this study, we present the validation of an AI algorithm, DeepRESP, which uses respiratory inductance plethysmography (RIP) signals to score sleep and arousals from a conventional HST.
Methods: The algorithm was validated using 814 clinical PSG sleep recordings from females. These recordings were manually scored using EEG, EOG, and EMG to determine sleep stages and arousals. The same recordings were automatically scored as if they were HST recordings, omitting any ExG signals, using two methods. Standard HST scoring was used as a reference, where respiratory events and desaturations are scored without considering sleep and arousal scoring, resulting in an REI value. The test method was the described algorithm, which used RIP signals to score sleep and arousals, along with respiratory events and desaturations, resulting in an AHI value. The results from these two methods were compared to manual scoring. Sensitivity, specificity, and accuracy were calculated when classifying the sleep recordings from women as having an REI/AHI value of 5 or 15 and above.
Results: The test method demonstrated sensitivity, specificity, and accuracy of 83.1%, 77.6%, and 82.6%, respectively, for classifying AHI ≥ 5. In comparison, the reference method showed 62.2%, 73.7%, and 63.3% for the same threshold. For AHI ≥ 15, the test method had sensitivity, specificity, and accuracy of 62.9%, 95.4%, and 78.4%, while the reference method achieved 35.9%, 93.8%, and 63.5%. Notably, the test method correctly classified 121 (23%) more sleep recordings as having AHI ≥ 15 compared to the reference method.
Conclusion: Females are more likely than males to have sleep apnea characterized by hypopneas that terminate in arousals. Consequently, they often receive inconclusive results from HST and require follow-up tests, which may make them less likely to continue seeking medical assistance for sleep apnea. By incorporating respiratory-based sleep and arousal scoring, females are more likely to receive conclusive HST results, thereby shortening their path to treatment.
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0425

DEEP NEURAL NETWORK USING SLEEP ELECTROCARDIOGRAPHY TO PREDICT FUTURE RISK OF ATRIAL FIBRILLATION

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Introduction: Sleep period may offer a unique opportunity for cardiovascular monitoring. Distinct modulations of the sympathetic and parasympathetic control of cardiac dynamics in sleep can be reflected in the electrocardiography (ECG). Sleep disordered breathing (SDB) has been linked to the risk of atrial fibrillation (AF). We investigated whether deep neural network model of sleep ECG is predictive of an incident AF risk and how it compares with a simple statistical model using commonly used

SDB metric alone, established cardiovascular risk factor alone or demographic factors alone.
Methods: We included participants of the Sleep Heart Health Study (SHHS) cohort without a known history of AF at the time of sleep study. We developed a convolutional neural network (CNN) model using a single lead ECG from polysomnography as an input and incident AF events as an outcome. We estimated the prediction of incident AF by the ECG-based CNN model and compared it with a conventional statistical model using SDB metrics alone, hypertension history alone, or age alone, which is the most potent AF risk factor. Data were split into 70% training, 10% validation, and 20% holdout testing.
Results: The dataset included 2,887 participants (86% white, 45% men, and mean age (SD) of 62.7 (±11.2) years old). Over the mean follow up of 5.3 years with incident AF rate of 11.5%. The final ECG-CNN model yielded an area under the curve (AUC) score of 0.72 on the hold out test set. However, the AUC was progressively higher when ECGs from deeper sleep stages were used (Wake: 0.68, N1: 0.71, N2: 0.73, N3: 0.78, rapid eye movement: 0.71). Conventional statistical models using SDB metrics alone yielded lower prediction (AUC for apnea hypopnea index: 0.57, obstructive apnea index: 0.59, central apnea index: 0.55). A conventional statistical model using hypertension history alone and age alone yielded AUC of 0.65 and 0.86, respectively.
Conclusion: ECG-based CNN model using a single lead ECG alone during sleep can predict AF risk with moderate accuracy, outperforming the conventional statistical model using SDB metrics alone. Notably, the performance of the prediction model was higher when a deeper sleep stage ECG was used.
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0426

SHELL SHOCKED: EVIDENCE OF SLEEP-LIKE STATES IN NON-NEURAL SYSTEMS SPARKS A REEVALUATION OF SLEEP-EEG RELIABILITY

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Introduction: Despite widespread anecdotal reports of its efficacy in humans, the effects of pink noise on sleep states in non-neural systems are poorly understood. This study aimed to evaluate the impact of pink noise stimulation on sleep architecture and oscillations in a decentralized nervous system model using wireless sleep-electroencephalography (EEG) technology.
Methods: Participants (12 deceased Maryland Blue Crabs; Callinectes sapidus) were randomly assigned to either a pink-noise, or control condition. Sleep was monitored from 23:00 to 08:00 using a wireless EEG system (SleepProfiler) with electrodes affixed to the cephalothorax (shell). To limit confounding from residual neural tissue, all subjects were pre-processed by immersion in a 100°C bath for 20 minutes. Subjects were positioned in sound-attenuated, adjacent rooms in the sleep laboratory. Two automated sleep-stage classifiers (YASA; SleepProfiler) were employed to compare sleep-architecture between conditions.
Results: Curiously, both the control and pink noise conditions demonstrated clear evidence of sleep. The pink-noise condition demonstrated significantly higher sleep efficiency than the control condition, as well as greater REM, SWS and reduced N2. Both the YASA and SleepProfiler autoscore-algorithms further identified Slow-Oscillations and spindle-like oscillations, purportedly indicative of sleep-states. Ultimately, post-hoc dissection resolved the observed phenomena to be attributable to environmental noise and algorithmic misclassification, rather than neural phenomena, as the crabs were, indisputably, deceased. Our findings serve as a whimsical yet cogent reminder of the perils of overreliance on autoscore algorithms in sleep-EEG research, particularly when dealing with complex recording environments and populations, which may be more prone to artifact.
Conclusion: This experiment aims to spark critical discussions about reproducibility, and the broader implications of methodological missteps in sleep-assessment technology. As sleep research grows increasingly dependent on automated procedures, it is important to think critically about the hazards they present. Given the ever-growing presence of such algorithms, and the degrees of blind adherence to their output, more work is required to ensure fidelity in isolating true neural signal from the spurious or artifactual. Although these crabs may never truly sleep, their unwitting sacrifice offers a timely reminder of the importance of skepticism and rigorous validation in the evaluation of automated sleep-technologies.
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0427

AI-DRIVEN MAPPING OF UPPER AIRWAY OBSTRUCTIONS USING A PASSIVE SLEEP SONAR

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Introduction: Obstructive sleep apnea (OSA) is characterized by recurrent airway collapse, with obstruction sites varying by sleep stage, position, and respiratory effort. Precise identification of these obstructions is essential for guiding personalized therapies, including nerve stimulators, surgeries, or oral appliances. Drug-Induced Sleep Endoscopy (DISE) is the current standard but is invasive, costly, and limited to sedated conditions. Advances in artificial intelligence (AI) and machine learning (ML) offer a path toward scalable, non-invasive techniques. Here, we introduce a "passive sleep sonar" approach, an ML-driven method that uses transfer function analysis of tissue-borne vibrations to map upper airway obstructions during natural sleep.
Methods: This passive sleep sonar system records tissue-borne vibrations via three synchronized contact microphones placed on the patient's face. The signals are processed to derive relative transfer functions (RTFs), which reflect how changes in upper airway anatomy alter sound propagation. Initially, the ML model was trained on 60 speech samples (10 consonants per sample) selected for their well-defined airflow obstruction sites. These training data established a baseline for localizing obstruction patterns. The model was then adapted using transfer learning with data from six OSA patients undergoing DISE. Each patient provided the same speech samples before sedation, allowing calibration to individual anatomy and bridging the gap between speech- and sleep-based vibration profiles.
Results: The passive sleep sonar system demonstrated promising agreement with DISE findings. Across six prediction categories, including obstruction configuration for the velum and obstruction degrees for the velum, oropharynx, tongue base, and

epiglottis, the method achieved a Cohen's Kappa of 0.53, indicating moderate agreement. Its 84% concordance with DISE is comparable to the 87% inter-rater reliability reported for DISE itself. These results suggest that this non-invasive, AI-enhanced approach can identify multi-level obstructions and provide clinically meaningful anatomical insight.
Conclusion: By integrating ML-based transfer function analysis with a passive sleep sonar concept, we present a viable alternative to DISE for mapping upper airway obstructions in OSA patients. This non-invasive method enables assessment during natural sleep, offering a scalable tool for personalizing treatment and monitoring therapy outcomes. Ongoing work seeks to validate and refine this approach for broader clinical application.
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0428
DEVELOPMENT AND EVALUATION OF EXCLUSIVELY ECG-BASED DEEP LEARNING MODEL FOR SLEEP STAGING

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Introduction: Sleep staging is an essential component of sleep evaluation but requires polysomnography (PSG). The technical complexity and high cost associated with PSG limit its application beyond in-lab setting. On the other hand, the accuracy of sleep staging by existing and emerging sleep wearable technologies based on body movement detection and pulse rate analysis is variable and modest. Electrocardiograms (ECG) measures the electrical activity of the heart and is the most commonly used clinical grade tool to detect cardiac arrhythmia. ECG contains electrophysiological properties beyond interbeat intervals, which may be sleep state dependent. Thus, we hypothesized that machine learning analysis of ECG would enable sleep staging.
Methods: We developed a Temporal Convolutional Networks (TCNs), designed for analyzing time series data by capturing complex temporal patterns. When time-series data is given as input, the convolutional network (CNN) processes the sample features along the timeline. A dilated causal convolution with dilation factors d = 1; 2; 4 and filter size k = 3 was used. In each 270-second single lead ECG from PSG, we extracted the timings of R peaks and other ECG morphological features. Each deep neural network contained a feed-forward CNN that learned features pertaining to each epoch, and a TCN to learn temporal patterns among consecutive epochs. The model was trained in clinical PSGs (n=3972) and was validated in another set of PSG against the reference manually scored sleep stages.
Results: The validation cohort consisted of 30 subjects (mean age 44.6± 11 years old, female 43%). The ECG alone TCN model yielded the following accuracy for sleep staging: Wake 81.5%, REM 85.9%, N1 77.4%, N2 82.2%, N3 83%, and intra-class correlation of total sleep time was 0.97.
Conclusion: Deep learning of single lead ECG alone yielded excellent accuracy in sleep staging. Our findings provide the potential for deriving sleep information from ECG-based cardiac rhythm monitoring widely used in clinical practice. Furthermore, unveiling sleep state and stage specific distribution of cardiac arrhythmia events may provide useful insights into the interplay of sleep/circadian rhythm with arrhythmogenesis.
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0429
DREAMGPT: VALIDATION OF CHATGPT AS A TOOL FOR EMOTION ANALYSIS IN DREAM REPORTS

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Introduction: Dream reports provide unique insights into emotional processing during sleep. While self-reports are the gold standard for assessing dream affect, natural language processing (NLP) tools like ChatGPT may offer scalable alternatives. This study evaluated ChatGPT's ability to estimate positive and negative affect from dream reports, comparing its performance against self-reported ratings.
Methods: A total of 136 participants provided one dream report each. Participants rated their positive and negative dream affect on a 0–10 scale. ChatGPT 3.5 Turbo was accessed via the OpenAI API using Python, where each dream report was analyzed and rated on identical scales. The model's outputs were programmatically appended to a CSV file for further analysis. Agreement between ChatGPT and self-reports was assessed using intra-class correlation coefficients (ICC3k) for consistency, mean absolute error (MAE) for deviation, and Bland-Altman plots for visual inspection of agreement.
Results: For positive affect ratings, ChatGPT demonstrated excellent agreement with self-reports (ICC3k = 0.844, 95% CI [0.781, 0.889], p <.001), with an MAE of 1.778. Negative affect ratings similarly showed excellent agreement (ICC3k = 0.857, 95% CI [0.799, 0.898], p <.001), with an MAE of 1.681. Bland-Altman plots for both affective dimensions indicated no systematic bias and acceptable limits of agreement upon visual inspection.
Conclusion: ChatGPT demonstrated strong agreement with self-reported dream affect ratings, supporting its potential as a scalable tool for analyzing emotional content in dream reports. These findings suggest that large language models can provide valid and reliable estimates of dream affect, which may advance sleep and affective science.
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0430
YASA AUTOMATED SLEEP STAGING PERFORMANCE IN SLEEP RESTRICTION CONTEXT

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Introduction: Traditionally, manual sleep stage scoring is conducted by at least one experienced technician, a process that is laborious and time-consuming. In contrast, automated sleep staging tools such as Yet Another Spindle Algorithm (YASA), leverage machine learning to extract features of sleep stages from large datasets, thereby reducing human effort and time costs. The current study compared YASA's automated sleep stage prediction to manual sleep staging in the context of an experimental sleep restriction protocol.
Methods: Seventy-five adults (mean age = 19.95 years, 55% female) participated in up to seven nights of laboratory-based polysomnography recording. The study involved one adaptation night, followed by three nights of normal sleep (9 hours time in bed) and three nights of restricted sleep (5.5 hours time in bed) in

counterbalanced order. Manual sleep staging was performed by a registered polysomnographic technician (>10 years experience) using TWin software. Sleep data were exported and processed using Python 3.12, MNE 1.8.0, and YASA 0.6.5; automated sleep staging was based on C4-A1, LOC-A2, and chin EMG.
Results: There was 82.88% overall agreement between YASA scoring and human manual scoring on 483 valid sleep nights. The highest agreement was observed for stage wake (93.34%), whereas N1 showed the lowest agreement (40.31%). Agreement for the other stages were moderate to good: N2 = 84.75%, N3 = 86.86%, and REM = 78.38%. YASA-manual agreement was highest during the baseline night (84.59%). Agreement was higher during normal sleep nights (83.65%) than sleep restriction nights (81.50%) ($\eta 2$=.082, $F(1,202)$=18.054, p<.001), particularly for N1 ($\eta 2$=.183, $F(1,202)$=45.131, p<.001), N2 ($\eta 2$=.054, $F(1,202)$=11.596, p<.001), and REM ($\eta 2$=.187, $F(1,202)$=46.312, p<.001; N3: p=.321); agreement for stage wake was higher during sleep restriction nights than normal sleep nights ($\eta 2$=.436, $F(1,202)$=156.28, p<.001).
Conclusion: YASA exhibited overall agreement with manual scoring. However, caution is needed when interpreting the results for N1, as well as in interpreting N1, N2, and REM on nights in which sleep duration is reduced to approximately five hours.
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0431
THE HYPNO-PC: UNCOVERING SLEEP DYNAMICS THROUGH UNSUPERVISED LEARNING

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Introduction: Traditional sleep research primarily depends on visually scored stages based on electrophysiological signals. This manual approach is time-consuming and subject to subjective biases, implicitly assuming that visually defined categories accurately represent the underlying biological processes. Recent advancements, however, have shown that complex brain activity can be effectively represented in low-dimensional spaces, offering valuable insights into the temporal organization and structure of physiological states. This raises the question of how such data-driven representations relate to and potentially refine our conventional understanding of sleep structure.
Methods: In this study, we developed a data-driven framework for identifying inherent brain states directly from continuous physiological signals. We applied Principal Component Analysis (PCA) to features extracted from overnight high-density EEG, EOG, EMG, and ECG recordings at 30-second and 4-second resolutions. After identifying the principal axes of variation, we employed a Gaussian Hidden Markov Model (GHMM) on the PCA-transformed data to delineate discrete states. To align the hidden states with the sleep labels, we used a minimally supervised approach—less than 0.5% of labeled data—and a cross-subject approach.
Results: The first principal component (PC1), termed the "Hypno-PC," showed a strong correspondence with the manually scored hypnogram, indicating that the largest source of variance in the spectral profile aligns closely with standard sleep staging. Furthermore, the GHMM-derived states achieved an agreement with conventional sleep labels at a level comparable to the reported inter-rater agreement. These results suggest that the states identified through purely data-driven means closely mirror established concepts of sleep architecture. Preliminary results on data from individuals with epilepsy indicate that this low-dimensional representation may reflect not only physiological but also pathological processes.
Conclusion: By integrating PCA and GHMM, we present a reproducible, scalable, and flexible methodology that complements traditional sleep scoring methods. While demonstrated with sleep and spectral features, this approach is adaptable to other continuous physiological signals. The findings support the notion that unsupervised, data-driven methods can uncover intrinsic patterns and structures in both normal and abnormal states. This perspective promotes a more nuanced understanding of the inherent organization of physiological and pathological state dynamics.
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0432
FEDERATED MACHINE LEARNING TO PREDICT SELF-REPORTED SLEEPINESS FROM HEART RATE AND PHOTOPLETHYSMOGRAPHY

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Introduction: Federated learning (FL) is a machine learning framework that eliminates the need to aggregate data to a centralized location by distributing model training over a federation of independent parties (i.e., peers). The goal of FL is to maintain the privacy and security of sensitive information while enabling predictive models to be developed from larger, more diverse pools of data. Here we tested the ability of FL to predict self-reported sleepiness from heart rate and photoplethysmography data distributed over multiple peers.
Methods: We used a public dataset from Kaggle to train and test models in our decentralized (i.e., peer-to-peer, P2P) FL sandbox, which was built in Java. The dataset included 4,890,260 records with four predictors (heart rate and three photoplethysmography channels measured from a smartwatch) labeled as either "alert", "somewhat sleepy", or "sleepy". We filtered data to include only the records labeled as "alert" (n=2,105,348) or "sleepy" (n=1,417,578), and normalized and binned the four predictors. We used an 80/20 random split stratified by class label to generate our global training and test sets. We then randomly split the global training set into four equally-sized federated peers. To evaluate FL performance, we compared the accuracy and F1-score of predictions from the model trained across the federated peers to a model trained on the global training set using a categorical Naive Bayes classifier.
Results: The global model had an accuracy=94.4% and F1-score=0.931. The FL model had the same overall accuracy and F1-score. The models were not biased towards a particular class label (true positive rate=92.7%, true negative rate=95.6%).
Conclusion: This work is a proof-of-concept that FL can be used to train predictive models from decentralized data without significant loss of model accuracy. Developing and implementing predictive models of self-reported sleepiness and other sleep-loss-related impairment in a privacy-preserving federated environment can improve safety outcomes across several operational settings, including among medical personnel, long-haul truck

drivers, airline pilots, and first responders, without compromising private information from these individuals or exposing individual liability.

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0433

SLEEP-DEEP-LEARNER LETS YOU TEACH GOOGLENET TO SLEEP-WAKE SCORE LIKE YOU

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Introduction: Sleep-wake scoring in vivo electrophysiologic signals is necessary in many basic and translational studies. Performing this manually is a burden and bottleneck. Thus, many attempts have been made to automate it. Recently, with increased access to machine learning (ML) technologies, a new wave of attempts is occurring. The overwhelmingly common strategy deployed involves leveraging large datasets to train completely novel, yet relatively simple, ML-models. However, evidence suggests this does little to help with a common problem that is ML-models can perform poorly with new or unfamiliar data. Instead, transfer-learning – re-training highly sophisticated ML models – is known to be flexible and dependable, robustly dealing with novel data. We demonstrate transfer-learning of GoogLeNet provides highly dependable sleep-wake scoring across several diverse mouse electrophysiologic datasets, and matches the scoring of the person who trained it. We term our freely-available code "Sleep-Deep-Learner".
Methods: Transfer-learning was used to retrain GoogLeNet – accessed first unmodified, from the pretrained deep-neural-nets available via MATLAB. High-level final layers were replaced to classify wavelet transforms of epochs as wakefulness, NREM sleep or REM sleep.
Results: We used F1 scores to test how closely Sleep-Deep-Learner mimics two independent expert scorers. We validated performance in wild-type EEG, EEG altered by the hypnotic agent zolpidem, LFP data, data from an Alzheimer's disease model and even sub-cortical data (hippocampus). We also reproduced findings of a CRISPR-based study previously completed with manual scoring. We ensure accurate fine-grain sleep architecture with hypnograms and bout analyses. Automated scores were very similar to either expert scorer regardless of dataset. We estimate this reduces labor burden of scoring to one twelfth.
Conclusion: We provide a transfer-learning based approach to automating sleep-wake scoring. This has the advantage that automated sleep-wake scores agree with those of the expert scorer using the application. This, unbiased, flexible approach of retraining before each scoring session means there is no dependence on familiarity with novel data to perform accurately.
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0434

COMPARISON OF MACHINE LEARNING MODELS FOR FMRI-BASED SLEEP STAGING

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Introduction: Changes in arousal result in fMRI signal fluctuations. Identifying sleep stage inside the MRI scanner can facilitate the study of sleep-associated changes in blood oxygen-level dependent signals. As simultaneous electroencephalography [EEG] is often not feasible, developing machine-learning-based algorithms for fMRI-based sleep scoring is needed.
Methods: Participants included 11 university students, who provided multiple 15-minute-long simultaneous EEG-fMRI scans (TR=2.1 seconds). This study used the first two scans from each participant. During fMRI sessions, participants completed visual-motor tasks and were asked to sleep. Sleep stage was scored based on the AASM criteria using simultaneous EEG. Preprocessed fMRI timeseries data was extracted from each region of the Automated Anatomic Labeling [AAL] atlas. We used Fisher's z-transformed correlations between all possible pairs of 166 AAL regions (13,695 in total) as features in training five different machine learning models to predict EEG-based sleep stage for each epoch: regularized multinomial logit classification (RMLC), random forest, linear support vector model (lSVM), radial SVM (rSVM), and extreme gradient boosting (XGBoost). The first 15 minutes of fMRI data was used for model training, and model performance was tested on the latter 15 minutes.
Results: Proportions of N1, N2, and Wake were: 35, 13, and 52%. lSVM had the highest receiver operating characteristics-area under the curve [ROC-AUC] for correctly predicted sleep stages in the validation dataset (68.6%). In general, lSVM had high sensitivity to wakefulness and high specificity to N1 and N2 sleep (sensitivity, N1=0.40, N2=0.56, Wake=0.88; specificity, N1=0.84, N2=0.95, Wake=0.62). On the other hand, XGB had the lowest validation ROC-AUC (60.2%). XGB also showed high sensitivity to wakefulness and high specificity to N1 and N2 sleep (sensitivity, N1=0.22, N2=0, Wake=0.88; specificity, N1=0.90, N2=0.99, Wake=0.18).
Conclusion: Despite a modest sample size, we found that lSVM showed acceptable performance in sleep stage prediction. While more work in larger samples is needed, our findings suggest that machine learning models may be used to develop algorithms for fMRI-based sleep staging and guide examination of sleep-dependent processes using MRI, potentially without simultaneous EEG.
Support (if any): Gawon Cho was supported by the Alzheimer's Association's Research Fellowship to improve Diversity (AARF-24-1306796).

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0435

VALIDATING THE PERFORMANCE OF ARTIFICIAL INTELLIGENCE-BASED AUTOMATIC POLYSOMNOGRAPHY SCORING SYSTEM

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Introduction: Polysomnography, the gold standard for diagnosing obstructive sleep apnea and other sleep disorders, requires manual scoring by trained sleep technologists or physicians to analyze its comprehensive physiological data. However, manual scoring is cost-intensive, prone to inconsistencies among scorers, and often causes delays in diagnosis and treatment initiation, potentially compromising patient outcomes. The purpose of this study is to validate the performance of artificial intelligence (AI)-based automatic polysomnography scoring system (SOMNUM) developed to overcome these limitations using a cross-sectional experimental design on a representative subjects of data recorded in the 3 sleep laboratories of university hospitals.
Methods: This study utilized a retrospective dataset of 400 polysomnography (PSG) recordings from three university hospitals: Soonchunhyang University Bucheon Hospital, Ajou University Hospital, and Chungnam University Hospital. Forty-eight full-night PSG studies were randomly selected from the dataset for the performance evaluation of SOMNUM, an AI-based automatic sleep scoring system. The performance of SOMNUM was assessed by comparing its scoring results with those of three human experts for four scoring functions: sleep staging, arousals, respiratory events, and periodic limb movements (PLMs). Performance metrics included positive percentage agreement, negative percentage agreement, and overall percentage agreement, calculated using R statistical software with relevant packages.
Results: The agreement rates between the scorer and AI-based automatic polysomnography scoring systems for each sleep stage (W, N1, N2, N3, R) were 89.96%, 77.93%, 91.13%, 84.04%, and 84.62%, respectively. The agreement rate between the scorer and AI for arousal was 82.5%, the agreement rate for respiratory events was 92.3%, and the agreement rate for periodic limb movements was 94.1%.
Conclusion: This study has demonstrated that SOMNUM is a valuable solution for automatic polysomnography interpretation. These results suggest that AI-based automated polysomnography scoring systems have the potential to advance the field of sleep medicine by improving diagnostic efficiency, reducing costs, and enhancing the consistency of sleep disorder diagnoses.
Support (if any): This work was supported by the Seoul Business Agency (2023 Bio/Medical Technology Commercialization Supporting Project, BT230157). This work was supported by the Technology development Program (RS-2023-00321754) funded by the Ministry of SMEs and Startups (MSS, Korea).

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0436

GETTING MORE FROM LESS: TRANSFER LEARNING TO IMPROVE SLEEP STAGE DECODER ACCURACY IN SLEEP WEARABLES

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Introduction: Consumer wearable devices such as smart-rings and smart-watches are increasingly being used to measure sleep in large-scale and longitudinal studies, but lack the fidelity to support accurate classification on the traditional 5-class sleep stage taxonomy (Wake, N1, N2, N3, REM). A way to extract higher fidelity sleep stage information from wearable sensors would be of tremendous value. Advances in artificial intelligence, particularly self-supervised learning (SSL) and transfer learning, now allow neural network-based decoders to be pre-trained on vast sleep EEG datasets and fine-tuned with minimal study-specific data. We hypothesized that models pretrained on sleep EEG could improve sleep stage decoding from peripheral wearable signals (such as pulse and respiration) by transferring their learned internalization of sleep structure, despite operating on fundamentally different physiological inputs.
Methods: We first pre-trained a transformer-based neural network model to classify sleep stage (Wake, N1, N2, N3, and REM) from EEG+EOG signals (C3 or C4, EOG) on a corpus of 10,897 overnights from 9,013 individuals compiled from 7 publicly available datasets hosted on the National Sleep Research Resource (sleepdata.org). We then fine-tuned this model by tasking it with 5-stage sleep classification using respiration and pulse time series from the MESA dataset (sleepdata.org) as inputs. For comparison, we also trained a from-scratch version of the model (without pretraining).
Results: The baseline from-scratch model showed overall accuracy on par with other reports at 68% [W: 81%, N1: 41%, N2: 59%, N3: 40%, R: 54%]. When pretrained on EEG+EOG instead of initialized with random weight values, however, the model's overall performance jumped to 77% [W: 87%, N1: 89%, N2: 64%, N3: 37%, R: 69%].
Conclusion: We observed a remarkable nearly 10 percentage point improvement in 5-class sleep stage decoding when applying transfer learning compared to training the same model from scratch. This improvement was associated with better overall accuracy on Wake, N1, and REM. These findings show that fine-tuning peripheral/wearable models pretrained on sleep EEG data significantly improves the accuracy of sleep stage classification from peripheral signals like respiration and pulse. This approach could enhance the reliability and utility of consumer wearables for sleep research.
Support (if any): Independent Research & Development Grant (JHU/APL)

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0437

AN OPEN SOURCE AND FREELY AVAILABLE SLEEP STAGE CLASSIFIER OPTIMIZED FOR FOREHEAD EEG DEVICES

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Introduction: Forehead-mounted sleep EEG devices enable large-scale, real-world sleep monitoring but classifiers trained on traditional PSG underperform on them due to differences in electrode placement, referencing, poor sensor contact/movement, and unique signal noise characteristics. Therefore, specialized sleep-stage decoders optimized for the unique characteristics of signals recorded from frontopolar regions are needed. In response to these challenges, we trained a neural-network-based

sleep stage classifier on a dataset of forehead EEG recordings that extends the traditional 5-class decoder taxonomy (N1, N2, N3, REM, WAKE) to include an additional "artifact" class, and compared its performance against the traditional 5-class solution.

Methods: A transformer based neural network classifier with a convolutional front end (for feature extraction from 30-s epochs) and a recurrent back end (for modeling sleep-stage dynamics over a 50-minute period) was compiled in Tensorflow and trained on 72 overnight recordings (from n=72 participants) of sleep from the Wearnize+ dataset (Sikder et al., in-prep). An additional 9 subjects' nights were held out as a test set. To label epochs obscured by artifact for the 6-class model, we implemented automated artifact detection contingent on statistical thresholds derived from signal characteristics (e.g., Hjorth complexity and mobility, max amplitude, mean/median amplitude, and signal variance) present in the training set, and verified post-hoc by a trained expert sleep scorer.

Results: The 5-class decoder converged on a best-performing accuracy of 81.2% [W: 72.5%, N1: 20.0%, N2: 86.5%, N3: 74.6%, R: 91.5%]. The 6-class decoder converged on a best-performing accuracy of 84.2% [W: 75.7%, N1: 75.0%, N2: 84.0%, N3: 85.5%, R: 89.1%, A: 69.3%].

Conclusion: Although both models attained accuracies on par with modern decoders trained to operate on traditional polysomnographic recordings using standard 10-20 system electrode placements, the 6-class model demonstrated slightly more balanced performance across all sleep stages and higher overall accuracy. The comparatively lower accuracy of the Artifact class, possibly due to heterogeneity in artifact types, suggests significant room for improvement on artifact handling. To facilitate future research and algorithmic development using forehead EEG, trained models will be publicly released to the community and made freely available.

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0438

ARTIFICIAL INTELLIGENCE-DERIVED SLEEP AGE FROM HEARTBEAT AND RESPIRATORY SIGNALS

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Introduction: Sleep is intricately linked to overall health, with previous studies demonstrating that AI-derived sleep age from polysomnography (PSG) data can reliably predict critical health outcomes such as mortality. This study seeks to investigate the potential of using easily recorded heartbeat and respiratory patterns during sleep—without the need for complex medical monitoring—as a means to predict health outcomes with comparable effectiveness.

Methods: We used PSG data from the National Sleep Research Resource and Human Sleep Project, focusing on heartbeat and respiratory signals to predict age, sex, and BMI. A transformer-based model was pretrained on 31,927 nights of PSG data to capture physiological patterns via EEG prediction, then fine-tuned using a 9:1 training-validation split. The Sleep Heart Health Study (SHHS) dataset, excluded from pretraining and fine-tuning, served as an external test set. Cox proportional hazards models analyzed the sleep age results from SHHS, assessing associations with all-cause and cardiovascular mortality.

Results: In the SHHS dataset, the mean absolute error (MAE) for predicted age was 5.9 years. In age-adjusted model, each 10-year increase in sleep age was significantly associated with higher mortality risk. For all-cause mortality, the hazard ratio (HR) was 1.40 (95% CI: 1.24–1.57, $p < 0.01$), which attenuated slightly to 1.37 (95% CI: 1.22–1.55, $p < 0.01$) after further adjustment for gender, race, BMI, and smoking. For cardiovascular mortality, each 10-year increase in Sleep age yielded an HR of 1.75 (95% CI: 1.37–2.23, $p < 0.01$), decreasing to 1.66 (95% CI: 1.30–2.11, $p < 0.01$) with additional demographic and lifestyle adjustments. These findings demonstrate a robust association between sleep age and mortality risk, particularly for cardiovascular outcomes.

Conclusion: AI-derived sleep age strongly predicts mortality risk, particularly cardiovascular mortality. These findings align with prior studies using full PSG data and underscore the potential of leveraging heartbeat and respiratory signals in home-based settings for personalized health assessment and risk stratification.

Support (if any):

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0439

COMBINING WEARABLES WITH NEARABLES: USING A MULTI-DEVICE MACHINE LEARNING APPROACH IMPROVES SLEEP TRACKING AT HOME

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Introduction: Wearables have expanded access to sleep data, but proprietary algorithms are inaccurate and legacy actigraphy algorithms are outdated. Furthermore, legacy algorithms were trained on nighttime sleep, and only identify 50.3% of daytime sleep. This presents a unique challenge for night shift workers, who are prone to disordered sleep and need access to improved sleep measurement tools. We recently found machine learning (ML) algorithms using raw accelerometer and heart rate data from an Apple Watch could improve nighttime sleep tracking achieving up to 90% accuracy. However, wearables alone still do not capture environmental inputs needed to accurately classify sleep versus wake (e.g. sleep onset latency). We conducted a proof-of-concept study assessing the feasibility of a ML approach that combines inputs from nearables and a wearable to improve daytime sleep tracking at home.

Methods: Researchers installed a curated sleep tracking system in participants' bedrooms to continuously monitor activity and the environment for 30 days. This included a presence sensor to detect presence in bed, a luxmeter to measure changes in ambient light, and a wireless light switch with smart light bulbs to track when lights were turned on and off. We also collected raw heart rate and accelerometer data from Apple Watches and raw accelerometer data from iPhones. Participants completed daily sleep diaries and a user experience questionnaire.

Results: Preliminary results show our multi-device ML approach increases detection of daytime sleep by 43.4% in night shift workers. In nighttime sleepers, our ML approach achieves 93.7% sensitivity for sleep identification, while maintaining 97.2% specificity in wake classification. Participants report strong acceptance of the multi-device approach, with low perceived intrusiveness (1.0 of 10) and high willingness to continue use (8.8 of 10).
Conclusion: These findings support the feasibility of a multi-device ML approach for more accurate sleep tracking outside of the lab. We plan to expand this research to a larger sample of night shift workers to improve the precision of daytime sleep tracking, while assessing the sleep environment. Because our sleep tracking system contains smart technology, we ultimately aim to help inform personalized interventions to the bedroom environment to improve sleep outcomes.
Support (if any):

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0440
ASSESSMENT OF ARTIFICIAL LIGHT EXPOSURE AND SLEEP PATTERNS IN LATE ADOLESCENTS BY USING AMBULATORY DRY EEG DEVICE

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Introduction: In addition to natural daylight, humans are exposed to a substantial amount of artificial light nowadays. This is often particularly the case within the evening hours, i.e. when the circadian system is most sensitive to light-induced phase delays. LED screens have repeatedly been suggested to interfere with sleep and therefore the physiological processes involved e.g., melatonin secretion. This study aims to investigate how using artificial light sources (modern electronic devices such as mobile, tablets, and LED lights) at bedtime affects healthy sleep patterns in late adolescent age group (16-25 yrs) participants.
Methods: This is an observational pilot study. Twenty healthy subjects aged 16 to 25 years were recruited and included in this study. All the subjects underwent one ambulatory home night monitoring with an EEG device (Dry EEG headband).
Results: There was significant correlation between duration of use of electronic device during bedtime and total sleep time and N1 stage of sleep with mean (SD) is 447.3 (64.7) min, 350.1 (27.1) min, and 262.7 (55) min and 44.8 (11), 32.5 (8.6), and 15.5 (6) ($P \leq 0.05$) for duration 0-1 hrs, 1-2 hrs and >2 hrs ($P \leq 0.05$) respectively. There was a significant correlation between use of mobile during bedtime with decreased TST, N1, N1% and N2 and NREM stage of sleep as compared to laptop users with mean (SD) values are 393.1 (62.4), 268.7 (55.9) ($P < 0.05$), 39.7 (7.9), 16 (6), 10.2 (1.3), 5.9 (1.7), 176.8 (26.7), 98.4 (30.3) and 303.6 (51.2), 199.8 (37.1) ($P < 0.05$) respectively.
Conclusion: The use of artificial light emitting sources such as mobile, laptop, and LED light in the hours leading up to bedtime is associated with shorter total sleep time, delayed sleep onset, and poorer sleep quality among youth. This study investigated the feasibility and acceptability of using the dry EEG-based headband, a sleep monitoring device, among adolescents. A high percentage of participants (80%) successfully met the one-night sleep recording requirement. The headband shows promise as a tool for screening, assessing, and monitoring sleep.
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0441
WITHDRAWN

Abstract citation ID: zsaf090.0442

0442
PREDICTING SLEEPINESS FROM VERBAL REACTION TIME DURING VERBAL COGNITIVE TESTING

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Introduction: Objective markers of sleepiness that can be collected passively, such as through voice data, can be helpful for detecting sleepiness in individuals with suspected sleep disorder and in situations in which sleepiness can pose health or occupational risk. We assessed verbal reaction time (VRT) as a vocalic marker of sleepiness in older adults with history of insomnia and Benzodiazepines receptor agonist (BZRA) use who were undergoing cognitive testing to determine whether VRT accurately reflected patient-perceived sleepiness.
Methods: Adults aged > 55 years without a diagnosis of dementia were recruited from within a BZRA deprescribing clinical trial (NCT03687086) into this ancillary study designed to test the feasibility of cognitive testing using out-of-office, self-directed mobile apps. Participants' working and episodic memory were assessed through recorded verbal responses to Verbal Paired Associates (VPA) tests, and patient reported sleepiness was assessed using ecological momentary assessments (EMA) of self-reported sleepiness (range: 1[not at all] to 4[more prominent]). Using a Generalized Additive Model (GAM), we examined the association between VRT during VPA testing and sleepiness, adjusting for sex, age, race, education, test parameters (difficulty, pass/fail status), caffeine intake, cognition, mood, and recent BZRA use (yes/no).
Results: 2230 audio samples from 19 patients were analyzed. VRT was operationalized as the time duration between recording start time and first epoch of speech. In the GAM model, longer (delayed) VRTs were positively associated with greater EMA sleepiness ($p=0.00151$). Our prediction model achieved 95% accuracy in classifying sleepiness levels after adjusting for other variables.
Conclusion: We found that longer VRTs are correlated with more self-reported sleepiness during cognitive testing. Voice data

have the potential be used as a marker of sleepiness in patients undergoing cognitive testing and in situations during which a method for capturing sleepiness that does not require patient input can inform care.

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0443

ESTIMATING CENTRAL CIRCADIAN PHASE WITH WRIST-WORN SPECTROPHOTOMETER IN AMBULATORY ENVIRONMENT

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Introduction: The central circadian pacemaker regulates essential physiological processes from cardiometabolism to mood and neurobehavioral performance. Accurate estimation of central circadian phase has broad implications for improving public health. Traditional laboratory-based methods are time- and resource-intensive. Advances in wearable technology, including wrist-worn spectrophotometers, enable continuous, non-invasive monitoring of light exposure with spectral information. This study evaluates the feasibility of using melanopic irradiance measured on the wrist to estimate central circadian phase in ambulatory settings.

Methods: We monitored healthy non-shift-worker adults (N=25, age: 18-54) wearing a wrist spectrophotometer continuously for two weeks while adhering to their habitual schedules. The devices recorded melanopic irradiance, photopic illuminance, rest-activity data, and off-wrist intervals concurrently. At the end of the two weeks, saliva samples were collected under dim-light conditions to assess dim-light melatonin onset (DLMO), serving as the gold-standard reference for central circadian phase. We evaluated the DLMO estimation performance of three van der Pol oscillator models using melanopic irradiance and photopic illuminance as inputs. Habitual sleep onset minus two hours was used as a baseline comparator.

Results: Melanopic irradiance-based estimation outperformed photopic illuminance- and habitual sleep onset-based estimations, achieving mean absolute errors of 40-43 minutes versus 50-52 minutes and 70 minutes, respectively ($p<.001$, Friedman test). Lin's concordance correlation coefficients for melanopic irradiance ranged from 0.94-0.95, significantly higher than 0.89-0.90 for photopic illuminance and 0.80 for habitual sleep onset ($p<.001$, Friedman test). Furthermore, 84% of participants had phase estimation within one hour of their saliva DLMO using melanopic irradiance, a 16% improvement over using photopic illuminance, and a 60% improvement over using habitual sleep onset.

Conclusion: This study demonstrates the superiority of melanopic irradiance-based methods for estimating central circadian phase in ambulatory environments. The estimation performance improvement of using melanopic irradiance is statistically significant but marginal, and its clinical impact requires further investigation. Future work should also test these methods among shift workers and patients with sleep and circadian rhythm disorders. Overall, the current results support incorporating spectral information, in addition to photopic illuminance and sleep timing, to improve the estimation of central circadian phase from wearables.

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0444

SELF-SUPERVISED PRETRAINING FOR WRIST-WORN ACCELEROMETER DATA IMPROVES ACTIVITY AND SLEEP-WAKE DISCRIMINATION

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Introduction: Wearable accelerometers are popular for monitoring activity and sleep habits in the general population. However, publicly available labeled datasets are often small and constrained to scripted behavior, with most remaining proprietary to wearable companies. This limits the adoption of deep learning methods in academia, as these require larger datasets. Here, we use self-supervised pretraining on a large unlabeled dataset to pretrain a model, which was then adapted to selected downstream tasks using smaller datasets.

Methods: A transformer masked autoencoder was pretrained using ~700,000 days of wrist-worn accelerometer data from 109,000 subjects in the UK Biobank. The model takes 50-minute windows of triaxial accelerometer data sampled at 30Hz as input. During pretraining, 60% of the input is masked in 10-second patches, and model was tasked with reconstructing the masked signal. For downstream tasks, the frozen encoder from the pretrained model was used to train a small classifier. For comparison, we also trained the full model from scratch. The model outputs a label for each 10-second patch. We used two labeled datasets: the Capture-24 dataset, with ~24 hours of accelerometry from 151 subjects with daytime activity labels of bicycling, walking, sitting-standing, vehicle, and mixed derived from body-cam recordings and sleep from a sleep diary, and a second dataset with 35 nighttime accelerometer recordings with concurrent polysomnography (PSG). For this study, the PSG-derived hypnogram was reduced to sleep-wake labels. An 80-20 subject-wise train-validation split was used for both tasks.

Results: In the Capture-24 validation set, we obtained balanced accuracies of 0.65 and 0.85, and Cohen's kappas of 0.69 and 0.81 for predicting activities and sleep, using the model trained from scratch and the pretrained model, respectively. For sleep-wake classification in the PSG cohort, balanced accuracies of 0.76 and 0.83, and Cohen's kappas of 0.52 and 0.59, were obtained. A high degree of overfitting was observed with the models trained from scratch.

Conclusion: Pretraining using masked reconstruction effectively improves activity recognition and sleep-wake distinction from wrist-worn accelerometer data on small, labeled datasets. This work highlights the value of foundation models for accelerometry in various downstream tasks. Future work will focus on predicting sleep stages and sleep disorders.

Support (if any):

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0445

ESTIMATION OF SLEEP STAGES FROM ACCELEROMETER AND PHOTOPLETHYSMOGRAM DERIVED FEATURES ACQUIRED FROM A WRIST-WORN WEARABLE DEVICE

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Introduction: Typical data derived from a wrist worn device include accelerometer and photoplethysmogram (PPG) sensor signals. These reflect underlying movement, heart rate, and vascular dynamics that contain sleep stage information which can be extracted using machine learning algorithms. However these signals can be difficult to upload to backend processing in raw format, due to memory and power constraints. We investigate the performance on sleep staging of reduced-size features derived from these signals, as such features can be more readily transmitted to a backend processing server.
Methods: A convolutional neural network (CNN) was proposed for application to two sets of features derived from PPG and accelerometer (i.e., movement and inter beat interval information). Output labels were mapped to four classes (wake, light sleep, deep sleep, and REM sleep) where light sleep is defined as Stages N1 and N2. The system was trained and evaluated on an internal set of records obtained under IRB approval from adults with corresponding scored PSG sleep stage labels. Data augmentation techniques were used to create additional training data. The system was then tested using a withheld data set of 76 records, containing subjects with sleep apnea (22 healthy patients, 25 with mild OSA, 29 with moderate and severe OSA). The overall performance of the system was evaluated by calculating two stage (wake versus sleep) and four stage accuracy and Cohen's kappa values (□).
Results: The overall performance for two-stage wake/sleep classification was an accuracy of 89% and □=.58. For four stage classification, the accuracy was 75% and □=0.57.
Conclusion: Compressed features derived from raw accelerometer and PPG signals contain a significant amount of information related to underlying sleep stages, and can be trained to produce hypnograms which approach the accuracy of human scorers. This may provide utility to backend sleep algorithms serving wearables or medical devices aiming at tracking sleep stages.

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0446

COGNITIVE PERFORMANCE CORRELATES WITH A METRIC OF ACTIGRAPHY-DERIVED SLEEP IN A WILDLAND FIRE-FIGHTER DISPATCH ENVIRONMENT

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Introduction: Sleep deprivation is associated with cognitive decrements. These assessments are usually performed under controlled laboratory conditions. Yet, it is still unclear what sleep patterns are related to cognitive decrements in real-world situations, where sleep loss may be more subtle and inconsistent. We have applied a novel actigraphy analysis algorithm, called the Wasserstein Algorithm for Classifying Sleep and Wakefulness (WACSAW) to determine sleep and wakefulness during their work shifts. WACSAW also returns interim metrics that can be used to associate cognitive metrics with a mathematical reflection of the night's sleep.
Methods: Dispatch firefighters from the Mark Twain National Forest in Rolla, Missouri and the Cleveland National Forest in California (n=31) were monitored from 2 weeks to 3 months over 3 different data collection periods. Actigraphy was measured using a high-frequency collection device and sleep metrics were derived using WACSAW. In addition, we collected cognitive data using the 3 min tablet-based Psychomotor Vigilance Task (PVT) and Digit Symbol Substitution Task (DSST) at the beginning and end of each shift. As WACSAW determines sleep and wakefulness, the algorithm produces interim metrics that provide a distributional representation of the night's sleep. We used the mean and tail of the distribution to create a score for each for each sleep segment for the night. Scores within and between individuals were compared to cognitive performance metrics to determine significant relationships.
Results: WACSAW scores were significantly associated with cognitive performance metrics. Variables derived from the analysis of sleep and wakefulness segments over the night of interest correlated with subjective sleepiness from the Karolinska Sleepiness Scale (KSS) in both the morning and evening. Moreover, a different set of variables significantly correlated with reaction time performance on both the PVT and DSST in the morning and evening.
Conclusion: Preliminary data indicate that interim metrics produced by WACSAW add information about how an individual sleeps under natural conditions and what types of sleep pattern are related to optimal and cognitive decrements. As our understanding of how the distributions relate to cognitive performance that may act as biomarker to suggest when an individual may not be cognitively optimal in a real-world situation.
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0447

WACSAW ESTIMATES OF SLEEP CORRELATE WITH SLEEP IN A WILDLAND FIREFIGHTER POPULATION

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Introduction: Our understanding of sleep and the impacts of sleep deprivation in people will depend on understanding how real-life sleep patterns vary and how they relate to human health and cognitive performance. Actigraphy has emerged as a method that can potentially track sleep and wakefulness during normal life and activities. We have developed a novel algorithm to convert activity data into sleep and wakefulness, called the Wasserstein Algorithm for Classifying Sleep and Wakefulness (WACSAW). We assessed sleep duration from dispatchers with the Mark Twain National Forest firefighters. We aimed to evaluate whether WACSAW-derived sleep assignments correlated with reported sleep amounts and metrics.
Methods: Wildland dispatch firefighters were monitored for three data collection periods spread out over a year and a half. Each period lasted for 45-60 days. Each participant (n=31) wore

a MEMS actimeter for high-frequency data collection. Sleep and wakefulness durations were determined using WACSAW and compared to the estimate from survey data taken each morning and afternoon that they attended work by correlation analysis. In addition, participants answered additional survey questions regarding sleep, sleep quality and attitudes toward work administered through a Qualtrics portal and data were analyzed within and between subjects.
Results: We applied WACSAW to the data collected from long-term actimetry collected during normal activity patterns during fire season and a low workload portion of the fire season. We also determined that WACSAW assigned sleep duration significantly correlated with the subjective sleep estimates provided by participants in morning questionnaires about the previous night. We also were able to track those changes in self-declared sleep tracked with WACSAW determined sleep and sleep quality responses, as well.
Conclusion: WACSAW can be applied to data collected from the field and reflect the sleep that a person sleeps under normal life circumstances. Not only can WACSAW provide sleep duration information, but it will also provide interim metrics that can act as an alternative representation of the night that can be correlated to other outcomes to provide more interpretable information about an individual's sleep at night.
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0448
NOVEL CONTACTLESS MONITORING OF SLEEP PHYSIOLOGY

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Introduction: The unobtrusive measurement of sleep psychophysiology is fundamental to understanding how we sleep. Our current understanding of sleep psychophysiology is still limited, due to the fact that conventional measures are disruptive and impractical to measure natural sleep. This pilot study examined sleep using a novel method of completely contactless psychophysiological monitoring called infrared-video photoplethysmography (IR-VPPG) in comparison with the conventional gold standard sleep physiological (e.g., ECG) monitoring. We predicted that IR-VPPG measurements of psychophysiology would demonstrate high accuracy and strong agreement with conventional measures of psychophysiology specifically heart rate.
Methods: We assessed 9 adult participants (Mage = 25.8 +/-4.1) during a 90-minute nap in a controlled lab environment. We monitored participants during their nap using specialized infrared recording, ECG and respiratory monitoring. Using specialized video processing and machine learning models we extracted a wide range of psychophysiological activities including Heart Rate from the participants video data. We then contrasted this data to the conventional sleep physiological measures.
Results: Comparison of heart rate between methods demonstrated a high accuracy of 96.49%, a low error of 3.51%, and high agreement (Mdiff = -0.99 +/- 2.77) between our novel IRPPG and the conventional ECG monitoring.
Conclusion: This pilot study provides evidence for a revolutionary contactless method, IRPPG to accurately monitor sleep psychophysiology, notably heart rate naturalistically. We are currently testing large sample while expanding the use cases of IRVPPG providing additional physiological measurements and assessing longitudinal use cases. Ultimately we hope to provide this contactless tool to users, researchers, and clinicians to monitor and measure psychophysiological features during sleep. Potential applications of this technology in research and other fields are discussed.
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0449
OBSTRUCTIVE SLEEP APNEA DETECTION USING AN ARTIFICIAL INTELLIGENCE-ENABLED WIRELESS ABDOMEN-WORN SENSOR

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Introduction: Obstructive sleep apnea (OSA) diagnosis traditionally relies on polysomnography (PSG), a costly, inconvenient procedure with limited accessibility due to sleep lab requirements and long waiting times. Artificial intelligence (AI)-enabled wireless wearable devices, such as smartwatches, rings, and chest-worn sensors, have emerged as promising alternatives to address these limitations. However, most wearable devices lack direct measurements of respiratory signals, body positions, and movements—key indicators for accurate OSA event detection. This study presents an automated deep learning-based algorithm for detecting moderate-to-severe OSA using data collected by a wireless abdomen-worn sensor (Soomirang device), which integrates a capacitive sensor for respiratory effort-like data measurement and a 3-axis accelerometer.
Methods: Two hundred participants with suspected OSA underwent overnight in-laboratory PSG alongside simultaneous data collection from an abdomen-worn sensor (sampling rate: 5 Hz). Sleep clinicians manually scored the PSG data, and OSA severity was classified based on the Apnea-Hypopnea Index (AHI), with moderate-to-severe OSA defined as AHI ≥ 15. Respiratory effort-like signals and 3-axis accelerometer data were synchronized with PSG data, preprocessed, and labelled as apnea or normal. The MLP-Mixer model was employed for automated apnea/normal classification due to its superior performance to the transformer and long short-term memory models. The classified apnea/normal outcomes were used to calculate the Respiratory Event Index (REI), with REI ≥ 15 indicating moderate-to-severe OSA. Seven recordings were excluded due to low-quality data, leaving 100 subjects for training and validation, and 93 for testing. Model performance was evaluated using sensitivity, specificity, accuracy, and F1-score. Agreement between AHI and REI was assessed through Pearson correlation and Bland-Altman analysis.
Results: The model achieved an accuracy of 89%, a sensitivity of 92.5%, a specificity of 81.8%, and an F1-score of 91.9% for detecting moderate-to-severe OSA. The correlation between AHI and REI was 0.92. Bland-Altman analysis indicated a mean difference between AHI and REI of 3, with limits of agreement averaging 34.
Conclusion: The deep learning-based algorithm using data from an abdomen-worn device achieved a strong performance in detecting moderated-to-severe OSA. These findings highlight the potential of this simple AI-enabled wireless wearable device as an accessible and effective tool for OSA screening.
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0450

PERFORMANCE OF AN AI ALGORITHM IN SCORING RESPIRATORY AND NON-RESPIRATORY AROUSALS USING RESPIRATORY INDUCTANCE PLETHYSMOGRAPHY SIGNALS

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Introduction: Arousals are brief awakenings from sleep that can occur spontaneously or in response to stimuli, including respiratory disturbances, limb movements, or environmental factors. They impact sleep architecture and are key to diagnosing sleep disorders, including obstructive sleep apnea (OSA). Respiratory-related arousals are closely tied to breathing disturbances, making them potentially detectable in respiratory signals. However, many arousals arise independently of respiratory events. This study examines the performance of the Nox BodySleep 2.0 deep learning algorithm in detecting both respiratory-related and non-respiratory arousals across OSA severity levels using respiratory inductance plethysmography (RIP) signals.
Methods: The algorithm was validated using clinical sleep recordings from 1,299 adults with suspected sleep disorders. Participants were stratified by apnea-hypopnea index (AHI): AHI< 5, 5≤AHI< 15, 15≤AHI< 30, and AHI≥30. Agreement for the arousal index (ArI) was analyzed using Bland-Altman bias, limits of agreement (LoA), and intraclass correlation coefficients (ICC). To explore the algorithm's ability to detect non-respiratory arousals, the proportion of scored arousals preceded by respiratory events was assessed, identifying arousals linked to respiratory events versus those from non-respiratory causes.
Results: ArI agreement metrics across OSA severity groups were as follows: - AHI< 5 (n=118): Bias (LoA) = -3.63 (-23.85, 16.59) events/hour; ICC = 0.68 (95% CI: 0.57, 0.78). - 5≤AHI< 15 (n=416): Bias (LoA) = -3.08 (-22,.91, 16.75) events/hour; ICC = 0.67 (95% CI: 0.57, 0.76). - 15≤AHI< 30 (n=344): Bias (LoA) = -3.61 (-24.95, 17.73) events/hour; ICC = 0.54 (95% CI: 0.42, 0.66). - AHI≥30 (n=421): Bias = -6.46 (-44.26, 31.34) events/hour; ICC = 0.62 (95% CI: 0.53, 0.69). The proportion of respiratory-related arousals across sleep recordings had a 95% central range from 10% to 90%. This indicates that while the algorithm is highly effective at detecting respiratory-related arousals, it also identifies non-respiratory arousals, capturing variability across sleep recordings.
Conclusion: The algorithm demonstrates consistent performance in detecting arousals across OSA severity levels. Its ability to detect both respiratory-related and non-respiratory arousals broadens its utility for arousal assessment. This enhances the value of respiratory signal-based models in home sleep testing, addressing a broader spectrum of arousal-related disturbances.
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0451

IMPROVING DIAGNOSTIC ACCURACY IN SLEEP APNEA THROUGH RESPIRATORY BASED HOME SLEEP TESTS

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Introduction: DeepRESP is a cloud-based software designed to overcome the limitations of type III sleep recordings, which traditionally lack the signals required to score sleep stages, arousals, and thus hypopneas ending in arousals. These limitations can lead to systematic underestimation of key metrics, such as the apnea-hypopnea index (AHI), increasing the risk of missed sleep apnea diagnoses, especially in patients with poor sleep efficiency or a high proportion of hypopneas ending in arousals. By utilizing respiratory inductance plethysmography (RIP) signals, the software enables estimation of sleep states (Wake, REM, and NREM), as well as scoring of arousals, desaturations, and respiratory events. This method aims to give more accurate AHI and central apnea-hypopnea index (CAHI) values from type III recordings that more closely reflect the values obtained from type I recordings.
Methods: The primary objective was to evaluate sleep apnea severity classification agreement for AHI and CAHI (using thresholds of AHI ≥ 5, CAHI ≥ 5, and AHI ≥ 15) between the software and manually scored type I and II recordings. Secondary objectives included assessing epoch-level agreement for sleep states (Wake, NREM, REM), respiratory events, and arousals. Positive, negative, and overall percentage agreement (PPA, NPA, OPA) values were calculated using confusion matrices, with 95% confidence intervals (CI) derived via bootstrapping.
Results: Our method demonstrated high overall agreement across critical metrics compared to manual scoring. For sleep apnea severity classifications, OPA was 90.2% for AHI ≥ 5, 96.8% for CAHI ≥ 5, and 83.6% for AHI ≥ 15. Sleep state classification also showed high agreement, with an OPA of 93.0% for Wake, 89.7% for NREM, and 95.7% for REM. The OPA for arousal scoring was 82.2%, and for respiratory event scoring was 85.1%.
Conclusion: The results highlight the ability of this method to estimate critical sleep parameters and clinical indices from type III recordings that show high agreement with what would have resulted from a type I recording. This method may enhance accuracy in sleep apnea diagnoses made using type III home sleep testing.
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0452

QUANTIFICATION OF HOW HYPOGLOSSAL NERVE STIMULATION AFFECTS UPPER AIRWAY NEUROMUSCULAR CONTROL USING COMPUTATIONAL AIRFLOW MODELING

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Introduction: Hypoglossal nerve stimulation (HGNS) has emerged as an alternative treatment for obstructive sleep apnea (OSA) patients in patients who cannot tolerate continuous positive airway pressure therapy. While clinical trials of HGNS have demonstrated reductions in the Apnea-Hypopnea Index (AHI), treatment efficacy remains variable. Current assessment methods

like polysomnography and drug-induced sleep endoscopy have limitations in quantifying the complex interaction between upper airway anatomy and airflow. Novel methods are needed to understand how HGNS treats OSA by counterbalancing inspiratory upper airway collapse.
Methods: Three male participants underwent four-dimensional computed tomography (4DCT) scanning during natural non-REM stage 2 (N2) sleep, both with and without HGNS. The 4DCT images had an in-plane resolution of 0.445x0.445 mm, slice thickness of 0.25 mm, and field of view of 210x210x160 mm, extending from the superior nasal cavity to the glottis. Simultaneous electroencephalographic monitoring and airflow measurements were recorded. Computational fluid dynamics (CFD) simulations were performed using anatomical data and airway dynamics from 4DCT imaging combined with measured airflow patterns. We assessed: 1) changes in airway cross-sectional area (CSA), 2) the mechanical work performed by muscles and air pressure in airway dilation and collapse, and 3) airway flow resistance.
Results: HGNS led to substantial increases in neuromuscular work for airway dilation (reaching 490%) and airway CSA (up to 300%). The most pronounced effects were observed in the oropharyngeal region, while responses in the nasopharynx and hypopharynx showed inter-subject variability. All participants exhibited increased minute ventilation (15-36%), alongside marked reductions in airway resistance (73-97%).
Conclusion: The quantitative parameters established in this study may provide insights into the variable therapeutic responses to HGNS in OSA treatment. These analytical methods hold potential for identifying non-responders, understanding treatment limitations, and optimizing device settings in clinical practice. This novel approach combines dynamic imaging with CFD simulation to reveal the underlying balance between neuromuscular control and air pressure, offering additional insights of HGNS efficacy in addition to traditional methods.
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0453

HYPOXIA AFFECTS GLYMPHATIC EFFICIENCY: ASSESSING GLYMPHATIC DISRUPTION IN OBSTRUCTIVE SLEEP APNEA USING NEAR-INFRARED SPECTROSCOPY

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Introduction: Near-Infrared Spectroscopy (NIRS) is a non-invasive imaging technique that monitors cerebral oxygenation and hemodynamic changes, making it valuable for studying sleep apnea. Obstructive sleep apnea (OSA), marked by recurrent airway obstruction during sleep, disrupts oxygen homeostasis and is linked to neurocognitive and cardiovascular dysfunction. This study explores a novel surrogate measure of glymphatic clearance in OSA subjects, focusing on sleep-related fluctuations in oxyhemoglobin (HbO) and water dynamics, using phase differences between water and HbO as proxies for flow changes.
Methods: NIRS measured changes in HbO and water concentrations during sleep in OSA participants (N=9) and healthy controls (N=18). Data were preprocessed to remove motion artifacts and bandpass filtered (0.01-0.2 Hz) to isolate low-frequency oscillations. The modified Beer-Lambert law was applied to extract phase and amplitude of HbO and water. Statistical analyses assessed differences in phase-amplitude coupling between HbO and water in OSA and controls. Phase shifts between water and HbO were used to indicate glymphatic clearance efficiency during sleep. Additionally, we also examined HbO and water concentrations in OSA subjects throughout sleep.
Results: Healthy individuals exhibited a distinct phase difference between HbO and water across sleep stages, absent in the OSA group. Post-hoc tests identified significant phase-amplitude coupling differences ($P < 0.05$) during N3 and Wake in healthy participants, while no differences were found in the OSA group. Moreover, HbO concentrations significantly decreased ($P < 0.01$) during REM sleep in OSA participants compared to other sleep stages, whereas healthy controls showed consistent HbO levels across sleep stages
Conclusion: Disrupted phase shifts between HbO and water in OSA subjects may indicate impaired glymphatic function, particularly during deep sleep, critical for waste clearance. Reduced HbO concentration during REM sleep for OSA subjects could imply severe oxygen desaturation and its potential systemic and neurological impacts.
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0454

FIRST STUDY TO ESTABLISH MINIMUM NIGHTS FOR RELIABLE SLEEP METRICS USING WEARABLES & AI IN INSOMNIA AND COMISA

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Introduction: Sleep metrics are essential for diagnosing insomnia and co-morbid insomnia with obstructive sleep apnea (COMISA). Single-night polysomnography (PSG) is insufficient for comprehensive evaluation, and actigraphy lacks the capability to measure apnea-hypopnea index (AHI). The optimal number of nights required for reliable assessment of insomnia and COMISA has not been established. This study aims to determine the minimum nights needed for accurate estimation of sleep metrics using the Belun Ring (BR).
Methods: Sixty-six participants with insomnia complaints (median age: 61 years; 61% female; 30% COMISA; median BMI: 23.6) were screened by a clinical psychologist and pulmonologist and underwent multiple-night BR testing. Insomnia was defined by an Insomnia Severity Index (ISI) ≥15 or a diagnosis per ICSD-3 criteria, and COMISA by insomnia criteria with PSG-AHI ≥15 events/h. Sleep metrics included total sleep time (TST), sleep efficiency (SE), REM sleep, wakefulness, sleep onset latency (SOL), wake after sleep onset (WASO), AHI4% and HRV time-domain metrics. Reference values were calculated as the average of all available nights. Concordance correlation coefficient (CCC) assessed agreement between 1-N night averages and reference values, with 1,000 bootstrapped simulations performed for each N-night scenario.

Results: Participants completed a median of 5 nights (IQR: 4–6; ≥100 minutes/night). Actual data showed key metrics reached a lower 95% CI CCC of ≥0.95 by the fourth night (e.g. AHI 4%, WASO, SOL, TST, SE, REM, RMSSD, SDNN, PNN50). Simulations confirmed that 4 nights were sufficient for good agreement (CCC ≥0.85) across most metrics, though SOL variability persisted beyond 6 nights. Sensitivity analysis, restricted to participants with ≥6 nights (N=27), yielded consistent results, with all metrics stabilising after 4 nights.
Conclusion: This study establishes that a minimum of four nights is required for reliable sleep metric assessment in insomnia and COMISA using the BR. This duration ensures accurate evaluation of HRV, OSA, and insomnia-related metrics. The BR offers significant advantages over PSG, actigraphy, and self-reports, delivering more precise diagnostics. The findings highlight how wearable-based sleep evaluations enhance the detection and management workflow for insomnia and underdiagnosed COMISA, especially in psychiatric settings.

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0455

USE OF NATURAL LANGUAGE PROCESSING TO IDENTIFY PATIENTS WITH DIAGNOSIS OF NARCOLEPSY

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Introduction: Narcolepsy is a rare chronic neurological disorder that requires precise identification for timely diagnosis and intervention. It is undocumented or underdiagnosed in the electronic health records due to lack of standardized template in reporting polysomnography. A validated natural language processing (NLP) pipeline can efficiently identify patients with narcolepsy from clinical notes.
Methods: We identified 240 with narcolepsy and 192 without narcolepsy with either diagnosis of sleep apnea or insomnia. Patients' diagnoses were determined using the International Classification of Diseases (ICD) 9th and 10th codes. We curated notes related to the index date of diagnosis. We extracted Concept Unique Identifiers (CUIs using MedCAT. CUIs, as integral components of the Unified Medical Language System (UMLS), serve as standardized identifiers for medical concepts across various terminologies and ontologies, enabling the integration and interoperability of diverse medical data sources. We performed a cascade of most important variables selection: prevalence ≥1%, p-value ≤0.1 in univariate analysis, and Random Forest (RF). We optimize the RF by constraining the complexity of forest, specifically by controlling tree depth and the number of leaves.
Results: Initially, 5,960 CUIs were extracted. The 1% prevalence reduced the set to 2,286 CUIs and the univariate analysis was yielded to 1,479 CUIs. The RF analysis reduced the feature set to 40 CUIs. We reached accuracy of 0.90 in discriminating narcoleptics notes from non-narcoleptic notes.
Conclusion: Our results confirmed the use of CUIs in identifying patients with probable narcolepsy diagnosis. Utilizing the proposed pipeline on a larger scale note as the initial filter for identifying patients with narcolepsy in the electronic health record can pave the road to enricher cohort definition. Additionally, it will reduce the possibility of under diagnosis.

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0456

SUPERIOR WAKE-PROMOTING AND ANTI-CATAPLEXY EFFECTS OF GUBOX, A DUAL OX1R/OX2R PEPTIDE AGONIST

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Introduction: Narcolepsy type 1 (NT1) is associated with severe loss of orexin neurons and characterized by excessive daytime sleepiness and cataplexy. Because orexin receptor type 1 (Ox1R) and type 2 (Ox2R) have complimentary roles in the regulation of wakefulness, dual Ox1R/Ox2R agonists could have significant therapeutic potential in NT1. Here, we report the characterization of GUBox, a highly potent dual Ox1R/Ox2R peptide agonist, in a standard mouse model of NT1.
Methods: Chow-fed male orexin/ataxin-3 transgenic mice (25 weeks of age) were randomized into treatment groups according to baseline body weight (n=8 per group). Animals received a single subcutaneous dose of GUBox, danavorexton (TAK-925, small molecule selective Ox2R agonist), or vehicle. 24h automated real-time recording of activity/wakefulness and cataplectic attacks was performed using an in-house AI-based behavioural monitoring platform. Body weight and food intake was measured 24h after dosing. Tail blood samples were collected for drug exposure analysis in wild-type littermate controls (n=3 per time point)
Results: Orexin/ataxin-3 transgenic mice displayed a clear narcolepsy-cataplexy phenotype, characterized by severe inactivity and the presence of highly frequent cataplexy-like episodes during the dark (active) phase. Narcoleptic mice consistently showed increased body weight (≈10%) compared to controls. GUBox dose-dependently increased wakefulness time and decreased the number and duration of cataplectic episodes in narcoleptic mice. GUBox demonstrated prolonged benefits on both wakefulness time and cataplexy (up to 12h post-dosing) compared to danavorexton (up to 3h post-dosing). The differential efficacy profiles were supported by extended systemic exposure of GUBox compared to danavorexton. GUBox, but not danavorexton, promoted a moderate body weight loss (≈5%) without affecting food intake in narcoleptic mice.
Conclusion: We report superior wake-promoting and anti-cataplexy effects of GUBox, as compared to danavorexton, in narcoleptic mice. Only GUBox improved body weight in narcoleptic mice. Collectively, our findings support the therapeutic potential of GUBox for the treatment of NT1.

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0457

COMPARISON OF RADIOIMMUNOASSAY AND ENZYME-LINKED IMMUNOSORBENT ASSAY FOR HYPOCRETIN DETECTION IN CEREBROSPINAL FLUID IN NARCOLEPSY PATIENTS

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Introduction: Narcolepsy is a neurological disorder characterized by excessive daytime sleepiness, cataplexy, sleep paralysis, and hypnagogic hallucinations, with its pathogenesis linked to hypocretin/orexin deficiency, a key regulator of the sleep-wake cycle. This study compares the diagnostic performance of radioimmunoassay (RIA) and enzyme-linked immunosorbent assay (ELISA) in measuring cerebrospinal fluid (CSF) hypocretin levels in narcolepsy patients.
Methods: Twenty-five narcolepsy patients were diagnosed based on clinical symptoms and electrophysiological tests. CSF hypocretin levels were measured using RIA and ELISA, with a hypocretin level of < 110 pg/ml considered diagnostic for narcolepsy type I according to established criteria.
Results: RIA showed a significantly lower average hypocretin level (9.77±5.65 pg/ml) compared to ELISA (134.56±57.21 pg/ml). Among the 25 patients, 17 were diagnosed with narcolepsy, all of whom had RIA measurements below 110 pg/ml, achieving 100% sensitivity. In contrast, only 4 patients had hypocretin levels < 110 pg/ml using ELISA, resulting in a sensitivity of 23.53%. RIA demonstrated higher sensitivity for detecting low hypocretin concentrations, while ELISA was more accurate for higher concentrations but less sensitive at lower levels.
Conclusion: RIA demonstrated superior sensitivity and accuracy in detecting low cerebrospinal fluid (CSF) hypocretin levels, which makes it highly valuable for the early diagnosis and ongoing monitoring of the disease. Despite these advantages, its complexity and associated costs pose significant limitations to its widespread clinical applicability. In contrast, ELISA, while less sensitive at very low concentrations, offers greater accessibility and is more suitable for large-scale screening programs. Clinicians are advised to select the most appropriate method based on their specific diagnostic requirements. This study not only contributes to the refinement of diagnostic strategies for narcolepsy but also offers valuable insights that could be applied to broader neurological disorders.
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0458

CONTINUOUS NOCTURNAL BLOOD PRESSURE MONITORING USING AN INTEGRATED PRESSURE SENSING MATTRESS PAD

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Introduction: Nonintrusive and continuous nocturnal blood pressure (NBP) measurement is crucial but challenging, as it relies on repeated cuff inflations that disrupt sleep. Intermittent BP measurements also miss episodic surges caused by events like sleep apnea. This study introduces an integrated pressure-sensing mattress designed to capture heartbeat signals from two major arterial sites. We suggest that the time difference between these sites represented pulse transit time (PTT), the time for an arterial pulse to travel between two locations, which is inversely correlated with BP and serves as the foundation for cuffless BP monitoring.
Methods: Subjects lay on a mattress pad embedded with a nanofabricated capacitive pressure sensor array that detected subtle heartbeat signals from the chest and leg (popliteal) areas in contact with the sensors. PTT, heart rate, low frequency of heart rate variability, pulse wave morphology, and anthropometric data were obtained. These variables were incorporated into a machine-learning algorithm to estimate BP. Standard BP was measured using an arm cuff and a finger cuff for continuous monitoring. BP perturbation maneuvers were performed to induce BP changes.
Results: A total of 30 subjects were enrolled, providing 140 BP data points for comparison with stationary BP readings. The results showed a high correlation (r = 0.9 for systolic BP [SBP] and r = 0.93 for diastolic BP [DBP]). The mean absolute error (MAE) ± standard deviation of absolute error (SDAE) was 3.1 ± 3.2 mmHg for SBP and 2.2 ± 2.6 mmHg for DBP. For continuous BP monitoring, 8 subjects were enrolled, showing a high correlation (r = 0.93 for SBP and r = 0.86 for DBP) and good MAE ± SDAE: 6.4 ± 5.2 mmHg for SBP and 5.1 ± 3.7 mmHg for DBP.
Conclusion: This novel capacitive pressure sensing array embedded in the mattress holds promise for unobtrusive, continuous tracking of NBP, causing less sleep disruption and effectively capturing episodic BP surges from sleep events.
Support (if any): UWIRB (IRBID: STUDY00019217). YH Kwon has served as a consultant for Jazz Pharmaceuticals, which may be relevant to the content of this work.

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0459

TARGETED DREAM INCUBATION TO ENHANCE CREATIVITY AND REDUCE PTSD SYMPTOMS USING AN EEG-BASED SOFTWARE PLATFORM

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Introduction: Recent studies and anecdotal reports suggest that sleep-onset hypnagogic dreams can contain creative insights, in some cases leading to Nobel prizes. While such reports are rare, targeted dream incubation (TDI) can induce dreams on pre-selected topics, such as "a tree," in 70% of dream reports collected shortly after sleep onset, as well as a subsequent increase in creativity around the targeted topic. Here we describe a new software platform for TDI and plans to use this platform to increase creativity around topics of concern for individuals suffering from PTSD following the October 7th terrorist attacks in Israel.
Methods: "Arctop Sleep" is a mobile app built on an Application Programming Interface developed by Arctop, Inc. (Los Angeles, CA), that allows communication between the app and an EEG headband. Here we used the dry electrode 4-channel Muse EEG headband (interaXon, Toronto). The app connects wirelessly with the headband, identifies sleep onset in real time, plays a prerecorded message to awaken the user and, once awakened, prompts them to dictate a dream report. Users are then prompted to return to sleep while thinking about the chosen topic. The app produces serial awakening with the user awakening, reporting, and returning to sleep repeatedly, for a 90-minute time interval.
Results: Early pilot studies have demonstrated successful integration with the EEG headband, with accurate detection of sleep onset in real time (verified by clinically scored PSG). Serial awakenings and dream reports were successfully recorded

for participants with PTSD. Analysis of these reports revealed both direct and metaphorical references to the preselected topic. Furthermore, participants showed an improvement in creativity and resilience related to the preselected topic on post-sleep tasks compared to baseline measures. Users reported the process was comfortable, with minimal complaints.
Conclusion: The Arctop Sleep platform demonstrates promising usability and potential for leveraging targeted dream incubation to enhance creativity around specific topics. This innovative approach has direct applications for individuals experiencing PTSD, and, by fostering constructive engagement with challenging topics in a controlled sleep environment, could facilitate better sleep and more effective cognitive and emotional processing of trauma memories.
Support (if any): Support provided by Arctop, Inc.

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0460

A FOUNDATIONAL TRANSFORMER LEVERAGING FULL-NIGHT, MULTICHANNEL SLEEP STUDY REPRESENTATIONS ESTIMATE CARDIOVASCULAR MORTALITY RISK

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Introduction: Sleep disorders and deprivation disrupt daily activities, mental health, and longevity and are closely linked to cardiovascular (CV) disease, which accounts for 33% of global deaths. Early detection and management of CV disease are critical for mitigating risk. Polysomnography (PSG) offers valuable data for assessing CV risk due to the relationship between sleep disorders, such as obstructive sleep apnea, and CV disease. PSG involves collecting electrophysiological data during sleep, which is manually annotated for staging, cardiac, and respiratory events. Cohort datasets, such as the Sleep Heart Health Study (SHHS), also provide long-term health outcome labels. Advanced machine learning models, such as the transformer (the model behind ChatGPT), are well-suited for modeling time-series data and can learn multichannel signal representations via self-supervision. These representations can be leveraged to predict risk for various outcomes, including CV disease, by training of an additional classifier model.
Methods: We utilized the Human Sleep Project (HSP, n=24,986), Osteoporotic Fractures in Men (MrOS, n=3,925), and Multi-Ethnic Study of Atherosclerosis (MESA, n=2,055) to train a foundational transformer using masked autoregression. The model learned representations of full-night (8 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 deep neural network that was trained via linear probing to predict CV mortality risk, including stroke, myocardial infarction, and coronary heart disease using the SHHS dataset.
Results: A foundational transformer was trained with 30,966 sleep studies (1.7 million hours of signal data). The classifier achieved an AUROC of 0.74 for CV mortality risk, indicating good discriminative performance. Average precision was 0.98 for low-risk individuals and 0.18 (> 4 times higher than the class proportion of 0.04) for high-risk individuals.
Conclusion: A foundational transformer can learn relevant representations of full-night, multichannel PSG data and these representations can predict CV mortality risk. Future work should be done to examine other methods to best represent sleep study data and utilizing representations for other relevant outcomes in sleep.
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0461

CHATBOT-LED SLEEP INTERVENTION FOR BLACK/AFRICAN AMERICAN YOUNG ADULTS WITH CARDIOMETABOLIC RISK

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Introduction: Young Black/African American (BAA) adults disproportionately report unhealthy sleep that increases cardiometabolic risk. While digital sleep health interventions have shown promise, they lack customization and interactive services. Artificial intelligence chatbots can address these limitations with human-like conversations. This study tested the preliminary efficacy of a chatbot-delivered sleep intervention for young BAA adults with short or poor sleep.
Methods: In this single-arm study, participants with short sleep (< 7 hours/night) or insomnia symptoms (Insomnia Severity Index>10) and at least one cardiometabolic risk factor were recruited from higher education institutions in Delaware. A 4-week transdiagnostic sleep intervention was delivered using personalized algorithms through a chatbot mobile app. The intervention included weekly chatbot-led sleep coaching (20–45 minutes) based on CBT-I guidelines and the Behavior Change Wheel, daily sleep tracking, and weekly goal setting with progress reviews. Pre- and Post-intervention assessments included sleep regularity (standard deviation of sleep midpoints), timing, efficiency, and duration (ActiGraph GT9X for 7 days), self-reported sleep satisfaction (Pittsburgh Sleep Quality Index, PSQI), and daytime alertness (Epworth Sleepiness Scale, ESS). A composite unhealthy sleep metric (range=0-6) was calculated by summing the number of unhealthy sleep domains, with higher scores indicating worse sleep health.
Results: Seventeen participants (19.47±1.36 years, 12 females) completed the intervention. At baseline, 16 participants (94%) self-reported poor sleep quality (PSQI > 5), and 9 participants (53%) slept < 7 hours/night. The post-intervention assessment showed significant improvement in composite sleep health (3.85 vs. 2.62, p = 0.01) and sleep satisfaction (PSQI: 8.59 vs. 5.94, p = 0.01). Although the changes in other sleep variables were not statistically significant, there is a noticeable trend suggesting improvements in sleep efficiency, duration, regularity, daytime sleepiness, and a delayed sleep midpoint.
Conclusion: This study demonstrates the preliminary efficacy of a chatbot-delivered sleep intervention to improve sleep health among young BAA adults. This approach offers an accessible, autonomous, and scalable method to address poor sleep in this

high-risk population, and underscores the potential of personalized digital health interventions.

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0462

REAL-TIME SLEEP STAGE-BASED BED TEMPERATURE ADJUSTMENTS IMPROVE SLEEP AND CARDIOVASCULAR METRICS

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Introduction: Temperature is a key factor in regulating sleep, and modifying bed temperatures throughout the night can improve heart rate (HR), deep, and REM sleep. However, we are unaware of studies examining whether modifying bed temperature for a specific sleep stage could increase time spent in that stage. The Eight Sleep Pod adjusts bed temperature throughout the night in real-time based on a user's current sleep stage (Sleep Stage Autopilot). Thus, this study evaluated how the Pod's Sleep Stage Autopilot affects sleep metrics in new Pod users.

Methods: Thirty-four new Pod users (10 female, 24 male; 43 ± 11 years) completed ≥7 nights of no Pod (baseline) and on the Pod with Sleep Stage Autopilot, while wearing Oura Rings. The Pod's Sleep Stage Autopilot adjusted temperatures in real-time, depending on the sleep stage. Paired t-tests assessed overall changes in sleep stages, HR, and heart rate variability (HRV). Correlations evaluated the magnitude of change from baseline to Sleep Stage Autopilot.

Results: Sleep Stage Autopilot significantly improved average HR (-2.3 bpm), HRV (+4.9 ms), deep sleep duration (+4.7 min), and deep sleep percentage (+1.2%; all $P < 0.05$). Light sleep percentage decreased by 1.4% ($P < 0.05$), likely as a trade-off for increased deep sleep. Those with lower sleep efficiency at baseline had larger improvements with Sleep Stage Autopilot (both $r = -0.41$, $P < 0.05$). Warmer (>25°C) temperatures correlated with less wake ($r = -0.38$), more light sleep ($r = 0.38$), and improved sleep efficiency ($r = 0.38$; all $P < 0.05$).

Conclusion: The Eight Sleep Pod's Sleep Stage Autopilot significantly improved sleep and cardiovascular metrics. To our knowledge, this is the first study to improve sleep via real-time sleep stage-based temperature adjustments. Modifying bed temperature real-time improves deep sleep and minimizes wake. The Eight Sleep Pod could be an effective non-pharmacological intervention to improve sleep and cardiovascular recovery.

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0463

LLM-DRIVEN CLASSIFICATION OF MULTIDIMENSIONAL SLEEP HEALTH MENTIONS FROM FREE-TEXT CLINICAL NOTES

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Introduction: Large language models (LLMs) provide an opportunity for high-throughput extraction of multidimensional sleep health (MSH) information from unstructured clinical text to support cohort identification and the development of detection tools in clinical care. However, class imbalance and data sparsity present challenges for MSH information. Here, we investigated the optimal methods and performance limitations for using LLMs to extract 9 MSH categories from narrative text in the EHR: behaviors, satisfaction/quality, daytime sleepiness/alertness, timing, efficiency, duration, disorders, medication, and interventions.

Methods: Classification performance of Llama-3.1-8B (general domain) and BioMistral-7B (medical domain) is investigated over 300 notes annotated for 9 MSH classes (e.g. medication). We compare 7 context window sizes and 5 different few-shot (reference examples in the prompt) quantities. Few-shot examples are sampled using semantic relevance to the test example and come from a subset of annotated examples (in-domain) or MIMIC ICD-10 and SDOH annotated examples (out-of-domain, OOD).

Results: The best performing configuration showed moderate overall performance (F1: 0.43, Recall: 0.66, Precision: 0.32). Balancing maximum context window size for the GPU VRAM limit (6000 characters on our H100) was critical for performance (0.2 F1 over 1000 characters). BioMistral-7B outperformed Llama-3.1-8B by ~0.02 F1. In-domain few-shot examples outperformed OOD few-shot examples by ~0.03 F1. In the best configuration, classification of sleep medication (F1: 0.64), disorder (F1: 0.49), and efficiency (F1: 0.50) mentions evaluated best while sleep timing (F1: 0.35), duration (F1: 0.20), and behavior (F1: 0.31) classification evaluated worst.

Conclusion: Current LLMs demonstrate moderate success (e.g., sleep medication category). Nuanced sleep health categories (e.g., sleep duration) remain challenging due to complex representations and model limitations in temporal understanding. High recall rates and minimal performance loss when using OOD few-shot examples suggest potential for iterative screening of clinical notes, with annotation needed mainly for validation. Balancing context window size and the number of few-shot examples is critical for performance, while other parameters have little meaningful effect, especially in application. Current LLMs show a base level of competency, and our analysis points to future research foci: better representation of challenging sleep health classes, finetuning strategies, and addressing security barriers that limit access to more advanced models.

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0464

RULE-BASED VOCABULARY FOR IDENTIFICATION OF MULTIDIMENSIONAL SLEEP HEALTH MENTIONS IN PEDIATRIC CLINICAL NOTES

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Introduction: Extracting multidimensional sleep health (MSH) information in clinical notes to improve pediatric learning health systems' cohort identification, surveillance of sleep health symptoms, and determining whether sleep disparities exist in detection and care among pediatric populations. Natural language processing (NLP) has emerged as a tool to capture sleep condition information (e.g., insomnia) among adults. Implementation of NLP in pediatrics is emerging. We present a novel, low-resource

sleep vocabulary that can be applied to pediatric clinical notes to identify MSH mentions automatically.
Methods: Using a combination of existing medical sleep ontologies, interviews with clinicians, and examination of clinical note narratives, we develop a novel vocabulary of MSH terms and phrases that covers both technical terms, abbreviations, and colloquial keywords used in describing pediatric sleep health. We compare our vocabulary against a set of manually annotated clinical notes to determine the effectiveness of our vocabulary for identifying notes with MSH mentions.
Results: Our vocabulary was able to correctly identify clinical notes with MSH mentions with a recall of 99.2 and a precision of 0.852. Most false positives were in progress notes that had either noted no MSH problems or MSH mentions not related to patient sleep health status (e.g. medication side effects). Keywords from our vocabulary appeared in 77.1% of the text spans within the note tagged as sleep mentions. However, the keywords also appeared in many non-patient related MSH mentions as well. For example, "nocturnal enuresis" appeared in sleep mention tagged text only 13 of 17 times (76.5%).
Conclusion: Our vocabulary showed excellent performance for identifying MSH mentions at the clinical note level and decent performance for identifying the specific text containing patient MSH mentions. However, keywords also appeared in other contexts, which can cause results to be noisy. A higher resource model, such as machine learning, is likely required to identify/classify patient MSH mentions. Thus, our low-resource vocabulary, which can be deployed in almost any compute environment, can serve as an identifying first pass over clinical notes to identify which notes/note sections should be further processed by more advanced models or manual review to identify more narrow mentions.
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0465

EVALUATING THE QUALITY OF CHATGPT'S RESPONSES TO ADOLESCENTS' AND CHILDREN'S SLEEP-RELATED QUESTIONS

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Introduction: The application of artificial intelligence (AI) in medical education and public health communication has gained increasing attention. Recent studies have investigated the utility of large language models, such as ChatGPT, in addressing health-related queries, including those concerning sleep. The current study aims to assess the accuracy, educational value, and age-appropriate nature of ChatGPT-generated responses to common sleep-related questions posed by children and adolescents. Additionally, we compare differences in the content and quality of responses tailored to different age groups.
Methods: We selected 18 frequently asked questions by children and adolescents regarding sleep-related issues, including daytime sleepiness, sleep talking, nightmares, nap duration, and appropriate sleep schedules. Each question was posed to ChatGPT-4.0 twice, once with the speaker framed as a 10-year-old child and once as a 16-year-old adolescent. Four sleep physicians independently evaluated the responses. Each expert rated the responses on a 1-to-5 scale for five domains: (1) age-appropriateness, (2) general informational value, (3) personal tailoring to the question, (4) comprehensibility, and (5) suitability as a recommended answer.
Results: For age-appropriateness, responses scored 4.05 ± 0.34 for children and 4.38 ± 0.50 for adolescents. General informational value ratings were 3.87 ± 0.55 for children and 4.00 ± 0.52 for adolescents. Personal tailoring was rated 3.01 ± 0.42 for children and 3.05 ± 0.45 for adolescents. Comprehensibility was rated 4.34 ± 0.65 for children and 4.83 ± 0.21 for adolescents. Overall suitability as a recommended answer was 3.65 ± 0.51 for children and 4.05 ± 0.57 for adolescents. Notably, only 22% of responses to children and 27% of responses to adolescents recommended consulting a healthcare provider. Additionally, ChatGPT's responses were significantly longer when addressing the adolescent audience.
Conclusion: Our findings suggest that ChatGPT-generated responses to pediatric and adolescent sleep-related queries demonstrate strong comprehensibility and general informational value, with responses appearing more appropriate and informative for adolescents than children. However, personal tailoring was limited, and explicit guidance on seeking medical consultation was infrequent. Greater caution and refinement are warranted before integrating ChatGPT responses into educational materials for pediatric and adolescent sleep-related concerns.
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0466

ENABLING CLICK-AND-RUN ACCESS TO ARTIFICIAL-INTELLIGENCE-READY SLEEP PARAMETERS FOR CLINICIANS AND RESEARCHERS

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Introduction: The polysomnography (PSG) signals contain rich phenotypes critical for understanding the function and pathology of multiple organ systems. Sleep clinicians often develop intuitions of these signal phenotypes throughout their clinical practice, which become an integral part of their decision-making. With the heated development of artificial intelligence (AI), many sleep clinicians with first-hand ideas from their patients need to use AI to test their hypotheses. However, quantifying their intuition into sleep parameters becomes the first burden that halts the development of many new ideas. On the other hand, sleep researchers with non-analytical backgrounds face a similar situation.
Methods: Here, we present Sleep Phenomics and Annotator (SPA), a website for click-and-run style quantification of PSG signal phenotypes. The user uploads a de-identified PSG signal file in European Data Format (EDF). The user can also upload an annotation file in any tabular format. Then, the system calculates the sleep parameters and shows a download button to save a tabular file onto their local computers. Importantly, the user will be responsible for data safety. The website displays a message to remind the user to de-identify the data thoroughly before uploading. The website immediately deletes the file once the analysis is done.
Results: The SPA website calculates sleep parameters including (1) sleep stages, if not provided in annotation, and standard

sleep architectures; (2) from brain wave: multitaper-based spectral powers in frequency bands, sleep spindles, slow oscillations (SO), spindle-SO coupling, arousals, and brain age; (3) from chin muscle: amplitude, sleep atonia index; (4) heart rate and heart rate variability; (5) respiration rate and apnea/hypopnea detections; (6) periodic limb movement detections; (7) from oxygen saturation: average SpO2 and hypoxic burden. All sleep parameters are stratified by sleep stages if applicable. The system is designed with a modular architecture, where each sleep parameter can be added separately.
Conclusion: By providing a clinician/researcher-friendly interface, the SPA website bridges the gap between clinical sleep medicine and quantitative sleep research, enabling reproducible sleep analysis at scale. The website is being actively deployed by the Beth Israel Deaconess Medical Center IT team and will become publicly available.
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0467

THE EFFECTS OF 1-4 HZ BINAURAL BEATS ON DELTA BRAIN WAVE DURING SLEEP IN UNIVERSITY STUDENTS: A PILOT STUDY

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Introduction: Sleep is crucial for the maintenance of both physical and mental health; however, a significant number of individuals are currently experiencing sleep disturbances or deprivation, which results in lower sleep quality, especially in university students. The N3 stage, deep sleep stage, has the importance of sleep quality enhancement and a delta brain wave with frequency of 1-4 Hz is generated in this stage. Binaural beats are believed to help improve sleep quality by helping the human brain to generate brain waves during sleep according to the frequency of the binaural beats. Binaural beats with frequency of 1-4 Hz have been proposed to induce delta waves in the brain, thus, the deep sleep stage will increase and eventually improve sleep quality. Therefore, the objective of this pilot study is to evaluate the effects of 1-4 Hz binaural beats in generating delta waves to increase the deep sleep stage (N3), as measured by electroencephalography.
Methods: A total of 9 right-handed participants (Male, n = 6; Female, n = 3) from KMITL institution with age of 18-25 years old (21.2 ± 0.97) were included in this pilot study, which utilized within-subjects study. 1-4 Hz binaural beats were created by musical chords to prevent monotony from using only one value of frequency and this 1-4 Hz binaural beats will generate a frequency of 1-4 Hz by using the difference of sound frequency between two ears. On the first night, participants slept without listening to binaural beats, while on the second night (7 days interval), they listened to 1-4 Hz binaural beats for 30 minutes during sleep. Electroencephalograms were recorded using polysomnography throughout the study.
Results: The results of this pilot study shows that the specific binaural beats increase total sleep time (TST), sleep efficiency, sleep onset, N1, N3 and REM stages but only N3 stage is statistically significant (p= 0.033). For the N2 stage, it decreases with statistical significance (p = 0.049), as calculated by the Wilcoxon-Signed Ranks test by SPSS software.
Conclusion: 1-4 Hz Binaural beats can help stimulate delta waves to increase the deep sleep stage (N3) with statistical significance.
Support (if any):

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0468

ENHANCEMENT OF SLEEP SLOW WAVES USING TRANSCRANIAL ELECTRICAL STIMULATION WITH TEMPORAL INTERFERENCE (TES-TI)

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Introduction: Slow waves are a key feature of high-quality, restorative sleep that occur during non-rapid eye movement (NREM) sleep, which comprises 75–80% of total time spent in sleep. Left ventromedial prefrontal cortex (vmPFC) regions have been shown to be a prominent "hot spot" where slow waves are generated. Slow-wave activity (SWA) is homeostatically regulated, which is believed to reflect the renormalization of synaptic strength that counteracts synaptic potentiation and cellular stress during wake. Disrupted SWA has been implicated in poor cognitive performance. Conversely, enhancement of slow waves has been shown to improve performance. Here, we used a novel neuromodulatory tool called Transcranial Electrical Stimulation with Temporal Interference (TES-TI) to enhance SWA.
Methods: Twenty-eight healthy participants (μ=30.5±10.0 years, 18 Female) received TES-TI interventions (STIM or SHAM) targeting left vmPFC during NREM sleep overnight for one (STIM-LOW) or two (STIM-HIGH) nights a week for four weeks. Simultaneous 256-channel high-density electroencephalography recordings were performed. TES-TI parameters were: 15,000Hz carrier frequency, 5mA, 15-second ramp, 3-minute stimulations repeated up to 10 times during NREM sleep. Difference frequencies were 1Hz for STIM and 0Hz for SHAM. Data were preprocessed and analyzed using MATLAB and EEGLAB. SWA (spectral power 0.5–4Hz) was quantified before (PRE), during (STIM), and after (POST) stimulations. Percent changes in SWA during (STIM-PRE) and after (POST-PRE) stimulation were calculated and evaluated for statistical significance using paired-samples t-tests with Bonferroni correction. Independent samples t-tests were used to compare STIM-HIGH and STIM-LOW.
Results: On combined first and last nights, twenty-one STIM participants (μ=31.5±10.0 years, 12 Female) showed a significant increase in SWA during (t=6.65, p=3.56x10-6) and after (t=7.11, p=1.38x10-6) TES-TI stimulation; whereas seven SHAM participants (μ=27.4±9.8 years, 5 Female) showed no significant changes in SWA (during: t=2.24, p=0.148; after: t=2.47, p=0.098). STIM-HIGH participants (N=10, μ=32.9±11.2 years, 7 Female) had greater increases in SWA during stimulation on the last night as compared to the first night when compared to STIM-LOW participants (N=7, μ=31.6±10.4 years, 2 Female) (t=1.89, p=0.039).
Conclusion: This study is the first to provide evidence supporting the ability of TES-TI to enhance SWA during NREM sleep overnight.
Support (if any): DARPA STRENGTHEN (HR00112320033)

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0469

SLEEP DURATION, TIMING, AND CONTINUITY THROUGHOUT MILITARY TRAINING IN UNITED STATES NAVY AVIATION PERSONNEL

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Introduction: Military environments are characterized by inadequate sleep and high fatigue, which heighten safety-related risk. Specific demands, roles, and operational events likely influence the presentation of inadequate sleep and the extent to which it can be mitigated. Here, we characterized sleep in a sample of U.S. Naval Aviation Enterprise personnel throughout a prolonged training event and examined the influence of work-related factors on sleep.
Methods: Personnel (n = 195, age = 28 ± 7 years [mean ± SD], 21% female) from an aviation squadron (n = 62) and an aircraft carrier air department (n = 133) were monitored prior to, during, and after an extended training exercise (~30 days at sea). Sleep was monitored continuously using a commercial sleep tracking device (Oura™ Ring Generation 3). Outcomes of interest included average total sleep time (TST), sleep efficiency (SE), and sleep midpoint for each training phase. ANOVAs were performed to examine the effects of training phase, study cohort, and rank (officer vs. enlisted personnel) on sleep outcomes.
Results: Across the training exercise, TST ($F_{2,279.28} = 6.70$, $p = .001$), SE ($F_{2,284.58} = 12.69$, $p < .001$), and sleep midpoint changed ($F_{2,282.12} = 42.58$, $p < .001$). Participants slept less pre-training (6.46 ± 0.95h) than during (6.68 ± 0.91h) or post-training (6.66 ± 0.99h). Conversely, SE decreased from pre-training (87.0 ± 4.4%) to during (85.5 ± 4.3%) and post-training (85.4 ± 5.0%). Further, average sleep midpoint was later during training (06:53 ± 4:50) than pre-training (03:84 ± 01:41) or post-training (04:37 ± 02:32). Differences in sleep were found by rank; officers slept longer and earlier than enlisted personnel.
Conclusion: Sleep varied across training phase in Navy personnel; sleep was shorter prior to a prolonged training event and sleep timing shifted when the training event started. Notably, while changes in TST and SE were modest, there was a marked shift in sleep timing due to the increased need for around-the-clock manning during training. In seeking to optimize sleep and reduce fatigue risk in operational settings, external constraints such as role and schedule demands must be considered.

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0470

SLEEP HEALTH AMONG FARMERS IN IOWA AND NORTH CAROLINA

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Introduction: Famers generally awake earlier and work longer hours than the average US worker, limiting time for sleep. Moreover, farmers are increasingly exposed to high temperatures and face psychological stress due to, for example, climate change-related crop loss–via drought or flooding, which can disrupt sleep. Farmers from socially disadvantaged groups (e.g., racially and ethnically minoritized) face added difficulties, yet sleep health and sleep health disparities among farmers remain understudied.
Methods: To (1) describe sleep characteristics and (2) assess sleep disparities among farmers, we used cross-sectional Agricultural Health Study survey data collected across multiple years from licensed pesticide applicators in Iowa or North Carolina. Sleep characteristics were self-reported during enrollment (1993-1997; insomnia symptoms); 2013-2015 (short sleep duration (SSD) [< 7-hours], excessive sleepiness, daytime napping); and 2019-2021 (sleep-disordered breathing (SDB), diagnosed sleep apnea (DSA)). After applying inverse probability weights for missingness, we estimated the prevalence of each sleep measure. Using cross-tabulations and Chi square tests, we described differences by age, sex, race and ethnicity, and educational attainment.
Results: Among 34,574 participants (mean age±SD=47±18 years), 98% were men; 93% identified as Non-Hispanic (NH)-White, 1.3% various races and ethnicities (American Indian, Alaska Native, Asian or Pacific Islander, Hispanic/Latino, multiracial, 'other'), 1.1% NH-Black, 4.1% missing race and ethnicity; and 8.4% attained < high school (HS). SSD (37%), napping < 30-minutes (27%), and SDB (26%) were most prevalent, overall. The oldest farmers (aged≥55 years) had the highest prevalence of excessive sleepiness (9.2%) and napping ≥30-minutes (31%) (all $p < 0.05$). Women had a higher prevalence of SSD (41% vs. 37%) and no napping (64% vs. 54%), but men were more likely to report SDB (27% vs. 14%) and DSA (23% vs. 10%) (all $p < 0.05$). SSD was substantially more prevalent among NH-Black (56%) than NH-White farmers (37%, $p < 0.01$). Farmers with < HS vs. ≥HS had higher prevalence of insomnia symptoms, excessive sleepiness, and napping but lower prevalence of SSD, SDB, and DSA (all $p < 0.05$).
Conclusion: Poor sleep characteristics were highly prevalent among farmers, and there were disparities by age, sex, race and ethnicity, and education. Identifying environmental and sociocultural determinants may inform sleep interventions among farmers.

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0471

SEX-SPECIFIC ASSOCIATIONS BETWEEN ORGANOPHOSPHATE INSECTICIDE METABOLITES AND SLEEP BEHAVIORS AMONG U.S. ADULTS

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Introduction: Dialkyl phosphate metabolites (DAPs) are common metabolites of organophosphate pesticides (OPPs)

that have been associated with suboptimal sleep behaviors in the United States (U.S). However, sex-specific differences in these associations have not been extensively studied. Therefore, this study aimed to examine the influence of exposure to common OPP metabolites on sleep behaviors among U.S. adults.

Methods: A cross-sectional analysis of National Health and Nutrition Examination Survey data (2015-2020) was conducted (N=4,149 adults, 18-80 years). Demographics and sleep behaviors were collected via interviews/questionnaires and concentrations of DAP metabolites were extracted from urine samples using solid phase extraction-high coupled with isotope dilution-ultrahigh performance liquid chromatography(UHPLC)-tandem mass spectrometry. Weighted multivariable logistic regression models determined the age-, socioeconomic status (SES) and body mass index (BMI)-adjusted associations between each DAP and sleep behavior. A sex-stratified analysis adjusting for the same covariates examined differences in these associations. All DAP metabolites were log-transformed to account for their skewed distribution.

Results: The mean age of the sample was 47.3 years (52.8% female, 16.5% Hispanic/Latino, 62.4% non-Hispanic White, 11.3% non-Hispanic Black, 5.9% non-Hispanic Asian, and 3.8% other or multiple races). Over half the sample (54.1%) had overweight or obesity, and 13.6% were socio-economically disadvantaged (below poverty line). About 23.7% did not meet the recommended 7-hour sleep duration, 24.8% reported trouble sleeping, 45.5 % snored ≥3 times a week, 24.5% reported excessive daytime sleepiness ≥15 times a month, and 11.5% experienced snorting or breath cessation ≥3 times a week. After adjusting for age, SES, and BMI, diethyldithiophosphate (DEDTP) was associated with a 69% increase in the likelihood of having trouble sleeping [aOR=1.69; 95% CI: 1.01,2.86; p< 0.05]. Sex-based stratification showed an increased likelihood of males having trouble sleeping when exposed to diethyl phosphate (DEP) [aOR=1.11; 95% CI: 1.01,1.23; p< 0.05] and DEDTP [aOR=2.56; 95% CI: 1.14,5.77; p< 0.05].

Conclusion: Findings suggest that exposure to certain DAP metabolites is associated with insomnia-related sleep behaviors, especially among adult males. Further research is needed to understand the causal relationships between DAP metabolites and sleep behaviors.

Support (if any):

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0472

HOW DO COLLEGE ATHLETICS IMPACT SLEEP AND MENTAL HEALTH?

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Introduction: Sleep disturbances and mental health concerns are highly prevalent among college students, but it is unknown whether college athletics may be a protective or risk factor for sleep or mental health concerns. Therefore, we aimed to investigate whether insomnia severity, diary- and wearable-derived sleep, and mental health symptoms differ in college student athletes versus non-athletes.

Methods: Participants were 144 college student athletes and 195 college student non-athletes recruited from two universities in the Pac-12 athletic conference (total N=339). Participants completed a baseline survey, 14-days of daily diaries, and wore a wearable device (Fitbit Sense) for 28 days. Statistical analysis was conducted using t-tests and linear regression models adjusted for age and gender.

Results: ISI scores were significantly lower/better (d=.34, p=.002) in college student athletes (M=6.4[4.6]) compared to non-athletes (M=8.0[4.9]). Diary- and wearable-derived sleep midpoint was significantly earlier in college student athletes (diary: M=3:31[0:55], wearable: M=3:48[1:01]) compared to non-athletes (diary: M=4:37[1:18], d=.92, p<.001, wearable: M=4:45[1:16], d=.80, p<.001). Diary- and wearable-derived SOL, WASO, TWAK, TIB, TST, SE, sleep quality, and sleep medication use did not significantly differ between athletes and non-athletes. All mental health variables were significantly better in college student athletes (PSS-4: M=4.1[2.3]; GAD-2: M=.7[.8]; PHQ-2: M=.4[.7]; PROMIS-Fatigue SF: M=7.8[2.1]) compared to non-athletes (PSS-4: M=5.3[2.6], d=.49, p<.001; GAD-2: M=1.5[1.2], d=.70, p<.001; PHQ-2: M=1.0[1.2], d=.62, p<.001; PROMIS-Fatigue SF: M=8.9[3.0], d=.41, p<.001). Caffeine and alcohol use were significantly lower in college student athletes (caffeine: M=.7[.9]; alcohol: M=.1[.3]) versus non-athletes (caffeine: M=.9[.9], d=.27, p=.028; alcohol: M=.3[.6], d=.34, p=.001). Athlete status remained a significant predictor of all outcomes described above (p's<.05), after adjusting for age and gender.

Conclusion: Participation in collegiate athletics may be protective against developing insomnia and mental health symptoms, potentially attributable to earlier sleep schedules, increased physical activity, and/or additional support, social resources, and monitoring provided to college athletes. Future directions include investigating daily relationships between sleep timing and mental health symptoms in athletes and non-athletes.

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0473

ASSOCIATIONS BETWEEN SLEEP HEALTH AND OBJECTIVELY MEASURED SOUND, TEMPERATURE AND LIGHT IN THE HOME

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Introduction: Sleep health plays a vital role in overall health and understanding the various factors that impair sleep would inform development of effective interventions to improve sleep health. Our objective was to identify environmental factors in the home associated with poor sleep health.

Methods: In the CARDIA Sleep Ancillary Study, we collected 7 days of wrist actigraphy and measured monitoring light,

temperature and sound levels in the participants' bedrooms using small devices placed near the bedside. Sleep health measures included total sleep time (TST), sleep percentage (TST/sleep period), sleep fragmentation and wake after sleep onset (WASO). We examined the night-to-night associations between environmental and sleep health measures within individuals using linear mixed models. Results are interpreted as the estimated difference in the outcome associated with a 1SD increase in the exposure.
Results: Our sample included 356 adults (51% Black, 49% White; 65% Women) aged 52-66 years. A greater amount of time above 10 lux within individuals was associated with longer TST (beta=10.5 minutes, p<.01), lower sleep percentage (beta=-0.6%, p<.01), greater sleep fragmentation (beta=1.3%, p<.01), and greater WASO (beta=4.7 minutes, p<.01). Similar associations were observed for time above 0 lux. Greater variability in temperature across the night was associated with longer TST (beta=18.7 minutes, p<.01), lower sleep percentage (beta=-0.7%, p<.01), greater sleep fragmentation (beta=0.8%, p<.01), and greater WASO (beta=5.8 minutes, p<.01). A larger mean sound level during the night was associated with lower sleep percentage (beta= -1.0%, p<.01), greater sleep fragmentation (beta=1.1%, p<.01), and greater WASO (beta=6.6 minutes, p<.01). Mean lux, proportion of time above 60 decibels, and proportion of time within optimal temperature range (18.3-21.1 degrees C) were not associated with any of the sleep health measures.
Conclusion: Compared to an individual's typical levels, longer duration of light exposure, more variable temperatures and higher sound levels during the sleep period were associated with poorer objectively measured sleep quality (percentage, fragmentation, WASO). They were also associated with longer TST, perhaps reflecting sleep extending into daytime hours due to later timing, greater fragmentation or WASO. Mitigating these environmental factors could improve sleep health.
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0474

INSOMNIA SYMPTOMS AND COGNITIVE FRAILTY IN OLDER INDIANS: FINDINGS FROM A NATIONALLY REPRESENTATIVE SURVEY

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Introduction: Cognitive frailty, the co-existence of physical frailty and cognitive impairment, is a significant predictor of adverse outcomes, including disability and death, in older adults. Existing studies on the relationship between insomnia and cognitive frailty have predominantly been conducted in high-income settings, with limited investigations in low- and middle-income countries (LMICs), where healthcare contexts and social determinants differ substantially. This study investigated the association between insomnia symptoms and cognitive frailty in older Indians using a nationally representative sample and examined sex-specific variations.
Methods: This study utilized data from the Longitudinal Aging Study in India (LASI, 2017–18) and included a sample of 26,175 community-dwelling older adults aged ≥ 60 years. Insomnia symptoms included sleep onset insomnia, sleep maintenance insomnia, early morning awakening and daytime sleepiness. Frailty was assessed using Fried's phenotype and cognitive impairment was assessed based on multiple domains of cognition such as memory, orientation, arithmetic function, executive function, and object naming. Multivariable logistic regression models adjusted for sociodemographic, health, and behavioral covariates were employed to examine the association between insomnia symptoms and cognitive frailty. Stratified analyses were used to explore sex differences.
Results: The prevalence of cognitive frailty was 5.8% among older adults. Individuals reporting insomnia symptoms had significantly higher odds of cognitive frailty (adjusted odds ratio [aOR], 1.53; 95% confidence interval [CI]: 1.20–1.97) than those without insomnia symptoms. Sleep-onset insomnia was significantly associated with cognitive frailty in older men (aOR: 1.67, 95% CI: 1.01–2.76). Among women, all four insomnia symptoms—sleep onset insomnia (aOR: 1.50, 95% CI: 1.12–2.00), sleep maintenance insomnia (aOR: 1.60, 95% CI: 1.25–2.05), early morning awakening (aOR: 1.50, 95% CI: 1.15–1.95), and daytime sleepiness (aOR: 1.34, 95% CI: 1.07–1.68)–were independently associated with cognitive frailty.
Conclusion: Insomnia symptoms are strongly associated with cognitive frailty in older Indian populations, especially among women. Addressing insomnia through cost-effective interventions and lifestyle modifications may potentially mitigate cognitive frailty. Gender-based public health strategies that prioritize sleep health awareness and integrate sleep care into geriatric frameworks are essential to support healthy aging in LMICs.
Support (if any):

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0475

THE ASSOCIATION BETWEEN REST-ACTIVITY CIRCADIAN RHYTHM AND SHIFT WORK PROFILES AMONG HONG KONG NURSES: AN ACTIGRAPHY-MONITORED STUDY

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Introduction: Shift work, particularly night shift, has been linked to poor sleep, which could increase the risks of various chronic diseases and mental health issues through potential disruptions in the rest-activity circadian rhythm (RAR) caused by the changing shift schedules. While recent studies have shown that day and afternoon shift nurses had better RAR than night shift nurses, the extent to which night shifts affect nurses' RAR is underexplored. Therefore, our study aimed to investigate the association between different shift work schedules and RAR parameters among Hong Kong nurses using actigraphy accelerometers.
Methods: This was a 7-day device-monitored study that recruited 201 nurses and 100 daytime office workers. Actigraphy accelerometers were applied to collect RAR, sleep and activity metrics over a consecutive 168 hours. Of the 301 participants, 277 participants had at least 96 hours of valid data. A self-reported questionnaire including sociodemographic characteristics, lifelong occupational history, and lifestyle information was completed by the participants. Multivariate logistic regression models were used to calculate the odds ratios (ORs) and 95% confidence intervals (CIs) for the relationships between RAR parameters and different shift work profiles.
Results: Nurses in our study tended to be younger, had higher monthly earnings, and possessed shorter work durations compared to the daytime counterparts. Furthermore, a higher prevalence of poor mental health and sleep disturbances was observed

among the nurses than daytime workers. There were 182 nurses, and 95 daytime workers had valid actigraphy data. Involving in night shift schedule (aOR=3.12, 95%CI: 1.78-5.49) and working frequent night shifts (≥ 2 nights) in the past 7 days (aOR=10.94, 95%CI: 3.67-32.64, ptrend =0.011) were significantly associated with reduced amplitude, indicating dampened RAR among nurses. Additionally, male sex and low levels of physical activity modified the association between work schedules and reduced RAR amplitude.

Conclusion: In conclusion, reduced RAR amplitude was significantly associated with shift work schedules and frequent night shift work, and the effect was particularly high among male shift workers. While frequent night shift work is not recommended for male shift nurses, high levels of physical activity might help shift nurses better adapt to night shift work.

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0476

INNOVATIVE APPROACHES TO UNDERSTANDING BASIC NEEDS AND INSOMNIA SEVERITY: EXPLORING HEALTH AND SOCIOECONOMIC FACTORS IN A LATINO POPULATION IN FLORIDA

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Introduction: Research suggests that individuals' basic needs, including housing stability, and financial security significantly influence sleep quality. This study aims to investigate how these basic needs relate to insomnia severity among a diverse Latino/a and Hispanic population residing in Florida providing valuable insights in an under-studied population.

Methods: Data are drawn from the Determinants, Outcomes, Responses, and Mechanisms of Insufficient sleep in Rural-urban settings (DORMIR) study which investigated environmental factors influencing sleep and their association with cardiovascular health in a diverse Latino/a population in Florida. Among 603 participants, housing stability (steady place to live, insecure housing, do not have a steady place to live), financial ability to meet basic needs (very hard, somewhat hard, not hard at all), and worries over food security (often true, sometimes true, never true) were assessed using the Social Needs Screening Tool (AHC HRSN). Additionally, respondents answered the Insomnia Severity Index (ISI). The Insomnia Severity Index (ISI) was regressed on each of the basic needs in 3 separate models in linear regressions, each adjusting for age, sex, race/ethnicity, Hispanic origin, marital status, employment, income, Body Mass Index, and whether the participant answered the Spanish or English version of the questionnaire.

Results: Respondents who are financially secure, when compared to those with who reported "very hard" and "somewhat hard" to meet financial obligations, had 2.40 and 1.66 higher ISI scores, respectively (β [95% Confidence Interval] (95% CI) = 2.40 [0.73, 4.08], p=0.005; 1.66 [0.60, 2.72], p=0.002). For housing security, compared to those who have a steady place to live, those who were worried about losing their housing had 3.08 higher ISI scores (β [95% CI] = 3.08 [1.81, 4.35], p< 0.001). For food security, those who were worried "often" or "sometimes" about their food security when compared to food secure respondents, had 2.80 and 1.97 higher ISI scores (β [95% CI] = 2.80 [0.81, 4.79], p=0.006; 1.97 [0.81, 3.13], p=0.001).

Conclusion: Insomnia severity was associated with financial security, housing security, and food security. Basic needs security—specifically housing, food, and finances—may be critical factors to mitigate insomnia severity within the Latino/a population.

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0477

WAKING UP TO THE ROLE OF OCCUPATIONAL PRESTIGE: DOES YOUR JOB TITLE AFFECT YOUR SLEEP?

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Introduction: Socioeconomic status (SES) is a robust risk factor for insomnia and is commonly measured with income and/or education; however, these factors may better capture access to resources instead of social status (i.e., the "status" part of SES). One way to better capture social status may be through occupational prestige, which reflects societal respect and status that comes with occupational title. We hypothesized occupational prestige would be significantly associated with sleep outcomes, specifically for insomnia severity and sleep reactivity (i.e., vulnerability to sleep disturbances).

Methods: Participants (n = 524) completed a survey assessing occupational prestige (categorized by job title), income, and education. Jobs were classified into high, medium, or low prestige using a validated ranking system. Only participants who were active in the workforce and had insomnia were included. The survey also included measures for insomnia severity (ISI), and sleep reactivity (FIRST). Data were analyzed using two ANOVAs with job prestige as the independent variable, and ISI and FIRST as the dependent variables.

Results: Results revealed that sleep reactivity differed by occupational prestige, $F(2,521) = 4.7$, $p < .01$. Higher-prestige occupations showed lower sleep reactivity ($M = 22.6 \pm 6.3$) compared to low ($M = 24.9 \pm 6.0$) and middle-prestige ($M = 25.1 \pm 5.9$) occupations. Insomnia severity, however, did not differ by occupational prestige.

Conclusion: These findings suggest that while job prestige may not be associated with the severity of insomnia, it is associated with sleep reactivity. One potential explanation may be that higher-prestige occupations serve as a protective factor against stress, reducing sleep reactivity and leading to better sleep outcomes. This may be because individuals in higher prestige

occupations are more likely to have greater self-esteem due to higher social status, or because higher prestige jobs often confer greater agency (e.g., these are often decision makers), there may also be greater internal locus of control. Additionally, lower prestige roles may involve unique stressors that exacerbate sleep disturbances. Future research should examine workplace stress and its impact on sleep across occupations to better understand SES influences and inform interventions and policies.

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0478

SLEEP AND FLOURISHING: A NATIONAL SLEEP FOUNDATION POPULATION STUDY OF THE BENEFITS OF GETTING HEALTHY SLEEP

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Introduction: Decades of research and public education have focused on the negative consequences of poor sleep health, which spans mood deficits, cognitive challenges, a host of physical complications, and social difficulties. Less is known about the potential positive effects of healthy sleep, which could include wellness, productivity, goal achievement, and social functioning—all of which can be cumulatively referred to as "flourishing." This study aimed to document the public's experiences with the myriad benefits of getting healthy sleep.

Methods: Data were drawn from an online, national survey utilizing a probability-based, random sample of 1,372 U.S. adults, oversampled for both Black and Hispanic individuals. The survey was administered in English or Spanish, and included demographic information and questions probing about the potential personal, occupational, home, goal achievement, and social benefits of good sleep. Measures of central tendency were used to characterize responses, and $\chi 2$ were used to examine group differences in the benefits of good sleep health.

Results: The overwhelming majority of adults in the US reported positive impacts of getting healthy sleep on their happiness (87%), work productivity (90%), home productivity (87%), goal achievement (86%), and social life (80%). The positive impact of getting healthy sleep was robust, observed across all groups; however, interesting group differences were observed with older adults and males generally reporting lower rates of positive benefits of getting healthy sleep compared to younger adults and females. Interestingly, no group differences emerged regarding the positive impact of getting healthy sleep on work productivity, while women and people working full-time were more likely to report positive impacts of healthy sleep on home productivity. People with a Bachelor's degree or more and those working full-time reported higher rates of getting healthy sleep positively impacting their goal achievement. Finally, women were more likely to report a positive impact of healthy sleep on their social life.

Conclusion: Getting healthy sleep has a meaningful, positive impact on people's happiness, work and home productivity, goal achievement, and social life. While the sleep field has traditionally focused on reducing deficits, sleep appears to serve as a crucial tool to help people flourish.

Support (if any):

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0479

LIFE SATISFACTION IN RELATION TO SLEEP HEALTH AMONG A NATIONALLY REPRESENTATIVE SAMPLE OF US ADULTS

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Introduction: Although satisfaction with life can influence sleep health and vice versa, few studies have investigated this relationship, especially in a nationally-representative sample of US adults. Even fewer studies have investigated potential disparities in this relationship despite evidence of sociodemographic groups having differential exposure to structural and social determinants of life satisfaction such as socioeconomic position and health status.

Methods: Therefore, we assessed associations between satisfaction with life and sleep health using cross-sectional data from the 2022 National Health Interview Survey. Life satisfaction was dichotomized as 'very satisfied/satisfied' vs. 'dissatisfied/very dissatisfied.' Sleep duration was defined as 'recommended' vs. 'short' (≥7 vs.< 7 hours), insomnia symptoms as difficulty falling or staying asleep: 'yes' [most days/every day to either] vs. 'no' [never/some days for both]), and non-restorative sleep as feeling well rested in the past 30 days: 'yes' [never/some days] vs. 'no' [most days/every day]. Adjusting for sociodemographic, behavioral, and clinical characteristics, we used survey-weighted Poisson regression with robust variance to estimate prevalence ratios (PRs) and 95% confidence intervals (CIs) for each sleep dimension. We tested interactions by sex/gender along with race and ethnicity.

Results: Among 25,090 adults, mean age ± SE was 48.1±0.2 years and 54% were women. Life satisfaction was reported by 93% of Non-Hispanic (NH)-American Indian/Alaska Native adults 94% NH-Multiracial/other, 95% NH-Black, 95% NH-White, 97% Latine, and 98% NH-Asian adults. Overall, satisfaction vs. dissatisfaction with life was associated with higher prevalence of recommended sleep duration (PR:1.14 [95% CI:1.07-1.21]). Satisfaction with life was more strongly associated with higher prevalence of restorative sleep among men vs. women (PRmen:1.26 [95% CI:1.21– 1.32] vs. PRwomen:1.17 [95% CI:1.12– 1.22]; p-interaction< 0.05). Satisfaction vs. dissatisfaction with life was most strongly associated with a 39% lower prevalence of insomnia symptoms among Latine adults (PRLatine:0.61 [95% CI:0.47-0.78] followed by a 34% lower prevalence among NH-Black adults (PRNH-Black:0.66 [95% CI:0.50-0.87] compared to a 14% lower prevalence of insomnia symptoms among NH-White adults (PRNH-White:0.86 [95% CI:0.78-0.95]; p-interaction< 0.05).

Conclusion: Satisfaction with life was associated with better sleep health. Specifically, life satisfaction was more strongly associated with restorative sleep among men and less insomnia symptoms among Latine and NH-Black adults.

Support (if any):

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0480

THE EFFECT OF THE 2024 US PRESIDENTIAL ELECTION ON SLEEP, PSYCHIATRIC HEALTH, AND HEALTH BEHAVIORS

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Introduction: Growing evidence suggests that major socio-political events can have dramatic impacts on "public mood" and emotional well-being. Our 2020 election study found that the effects can extend to other health behaviors, such as sleep and alcohol use. Here, we aimed to replicate these findings during the 2024 US Election and expand our understanding by assessing the impact on additional health outcomes, such as cannabis and nicotine use, dietary habits, exercise, optimism, hopefulness, worry, and anxiety.
Methods: A non-representative, primarily liberal-leaning (71.9%) convenience sample of US- (n=297) and non-US-residing (n=54) participants were recruited. Participants responded to daily online surveys assessing their affect, sleep, alcohol consumption, and other health measures during a baseline period (October 7-19, 2024) and in the days surrounding the 2024 election (October 27-November 9, 2024).
Results: Preliminary analyses have been conducted on measures of sleep, mood, depression, and alcohol consumption, with plans to report all listed measures at the time of presentation. We again found a statistically significant reduction in sleep on Election Night followed by recovery sleep post-election. Stress again peaked on Election Day but took twice as long (4 days) to return to baseline compared to 2020. Alcohol use, negative affect, and depression all significantly increased with a substantially greater increase in depression after this election compared to 2020. Positive affect significantly decreased and did not recover for the remainder of the assessment period, unlike 2020. Exploratory analyses indicated that more liberal-leaning participants were the most affected, with poorer outcomes during the election period in measures of sleep, stress, depression, and negative and positive affect.
Conclusion: We have replicated the negative sleep and psychiatric health outcomes brought on by stressful socio-political events. While measures followed the same general trajectory, we saw a protracted return to baseline in several measures compared to 2020. Exploratory analyses also suggest that more severe negative impacts correlated with being more liberal-leaning. We plan to build upon these findings and report the impact on additional measures of psychiatric health and health behaviors.
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0481

REPRESENTATIVE SUBSAMPLING AND CLINICAL IMPACT IN THE NATIONAL SLEEP RESEARCH RESOURCE

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Introduction: Representation biases occur when research cohorts do not reflect the distribution of subgroups in a target population. These biases can contribute to several types of harms, so recent research has worked to assess and address representation biases in datasets, including within sleep medicine. Aggregating data from multiple studies can help overcome the representation biases of individual studies, and this is one rationale behind the National Sleep Research Resource (NSRR). In this study, we systematically assess representativeness within NSRR compared to a U.S. Census target and evaluate the impact of representative subsampling on cohort representativeness and clinical covariates.
Methods: We evaluated three large NSRR studies: the Multi-Ethnic Study of Atherosclerosis (MESA), Sleep Heart Health Study (SHHS), and Wisconsin Sleep Cohort (WSC). We extracted harmonized demographic data from the first NSRR timepoint and assessed representativeness via Kullback-Leibler divergence (KLD), a measure of distribution similarity, to a comparable subset of Census population estimates. We then subsampled records for representation using a variation of our previously described methodology,12 both from each dataset individually and together. Because of stochasticity in record selection, experiments were repeated 40 times and mean values with 95% confidence intervals were reported.
Results: Total cohort KLDs for MESA, SHHS, WSC, and the combination of all datasets were, respectively, 1.17, 0.36, 0.62, and 0.33 (lower being more representative). Subsampling records yielded significantly more representative cohorts, with respective mean minimum KLDs [95% CI] of 0.61 [±0.001], 0.16 [±0.001], 0.29 [±0.001], and 0.09 [±0.002] achieved at sample sizes of 348, 140, 131, and 251 (i.e., most representative subsets). Representative subsampling did not shift mean cohort body mass index, apnea-hypopnea index with 3% desaturation criteria, total sleep time, and wake after sleep onset index in a clinically substantial manner.
Conclusion: We demonstrate that representative cohorts may be subsampled from NSRR and how combining datasets may improve representation, as postulated. While representative subsamples differ substantially in their demographics, they do not substantially differ in mean clinical covariates from their respective total cohorts, supporting the feasibility of dataset aggregation in future studies.
Support (if any): VAB was funded by F30HL168976. NSRR funding information is available at https://sleepdata.org.

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0482

COMBINING SLEEP EDUCATION WITH FINANCIAL INCENTIVES FOR SLEEP: A RANDOMIZED CONTROLLED TRIAL

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Introduction: Insufficient sleep is prevalent among college students and is linked to poorer health, lower academic performance, and reduced well-being. Educating students on the importance of sleep typically has minimal impact on nighttime behaviors. One potential solution is to complement sleep education with financial incentives to encourage greater prioritization of good sleep habits (e.g., earlier bedtimes). Using a randomized

controlled design, we investigated whether a combined education+incentive intervention initially improves sleep patterns and whether effects persist following removal of incentives.
Methods: Following a one-week baseline, 110 college students (mean age = 18.34 years, 71.9% female, 45.6% non-Caucasian, 76.3% freshman) completed a sleep education program and were randomized into two groups. The Intervention group received financial incentives for achieving 8+ hours of sleep per night. The Comparison group earned compensation based on performance on a sleep-related quiz. Sleep was measured objectively with actigraphy and subjectively through diaries and questionnaires. One month later, participants completed follow-up actigraphy and questionnaires (no incentives provided during this phase). Randomization was automated, instructions were delivered via pre-recorded videos, and analysts were blinded to group assignments. Materials and hypotheses were registered to https://osf.io/a2yck.
Results: There was a significant group-by-time interaction, F(1, 105)=9.11, p< 0.01, such that the Intervention group showed an increase of 23 minutes/night from baseline (M=411.31 minutes, SD=41.01) to post-intervention (M=434.34, SD=51.57) whereas the Comparison group showed a decrease of 2 minutes/night (baseline: M=412.60, SD=58.49; post-intervention: M=410.29, SD=49.63). Sleep efficiency did not change across groups or phases (ps>.10). There was a delay in both rise times and bedtimes across phases (ps<.05), but the financial incentive Intervention led to relatively earlier bedtimes during the post-intervention phase (F(1,106)=7.89, p< 0.01). At the one-month follow-up, sleep duration returned to baseline levels (ps>.10).
Conclusion: Financial incentives temporarily improve sleep duration by encouraging earlier bedtimes; however, the benefits are lost one month later when the incentive had been discontinued.
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0483

HEALTHY SLEEP DURATIONS APPEAR TO VARY ACROSS CULTURES

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Introduction: Sleep duration is a reliable predictor of health outcomes. However, average sleep duration varies significantly across countries, with Japan and other East Asian countries reporting the shortest average sleep durations, and some Western European countries the longest. These disparities exceed 90 minutes, raising the question of whether countries with shorter sleep durations may be suffering from worse health. These striking differences highlight the need for cross-cultural research to better understand the relationships between culture, sleep duration, and health.
Methods: We conducted a pre-registered cross-national survey of approximately 5000 participants across 20 countries regarding sleep duration and current health using Qualtrics sampling panels. We used multilevel modeling to explore the relationships between self-reported sleep duration and health both within and between countries.
Results: France had the longest average sleep duration at 7 hours 52 minutes, whereas Japan had the shortest average sleep duration at 6 hours and 18 minutes for a range of 94 minutes. Within countries, participants with longer sleep duration had better health on a health composite variable that included mental health, subjective health, and chronic conditions (b = 0.09, 95%CI = [0.07-0.10], p = < 0.001). In contrast, national sleep duration did not predict health (b = 0.09, 95%CI = [-0.10, 0.27], p = 0.349). ANOVA revealed a significant difference between sleep durations that are associated with optimal scores on the health composite variable F(19, 4913) = 44.97, p <.001, partial η2 =.15, 90%CI [.13,.16]. Participants who slept closer to their cultural ideal sleep duration had higher health composite scores (b = -0.06, 95%CI = [-0.08, -0.10], p = < 0.001).
Conclusion: The optimal amount of sleep, as it relates to health, appears to vary across countries suggesting that sleep needs are flexible within limits and shaped by cultural norms.
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0484

EXPLORING THE ADVERSE IMPACT OF MATERNAL STRESS ON SLEEP QUALITY IN PERINATAL WOMEN OF COLOR

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Introduction: Perinatal women experience numerous physiological and behavioral challenges, including heightened stress and sleep difficulties. These issues are more prominent among minority women of color. Studies have highlighted the adverse impact of maternal stress on sleep quality. Yet, research exploring this relationship among underrepresented groups remains limited. This study uses a virtual reality (VR) program to investigate the relationship between stress and sleep among a marginalized perinatal woman, addressing a critical research gap.
Methods: A pre-and post-design study, Nurturing Moms, assessed the effectiveness of a maternal health VR program on stress among expectant (0-36 weeks gestation) and postpartum (up to 12 months) Black and Latina and/or Hispanic women. Forty-six women completed baseline surveys (expectant: 29.3±4.8 years; postpartum: 31.6±5.1 years) via REDCap. Surveys included the Perceived Stress Scale (PSS) and Patient Reported Outcomes Measurement Information Systems (PROMIS) Short Form v1.0 – Sleep Disturbance 4a, measuring stress and sleep quality, respectively. Spearman Correlation and Linear Regression with Bootstrap (adjusting for race, age, and income level) examined the relationship between stress and

sleep. The stratified analysis explored variations across racial subgroups.
Results: A statistically significant correlation was observed between PSS scores and PROMIS scores (rs =.379, p =.009), indicating that higher maternal stress level was associated with greater sleep difficulties. While the overall regression model was not significant, F (4, 41) = 1.41, p > 0.05, maternal stress was identified as a significant predictor of sleep disturbance (β =.396, p =.026). The stratified analysis revealed a stronger correlation (rs =.398, p =.044) between higher stress levels and sleep disturbances among Latina and/or of Hispanic origin compared to perinatal women of color.
Conclusion: The analyses emphasize a significant correlation between maternal stress and sleep disturbance, with a stronger association observed among Latina and/or Hispanic women. Although the overall regression model was non-significant, likely due to limited sample size and reduced statistical power, maternal stress remained a key predictor. Future research should explore socio-cultural factors and additional moderators, on a larger and more diverse scale.
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0485
PATTERNS OF NIGHTTIME CAREGIVING AND PARENT-INFANT SLEEP OUTCOMES: A LATENT CLASS ANALYSIS

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Introduction: Parental-infant sleep and sleep problems are a significant source of stress for parents. Although greater paternal involvement in childcare is broadly associated with improved maternal and infant sleep outcomes, there is limited understanding of how different patterns of nighttime caregiving are distributed across families and their unique implications for parent-infant sleep. Identifying distinct caregiving arrangements and their relationships with sleep outcomes could provide critical insights into optimizing nighttime care practices for families.
Methods: We recruited 138 parent dyads who had an infant between 6 to 18 months of age to complete an online questionnaire about parental division of nighttime care, parental sleep, infant sleep, parental mental health, and relationship satisfaction.
Results: These nighttime caregiving patterns were identified as: Mother Exclusive, Mother Dominant, Mother More than Partner, Equal Contribution, and Partner More than Mother. Significant differences in parental sleep duration and quality and number of infant night wakes were observed across groups (p < 0.001). Patterns involving greater paternal involvement, such as Equal Contribution and Father Major, were associated with reduced parental fatigue and improved parental sleep quality.
Conclusion: A greater proportion of nighttime infant care is provided by mothers compared with partners. The findings suggest that greater paternal involvement is associated with better parental sleep quality. Longitudinal and experimental studies are needed to further investigate causal relationships between nighttime caregiving patterns and family sleep outcomes. Additionally, exploring barriers to greater paternal involvement and strategies to encourage equitable caregiving could inform interventions aimed at optimizing family functioning and well-being.
Support (if any): University of Victoria Internal Research Grant

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0486
OBSERVED CHANGES IN SLEEP DURATION ACROSS THE MENSTRUAL CYCLE FROM WEARABLE DATA

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Introduction: Prior studies on changes in sleep duration over the course of the menstrual cycle in women of child-bearing age has shown mixed evidence on any systematic variation in duration or sleep stage. However such studies have either relied on a limited number of observed nights in a sleep laboratory or self-reported sleep values. Consumer wearable devices offer the capability of tracking sleep longitudinally in a large cohort of users, and revealing patterns of interest.
Methods: Users of commercially available wearable devices (Fitbit devices) are enabled to record the timing of their menstrual cycles (e.g. date of period or onset), and can consent to allow such data to be analyzed at an aggregate level for research. This analysis reviewed wearable recorded sleep parameters from 5409 users (not using hormonal birth control) who recorded at least 51 periods and 1200 nights of recorded sleep stage over a 58 month time segment. By using the date of period onset as an anchor timing (Day 0), we considered changes in estimated sleep duration, and the distribution of sleep stages across the menstrual cycle.
Results: The population had an average age of 36± 7 yrs at study start, and BMI of 27.5±6 kg/m2. There was a small but significant change in population sleep patterns over the course of the menstrual cycle. Sleep duration was at its lowest in the pre-menses phase (nadir at Day -2), then climbed steadily during the menses and follicular phase (peak at Day 3), before dipping again around ovulation, followed by an increase in mid-luteal phase. However, the overall range of variation was small with a deviation of approximately 7 mins from nadir to peak. The population level trends were somewhat blunted in women using hormonal birth control versus those not using such birth control, consistent with a hypothesis that the changes in estrogen and progesterone have a small effect on sleep parameters over the course of the menstrual cycle.
Conclusion: Consistent with self-report sleep duration and smaller scale laboratory studies, we demonstrated that sleep duration varies over the course of the menstrual cycle.
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0487
SEX-SPECIFIC DIFFERENCES IN PAIN FOLLOWING 1-YEAR OF SHIFTWORK

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Introduction: Shiftwork is associated with an increased risk for adverse health outcomes, including higher incidence and exacerbation of pre-existing pain compared to non-shiftworkers. Evidence suggests that men and women have different pain sensitivity responses; however, it is unknown if there are sex-specific effects of shiftwork on pain. Therefore, we examined how pain was affected by shiftwork in a sex-specific fashion.
Methods: General pain levels were assessed on a 10-point scale (0=no pain, 10=worst imaginable pain) during a baseline daytime work schedule among 89 participants (66 males) and reassessed following 1-year of working as a new transit bus operator. Based on self-reported work schedules, participants were classified into work groups as either having mostly worked a day schedule or a shiftwork schedule (>33% of hours outside 0800-1700) across the year. Baseline differences between sexes were assessed using independent t-tests. Mixed effects models were used to assess the within-sex effects of time (baseline vs. 1-year) and work group (day vs. shift) on pain. The relationship between percent days working shiftwork at 1-year and pain was assessed using Pearson correlation analyses.
Results: There was no significant difference in age between males and females (mean±SD; 44±14.2yrs vs. 42±12.1yrs, respectively, p=0.53). Overall, pain levels decreased by 40% across the year (1.37±1.7 vs. 0.82±2.2, p< 0.01). Among males, there was an interaction between time and work group (p=0.02) such that pain was significantly reduced in the day group at 1-year (3.38±1.71 vs. 2.00±2.12; p<.01), yet did not significantly change in the shiftwork group (2.37±1.14 vs. 2.11±1.53; p=0.70). There was no effect observed among females (p=0.81), but there was a non-significant trend for percent shiftwork being positively correlated with pain among males (r=0.23; p=0.07).
Conclusion: Night shiftwork may be one contributing factor for maintaining pain levels, particularly amongst males. While global pain questionnaires provide modest insight into changes in pain over time, further work is needed to identify how different pain conditions respond to shiftwork. Additionally, more work is needed to consider sex-specific pain modulation that may be masking shiftwork's effect on pain in females.
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0488

SOCIAL DETERMINANTS AND GENDER DIFFERENCES IN SLEEP HEALTH DISPARITIES: PRELIMINARY FINDINGS FROM A DESCRIPTIVE ANALYSIS IN HONG KONG 2024

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Introduction: Sleep health is influenced by social and structural factors such as income, housing, commuting, and noise. This study examines sleep duration, sleep latency, and sleep adequacy and associated factors in Hong Kong, the city with high income inequality and the lowest per capita living space in the world.
Methods: An anonymous, cross-sectional telephone survey was conducted on adults in Hong Kong, 2024 (n=500). Descriptive statistics (mean, standard deviation, and frequencies) summarized sleep data: (1) sleep duration, (2) time to fall asleep (sleep latency), and (3) sleep adequacy. Associated sociodemographic (e.g. sex, income), behavioural (e.g. exercise habits, commuting time) and environmental factors (e.g. housing type, ambient noise, residential area) were also examined to identify patterns in sleep disparities using multivariable regression analyses.
Results: Preliminary findings show that sociodemographic factors are significantly associated with sleep. In particular, females and people with lower income reported shorter sleep duration (mean < 6.1 hrs), longer time to fall asleep (mean > 36 minutes), and lower sleep adequacy (mean < 7.6 hrs) than higher income groups and males (p< 0.05). Noise disturbances were more also common in lower-income groups, worsening sleep outcomes. Behavioural and environmental factors also contribute significantly to poor sleep quality (p< 0.05).
Conclusion: Targeted interventions are required to address sleep inequalities in those sociodemographic groups with poor sleep such as women and lower income individuals. Since personal and environmental factors contribute to sleep health disparities in Hong Kong, there is a need for sleep interventions that go beyond the personal level. As sleep is a vital component of good health, sleep health should be included in public policy discussions in high population density, urban environments.
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0489

HIGH BMI ASSOCIATED WITH POORER OVERNIGHT DECLARATIVE MEMORY IN OLDER MEN WITH OSA

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Introduction: Sleep-dependent declarative memory is negatively affected by obstructive sleep apnea (OSA) in middle-aged adults. Older age is associated with deficits in learning and cognition. Three age-related comorbidities that may contribute to this relationship are OSA, Alzheimer's, and weight gain. We hypothesize that, as in middle-aged adults, poorer health would be associated with worse declarative memory in older adults.
Methods: Seventy-nine adults (65-83 years; mean age=70; 44% female) were enrolled as part of a larger study. Participants completed polysomnography to assess OSA status, defined as >5 apnea-hypopnea events/hour (3% AASM Recommended Criteria). Participants with APOE4+ status, identified via saliva-based genetic screening, were classified as high risk for Alzheimer's. Overnight declarative memory was assessed using the San Diego Word Pairs Associates (WPA), where participants learned 40 semantically related word pairs prior to sleep and tested after sleep. Linear regression modeled the effects of OSA status, Alzheimer's risk, and overweight status (BMI>25) on WPA performance with post-hoc t-tests. Spindle oscillations (slow: 9-12Hz, fast: 12-15Hz) were measured from central EEG electrodes during NREM sleep.
Results: There was a significant fixed effect of overweight status on WPA performance (f(1,75)=4.4, p=0.04) but not for OSA (f(1,75)=0.6, p=0.93) or Alzheimer's risk (f(1,75)=127, p=0.18). Post-hoc analysis suggested that overweight participants recalled fewer word pairs than their normal/underweight counterparts (102.3% vs 107.1% recalled, t(70)=-2.6, p=0.01), and this effect was seen only among men, t(34)=5.3, p<.001). Overweight participants also had a lower density of fast sleep spindle density (1.5 vs 1.9 spindles per minute, t(45)=-2.1, p=0.04) but no difference in slow sleep spindle density (1.5 vs 1.4 spindles/minute, t(58)=0.8, p=0.4).

Conclusion: Overweight older men exhibited poorer overnight declarative memory alongside reduced density of fast sleep spindles, which are critical for memory consolidation. OSA was not associated with memory deficits, likely due to the limited number of participants without OSA (72 vs. 7). This imbalance may have masked the effect of OSA on cognition or suggests that alternative mechanisms underlie OSA in older adults, particularly among men. Moreover, men may face greater metabolic impacts of excess weight, potentially impairing memory-related neural processes during sleep.

Support (if any):

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0490

HEAT STRESS IN RELATION TO SLEEP HEALTH AMONG FARMERS

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Introduction: Sleep is sensitive to daytime and nighttime temperature extremes, which are being amplified by climate change. Many prior studies have not accounted for heat stress, which includes temperature, humidity, wind speed, sun angle, and solar radiation. Furthermore, weather-exposed workers such as farmers may be particularly vulnerable but are understudied.
Methods: To address these important literature gaps, we used survey data from the Agricultural Health Study of farmers in Iowa and North Carolina (NC), linked to heat stress data from the National Centers for Environmental Prediction for including daily measures from May–September of 2013–2015. Absolute heat exposure was based on the average of wet bulb globe temperatures (WBGT) 2 days prior to the interview date. Relative heat exposure was defined as the difference between absolute heat exposure and the 92.5th percentile of WBGT. Sleep measures included short sleep duration (< 7 hours vs. ≥7 hours), daytime sleepiness (≥3 days/week vs. < 3 days/week), daytime napping (yes vs. no), and long nap duration (≥30 minutes vs. < 30 minutes). Adjusted for sociodemographic characteristics, log-binomial models were used to estimate prevalence ratios and 95% confidence intervals (PR[CI]) in NC and Iowa, separately.
Results: Among 9,261 farmers, median age was 63.0 [IQR= 56.0–72.0] years and most (75.7%) were from Iowa. Overall, 37.2% reported short sleep duration, 9.2% reported daytime sleepiness, 47.2% reported daytime napping, and 27.0% reported long naps Mean absolute heat measures were 78.7 °F (IQR= 72.2–84.5) in NC and 70.8 °F (IQR 66.5-74.7) in Iowa, and relative measures were –7.7°F (IQR= -12.3, -4.2) in NC and -7.7°F (IQR= -11.8, -4.0) in Iowa. A standard deviation (SD) increase in WBGT was not associated with short sleep (PR-NC=1.00 [95% CI: 0.99–1.02]; PR-Iowa=1.01 [1.00-1.02]) nor daytime sleepiness (PR-NC=1.00 [0.99–1.01]; PR-Iowa=1.00 [0.99-1.00]). WBGT was associated with a higher prevalence of daytime napping in NC (PR=1.03 [1.01-1.04]), but not in Iowa (PR=1.00 [1.00-1.01]) and not for long naps (PR-NC=1.02 [0.97–1.02]; PR-Iowa=0.99 [0.98-1.00]). Relative heat exposure was associated with daytime napping in NC (PR=1.02 [1.00-1.03]).
Conclusion: Heat stress was associated with more daytime napping among farmers in NC.
Support (if any):

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0491

EXAMINING THE PREDICTORS OF SLEEP DISTURBANCE AND OUTCOMES IN BLACK COLLEGE STUDENTS

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Introduction: Sleep disturbance is a significant concern among Black college students linked to diminished mental and physical health and poor college adjustment. Identifying key predictors of sleep disturbance is crucial to understanding its etiology in this population. Thus, we examined both the predictors of sleep disturbance as well as the subsequent effect of sleep disturbances on their mental health.
Methods: The sample consisted of Black students attending a large predominantly White university (n = 263, 82.37% female, Mage = 20.3 years, 19.4% low SES). Sleep disturbance was assessed via the Pittsburgh Sleep Quality Index (PSQI), with 81.4% of participants reporting poor sleep based on the recommended 5-point cutoff. The first multiple linear regression model examined the predictors of sleep disturbance, which included individual and collective race-related stress, ethnic identity, online racism, self-efficacy, gender, age, and income. All predictors were centered to interpret effects relative to the mean. Additional models explored the effect of sleep disturbance on depressive and anxiety symptoms.
Results: Race-based and gender-based differences in sleep quality emerged. Overall, our model explained 23.6 percent of the variance in sleep disturbance (R2=.236, p <.01). Individual race-related stress (B=.095, p <.01) and online racism (B=.069, p <.01) were positively associated with sleep disturbance, indicating that greater exposure to these stressors predicted higher sleep disturbance. Ethnic identity (B=−.079, p <.01) was inversely associated with sleep disturbance, suggesting a buffering role. Gender differences emerged, with participants identifying as "other" reporting significantly higher sleep disturbance (B=3.80, p <.01) than males. Females also reported higher sleep disturbance, nearing significance (B= 1.21, p= 0.085). Higher family income (401% or above the federal poverty level) was associated with lower sleep disturbance (B=−1.72, p <.05). Collective race-related stress, self-efficacy, and age, were not significantly associated with sleep disturbance. Sleep disturbance was significantly associated with higher levels of depression (B=1.76, p<.01, R2=0.29) and anxiety (B=2.06, p<.01, R2=0.286).
Conclusion: Our findings emphasize the importance of addressing systemic and interpersonal stressors, such as online racism and individual race-related stress in interventions targeting sleep health as well as promoting protective factors such as ethnic identity in Black college students.
Support (if any):

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0492

SLEEP AND ACADEMIC PERFORMANCE IN UNIVERSITY STUDENTS: A CRITICAL APPRAISAL

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Introduction: Conventional wisdom is that sleep loss is harmful to students' academic performance. Yet, previous meta-analyses

investigating the association between sleep quantity/quality and academic performance indicate small-sized correlations (r=.03 to r=.15). The goal of this work was to critically evaluate the study design characteristics in the sleep-academic performance literature to inform why effect sizes may be low overall, as well as to evaluate whether causal direction can be determined by existing work.
Methods: We systematically searched three databases (PubMed, PsycInfo, and Web of Science) through September 2023. Studies were included if they were published in English, were original research published in a peer-reviewed journal, included college or university student participants, assessed sleep, and assessed academic performance/achievement. All studies were screened by two independent reviewers. Extracted variables included study author, publication year, study country, study sample size, mean age, percentage of females, study population, study design, type of sleep measurement, type of academic performance measurement, covariates used in analyses, and sleep-academic performance outcomes. Sleep variables of interest were sleep quality, sleep duration, sleepiness, bedtime, rise time, and chronotype.
Results: 282 studies reported associations between academic performance and sleep variables, with 62.1% reporting at least one significant association. Academic outcomes were often assessed by self-reported grades (65.2%, k=184) and very few studies (3.9%) used objective measurements of sleep (e.g., actigraphy). Most studies relied on cross-sectional rather than longitudinal designs (81.2%, k=229), and fewer than half of studies adjusted for potential confounding variables in analyses (38.4%, k=108). All studies focused on correlational analyses; no studies used randomized controlled experimental designs.
Conclusion: Small effect sizes for sleep-academic associations may be explained by non-optimal measurement (self-report) and minimal use of longitudinal sleep monitoring. The true relationship between sleep and academic outcomes may be larger, but rigorous experimental designs will be necessary to disentangle the causal direction(s) between sleep and academic performance.

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0493

SLEEP DISTURBANCE AND ALCOHOL USE DURING THE COVID-19 PANDEMIC: A QUALITATIVE ANALYSIS OF YOUNG ADULTS WITH COMORBID INSOMNIA AND HEAVY DRINKING

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Introduction: The COVID-19 pandemic significantly impacted both sleep patterns and alcohol consumption, yet little is known about these effects in individuals with pre-existing sleep disturbance and heavy drinking. This study examined how young adults with comorbid insomnia and heavy drinking perceived pandemic-related changes to their sleep and alcohol use patterns.
Methods: Heavy drinking men (n = 28) and women (n = 42) with insomnia were interviewed as part of a study evaluating digital cognitive behavioral therapy for insomnia. Semi-structured qualitative interviews were conducted at baseline and after program completion. Interviews were digitally recorded, professionally transcribed, and coded using a multi-stage, inductive process aided by NVIVO software.
Results: Most participants were female (60%) and white (81%) with an average age of 26 (SD 6.1). Participants described significant pandemic-related disruption to sleep timing and quality. Many reported temporal structure loss: "At the beginning of the pandemic, I had no sense of time at all. I didn't know the difference between night and day. I was sleeping during the day, staying up and partying at night." While some participants reported that flexible schedule improved their sleep ("I think it's helped... I'm able to sleep in until my meetings start,") others reported deterioration due to increased demands: "a lot of professors just think we're at home, so we can do 18,000 assignments... I think my sleep has been impacted by that." Similarly, loss of temporal structure impacted drinking patterns. Some participants, particularly students, reported increased drinking ("all of our classes are online...so our schedules are more flexible to drink if we want to,") while others noted reduced alcohol consumption due to quarantine: "during the thick of COVID, it made me drink less because nothing was open."
Conclusion: The pandemic altered sleep patterns among young adults with pre-existing sleep disturbance, particularly affecting sleep timing and circadian organization. While increased schedule flexibility benefited some, loss of temporal structure often exacerbated sleep difficulties. Effects on alcohol use were also variable. These findings highlight the need for targeted interventions addressing both sleep and substance use behaviors during periods of environmental and social change.
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0494

AGE AND GENDER-SPECIFIC ASSOCIATIONS BETWEEN SEVERE SLEEP APNEA AND ALL-CAUSE MORTALITY IN FEMALE VETERANS: INSIGHTS FROM A RETROSPECTIVE COHORT STUDY

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Introduction: Sleep apnea (SA) is a prevalent sleep disorder associated with increased health risks, including mortality. While previous studies largely focused on male populations, gender-specific associations remain underexplored. This study aimed to investigate the association between severe SA and all-cause mortality in a large cohort of female veterans, emphasizing age-specific interactions and their clinical implications.

Methods: This retrospective cohort study analyzed 19,334 female veterans referred for sleep evaluation between 1999 and 2022. A validated natural language processing (NLP) tool extracted apnea-hypopnea index (AHI) from electronic medical records, stratifying participants into severe SA (s-SA, AHI ≥30; 33%) and no SA (n-SA, AHI < 5; 67%). Participants were further stratified into age groups: Young (≤40 years), Middle-aged (40< age < 65 years), and older adults (≥65 years). Mortality risks were analyzed using Cox proportional hazards models, adjusted for age, body mass index (BMI), race/ethnicity, and

Charlson Comorbidity Index (CCI). Kaplan-Meier survival curves examined survival trends.
Results: Participants with s-SA exhibited higher BMI (34.32±6.73 vs. 30.86±6.01) and greater comorbidity burden (CCI ≥2: 16.86% vs. 8.55%) compared to the n-SA group. All-cause mortality (4.66% vs. 3.28%) and the prevalence of cardiovascular (47.54% vs. 34.54%) and metabolic conditions (56.86% vs. 35.81%) significantly exceeded in s-SA compared to n-SA. The unadjusted odds ratio for mortality in s-SA compared to n-SA was 1.44 (95% CI: 1.24–1.68), which decreased to 0.64 (95% CI: 0.54–0.76) after adjusting for covariates. The Kaplan-Meier analysis revealed that only in older adults (≥65 years) with s-SA all-cause mortality was lower than in n-SA. In the other two age groups, mortality did not differ in s-SA compared to n-SA.
Conclusion: In female veterans, severe SA was associated with increased mortality, particularly in younger and middle-aged individuals, driven by a higher burden of cardiovascular and metabolic comorbidities. However, this association diminished in older adults, suggesting potential adaptive physiological mechanisms. These findings highlight the need for age- and gender-specific approaches in the diagnosis and management of severe sleep apnea among female veterans.
Support (if any):

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0495

INVESTIGATING THE FEASIBILITY OF COLLECTING SLEEP AND READINESS DATA PRIOR TO DEPLOYMENT ON A U.S NAVY SHIP

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Introduction: Maintaining optimal readiness and adequate sleep is essential for Navy sailors, particularly when preparing for deployment. However, assessment of performance factors (e.g., sleep and fatigue, occupational and environmental stressors, mental and behavioral health concerns) is challenging in an operational environment. We conducted a pilot study leveraging wearable technology for sleep and behavioral health surveillance in a shipboard environment. Here, we describe preliminary feasibility data from that study.
Methods: Sailors (n= 244, 27.2±8 years, 14% female) aboard a U.S. Navy ship were monitored in-port for 5 weeks prior to leaving for a deployment. They were asked to complete a baseline and post-study questionnaire, brief weekly questionnaires, and to continuously wear a wearable device (Oura Ring; Gen 3) to collect daily sleep duration data. Sailors were asked to report device comfort and usability. Oura data yield was calculated as the ratio of (number of days in which sleep data were obtained across the entire sample) / (total number of possible days of sleep data, given the enrolled sample). Descriptive data are presented as proportions and mean and standard deviation.
Results: Response rates for questionnaires varied across the 5 weeks: baseline= 100%; week 2= 69%; week 3= 51%; week 4= 34%; post study= 72%. Across each study day, 73±9% of potential sleep data was collected. Across the study period, 10% of participants slept more than 7 hours per night, 82% slept 5–7 hours, and 8% slept fewer than 5 hours, on average. 77% of participants found the ring to be "somewhat" or "very" comfortable, and 88% reported the ring was "somewhat" or "very" convenient to manage.
Conclusion: The present study demonstrated that adequate amounts of questionnaire and wearable sleep data can be collected, even under the many constraints of shipboard settings (e.g., high operational tempo, varied leave and work schedules, preparations for deployment). Future analysis of this data aims to categorize associations with the sleep data collected and measures of command climate, stress, and mental health to create actionable recommendations for military personnel and leadership.
Support (if any): Department of the Navy Office of Force Resiliency and Naval Health Research Center (work unit no. 62472).

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0496

CROSS-SECTIONAL EVALUATION OF SLEEP HEALTH, BURNOUT AND PROFESSIONAL SATISFACTION IN ACADEMIC PHYSICIANS

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Introduction: Burnout has reached crisis portions in health workers in recent years. Evidence suggests many medical professionals do not get adequate sleep, which may lower well-being and contribute to burnout. We investigated the relationships between sleep health and burnout among the Department of Medicine (DOM) physician faculty at a major academic medical institution.
Methods: We provided virtual 30-minute educational sessions during regular conference or meeting times to divisions within the DOM which covered impaired sleep and its related impact in personal and professional domains. Immediately following each presentation, attendees were invited to complete the Penn Sleep Health Survey via REDCap. Survey items included metrics regarding 1) sleep disturbance: Epworth Sleepiness Scale (ESS), Insomnia Severity Index (ISI), Multivariable Apnea Prediction 2) burnout (Maslach Burnout Inventory (MBI), with subscales on emotional exhaustion (EE), depersonalization (DP) and personal accomplishment (PA); and 3) demographics. We used Pearson correlation coefficients to determine the association between the presence of any sleep disorder and MBI, and each of its subscales (EE, DP, and PA). The thresholds for moderate burnout were: 18-29 (EE); 6-11 (DP), and 34-39 (PA).
Results: Of N=280 faculty attendees, 55.8% identified as female and 70.7% identified as White with a mean (SD) age of 45.5 (11.9) years. A total N=226 (80.7%) completed the surveys. Of these, N=125 (55.3%) flagged positive for at least one sleep disturbance. Among those with sleep disturbances, 76.8% had at least moderate burnout on EE or DP compared to 48.5% of those without sleep disturbance (chi sq(1)=19.4, P< 0.0001). Correlations (all $p < 0.05$) between the subscales of the MBI and ESS, ISI, and MVAP were as follows: 1) EE: 0.21, 0.43, 0.25; 2) DP: 0.22, 0.39, 0.21; 3) PA: -0.09, -0.18, -0.11.
Conclusion: Impaired sleep and sleep disturbance was common in academic medical physician faculty at a tertiary health center and associated with increased burnout and burnout subscales, including greater emotional exhaustion and depersonalization and less personal accomplishment. Future work should incorporate sleep health education and targeted interventions to improve sleep health into physician wellness programs and assess the impact of these approaches on burnout.
Support (if any):

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0497

BEDTIME PROCRASTINATION EXPERIENCES AMONG CHINESE CLINICAL NURSES: A QUALITATIVE STUDY

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Introduction: Bedtime procrastination, a phenomenon previously overlooked but more recently receiving attention, has been shown to be linked to negative health outcomes. Different population groups often delay their bedtimes. However, there is a lack of research exploring the experiences of bedtime procrastination among shift workers, including clinical nurses. The study aimed to explore the bedtime procrastination experiences among Chinese clinical nurses and depict how they cope with the negative impacts caused by delaying their bedtime.
Methods: A descriptive qualitative design was adopted. Purposive sampling, combined with maximum variation and snowballing sampling strategy, was employed to select Chinese clinical nurses with bedtime procrastination experiences from healthcare institutions with different levels in two cities in Zhejiang Province, southeast China. From June 2023 to October 2024, data were collected through online, audio-recorded semi-structured individual interviews, and analyzed using conventional content analysis.
Results: Sixteen participants, with an average age of 28, took part in the study. Four main themes and nine subthemes were identified. Theme 1: staying connected to both me and the external world (e.g., enjoying personal time). Theme 2: bedtime procrastination being a habitual behavior (e.g., fostering sleep by delaying going to bed). Theme 3: experiencing negative feelings and cognitive arousal prior to and during bedtime procrastination (e.g., getting lost in negative feelings). Theme 4: trying to decrease negative impacts from bedtime procrastination (e.g., taking advantage of any opportunities to reduce sleep deprivation)
Conclusion: This study highlighted the diverse bedtime procrastination experiences among Chinese clinical nurses. This study also uncovered the strategies that nurses have employed to cope with the negative effects of bedtime procrastination. Future interventions, supported by dual-process models, using personalized-based design and with the incorporation of sleep hygiene education, are needed to decrease bedtime procrastination. This may foster the forming of health behavior among clinical nurses, which can lead to improved sleep health and overall well-being.
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0498

MONITORING VIGILANCE DECREMENT IN PHYSICIANS-IN-TRAINING USING WEARABLE SENSORS

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Introduction: Vigilance decrement, or the decreased ability to remain attentive after conducting tasks for more than 5-10 minutes, is frequently reported in the clinical environment due to shift work and long working hours resulting in sleep deprivation. This context underscores the importance of continuously monitoring vigilance decrement in the clinical environment given its threatening repercussions for patient safety. This study aims to identify factors and physiological responses associated with vigilance decrement in physicians-in-training.
Methods: We recruited six internal medicine residents (1 female-identified, 5 male-identified) between the ages of 27 and 35 (mean = 30.167, SD=2.858). The participants visited an experimental unit twice: once after having at least six hours of continuous sleep and once after having less than five hours of sleep. During each visit, the participants completed two tasks: the standardized Psychomotor Vigilance Test (PVT) and an electrocardiogram (ECG) reading test that asked if each ECG image included signs of acute myocardial infarction. We developed the ECG test as a clinically relevant task that requires vigilance. During the experiment, participants' electrodermal activities, skin temperature, and heart rates were recorded. Each visit lasted about 45 minutes.
Results: The mixed-effects regression model revealed that lower sleep quality, measured by the Pittsburgh sleep quality index, contributed to vigilance decrement indicated by prolonged response time when completing both the PVT ($\beta = 14.878$, $p = 0.034$) and ECG reading tests ($\beta = 0.807$, $p = 0.042$). Such prolonged response times were associated with decreased heart rates (beats per minute) ($r = -0.162$, $p = 0.05$ for PVT; $r = -0.507$, $p < 0.001$ for ECG) and electrodermal activities ($r = -0.321$, $p < 0.001$ for PVT; $r = -0.534$, $p < 0.001$ for ECG) during both tests, revealed by repeated-measures correlations.
Conclusion: The significant variables associated with vigilance decrement identified in this study will be used to construct predictive models of vigilance decrement, with the potential for integration into shift schedules and personalized interventions toward improving the self-care and well-being of healthcare practitioners.
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0499

WHO LASTS LONGER – SLEEP REACTIVITY PREDICTS DURATION OF NIGHT SHIFT WORK

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Introduction: Shift workers experience disturbed sleep that worsens over time. Emerging studies have implicated sleep reactivity as one causal mechanism in these sleep disturbances that predict health outcomes, such as diagnoses of Shift Work Disorder. As such, sleep reactivity may predict how long individuals work night shifts, given that healthier employees are more likely to stay in their occupation. Here, we assessed whether a relationship exists between sleep reactivity and tenure of night shift work and predicted individuals who have lower sleep reactivity would be more likely to work the night shift longer.
Methods: We collected data from 1022 night shift workers (Mage = 37.09 ± 10.93), who were at high risk for Shift Work Disorder (Shiftwork Disorder Screening Questionnaire) and worked night shift consistently for an average of 54.30 ± 71.55 months. Participants completed a measure of sleep reactivity (FIRST) and reported their duration of night shift work in months. We conducted a Pearson correlation to examine the relationship between these factors.

Results: Results indicated a small negative correlation between sleep reactivity and duration of night shift work (r = -.08, p <.01), suggesting the better their sleep reactivity scores were, the longer an individual worked night shifts were. However, the duration of night shift work only accounted for 0.06% of the variance in sleep reactivity.
Conclusion: Our findings suggest that although sleep reactivity was associated with the duration of night shift work, sleep reactivity is likely not the primary explanation for individual differences in the duration of night shift work. Instead, sleep reactivity may be part of a larger factor that explains night shift worker tenure, such as employee health, which predicts how long individuals remain in their job. Thus, this study can be used as a steppingstone for deeper exploration into health-related factors that affect tenure in night shift workers. This finding may also inform the hiring process, suggesting that individuals who are more vulnerable to sleep-related disturbances may be more likely to contribute to employee turnover.
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0500
EFFECTS OF WESTWARD LONG-HAUL BUSINESS CLASS TRAVEL ON SLEEP BEFORE, DURING, AND AFTER THE FLIGHT

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Introduction: Travel across time zones can disrupt sleep and cause jet lag. Here, we measured effects of westward long-haul flights on sleep in business class passengers. We hypothesized that sleep would be earlier and more misaligned relative to local clock time (i.e., jet lag) after night flights compared with day flights.

Methods: We studied 53 business class passengers (34 women; mean age ± SD=42.1y ± 9.6y) who travelled westward (6-8 time zones) from Singapore to Europe. Passengers took day flights that arrived in the evening (n=27) or night flights that arrived in the morning (n=26). Sleep was tracked before, during, and after the flight using actigraphy watches and daily diaries. Estimation statistics were used to measure effect sizes for associations of flight time (day vs. night) and time period (pre-flight, in-flight, post-flight) with sleep timing and duration.
Results: Day-flight passengers slept about 1.7 h less than usual on the night before their flight (M=-1.7 h, 95% CI -2.4 to -1.1 h, P< 0.001), but they obtained about 2 h of in-flight sleep (2.0 h ± 1.3 h). Night-flight passengers obtained about 6 h of in-flight sleep (6.1 h ± 1.7 h), which was about an hour less than their usual nocturnal sleep duration (M=-1.2 h, 95% CI -1.9 to -0.6 h, P=0.001). Post-flight sleep timing (onset, offset, midpoint) was earlier relative to local clock time after both day and night flights and realigned gradually with local clock time over 4 days. However, sleep midpoint on the first post-flight night was about an hour earlier for night flights compared with day flights (M=-1.2 h, 95% CI -2.1 to -0.4 h, P=0.048).
Conclusion: Day flights and night flights differentially impacted sleep and jet lag. Morning departures shortened pre-flight sleep, whereas late-night departures shortened in-flight sleep. Sleep on the first post-flight night was more misaligned with local clock time after night flights versus day flights. Our findings show that the timing of long-haul flights is an important determinant of sleep behavior before, during, and after the flight.
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0501
EVALUATING DAYLIGHT SAVINGS EFFECTS ON SLEEP IN THE MIDDLE AND END OF THE SUMMER PERIOD IN AUSTRALIA

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Introduction: It has been suggested that Daylight Saving Time (DST) contributes to a variety of health risks. Many studies attribute these risks to disrupted sleep patterns following the transition from standard time to DST, particularly during the immediate post-transition period. In response, sleep research societies have called for the elimination of Daylight-Saving Time (DST). However, no research has comprehensively explored the effects on sleep health later in the DST period. This study aimed to address this gap by investigating the impact of DST on sleep timing measures, sleep health measures and daytime functioning during the middle-to-late parts of the DST period.
Methods: Two analyses were conducted using Australia-wide samples including participants from both DST states and those states staying on standard time. The first involved a population-representative sample (N = 1,011, 70% from DST states) during the final month of DST, while the second focused on individuals with clinical insomnia symptoms (Insomnia Severity Index > 14, N = 402, 85% from DST states) during the mid summer period. Sleep/wake timing, total sleep time (TST), various sleep health measures, and subjective daytime functioning measures were compared between participants from DST and Standard Time (ST) states.
Results: Results from both the population representative sample and the insomnia sample were very consistent. Individuals in DST states went to bed and woke up at somewhat later clock times than those in ST states (12 – 35 minutes) with some differences reaching significance. However, there were no significant differences in total sleep time, sleep quality, or subjective daytime functioning measures between the participants from the DST and ST states.
Conclusion: These findings suggest that the disruptive effects of DST do not persist well into the DST period. This research highlights the need for further longitudinal studies to precisely measure the duration of initial disruptive effects of the transition onto DST in order to more fully evaluate the extent of its possible negative impacts.
Support (if any):

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0502
MEDIA REPRESENTATION FAVORS PERMANENT DAYLIGHT-SAVING TIME

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Introduction: The scientific and medical community endorse permanent standard time (pST), but many politicians and public polls still favor permanent daylight-saving time (pDST) to end clock change. Media representation may adversely influence attitudes by favoring daylight saving time and advancing myths and misconceptions. It is our objective to evaluate the quantity and content of DST and ST representation in the media.
Methods: Web search found 183 articles including DST and ST terms between the years of 2018-2024 from five news sources (CBS, Wall St Journal, The Hill, Washington Examiner, New York Times). Articles were excluded if text, repeats in same news cycle, is unrelated to DST or only referential to another article. Two independent readers reviewed and quantified the stance, myths, and message of each article and discrepancies were resolved. Stance was considered in favor of a particular viewpoint if there were quotes, myths or data disproportionally supportive of one position or failed to mention other viewpoints.
Results: 168 articles were included. Media coverage has increased; 2018 (n=8), 2019 (n=14), 2020 (n=9), 2021 (n=16), 2022 (n=36), 2023 (n=42), 2024 (n=43). Article stance was pro-pDST (n=55,32.7%), pro-pST (n=19,11.3), pro-seasonal DST (n=2,1.2%), pro-ending clock change (n=41,24.4%), or neutral (n=48,28.6%) and one for shortening DST duration, one for Saturday clock change, and one referring to the effects of sudden policy change. The number of pro-pST articles generally increased from 2018-2024 (n=0,0,1,1,7,4,6; 2018-2024 respectively). In 2024, 14.0% were pro-pST and 27.9% pro-pDST, 28.0% anti-switch and 30.2% neutral. Articles noted scientific concerns about short-term effects of clock shifts only (n=69,41.1%), long term effects of DST (n=21,12.5%), both (n=29,17.3%) or neither (n=46,29.2%). Commonly reported misconceptions included that DST lengthens days or increases sunlight duration (n=23,13.7%) and that DST improves physical health (n=18,10.7%) and mental health (n=23,13.7%) and that effects of DST are only due to switching clocks (n=79,47.0%).
Conclusion: Media representation of DST and ST has been increasing. A growing number of articles are favorable toward pro-pST or neutral, but close to a third still more positively portray pDST. More research into the impact of media representation on DST vs ST public policies is needed.

Support (if any):

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0503

ESTIMATING ALGORITHMIC FAIRNESS AND BIAS IN PREDICTING SLEEPING DIFFICULTIES USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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Introduction: Sleeping difficulties are associated with several adverse outcomes such as cardiovascular disorders, metabolic syndrome, and higher levels of road traffic accidents. Better predictive abilities could help in early detection and improved control over these adverse outcomes. However, identifying and accounting for algorithmic biases in predictive models across different ethnic groups remains a challenge. We used advanced machine learning techniques and fairness metrics to investigate for potential disparities in predicting sleeping difficulties between different racial and ethnic groups.
Methods: We analyzed a cohort of participants from NHANES with sleeping difficulties between August 2021 and August 2023. We utilized 45 features to predict sleeping difficulties across different racial ethnic groups. The features included demographics, body composition measures, past medical history, and comorbidities. Feature importance values were analyzed to identify the most influential features and consistent trends. Fairness was assessed with emphasis on demographic parity difference and equalized odds between the racial and ethnic groups.
Results: There were 8,153 eligible participants; 55% were women; median age [Q1, Q3] was 55 [36,68] years; and 50% reported sleeping difficulties. Majority of the patients were of White race (57.7%), followed by Hispanic (17.4%), and Black race (12.8%). Feature importance scores from the best model (CatBoost) showed that sleeping difficulties were associated with other depressive symptoms (54.4%), followed by factors such as poverty to income ratio (6.0%), increasing age (4%), higher BMI (4.0%), sedentary lifestyle (2.8%), household size (2.0%), total working hours (2.0%) and number of medications (1.6%). Overall accuracy of the CatBoost model for predicting sleeping difficulties was 84.6%. The highest difference in demographic parity (15%) and equalized odds (13%) were observed between White and Asian groups. Using threshold optimizer, demographic parity difference between the same groups decreased by 27%.
Conclusion: Despite high accuracy in predicting sleeping difficulties, our models were biased and fair-unaware. Due to high demographic parity differences in the models for predicting sleeping difficulties, Asian participants might receive fewer necessary screenings. Threshold optimizer technique decreased algorithmic bias and increased model fairness. Our findings underscore the critical importance of assessing fairness and bias in predicting clinical outcomes using machine learning approaches.

Support (if any): None.

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0504

CAN SELF SLEEP HEALTH SCREENING INCREASE ACCESS TO SLEEP HEALTH CARE? A PILOT STUDY

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Introduction: While primary care may be the ideal place to assess for, detect, and triage sleep health care, multiple barriers prevent the integration of sleep medicine into standard primary care. Obstacles include time constraints during patient visits and the lack of training for PCPs. To address this issue, a self-administered sleep health screener was developed. To evaluate the potential of the screener to affect clinical practice, we conducted a pilot study on the effects of placing posters in primary care practices that simply ask "How's your sleep health?" and provide URL and QR codes to access the screener.
Methods: 20 primary care practices were identified for inclusion; 10 practices were selected for "postering" and 10 practices served as controls. Matching was by location and practice size. The posters were 2x3' in size. The screener (The SDS-CL-25) is comprised of 25 symptom items scaled from 0-4 by frequency of symptom occurrence. When completed, the respondent may view and/or email as PDFs their completed survey and report. Both outputs clearly indicated which (if any) of 13 sleep disorders the respondent is symptom positive for. If positive, the report suggests further evaluation by a primary care provider, or a sleep specialist, may be warranted. The number of referrals and diagnoses related to sleep disorders were measured for three months prior to poster placement, and for ten months of postering. Generalized estimating equations for repeated count data (Poisson family with log link) were fit to both outcomes with group, time, group-by-time interactions, and practice size as covariates.
Results: Referral rates increased in all practices but more so for the practices with posters. Significant differences were observed at 5 months where postered practices had 23% more referrals than practices without posters (95%CI= 3%, 46%). Significant differences in diagnosis rates were observed at 3 months of postering where postered practices had 19% more sleep diagnoses than practices without posters (95%CI= 9%, 30%).
Conclusion: The data from this pilot is promising. It suggests that the simple intervention proposed may allow for greater access to sleep health care and potentially the realization that 'better sleep is better health'.
Support (if any):

Abstract citation ID: zsaf090.0505

0505

VALIDATION OF IOWA RESISTANCE TO SLEEPLESSNESS TEST- CHINESE VERSION IN INSOMNIA PATIENTS

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Introduction: Sleep loss vulnerability refers to individual differences in susceptibility to performance impairments in responding to sleeplessness. The Iowa Resistance to Sleeplessness Test (iREST) is designed to assess this trait by rating negative consequences in affective, cognitive, and somatic dimensions due to sleep loss. It has been shown to correlate with dysfunctional beliefs, sleep quality and sleepiness in young normal sleepers, suggesting the possibility that sleep loss vulnerability may play a role in the pathology of insomnia. This study evaluates the reliability and validity of the Chinese version of iREST (iREST-C) among patients with insomnia in order to serve as a tool for future study.
Methods: A total of 119 insomnia patients (F:M = 31:68, age = 33.38 ± 8.41) completed the iREST-C, ISI, and the Ford Insomnia Response to Stress Test (FIRST), with 79 participants retested 1.5 months later. Exploratory Factor Analysis (EFA) was conducted to identify factor structure and Chronbach's alpha to assess internal consistency. Pearson correlations were used to evaluate test-retest reliability and correlations with the FIRST and ISI.
Results: EFA revealed that the IREST-C comprises three dimensions: affective, cognitive, and somatic (KMO = 0.895; Bartlett's test: χ^2 = 1508.109, p <.001). The items included were the same as the original scale, except that item 13 changed from somatic to affective dimension with a low factor loading (0.410). After excluding item 13, Cronbach's α coefficient showed good internal consistency (affective: 0.924; cognitive: 0.933; somatic: 0.818). Test-retest reliability showed significant correlations for all subscales (affective: r = 0.475; cognitive: r = 0.477; somatic: r = 0.493) and the total iREST score (r = 0.579, p <.001). Significant correlations were found between the FIRST score and the cognitive (r = -.201, p <.05) and somatic (r =.229, p <.05) subscales of iREST-C, but not the affective subscale. No correlations were obtained between the ISI and iREST-C scores.
Conclusion: The iREST-C demonstrates good construct validity and test-retest reliability in insomnia patients. Vulnerability to sleep loss is associated with stress-related sleep reactivity but not with insomnia severity, indicating that it may be associated with arousal but not with insomnia directly.
Support (if any):

Abstract citation ID: zsaf090.0506

0506

PSYCHOMETRIC EVALUATION OF THE STRUCTURED CLINICAL INTERVIEW FOR SLEEP DISORDERS-REVISED (SCISD-R): A RELIABILITY STUDY

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Introduction: Structured clinical interviews are the optimal means for assessing certain sleep diagnoses, yet no such interview existed. To address this gap, the Structured Clinical Interview for Sleep Disorders (SCISD) was developed to evaluate DSM-5 sleep disorders. The SCISD-Revised (SCISD-R) was updated to align with DSM-5-TR criteria but has not yet undergone psychometric evaluation. This study, funded by the AASM Junior Investigator's Award, focuses on assessing the inter-rater reliability of the SCISD-R to confirm its utility in both clinical and research contexts.
Methods: Data for this study were obtained from a randomized clinical trial evaluating different modalities of Cognitive Behavioral

Therapy for Insomnia in adults aged 50–65 years. The sample is primarily White (88%), female (83%), and non-Hispanic (88%), with an average age of 57.99 years (SD = 4.92). A random sample of 100 SCISD-R interviews, conducted by trained clinicians, was selected for double-rating. Each interview consists of a general information section and modular assessments aligned with DSM-5-TR criteria. The double-rating process is ongoing, and inter-rater reliability will be assessed using the percent agreement and Cohen's Kappa.

Results: The SCISD-R is predicted to have high inter-rater reliability across modules with sufficient prevalence, similar to the SCISD for DSM-5. Preliminary data (n = 47) show strong consistency in clinician ratings for insomnia (97%), circadian disorders (82%), and obstructive sleep apnea (77%). Data analysis will be completed by January 2025.

Conclusion: The SCISD-R is expected to demonstrate robust inter-rater reliability, supporting its future use as a reliable diagnostic tool for DSM-5-TR sleep disorders. These findings will provide a critical foundation for upcoming research and enhance assessment in clinical settings, paving the way for broader validation studies and adaptations for diverse populations.

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0507

EVALUATING DIFFERENTIAL ITEM FUNCTIONING OF THE INSOMNIA SEVERITY INDEX USING MODERATED NONLINEAR FACTOR ANALYSIS

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Introduction: Insomnia is common among veterans, particularly those with mental health conditions like depression and anxiety and can lead to significant health complications. Routine screening in healthcare settings is crucial to prevent chronic insomnia. The Insomnia Severity Index (ISI), a widely used and validated tool, has been adapted for diverse populations, but its differential item functioning (DIF) remains underexplored. This study uses moderated nonlinear factor analysis (MNLFA) to address this gap. This flexible approach allows for simultaneous modeling of multiple sources of bias based on individual characteristics, which can improve accuracy of insomnia severity ratings.

Methods: Veterans (N = 620) from the Miami VA sleep center completed a baseline psychosocial assessment, HSAT (mean AHI=18), and medical/psychiatric diagnoses were extracted from medical records. MNLFA was used to model nighttime (ISI items1a,b,c) and daytime symptoms (items 2–5) separately, examining the effects of age, gender, race/ethnicity, depression, anxiety, PTSD, and chronic pain on DIF. DIF-adjusted factor scores, confirmatory factor analysis (CFA) factor scores, and sum scores were compared.

Results: The veteran sample (N=620) was middle-aged (M=52, SD=14.5), predominantly male (83.5%), and White (57.3%), with 50% diagnosed with chronic pain and 51% with clinical depression. DIF analysis showed ISI1 had intercept bias for age, Hispanic/White identity, chronic pain, and depression, as well as factor loading bias for age. ISI3 had intercept bias for depression. ISI4 exhibited intercept and factor loading bias for male gender. ISI5 and ISI6 showed intercept bias for age, and ISI7 showed both intercept and factor-loading bias for PTSD. No DIF was found for AHI. Factor scores derived from MNLFA, CFA, and sum scores were highly correlated across both factors.

Conclusion: This study examined the DIF of ISI by investigating how an array of psychosocial factors influences insomnia severity ratings. Six of the seven ISI items demonstrated bias based on age, gender, race, depression, PTSD, and chronic pain. Differences observed between groups with these characteristics may be influenced. MNLFA demonstrated methodological advantages by allowing simultaneous modeling of DIF testing. Although difficult to implement in primary care, MNLFA-based factor scores hold promise for secondary predictive models.

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0508

EXPLORING DIMENSIONS OF DAILY DYSFUNCTION IN INSOMNIA AND THE PREDICTIVE ROLE OF PHYSIOLOGICAL SLEEP FEATURES

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Introduction: Insomnia significantly impairs daily functioning, but the underlying dimensional structure of daily dysfunction and its physiological predictors remain underexplored. This study aims to better characterize the daily dysfunction in individuals with and without insomnia and examines the physiological predictors of this dysfunction.

Methods: Data from the Sleep Apnea Global Interdisciplinary Consortium (SAGIC) were analyzed, including 1058 participants (50% female; age 45.3±14.7 years) without obstructive sleep apnea (OSA) or shift work. Insomnia was defined by self-reported difficulty falling or staying asleep ≥3 nights/week for >3 months (n=387, 57% female; age 49.0±14.5 years). The dimensionality of self-reported daily dysfunction items (e.g., bother, affecting work, affecting social life, affecting sex life, affecting others, irritability, trouble concentrating, fatigue, and sleepy) was assessed using exploratory factor analysis (EFA). The role of EEG metrics (macro and micro-architecture and Odds-Ratio-Product [ORP]) in determining daytime dysfunction was examined using linear regression analyses to evaluate the predictive value of sleep metrics, group differences, and interaction effects.

Results: EFA identified a single-factor structure, explaining 60.4% of the variability in measures of daily dysfunction (KMO = 0.93; > 0.80, Bartlett's test: $\chi^2(36) = 2452.844$, $p < 0.001$). The single factor represents overall daily dysfunction, with higher values indicating greater severity. All variables load in the same direction, meaning that as values increase, dysfunction worsens. Linear regression analyses revealed that longer sleep onset latency (SOL) and higher ORP-9, reflecting fragmented and unstable sleep, significantly predicted greater daily dysfunction in individuals with insomnia. In the ORP model, the higher ORP-9 × group (insomnia yes/no) interaction predicted worse daily dysfunction, while higher ORP wake was unexpectedly associated with better functioning. This suggests that preserved arousal stability may buffer some negative effects of insomnia. The interaction examines whether the effect of ORP-9 on daytime dysfunction differs between the insomnia groups. The linear regression models accounted for 19–23% of the variance in daily dysfunction.

Conclusion: These findings highlight the role of fragmented sleep and altered arousal stability in daily dysfunction among individuals with insomnia, emphasizing the value of combined sleep metrics in understanding sleep-related functional impairments.

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0509

PREDICTORS OF PARENTAL BEDTIME PROCRASTINATION USING MACHINE LEARNING

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Introduction: Bedtime procrastination (BP) is defined as "going to bed later than intended, without having any external factors for doing so". BP is an important health behavior associated with sleep health. Caregivers of young infants are significantly affected by lack of sleep, yet often intentionally postpone their bedtime after their child sleeps. This study aimed to explore predictors of parental bedtime procrastination.

Methods: A total of 477 parents with children aged 0–25 months were categorized into high and low BP groups based on the Bedtime Procrastination Scale (BPS) groups (cutoff score 33). Participants completed questionnaires including demographic information, the Insomnia Severity Index (ISI), Smartphone Addiction Scale (SAS), Sleep Readiness Scale (SRS), Solitude and Unfulfilled Aspects Scale (SolAS), Difficulties in Emotion Regulation Scale (DERS), Edinburgh Postnatal Depression Scale (EPDS), and a perceived reward scale. Demographic variables included income, age, and residence type. Child sleep variables included total sleep time (TST), wake after sleep onset (WASO), nighttime sleep stretch (NSS), sleep onset latency (SOL), total nap time, bedtime routine consistency, perceived sleep problems, and sleep management difficulties. The model included 20 variables using eXtreme Gradient Boosting (XGBoost), a tree-based ensemble learning algorithm. Feature importance of each variable is based on their contributions to predictive performance.

Results: Among the 477 participants, 52.4% of infants were boys, with a mean age of 11.04 months (SD = 6.02). Most caregivers were mothers (82.2%), married (97%), and aged 30–34 years (46.5%). XGBoost analysis identified insomnia severity (13.8%), difficulties with emotion regulation (9.5%), smartphone addiction (8.4%), sleep readiness (7.7%), and desire to be alone (7.1%) as the most significant predictors of bedtime procrastination, with the model achieving an area under the curve (AUC) of 0.707.

Conclusion: This study underscores the importance of psychological factors, including insomnia severity, emotion regulation difficulties, and smartphone addiction, in parental bedtime procrastination by impairing sleep quality, increasing nighttime arousal, and disrupting sleep readiness. These results suggest that bedtime procrastination among caregivers is driven less by child-related sleep and more by their own psychological and behavioral patterns.

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0510

LARGE LANGUAGE MODELS STREAMLINE THE IDENTIFICATION OF AN INSOMNIA PHENOTYPE IN ELECTRONIC HEALTH RECORDS

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Introduction: Insomnia is a common disorder characterized by difficulty falling and/or staying asleep. Its association with other health conditions and impact on quality of life underscore the importance of studying it at the population level. However, documentation of insomnia in electronic health records (EHRs) is inconsistent, and the condition is likely underdiagnosed. This study proposes the use of Natural Language Processing (NLP) methods to address the under-documentation of insomnia in EHRs, evaluating the performance of two Large Language Models (LLMs) in detecting an insomnia phenotype in clinical notes.

Methods: Two corpora of de-identified clinical notes were utilized in this study: 237 from the publicly available MIMIC-III database and 777 from patients in the University of Kansas Health System (UKHS) with family medicine encounters. Insomnia identification criteria were adapted from diagnostic guidelines, and gold standard datasets were created by manually annotating each note and labeling them as "Insomnia" or "Not Insomnia." Two open-source LLMs, Llama3-70B and Llama3-405B, were trained to detect insomnia in the notes using prompt engineering. Values for precision, recall, and F1 score were used to evaluate LLM performance against more traditional NLP models. The LLM trained on the MIMIC-III was used to classify the UKHS notes.

Results: Both LLMs outperformed the conventional NLP models in detecting insomnia in a set of 70 test notes. Llama-3-405B achieved the highest values for precision (95.8), recall (100.0), and F1 score (97.9), and made the fewest classification errors. Both Llama3-70B and Llama3-405B both had a higher binary classification accuracy than proportion of error-free explanations for the same set of test notes. Transportability to UKHS notes revealed a decrease in performance, but with reasonable results (Llama3-405B precision 73.5, recall 86.2, F1 score 79.4).

Conclusion: The LLMs used in this study not only performed better than more traditional NLP models when detecting an insomnia phenotype from notes in EHRs but also exhibited adherence to a set of rules and provided explanations for their classifications. These results support the potential of generative AI to advance the study of insomnia on a larger scale through the reliable and accurate identification of a computable phenotype for insomnia.

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0511

ASSOCIATION BETWEEN INSOMNIA DISORDER AND HEALTHCARE RESOURCE UTILIZATION IN THE UNITED STATES MILITARY HEALTH SYSTEM

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Introduction: Insomnia disorder is common among U.S. military personnel and negatively impacts health and military readiness. Among civilians, insomnia is associated with substantial economic burden; yet, little is known about the burden of insomnia within the US Military Health System (MHS). The MHS is a large, integrated healthcare delivery system with worldwide operations and thus ideal for health services research. This study

aimed to determine the association between insomnia disorder and healthcare resource utilization (HCRU) in the MHS.
Methods: Our data source was the Military Data Repository (MDR) between years 2016-2021. This large data repository includes encounter, procedure, medication, and durable medical equipment information for active-duty military personnel, military dependents, National Guard, and Reserves. Demographic and military information was obtained from the MDR. Inclusion criteria were age < 65 years, active-duty military personnel, 12 months of continuous enrollment before and after first insomnia diagnosis (i.e., the index date), and no evidence of insomnia during the 12 months prior to first diagnosis. Insomnia and comorbid medical and psychiatric conditions were defined based on International Classification of Disease-10th Edition codes. Beneficiaries with insomnia were matched 1:1 with non-insomnia controls on >20 demographic, military, and medical and psychiatric comorbidity variables. Mixed effects models were used to compare non-insomnia related HCRU between groups across multiple points of service: outpatient, inpatient, and emergency department (ED).
Results: We identified 40,978 MHS beneficiaries with insomnia and 40,978 matched non-insomnia controls. Most (35.9%) beneficiaries with insomnia were between ages 25-34 years, and 20.7% were women. 4.2% of beneficiaries with insomnia had one comorbid medical or psychiatric condition, and 1% had >2 comorbid conditions. Relative to matched non-insomnia controls, beneficiaries with insomnia demonstrated greater 12-month HCRU at every point of service (all p values< 0.001). The incident rate ratio for non-insomnia inpatient visits was RR (95% CI) = 1.96 (1.85,2.08); for non-insomnia outpatient visits was 2.24 (2.23,2.24); and for non-insomnia related ED visits was 1.60 (1.57,1.63).
Conclusion: Insomnia is associated with substantially increased healthcare resource utilization in the US military health system. Future research should seek to advance personalized medicine approaches to improve outcomes of evidence-based insomnia care.

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0512

DEEP LEARNING MODELS TO IDENTIFY INSOMNIA USING HEART RATE DATA DURING WAKE BEFORE SLEEP ONSET

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Introduction: Stress and hyperarousal are common factors in patients with insomnia, especially those with difficulty falling asleep. Recent research has revealed altered physiological dynamics during the transition from wakefulness to sleep, including findings on autonomic systems (e.g., sympathetic and parasympathetic regulation) that can be assessed by heart rate dynamics. In this study, we aimed to compare deep learning models for identifying patients with chronic insomnia disorders solely with raw heart rate data during wake before sleep onset.
Methods: We used data from a multi-center cohort (Sleep Heart Health Study) and we included 1810 subjects (age 40-90 years, mean age 62.2±11.2 years, 50.5% male) who had overnight polysomnography with validated sleep scorings, where rate data during sleep onset was extracted for analysis. We tested multiple deep learning models, including Convolutional Neural Networks (CNN), Long Short-Term Memory Networks (LSTM), Gated Recurrent Units (GRU), Recurrent Neural Networks (RNN), Multilayer Perceptrons (MLP) and Transformers. We used balanced/unbiased data (random samples from all participants with or without insomnia on a 1:1 ratio) with 80% data for training and 20% for testing.
Results: From 5-fold cross-validation and five iterations on each model, we compared the mean accuracy of each model, and the highest accuracy for detecting insomnia was achieved by Transformers (88.3%), followed by CNN (85.8%). The mean accuracy of other models ranged between 50% to 70%. The performance of Transformers and CNN surpassed the other tested models in the detection of insomnia.
Conclusion: Deep learning models may identify the presence of insomnia with raw heart rate data during wakefulness before sleep. Given the popularity and easy access of wearable sensors, heart/pulse rate data may be useful in tracking insomnia or assisting long-term management of insomnia by providing longitudinal recordings for assessing interventions targeting sleep onset difficulties.
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0513

THE FEASIBILITY OF HOME-BASED ESTIMATION OF CIRCADIAN TIMING IN VETERANS WITH INSOMNIA AND PAST TRAUMATIC BRAIN INJURY: PRELIMINARY FINDINGS

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Introduction: Veterans with a history of traumatic brain injury (TBI) are significantly more likely to develop insomnia than their non-injured peers, which contributes to functional impairment and diminished quality of life. Emerging evidence suggests that circadian abnormalities may underlie a sizeable subset of sleep disturbances following TBI, yet such abnormalities remain under-detected in this patient population. Pragmatic methods that estimate circadian timing (e.g., dim light melatonin onset [DLMO]) in the homes of veterans may help address this clinical gap. Preliminary findings are presented for a study examining the feasibility of two home-based methods of estimating DLMO among veterans with insomnia and a history of TBI.
Methods: Veterans with insomnia and a history of TBI are being recruited to provide feedback on two different methods for estimating DLMO at home (target N = 30). The first method involves estimation of DLMO using salivary samples self-collected by veterans. The second method involves prediction of DLMO (pDLMO) using actigraphy-derived light data and the Kronauer

limit-cycle model. Feasibility for each method is defined as the ability to measure DLMO for ≥70% of participants.
Results: To date, 20 veterans have been enrolled and 18 have completed the study. Saliva-based DLMO could only be estimated for 9 of 17 veterans (53%) who submitted collection kits. Potential explanations for undetermined DLMO estimates include difficulties using the collection kit and excessive light exposure. Additionally, all 9 veterans for whom DLMO could be estimated were exposed to light greater than 50 lux within 30 minutes of collecting the saliva samples ultimately used to determine DLMO. pDLMO was successfully estimated for 17 of the 18 veterans (94%) who returned actigraphy data.
Conclusion: Estimation of pDLMO using actigraphy-derived light data appears to be a feasible method for estimating circadian timing in veterans with insomnia and past TBI. Data collection and analyses are ongoing.
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0514

PRE-SLEEP SALIENCE NETWORK CONNECTIVITY PREDICTS SUBSEQUENT REM DURATION AND SLEEP EFFICIENCY

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Introduction: The hyperarousal theory of insomnia proposes that excessive physiological and psychological arousal contributes to the etiology of insomnia. Previous neuroimaging studies have corroborated this by finding that large-scale neural networks, such as the default mode network (DMN), show higher connectivity in individuals with insomnia. Less is known about the salience network's (SN) involvement in hyperarousal mediated insomnia; however, it's hypothesized that increased connectivity in the SN would also be correlated with more severe insomnia.
Methods: As part of a larger study investigating the effects of transcranial magnetic stimuliation (TMS) on insomnia, participants (n=20, 12 female) scoring at least a 7 on the Insomnia Severity Index (ISI) underwent fMRI resting state scans taken before sleeping overnight in the lab, where polysomnography data were collected. Only data from the sham condition were used for this analysis.
Results: Seed to voxel analyses, using the mean of individual SN nodes (i.e., supramarginal gyrus, insula, rostral prefrontal cortex, and anterior cingulate cortex) as a single seed region, revealed significant functional connectivity correlations with REM duration and sleep efficiency. Specifically, sleep efficiency and REM duration were each associated with greater functional connectivity between the SN and a region of the lateral occipital cortex (Corrected P <.05). Correlations with other sleep stages were non-significant.
Conclusion: Neuroimaging of participants with self-reported insomnia symptoms suggests that SN connectivity to the lateral occipital cortex correlates with better sleep efficiency and greater REM duration. These findings suggest that increased connectivity between the SN and lateral occipital cortex before bedtime may contribute to more consolidated REM sleep. It is plausible that this may occur as a consequence of use-dependent synaptic potentiation of these regions during wake due to high levels of visual stimulation. Alternatively, greater connectivity of these systems prior to bedtime may also be evidence of interactions between the visual and circadian systems, indicating more robust photoentrainment. This would explain why there is both greater REM duration— a component of circadian regulated sleep process — and greater sleep consolidation, which has also consistently been attributed to increased circadian consolidation. Future work may be able to address these possibilities.
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0515

STEADY HEARTS, SLEEPLESS MINDS: ANALYZING HEART RATE VARIABILITY IN INDIVIDUALS WITH CHRONIC INSOMNIA

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Introduction: Autonomic hyperarousal is thought to be a pathogenic mechanism in chronic insomnia, characterized by elevated heart rate (HR) and reduced heart rate variability (HRV), indicating greater sympathetic nervous system activity. Spectral analysis links HR changes to central nervous system activity, with low frequency (LF) reflecting sympathetic activity and high frequency (HF) indicating parasympathetic activity. This study examined differences in HR and HRV between individuals with insomnia and healthy control sleepers during total sleep deprivation (TSD).
Methods: 7 individuals with chronic sleep-onset insomnia (M=29.0y, SD=6.2y, 6 females) and 7 age-matched healthy control sleepers (M=29.0y, SD=6.6y, 4 females) completed a 5-day (4-night) laboratory study. After an adaptation day and baseline day (each 10h time in bed, 22:00-08:00), participants underwent 38h of TSD followed by a recovery day (10h time in bed; 22:00-08:00). They were fitted with a 5-lead Holter monitor (DMS 300-3A Digital Holter Recorder) for continuous ECG recording. Mean HR was extracted in 5-minute bins, and power in the LF (0.04–0.15 Hz), HF (>0.15–0.40 Hz), and the LF/HF ratio components of HRV were determined by spectral analysis. Data were analyzed using mixed-effects ANOVA with a fixed effect of group (insomnia vs. controls) and period (daytime 08:00-22:00 vs nighttime 22:00-08:00) and their interaction with a random effect of subject on the intercept.
Results: Overall, the insomnia group exhibited lower LF power ($F_{1,1299}=5.38$, $P=0.021$) or greater parasympathetic activity as compared to the healthy control sleepers. There was a significant effect of period for all measured parameters, indicating a shift toward greater parasympathetic activity at night (all $F>17.7$, $P<0.001$). However, the significant period-by-group interactions revealed that this shift was less pronounced in the insomnia group for all measured parameters (all $F>2.24$, $P<0.02$).
Conclusion: Our findings suggest an interplay of homeostatic, circadian, and sleep related effects on sympathovagal balance, with more pronounced sympathetic effects observed in the healthy controls compared to individuals with insomnia. This dampened response in the insomnia group may be a result of their chronic sleep deficiency, making them less responsive to sleep and TSD due to underlying hyperarousal.
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0516

EVALUATING THE RELATIONSHIP BETWEEN INSOMNIA, PAIN INHIBITORY CAPACITY, AND TEMPORAL SUMMATION OF PAIN IN OLDER ADULTS USING ENDOTOXIN

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Introduction: Chronic pain is a leading cause of disability in older adults, with insomnia identified as a major risk factor, particularly in women, though mechanisms remain unclear. Aging, insomnia, and chronic pain are associated with increased systemic inflammation. To explore inflammation as a pathway connecting insomnia and chronic pain, we randomized pain free older adults with and without an insomnia diagnosis to endotoxin or placebo conditions and assessed central pain inhibitory capacity [conditioned pain modulation (CPM)] and pain facilitation [temporal summation (TS)] with quantitative sensory tests (QST) linked with chronic pain pathophysiology.
Methods: We conducted a double-blinded, randomized, placebo-controlled, clinical trial. Participants were randomized to endotoxin (0.8ng/kg) or placebo (saline) injection. CPM and TS were assessed using QST approximately 5.5hrs post-injection. ANCOVAs (2x2: insomnia vs. normal sleeper; endotoxin vs. placebo), controlling for time since injection and sex, examined whether insomnia increases TS and decreases CPM after endotoxin compared with normal sleepers. Twelve blood samples were collected over 8hrs to measure inflammatory cytokines.
Results: Analysis included 114 older adults (insomnia n=42; endotoxin n=44; M Age=62.88±6.41). Compared to placebo, endotoxin increased area under the curve for all inflammatory markers (IL-6, TNF-α, IL-1β) ($P<.05$). However, we found no significant interaction effects of Endotoxin X Insomnia on inflammation. Endotoxin significantly reduced CPM ($F(1,100)=5.734$, $P=.019$; model: $R^2=.093$, $P=.042$), but had no significant effect on primary measure of TS ($P>.05$). We found no interaction effects of insomnia X endotoxin on CPM or TS. Planned secondary analyses including sex as a moderator and BMI, age, race/ethnicity, education, and baseline pain as covariates ($R^2=.259$, $P=.010$) identified a significant three-way interaction of Endotoxin X Insomnia X Sex on TS ($F(1,87)=4.820$; $P=.031$). Females with insomnia had a greater TS response to endotoxin than males with insomnia, whereas males without insomnia showed heightened TS with endotoxin compared to males with insomnia and males receiving placebo.
Conclusion: Findings suggest that older adults with insomnia do not exhibit exaggerated inflammatory response to endotoxin. Endotoxin impaired pain inhibition, suggesting a pathway linking inflammation to chronic pain in late life. Insomnia may influence the effects of systemic inflammation on central pain facilitatory processes differently by sex.
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0517

THE IMPACT OF PAIN INTERFERENCE ON INSOMNIA SEVERITY AMONG OLDER SURGICAL PATIENTS

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Introduction: Approximately one-third of adults over the age of 65 undergoing surgery exhibit symptoms of sleep-related disorders, such as insomnia. Decades of research have demonstrated that insomnia-related sleep disturbances can weaken the immune system, delay recovery, and reduce pain tolerance – effects that are particularly pronounced in older adults. However, the relationship between pain and sleep disturbances in this population remains underexplored. Given the rising hospitalization rates among older adults, we hypothesized that greater pain interference would be associated with higher insomnia severity.
Methods: A cohort of 17 older adults (≥70 years) scheduled for total knee, total hip, or spine surgery, was recruited. One week before their scheduled surgery, participants completed the Insomnia Severity Index (ISI) questionnaire and the Patient-Reported Outcomes Measurement Information System (PROMIS) to assess pain interference. A simple linear regression model analysis was used to examine the influence of pain interference on sleep disturbance before surgery. Additional model predictors were used to control for the variance across surgery type, sex, and age.
Results: In line with our initial hypothesis, pain interference, as measured by the PROMIS scale, was positively associated with insomnia severity (ISI). Specifically, our model predicted that for one SD increase in pain interference scores, ISI scores would increase by 0.076 SD ($SE = 0.038$, $p = 0.07$). While this trend was marginally non-significant, our findings are promising as data is still being collected for this study. Additionally, analysis of variance revealed that surgical type significantly influenced insomnia severity ($F = 4.11$, $p = 0.047$), with total hip and total knee surgeries showing distinct patterns compared to the spine surgery patients. Sex also emerged as a significant predictor, with males showing higher ISI scores compared to females ($p = 0.027$).
Conclusion: Overall, these preliminary results highlight the potential relationship between pain interference and insomnia severity in older surgical patients, warranting further investigation with a larger sample size.
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0518

BLUNTED CORTISOL STRESS REACTIVITY TO THE TRIER SOCIAL STRESS TEST AMONG INDIVIDUALS WITH GREATER INSOMNIA SYMPTOMS

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Introduction: Insomnia is a highly prevalent disorder, impacting roughly 10% of the population. Evidence suggests that insomnia may be a disorder of hyperarousal, but it is unclear whether individuals with insomnia exhibit a generalized hyperarousal or if this hyperarousal only occurs in response to sleep-related stressors. The HPA-axis, one of the primary stress-related neuroendocrine systems, plays a pivotal role in responding to stressors but also in regulating sleep. Little is known the extent to which HPA-axis reactivity to non-sleep-related cues (i.e., psychosocial stressors) plays in the pathophysiology of insomnia. This study aimed to investigate the association between HPA-axis reactivity to a psychosocial stressor and insomnia symptom severity.
Methods: Data was collected from 312 participants (69.9% women,72.7% white, mean age = 21.3 years) who completed the Trier Social Stress Test (TSST), an in-lab psychosocial stress task. Saliva samples were used to measure the cortisol stress response and were collected at the start of the TSST, as well as 35, 45, and 55 minutes post-stressor. Insomnia symptom severity was also assessed using the Insomnia Severity Index.
Results: We examined whether there was an effect of insomnia symptom severity on cortisol stress reactivity with and without adjusting for gender. As expected, men (compared to women) had a greater cortisol stress response to the TSST (linear, b=0.055, t(786)=1.67, p=< 0.001, quadratic, b=0.00006, t(552)=2.64, p=< 0.01). While the overall main effect of insomnia on cortisol reactivity was not statistically significant (linear, b=0.0001, t(790)=-1.78, p=0.08, quadratic, b=0.000001, t(554)=1.15, p=0.25), the linear slope was significant while adjusting for gender, linear, b=-0.0002, t(788)=-2.25, p=0.03. Specifically, among men, greater insomnia symptom severity was related to a blunted cortisol response to the TSST.
Conclusion: Results from these analyses suggest that there is a small, but significant, association with blunted cortisol reactivity and greater insomnia symptoms in men. These findings support that, at least in men, greater insomnia symptoms may be related to HPA-axis dysregulation, but that a different pathway may exist for women.
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0519

SLEEP RELATED ATTENTIONAL BIAS AND INSOMNIA PHENOTYPES BASED ON OBJECTIVE SLEEP DURATION IN ADOLESCENTS

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Introduction: Adolescence is a crucial developmental stage that is often associated with various psychosocial and biological changes, increasing one's risk for developing sleep problems including insomnia. Insomnia with objective short sleep duration (ISSD) has been proposed as a unique phenotype associated with heightened physiological arousal and more severe clinical presentations, but its underlying mechanism remained unclear. Sleep-related attentional bias may perpetuate insomnia but limited research has looked into this cognitive factor in adolescents with insomnia, especially those with objectively short sleep duration. This study aimed to investigate the role of objective short sleep duration in differentiating behavioural profile in sleep-related attentional bias in adolescents with insomnia.
Methods: Adolescents aged 12-20 were recruited. Participants in the insomnia group met the DSM-5 criteria for insomnia disorder, and those in the healthy control group (HC) without any neuropsychiatric or sleep disorders and reported an average sleep duration of 7-10 hours. All participants underwent a clinical interview to ascertain their eligibility and completed questionnaires, sleep-related dot-probe task, and 7-day objective sleep monitoring by actigraphy. Participants with objective sleep duration ≤ 7 hours were classified as ISSD, and others (> 7 hours) were classified as insomnia with objective normal sleep duration (INSD).
Results: Total 106 participants were recruited (age: 18.22 ± 1.52, 12-20, female: 64%, ISSD = 50, INSD = 33). ISSD and INSD had more severe insomnia symptoms, poorer subjective sleep quality, longer objective sleep onset latency and poorer objective sleep efficacy, compared to HC (all p <.05). ISSD had a higher sleep interference index than INSD (adj p = 0.026), indicating more vigilance to sleep-related stimuli in ISSD compared to INSD.
Conclusion: The result suggested that ISSD and INSD show different attentional responses toward sleep-related stimuli. It may provide evidence on psychological understanding on insomnia phenotypes with the potential implications for early detection of insomnia and interventions. Further investigation with neuroimaging is needed to understand sleep-related attentional bias between phenotypes.
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0520

THE ASSOCIATION BETWEEN SLEEP VULNERABILITY AND INTEROCEPTIVE SENSITIVITY: A HEP STUDY

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Introduction: Previous research has explored sensory hypersensitivity in both wakefulness and sleep among insomnia patients. Compared to healthy individuals, insomnia patients exhibit heightened sensitivity not only to external stimuli but also to internal bodily signals, known as "interoception." Interoceptive sensitivity can be assessed using physiological measures, such as heartbeat-evoked potentials (HEP), as well as self-reported questionnaires. However, it remains uncertain whether heightened interoceptive sensitivity is a predisposed trait associated with an increased vulnerability to sleep disturbances or if it is a consequence of chronic insomnia. This study aims to investigate the association between sleep vulnerability and interoceptive sensitivity by comparing HEP between individuals with high and low levels of sleep vulnerability.
Methods: Thirty-one normal sleepers participated in the study (average age = 23.91 years; M:F = 15:16). Among them, 14 were classified as high sleep vulnerability (HV) and 17 as low sleep vulnerability (LV), determined by the Ford Insomnia Response to Stress Test (FIRST). Participants completed the Multidimensional Assessment of Interoceptive Awareness (MAIA) questionnaire to assess self-reported interoceptive sensitivity. Additionally, a 5-minute HEP recording was obtained in the evening during a wakeful, eyes-open resting state as a physiological index of interoception. Correlation analyses were conducted to evaluate the relationship between MAIA scores and HEP amplitudes at frontal electrodes, specifically 300 to 650 ms

after the R peak. T-tests were performed to examine group differences in interoception measures between the HV and LV groups.
Results: Frontal HEP amplitudes exhibited a positive correlation with the Noticing subscale of the MAIA (r = 0.358, p = 0.048), but no significant correlations were found with the other subscales. Additionally, t-tests showed no significant differences in HEP amplitudes or MAIA scores between the HV and LV groups.
Conclusion: The positive correlation between HEP amplitudes and the Noticing subscale suggests that greater awareness of bodily sensations is associated with enhanced physiological interoceptive processing. Furthermore, the absence of significant differences in interoceptive sensitivity between individuals with high and low sleep vulnerability indicates that heightened interoceptive sensitivity in insomnia patients may be a consequence of chronic sleep disturbances rather than a predisposing trait for sleep disturbances.
Support (if any):

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0521

INSOMNIA WITH SHORT SLEEP DURATION IS ASSOCIATED WITH HYPERTENSION: EVIDENCE FROM THE UK BIOBANK COHORT

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Introduction: Evidence from both the general population and clinical samples based on polysomnography suggests that insomnia with objective short sleep duration (ISSD) represents a biologically severe phenotype of the disorder, characterized by adverse cardiometabolic outcomes, i.e., hypertension and diabetes. No longitudinal study to date has examined the association of this type of insomnia with incident hypertension using ecologically friendly, home-based, cost-effective sleep-monitoring tools, which could replace PSG, in a large general population sample. The aim of this study is to assess the risk of ISSD with incident hypertension in the large Biobank cohort based on self-reported insomnia and objectively measured habitual sleep duration by accelerometer.
Methods: We identified 96219 participants from the UK Biobank who underwent a 1-week objective sleep measure during 2013-2016. Short sleep duration was defined as ≤ 7.3 hours/night (i.e., median), after excluding participants who slept ≤ 3 hours/night or ≥11 hours/night. Self-reported insomnia symptoms obtained ± 1-year within the objective sleep measure, which was available from 8,762 participants, was used to define insomnia status. Participants reported "Usually" having insomnia symptoms (vs. Never/Rarely/Sometimes) were categorized as having insomnia. Four sleep phenotypes based on the presence of short sleep duration (Yes/No) and/or insomnia symptoms (Yes/No) were created. Major confounding factors, including age, sex, BMI, smoking, alcohol intake, sleep apnea diagnosis were extracted from the study visit closest to the objective sleep measure. To evaluate the associations between the sleep phenotypes with incident hypertension, multivariable-adjusted Cox proportional hazards models were used. The effective sample sizes for analysis on hypertension was 4451.
Results: Compared to normal sleepers with normal sleep duration, only ISSD phenotype was associated with significant risk for hypertension (HR=1.20, 95%CI=1.03-1.41, P=0.02), after controlling for confounding factors. In contrast, neither the insomnia normal sleep duration group (INSD) nor the normal sleepers short sleep duration group were associated with increased risk for hypertension.
Conclusion: These data from the large UK biobank database using an ecologically friendly method to assess habitual objective sleep duration suggest that it is the combination of insomnia plus short sleep duration (ISSD), that increase significantly the risk for hypertension.
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0522

INSOMNIA WITH IMPAIRED MENTAL RESILIENCE IS ASSOCIATED WITH ALTERED REM SLEEP MACROSTRUCTURE AND SLEEP MISPERCEPTION

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Introduction: Insomnia is prevalent and often precipitated by stress. Individuals with high severity of insomnia have been reported to show low resilience capacity, which renders them prone to stress-related disorders. It is important to understand how sleep is related to impaired mental resilience in insomnia, particularly prior to development of stress psychopathology. Therefore, this study aimed to examine the associations between sleep and resilience in adults with insomnia disorder.
Methods: After the semi-structural clinical interview (SCID-CV), a total of 189 participants without stress-related disorder were included. Resilience outcome was calculated by the residual approach in a linear model with negative life stressful events as independent variable and the quality of life (WHOQOL-BREF mean score) as dependent variable. Resilience capacity was measured by the Connor Davidson Resilience Scale (CDRS). Being non-resilient was defined by the combination of having low-level resilience capacity (CDRS < 27) and also non-resilient outcome despite negative life stressful events in the past year (residual value < 0). Sleep wake pattern was measured by 7-day actigraphy, and sleep macrostructures were measured by the ambulatory polysomnography (Nox A1 and Nox SAS solutions). Comparisons and associations of sleep macrostructures and sleep wake pattern between resilience groups were conducted by the generalized linear model, with covariates adjusted.
Results: The non-resilient group had more anxiety and depressive problems, higher insomnia severity, but longer total sleep time, compared to the resilient group. When adjusted for age, sex, and apnea-hypopnea index, the greater REM sleep percentage and shorter REM sleep onset latency were associated with higher risk of non-resilience (REM%: B= 0.04, p=0.03; REM latency: B= -0.01, p=0.01). Besides, the non-resilient group also perceived themselves sleeping less and falling asleep longer than actual sleep time, than the resilient group.
Conclusion: REM sleep macrostructures and sleep misperception are associated with impaired resilience in insomnia disorder. Future studies should target examining the underlying mechanism explaining REM sleep, sleep misperception and resilience.
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0523

DOES SLEEP REACTIVITY MODERATE THE ASSOCIATION BETWEEN DAILY FLUCTUATIONS IN STRESS AND SLEEP ONSET AND MAINTENANCE PROBLEMS?

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Introduction: Sleep reactivity, or the tendency to experience sleep disturbances in response to stressful life events, is considered to be a vulnerability factor for insomnia. According to the sleep reactivity hypothesis, those individuals with high sleep reactivity tend to experience greater sleep onset and maintenance problems following a stressor. Few studies, however, have observed whether this phenomenon occurs at the daily level. That is, are day-to-day fluctuations in stress related to changes in sleep onset and maintenance problems among individuals with greater sleep reactivity?
Methods: Participants included 60 adults from the greater Northwest Arkansas area (63.9% White, 67.2% Female, 30-79 years old) who completed 10 consecutive days of sleep monitoring. Sleep was assessed objectively through actigraphy and subjectively through sleep diaries. Variables examined included actigraphy and diary based total sleep time (TST) and total wake time (TWT). Sleep reactivity was assessed using the Ford Insomnia Response to Stress Test (FIRST). Daily stress level was assessed using daily diaries. Participants were asked to rate how "stressed they were that day" on a scale of 1 (being not stressed at all) to 7 (being extremely stressed). Linear regression models were conducted with sleep variables as the outcome. Daily stress and FIRST scores were mean-centered and entered as independent variables. Race, gender, and age were entered as covariates.
Results: FIRST scores were associated with lower diary TST (β = -2.76, p = 0.02) and greater diary TWT (β = 0.18, p < 0.01). Daily stress was not found to be associated with any sleep variable. FIRST score was not found to moderate the relationship between daily stress level and diary TST (β = 0.63, p = 0.19), diary TWT (β = -0.03, p = 0.13), actigraphy TST (β = 0.54, p = 0.18), or actigraphy TWT (β = 0.07, p = 0.56).
Conclusion: While sleep reactivity (as assessed via the FIRST) has been consistently linked to greater risk for developing insomnia disorder, the data from the present study suggest that this effect may be cumulative and not observed at the daily level.
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0524

HOW ARE INSOMNIA SYMPTOMS ASSOCIATED WITH WORKING HOURS AND WORK PERFORMANCE IN NEW PARENTS?

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Introduction: The relationship between insomnia symptoms, productivity, and long working hours has been linked to poor sleep and diminished workplace performance. However, the literature remains sparse when it comes to new parents, a group uniquely vulnerable to sleep disturbances and facing delicate work transitions, such as returning from parental leave and managing work-life balance after the birth of a new child. This study addressed this literature gap, investigating the complex interplay between sleep, performance, and working hours in new parents.
Methods: Among Nanit camera users, we recruited 376 working parents (72% Mothers) of infants 1-7 months old (mean infant age 4.2 months). Participants completed the Insomnia Severity Scale (ISI; < 7 healthy; 7-14 Subclinical insomnia; >15 Clinical insomnia) and responded to questions relative to their employment status, performance at work in the past month (How would you rate your overall job performance on the days you worked during the past 28 days?1-10) and working hours. Data were analyzed using linear or multinomial regressions.
Results: Among parents, 10% reported symptoms of clinical insomnia, 38% subclinical and 52% no symptoms, with no significant differences between mothers and fathers. Mothers reported poorer work performance than fathers (β=-0.47±0.19,p< 0.001). Among mothers, those who had subclinical or clinical levels of insomnia reported poorer work performance in the last month than those with no insomnia symptoms (respectively β=-0.60±0.22,p=0.007; β =-0.98±0.35,p=0.005), but there were no associations in fathers. In addition, parents with subclinical levels of insomnia were more likely to report 'working more than expected' than those with no insomnia symptoms (respectively OR=1.9 CI:1.1-3.4), but the association was not significant when stratified by mothers and fathers. The number of working hours was not associated with perceived performance (p=0.4).
Conclusion: Insomnia symptoms in new parents were associated with poorer work performance and working more than expected, but working hours were not associated with performance. Further investigation is needed to better understand the relationship between overwork, performance and poor sleep in new parents.
Support (if any):

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0525

THE IMPACT OF LIFETIME TRAUMA ON SLEEP REACTIVITY IN ACUTE TRAUMA PATIENTS: THE ROLE OF VICTIMIZATION TRAUMAS

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Introduction: Sleep reactivity is a vulnerability to sleep disturbance after stress that increases risk for insomnia and myriad negative health outcomes. Previous research shows life stress can heighten sensitivity of the sleep system, exacerbating sleep reactivity. This study investigated the relationship between lifetime trauma exposure and sleep reactivity among patients hospitalized for acute trauma.
Methods: We recruited 88 patients hospitalized in Detroit, MI within one week following traumatic injury (Mage = 39.53 ± 14.31, 67.0% male, 67.0% Black). Patients reported their lifetime exposure to traumatic events using the Life Events Checklist for DSM-5 (LEC-5). We summed all positive trauma exposures to compute a "trauma load" variable, with greater scores indicating cumulative lifetime trauma experiences. Additionally, we computed three empirically derived clusters of trauma types previously shown to differentially correlate with mental health: Accidental/injury traumas (e.g. transportation accident),

victimization traumas (e.g. physical assault), and predominant death threat traumas (containing mostly death-related traumas, e.g. assault with a weapon). Participants reported their sleep reactivity using the Ford Insomnia Response to Stress Test (FIRST) and insomnia using the Insomnia Severity Index (ISI).
Results: Reactive sleepers (FIRST ≥ 20) reported significantly more traumatic life events (M number of events = 7.64 ± SD 3.72) than nonreactive sleepers (M number of events = 5.91 ± SD 4.12), p =.041. High sleep reactivity was uniquely associated with greater lifetime exposure to victimization trauma types (F(1, 84,) = 4.22, p =.043, ηp2 =.048), adjusting for sex and insomnia (ISI ≥ 11). Specifically, 59.0% of patients with a history of physical assault had high sleep reactivity, whereas 41.0% had low sleep reactivity (χ2 = 4.94, p =.026). Similarly, 69.0% of patients with a history of sexual assault had high sleep reactivity, whereas only 31.0% had low sleep reactivity (χ2 = 5.50, p =.019).
Conclusion: Acute trauma patients with high sleep reactivity report greater lifetime exposure to traumatic events, particularly physical and sexual assault. These results highlight the potential link between victimization traumas and increased sensitivity of the sleep system, independent of insomnia status, which may contribute to the development of insomnia and other negative health outcomes.
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0526

LONGITUDINAL BI-DIRECTIONAL RELATIONSHIP BETWEEN INSOMNIA SYMPTOMS AND FAMILY INVOLVEMENT AMONG FULL-TIME WORKERS

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Introduction: For full-time workers, family involvement (i.e., level of involvement in family activities) and sleep are important aspects of their nonwork life. While both sleep and family involvement may help buffer the effects of work demands on health, they also may affect each other. Specifically, greater involvement in family activities may disrupt or promote workers' sleep; meanwhile, having high-quality sleep may help workers have more energy and resources to devote to family activities after a day's work. In this study, we examined a potential bi-directional relationship between insomnia symptoms and family involvement among full-time workers in a longitudinal study.
Methods: We analyzed survey data from 199 full-time employees in the U.S. who provided ratings of their experience of four insomnia symptoms over the preceding few weeks (1 = to a very small extent, 5 = to a very large extent) and level of involvement in family activities across three waves with 6 weeks in between. Their average age was 38.2 years (SD = 8.5), 78.9% were white, and 69.3% were male. These employees reported working an average of 41.8 hours per week and came from a variety of industries, including manufacturing (16.1%), finance (15.1%), medical/social services (14.1%), service (13.1%), education (12.1%), and information technology (10.1%).
Results: We performed cross-lagged panel analyses to examine the lagged associations between insomnia symptom severity (averaged across the four items) and subsequent family involvement (while controlling for previous level of family involvement, hours worked per week, industry, age, sex, and race) and between family involvement and subsequent insomnia symptom severity (while controlling for previous insomnia symptom severity, hours worked per week, industry, age, sex, and race). Greater insomnia symptom severity was negatively associated with lower subsequent family involvement (b= -0.11, SE=.03, p <.01), but family involvement was not significantly associated with subsequent insomnia symptoms (b= -0.02, SE=.05, p =.739).
Conclusion: Our findings suggest that insomnia symptoms may decrease workers' involvement in family activities, perhaps by decreasing workers' energy and resources to cope with work demands. In contrast, involvement in family activities may not affect workers' sleep quality.
Support (if any): N/A

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0527

DIFFERENCES IN SUBJECTIVE AND OBJECTIVE MEASURES OF SLEEP BY MARITAL STATUS IN A SAMPLE OF US VETERANS

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Introduction: Marriage confers a degree of benefit for a range of health factors, including sleep behaviors and outcomes. Veterans are more likely to report sleep difficulties (e.g., insomnia) and have less social support than the general population. As such, it is important to examine associations between marital status and the occurrence of sleep issues among veterans.
Methods: This study utilizes baseline visit data from veterans in Los Angeles reporting sleep concerns who were enrolled across four structured cognitive behavioral therapy for insomnia intervention trials. Measures included the Pittsburgh Sleep Quality Index (PSQI) total and factor scores, Insomnia Severity Index (ISI), sleep efficiency (measured with actigraphy), and the Patient Health Questionnaire (PHQ-9). Overall, 1,411 veterans had available data (74.1% male; mean age: 63.4 years; 43.3% married/living as married, 21.9% separated, 17.0% single/never married, 10.5% divorced, 7.2% widowed). Multilevel models were constructed to evaluate associations between marital status

and sleep measures after controlling for sex, age, and depressive symptoms. Individuals were nested within the four different sleep trials and "married" served as the reference group.
Results: Multilevel modeling showed that separated individuals had scores indicative of worse sleep compared to married individuals (PSQI total score: β = 0.18, p <.01, N = 1,181; PSQI Sleep Efficiency factor score: β = 0.18, p =.017, N = 1,188; sleep efficiency per actigraphy: β = -0.23, p = 0.014, N = 845). Differences by marital status were not found for the PSQI Perceived Sleep Quality factor, PSQI Daily Disturbances factor, or ISI. Divorced, widowed, and single/never married compared to married did not show differences for any of the sleep measure outcomes.
Conclusion: Using cross-sectional data, we found that veterans who are separated have more severe sleep concerns compared to veterans who are married/living as married. Given this difference, separated veterans may represent a group that are particularly at-risk for sleep difficulties and they may benefit from evaluation of sleep concerns and management of sleep disorders. Findings align with past work showing that marital status can impact measures of health.
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0528

JOB DEMANDS AND JOB CONTROL: LINKS WITH SUBJECTIVE AND OBJECTIVE SLEEP QUALITY IN A COMMUNITY-BASED COHORT

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Introduction: Existing research links higher levels of perceived job demands (i.e., aspects of work that require workers' efforts, including physical demands and psychological demands) and lower levels of perceived job control (i.e., aspects of work over which employees can exert control, including decision authority and skill discretion) with poorer sleep quality. However, prior studies primarily have focused on self-reported, rather than objectively measured, sleep quality. We examined the associations of job demands and job control with both self-reported and actigraphic sleep quality.
Methods: We analyzed data from 269 participants (52.2±6.1 years, 61% female, 36.8% non-white) in the Baltimore Epidemiologic Catchment Area (ECA) Study who participated in Waves 4 (2004-05) and 5 (2016-22), reported being employed, had complete job demands and control data at Wave 4, and completed the Pittsburgh Sleep Quality Index (PSQI) and 7.0±1.3 nights of wrist actigraphy at Wave 5. We examined associations between Wave 4 job demands and control and Wave 5 PSQI global scores (higher scores indicate poorer sleep quality) and Wave 5 actigraphic sleep efficiency using multivariable linear regression models that adjusted for age, sex, race, education, and self-reported total sleep time in a 24-hour period at Wave 4.
Results: In adjusted analyses, higher psychological demands at work were associated with lower PSQI global scores (b= -0.28, p <.05). Both higher psychological demands (b= 0.64, p <.05) and decision authority (b= 0.77, p <.05) were associated with higher actigraphic sleep efficiency. Physical demands and skill discretion were not associated with PSQI global scores (b= 0.13, p=0.07 and b= -0.12, p=0.25, respectively) or actigraphic sleep efficiency (b= -0.22, p=0.15 and b= -0.11, p=0.62, respectively).
Conclusion: In a community-based sample of working adults, higher levels of perceived psychological job demands were associated with better self-reported sleep quality and actigraphic sleep efficiency, and higher perceived decision authority was linked to higher actigraphic sleep efficiency. Findings suggest that higher levels of psychological demands and decision authority may allow workers to be more engaged at work, develop better sleep patterns to recover from work, and experience better sleep quality.
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0529

GEOGRAPHIC AND DEMOGRAPHIC DISTRIBUTION OF AN INSOMNIA PHENOTYPE IN THE ALL OF US RESEARCH PROGRAM

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Introduction: Insomnia is common among adults, but individuals' experiences with the condition may not be well-reflected in electronic health records (EHRs). This leads to inconsistencies when using these codes alone to study insomnia. A computable phenotype for insomnia incorporating diagnosis codes, drug codes, and self-reported insomnia status could help us better understand the condition at the population level. This study aimed to use both EHR data and survey responses to understand the prevalence, geographic distribution, and demographic correlates of insomnia in a large cohort of adults in the All of Us Research Program.
Methods: Data from 99,824 participants who responded to the Personal/Family Health History survey and provided EHR and genomic sequencing data were included. We used an algorithm to identify individuals meeting a stringent (≥2 insomnia condition codes and ≥1 drug code in the EHR) or a broad (≥1 condition codes, drug codes, or self-reported insomnia) definition of insomnia. We estimated the overall clinical prevalence for each definition of insomnia among all participants, and stratified by sex, race, ethnicity, and geographic location.
Results: From included participants, 29,972 (30%) met the broad definition for insomnia and 17,596 (17.6%) met the stringent definition. For both definitions, groups that were overrepresented among insomnia cases relative to their proportion of the sample population included males, those identifying with a sex other than male or female, Non-Hispanic individuals, those identifying with an ethnicity other than Hispanic or Non-Hispanic, and White individuals. Black individuals were overrepresented among insomnia cases when the stringent, but not broad definition was used. Among U.S. states, Kansas had the highest insomnia prevalence according to both definitions (55.71% for

broad and 39.5% for stringent), and North Dakota had the lowest (5.5% and 0%, respectively).
Conclusion: Using the broad definition resulted in a much greater estimated insomnia prevalence, reinforcing the idea that insomnia is underdiagnosed and underreported in EHRs. However, both definitions produced similar demographic and geographic trends. Further research should involve validating the algorithm used in this study to identify individuals with insomnia.
Support (if any): All of Us Research Program is supported by the NIH, Office of the Director.

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0530
WHEN PAIN MEETS PLACE: UNDERSTANDING RURALITY'S IMPACT ON FATIGUE AND SLEEP DISTURBANCES

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Introduction: A long-standing body of research supports the intricate relationship between chronic pain, fatigue, and sleep, yet these complex variables are not uniform among different populations. Moreover, many rural individuals experience health disparities related to sleep, fatigue, and pain, which may be related to limited care access. Herein, we examined whether urbanity/rurality moderated the relationship between pain and sleep disturbance and pain and fatigue in women with pain complaints.
Methods: Women (N=261, Mage=41.8, SD=13.9, 61% urban) with sleep and pain complaints completed surveys during the baseline assessment of an RCT in mid-Missouri. Measures included sleep (PROMIS-Sleep Disturbance, fatigue (PROMIS-Fatigue), pain (McGill Pain Questionnaire), and rurality (Y/N, according to Census Bureau data for 2020 as reported by Rural Health Information Hub's Am I Rural? tool). Using SPSS PROCESS, we examined moderation analyses while controlling for age, employment status (Y/N), and whether individuals live in a low-income area (Y/N) based on the Human Resources and Services Administration low-income city service area designation as specified by the Am I Rural? Tool.
Results: A significant interaction was found between pain and rurality predicting fatigue, $F(1, 252)=8.72$, $p=.003$. Greater pain was associated with greater fatigue in only rural individuals, $\beta=0.21$, $t(252)=4.72$, $p<.001$. Similarly, there was a significant interaction between pain and rurality predicting sleep disturbances, $F(1, 252)=5.78$, $p=.012$. This was only observed in rural individuals, $\beta=0.34$, $t(252)=3.40$, $p<.001$, such that increased pain was related to increased sleep disturbances.
Conclusion: Living in rural areas may increase the risk of experiencing increased pain, fatigue, and sleep disturbance. While this may be partly due to limited access to care, future studies should utilize longitudinal and experimental methodology to determine the causality of these relationships and examine physiological measures of sleep and pain. Further exploration is important for targeted support and consideration of disparities (including access to care) in women struggling with pain, sleep, and fatigue in rural areas.
Support (if any): National Institute of Nursing Research (NR01768; Clinical trial: NCT03744156; PI: McCrae)

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0531
RACIAL AND ETHNIC DISPARITIES IN INSOMNIA DIAGNOSIS AND TREATMENT AMONG COLLEGE STUDENTS

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Introduction: The aim of this study was to explore racial and ethnic disparities in clinical insomnia diagnosis among college students. Our a priori hypothesis suggests that cultural stigmas, limited awareness, and other systemic barriers disproportionately affect students from marginalized racial groups in obtaining a clinical insomnia diagnosis. These disparities have significant implications for access to medical treatment and care.
Methods: This study utilized data from the ACHA-NCHA, a national cross-sectional survey of U.S. college students, collected between Fall 2019 and Spring 2023. Insomnia was identified based as experiencing one or more self-reported symptoms at least four or more times per week, including taking over an hour to fall asleep, difficulty falling asleep, or trouble staying asleep. Participants also reported clinical insomnia diagnoses, medical provider visits within the past year, and current treatment status. Racial and ethnic groups were self-reported and non-mutually exclusive. Logistic regression was used to examine the likelihood of clinical insomnia diagnoses across racial and ethnic groups among those reporting insomnia symptoms.
Results: A total of 180,929 students participated in the survey, with most participants being white (58.5%). The regression revealed that students with insomnia symptoms from marginalized racial groups were significantly less likely to receive a clinical diagnosis compared to white students with insomnia symptoms. Specifically, Asian students had an odds ratio (OR) of 0.582 (95% CI [0.535, 0.633]), Black students had an OR of 0.699 (95% CI [0.585, 0.730]), and Hispanic students had an OR of 0.654 (95% CI [0.646, 0.755]).
Conclusion: This approach highlights the gap between experiencing insomnia symptoms and reporting a formal diagnosis, underscoring inequities in healthcare access and awareness among different racial groups. Given that most research on insomnia focuses on individuals already receiving care, further investigation is needed into students experiencing insomnia symptoms but lacking access to care. Understanding these underserved populations is crucial, as treatment approaches may differ for those unable to engage with healthcare services.
Support (if any):

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0532
ASSOCIATION BETWEEN ACCULTURATIVE STRESS AND INSOMNIA SEVERITY AMONG SPANISH-SPEAKING LATINOS IN FLORIDA

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Introduction: Latinos, particularly those who have recently migrated to the United States, often encounter significant acculturation stressors while adapting to the U.S. culture, language, and environment. These challenges, in turn, can negatively impact sleep quality and duration while exacerbating the prevalence of sleep disorders. Our primary focus was to study individuals who primarily speak Spanish, as individuals who do not speak English often experience heightened acculturative stress due to the language barrier. This study aims to explore the relationship between acculturative stress and insomnia severity among a Spanish-speaking population residing in Florida.
Methods: Survey data were collected from the Determinants, Outcomes, Responses, and Markers of Insufficient Sleep in Rural-Urban (DORMIR) study at the University of Miami. Acculturation stress levels were assessed using the Multidimensional Acculturative Stress Inventory (MASI), where higher scores indicate greater levels of stress. Insomnia symptoms were assessed using the Insomnia Severity Index (ISI), a self-reported instrument designed to measure the nature, impact, and severity of insomnia. Both MASI and ISI scores were gathered from a sample of 231 Spanish-speaking adults residing in Florida. ISI scores were regressed on MASI scores using linear regressions, adjusting effects of age, sex, race/ethnicity, Hispanic origin, marital status, income, education, employment, and Body Mass Index.
Results: A one-unit increase in MASI scores (min, max = 0, 109) was associated with a 0.15 increase in ISI scores (b [95% Confidence Interval]: 0.14 [0.08, 0.20], p< 0.001). Of the individual items of the MASI, experiences of being treated rudely or being discriminated against due to English ability, discomfort with English, not feeling accepted by Americans, being expected to know of American ways, and feeling looked down upon if individuals practice Latino customs each were associated with 2 points or higher on the ISI per unit increase.
Conclusion: The study shows that acculturative stress is significantly associated with insomnia severity scores among Spanish speaking populations living in Florida. In these populations, increased acculturation stress may help explain the etiology of insomnia. Future research may investigate modifiers of this association, such as by age or sex or native English or Spanish speaker.
Support (if any): R01HL152453, R01HL142066, R01HL095799, R01MD016236, R01MD016236-03S1, R01MD004113, R01AG072644

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0533

INSOMNIA SEVERITY, SLEEP RELATED IMPAIRMENT, AND DIET QUALITY AMONG BLACK ADULTS IN THE US

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Introduction: Adequate sleep and a healthy diet are known to play beneficial roles in cardiometabolic health. However, there is limited epidemiological evidence of this relationship among Black adults, potentially contributing to higher rates of cardiometabolic diseases. This study investigated the associations between 1) diet quality and insomnia severity and 2) diet quality and sleep-related impairment (SRI).
Methods: Baseline data was obtained from 534 Black participants (females 64%; age range 18-75 years) who were enrolled in the NIH-funded study, ESSENTIAL. The Insomnia Severity Index (ISI) and the Patient-Reported Outcomes Measurement Information System-SRI (PROMIS-SRI) were used. Diet quality was assessed via the Rapid Eating Assessment for Participants–Short Form (REAP-S); higher scores indicated a healthier diet quality. Using the REAP-S, we also calculated separate categories for healthy and unhealthy diet quality; lower scores indicating lower vs. higher consumption, respectively. Multivariate linear regression models were used to evaluate the associations between diet quality (predictor variable) with insomnia symptoms and SRI (outcome variables). Adjusted covariates included age, sex, education, body mass index, and marital status.
Results: Mean (SD) scores for ISI and SRI were 16.97 (7.03) and 53.64 (8.72), respectively. The total mean REAP-S score was 26.22 (5.03), indicating a lower average score compared with the United States mean of 32. Multivariate regression analysis revealed that higher ISI scores were associated with lower total diet quality (β = -0.20, p = 0.002) and a lower unhealthy diet score (β = -0.43, p = 0.002), indicating increased intake of unhealthy foods. Similarly, higher SRI scores were associated with lower total diet quality (β = -0.30, p = 0.0002), lower unhealthy diet scores (β = -0.58, p = 0.001), and lower healthy diet consumption (β = -0.70, p = 0.003).
Conclusion: Inverse relationships were observed between diet quality and both insomnia and sleep-related impairment among Black adults. Future studies should examine dietary patterns and metabolic outcomes among larger, more diverse populations.
Support (if any): 5T32HL166609-02, U24DK132733, R01HL142066

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0534

MENTAL HEALTH SYMPTOMS AND INSOMNIA IN APPALACHIA: DEPRESSION AS A KEY MEDIATOR OF SOCIAL SUPPORT EFFECTS

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Introduction: Appalachian Kentucky experiences disproportionate rates of both sleep and mental health disorders. While the relationship between mental health and sleep is well-documented, the complex interplay between social support, mental health symptoms, and insomnia severity remains poorly understood, particularly in rural populations facing multiple health disparities. This study examined associations between mental health symptoms (i.e., anxiety, depression, perceived stress) and insomnia severity in Appalachian adults. Given the well-established associations between depression, social support, and insomnia, we additionally investigated depression as a key mediator between social support and insomnia.
Methods: Data were collected from the Researching Equitable Sleep Time in Kentucky Communities (REST-KY) study, a longitudinal study of sleep and health disparities in Appalachian

Kentucky. In Wave 1, data were collected from 306 adults across 12 Appalachian Kentucky counties via REDCap surveys. Measures included the following well-validated scales: Insomnia Severity Index (ISI), Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), Perceived Stress Scale (PSS), and modified Medical Outcomes Study Social Support Survey (mMOS-SS). Analyses adjusted for living alone, age, sex, income, use of sleep medications (yes/no), polypharmacy (i.e., 5+ medications [yes/no]).

Results: Of the 270 participants who completed the ISI (Mage 46.0 [range = 18-81]), most were white (97.4%) women (79.9%) Higher symptoms of depression (r=0.63, p< 0.001), anxiety (r=0.51, p< 0.001), and perceived stress (r=0.48, p< 0.001) were strongly associated with greater insomnia severity. After covariate adjustment, each one-point increase in PHQ-9, GAD-7, and PSS scores was associated with 0.6, 0.5, and 0.3-point increases in the insomnia severity index, respectively. Mediation analysis revealed that depressive symptoms mediated 62% of the total effect of social support on insomnia severity (p=0.007).

Conclusion: In this sample of Appalachian Kentucky adults, symptoms of depression, anxiety, and perceived stress were all significantly associated with greater insomnia severity. Depression, known to be highly prevalent in this population, significantly mediated the relationship between social support and insomnia severity. These findings suggest that addressing mental health symptoms, particularly depression, may be crucial for improving sleep outcomes in this underserved region and culturally tailored interventions that simultaneously target both social support and depression may be particularly effective.

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0535

EVERYDAY DISCRIMINATION EXPERIENCES AND INSOMNIA SEVERITY, STRATIFIED BY SEX, AMONG BLACK INDIVIDUALS LIVING IN NEW YORK CITY AND MIAMI

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Introduction: Although emergent research has explored relationships between everyday discrimination (EDS) and insomnia severity (ISI), little is known about whether discrimination impacts sleep differently across diverse demographic groups such as sex. Biological males and females tend to have differing insomnia severity, and discrimination may impact this relationship in unique ways. By sex, this study investigates the associations of EDS experiences with insomnia among Blacks living in two urban cities, New York and Miami.

Methods: Cross-sectional survey data were extracted for 382 Blacks, ages 18 to 75 years, who were enrolled in the NIH-funded study ESSENTIAL, which investigates psychosocial and environmental determinants of insufficient sleep and associations with adverse health outcomes. Ordinary Least Squares (OLS) linear regression analyses examined sex-stratified associations between EDS and ISI. Adjustment covariates included age, Body Mass Index, education, income, marital status, employment, and ethnicity. Post-hoc regression analyses assessed non-linear relationships between spline-modeled EDS and ISI. Nine sex-stratified linear regressions were conducted as follow up to assess associations in each EDS item. Results were evaluated qualitatively.

Results: in the sample, 68% were female (Meanage = 39.0±12.7[Meanage for males was 42.4±13.3]). Among females, greater everyday discrimination was significantly associated with greater insomnia severity (β=0.115, 95% CI [0.039, 0.191], p = 0.003). However, among males, analyses revealed that greater everyday discrimination was not significantly associated with greater insomnia severity (β=.075, 95% CI [-0.035, 0.184], p = 0.178). In subsequent analyses, we further observed a potential non-linear relationship between EDS and ISI among females. Qualitative assessment of the EDS items on ISI suggested that seven of the nine point components may have a greater association in females than males.

Conclusion: Discrimination may be a contributing factor to sleep disparities among Blacks, potentially moderated by sex. For females (but not for males), every unit increase in EDS was associated with a unit increase in ISI. Understanding how Black males and females differentially conceptualize insomnia and/or their experiences with discrimination is imperative for the development of tailored interventions to reduce sleep health disparities among these groups. Future investigations should explore the gendered experience of discrimination and insomnia which may differ by sex.

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0536

LIVING ARRANGEMENTS AND INSOMNIA IN RURAL APPALACHIA: THE ROLE OF SOCIAL SUPPORT

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Introduction: Appalachian Kentucky faces significant sleep health disparities, including higher rates of insomnia. In this region, where family connections and multigenerational households are culturally valued, living alone may contribute to sleep difficulties. However, the mechanisms linking living arrangements to sleep health in this population remain understudied. This study examined the association between living alone and insomnia severity and investigated whether social support mediates this relationship in a region already experiencing substantial health disparities.

Methods: Data were collected from the Researching Equitable Sleep Time in Kentucky Communities (REST-KY) study, a longitudinal study of sleep and health disparities in Appalachian Kentucky. In Wave 1, 306 adults from 12 counties completed REDCap surveys containing numerous validated scales including the Insomnia Severity Index (ISI) and modified Medical Outcomes Study Social Support Survey (mMOS-SS). Living situation was self-reported. Multiple linear regression models adjusted for age, sex, income, sleep medication use, and polypharmacy (5+ medications). Mediation analysis examined social support as a mediator between living alone and insomnia severity.

Results: 270 participants completed the ISI; most were middle-aged (MAge=46.0 range = 18-81]) white (97.4%) women (79.9%). Participants living alone (n=52) reported significantly

higher insomnia severity compared to those not living alone (mean ISI: 14.6 vs 11.1, p< 0.001). Living alone was also associated with lower overall social support (mean: 3.35 vs 4.16, p< 0.001). After covariate adjustment, living alone remained significantly associated with higher insomnia severity (p< 0.001). Mediation analysis indicated that living alone had a significant total effect on insomnia severity (p=0.017), with living alone leading to higher insomnia severity. A significant proportion of this effect (approximately 32%) was mediated through social support (p=0.027).
Conclusion: Living alone is associated with higher insomnia severity in this sample of Appalachian adults, with social support playing a significant mediating role. Findings highlight the importance of social connections for sleep health in a region where family ties are culturally central and sleep disparities are overrepresented. Interventions targeting social support, particularly for those living alone, may help address sleep disparities in Appalachian Kentucky. Future research should explore culturally-tailored approaches to enhance social support and improve sleep health in this underserved population.
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0537

"SINGLE-SHOT" COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA (CBT-I) IS RELATED TO IMPROVEMENTS IN SLEEP ONSET AND MAINTENANCE PROBLEMS

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Introduction: Although more than half of primary care patients endorse insomnia symptoms, few options are available to manage their sleep continuity disturbance. CBT-I is the first line treatment for insomnia, but a standard course of at least 6 sessions is typically not feasible in primary care settings. The present RCT investigated a "single shot" version of CBT-I in primary care patients suffering from clinically elevated insomnia symptoms.
Methods: Forty-one primary care patients (Mage = 26.2, SDage = 9.4; 70.7% women, 73.2% White) at an integrated behavioral health center were enrolled in the current study and randomly assigned to either one session of CBT-I or one session of an attentional control condition. Daily sleep diaries were used to assess changes in total wake time (TWT = SL+WASO+EMA) and sleep efficiency (%SE) at (1) baseline, (2) one-week post-treatment, and (3) one-month post-treatment. Insomnia symptoms (ISI) and depression symptoms (PHQ-8) were also assessed at baseline and one-month post-treatment.
Results: The final analyses included data from 37 patients (CBT-I = 17, control = 20), after 4 patients were lost to follow-up. Compared to the control group, patients who received one-session of CBT-I reported greater improvements in TWT (t(33) = -2.54, p<.01; mean difference = -42.64; Cohen's d = -0.86) and %SE (t(33) = 1.80, p<.05; mean difference = 0.05; Cohen's d=0.61) from baseline to post-treatment. The CBT-I patients continued to show greater improvements through the 1-month follow-up in TWT (t(30) = -4.11, p <.001; mean difference = -73.28; Cohen's d = -1.46) and %SE (t(30) = 3.18, p<.01; mean difference = 0.12; Cohen's d = 1.13). There was also greater improvement for patients in the CBT-I group on ISI scores (t(30) = -1.85, p<.05; mean difference = -2.65; Cohen's d = -0.66) and PHQ-8 scores (t(29) = -2.29, p<.05; mean difference = -3.70; Cohen's d = -0.83) from baseline to 1 month follow-up.
Conclusion: The present study provides preliminary data to support the use of "single-shot" CBT-I in primary care settings. Furthermore, results suggest that this one-session version of CBT-I may provide a potential benefit beyond sleep by also having meaningful effects on depression symptoms.
Support (if any): K23-HL141581

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0538

A RANDOMIZED CONTROLLED TRIAL OF CBT-I IN VETERANS IN EARLY RECOVERY FROM ALCOHOL USE DISORDER

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Introduction: Although insomnia increases relapse risk in early recovery from Alcohol Use Disorder (AUD), no adequately powered clinical trial has evaluated the efficacy of Cognitive Behavioral Therapy for Insomnia (CBT-I) on either insomnia or alcohol outcomes in a largely African-American sample. Objectives: 1) To determine the efficacy of CBT-I for improving insomnia, alcohol-related outcomes, and daytime functioning at post-treatment and at 3- and 6-month follow-up; 2) Evaluate whether improvement in insomnia is associated with a reduction in alcohol-related outcomes post-treatment.
Methods: Design: A randomized, controlled clinical trial of CBT-I compared to Quasi-Desensitization therapy (QDT), conducted between 2015 and 2020, with assessments at baseline, end of treatment (8 weeks), and 3- and 6-month post-treatment (Clinicaltrials.gov # NCT01987089). Setting: Outpatient addiction psychiatry clinic at an urban VA Medical Center. Participants: 63 veterans (51.6±9.6 years, 58 men (92.1%), 52 African-Americans (82.54%) with insomnia and past-year AUD. Intervention(s): Eight weekly in-person sessions of either CBT-I (n=31) or QDT (n=32). Main Outcome(s) and Measure(s): Primary outcomes were the Insomnia Severity Index score (ISI), and Percent Days Abstinent (PDA, from the Timeline Follow Back interview). Secondary outcomes were sleep diary variables, drinks per day, percent non-heavy drinking days, Penn Alcohol Craving Scale score, and scores from the 12-item Short Form scale (SF-12), Beck Depression Inventory and Trait subscale from the State-Trait Anxiety Inventory.
Results: Post-treatment data were obtained from 88.9% of participants. Although CBT-I was efficacious in improving insomnia with effect sizes (E.S.) larger than the meta-analytic estimates, QDT was equally efficacious in improving insomnia (E.S.=-1.63 vs. -1.50), improving abstinence (E.S.=1.54 vs. 1.91) and next-day functioning (E.S.=-0.26 vs. -0.17). Across treatment groups, remission from insomnia was associated with a lower post-treatment alcohol craving score at 8 weeks (2.8, 95% CI=1.1, 4.4 vs.

9.5, 95% CI=6.1, 13.0 in non-responders), an effect that persisted for 6 months after treatment.
Conclusion: CBT-I and QDT are equally effective for treating insomnia during early recovery from AUD. Reduced alcohol craving may be a mechanism by which a remission from insomnia improves drinking outcomes.
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0539

COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA IN VETERANS WITH MILD TRAUMATIC BRAIN INJURY

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Introduction: Recent meta-analyses show that 30-70% of individuals with a history of traumatic brain injury (TBI) suffer from persistent sleep disturbances. Further, more than 80% of all TBI cases are mild (mTBI) and report more insomnia than those with moderate-to-severe TBI. Given the positive track record of Cognitive Behavioral Therapy for Insomnia (CBT-I) in other conditions, CBT-I could also be an effective treatment for insomnia in those with mTBI, despite common comorbidities.
Methods: In this RCT (NCT03261674) veterans (n=110, 29.1 % female, 51.2±11.5 years old) were randomized to either CBT-I or an active control involving pseudo desensitization. During the treatment, participants had access to a therapist for six 60-minute sessions, once per week, for six consecutive weeks. Treatment was remotely delivered nationwide via telehealth. Independently living veterans with chronic (>3 months since injury) mTBI and insomnia were included in the trial. Comorbid post-traumatic stress disorder (PTSD) was permitted. Central nervous system-active medications were allowed as long as the dose, timing, and formulation were stable (≥ 3 weeks pre-treatment). All sleep measures were based on self-report. The primary outcome measure was the Insomnia Severity Index (ISI) and treatment effects were tested using intent-to-treat analyses based on linear mixed effects models with data derived from multiple imputations.
Results: CBT-I was associated with significantly greater improvement in ISI (p <.001, Beta=0.59) compared to controls. At post treatment, CBT-I had > 8-point reduction of ISI from 16.4±3.6 to 7.4±5.3; controls only improved moderately from 15.6±4.6 to 10.2±6.2. Pre-post improvements in CBT-I were accompanied with improved (p's <.001) sleep efficiency (+12.1±12.0 %), mental health (SF-36 mental component score, -4.8±12.3), depression (PHQ-8, -4.2±5.2), and reduced time in bed (-1.0±1.3 h), wake after sleep onset (-32.6±33.6 min), sleep onset latency (-30.4±42.1 min), early morning awakenings (-28.2±42.2 min) while total sleep time remained virtually unchanged (+0.1±1.3 h).
Conclusion: Despite high rates of co-morbid PTSD and cognitive difficulties associated with mTBI, CBT-I remains a robust treatment for insomnia in this group. Future efforts should focus on increasing accessibility of CBT-I for individuals who have recently sustained a mTBI.
Support (if any): VA REHABILITATION RESEARCH & DEVELOPMENT

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0540

COMPARATIVE EFFECTIVENESS OF MEDICATION, DIGITAL CBT-I (DCBT-I), AND COMBINED THERAPY FOR INSOMNIA IN RURAL ADULTS

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Introduction: Cognitive Behavioral Therapy for Insomnia (CBT-I) is the recommended first-line treatment for insomnia, but medications remain widely used. Limited evidence suggests combination treatment may capitalize on the advantages of each treatment. However, CBT-I, medication, and combination treatment are rarely compared, and empirical evidence to support best clinical practice with these modalities remains sparse. The COZI study addressed these evidence gaps.
Methods: COZI was a multi-center 3-arm randomized comparative effectiveness trial conducted in primary care settings. Participants were 155 rural U.S. adults aged 23-80 years old with chronic insomnia, randomized to: 1) medication (patient/provider preference of trazodone or zolpidem); 2) digital CBT-I (dCBT-I); or 3) combination of medication+dCBT-I. Treatment outcomes were measured at 9 weeks, 6 and 12 months. The primary outcome was the Insomnia Severity Index (ISI) score. Secondary outcomes included treatment response (defined as □6-point decrease in ISI score) and the Pittsburgh Sleep Quality Index (PSQI) score.
Results: All groups experienced significant, large reductions in ISI scores at all time points. At 6 months, combination therapy (ΔISI=10.2) showed a significant advantage over dCBT-I (ΔISI=7.8) or medication (ΔISI=8.0) alone (both pairwise comparisons Ps< 0.05). These comparisons were not statistically significant after correction for multiple comparisons. Combination therapy showed significantly higher treatment response rates (81.3%) compared to medication alone (57.4%). Combination therapy also showed significantly larger reductions in PSQI scores at all time-points compared to medication alone. Among the 79.4% of participants whose pre-randomization preferred medication was trazodone, both trazodone alone and combined trazodone+dCBT-I were effective in reducing ISI. Side effects were minimal in all groups.
Conclusion: All three treatments showed robust effectiveness for chronic insomnia in primary care practices. Medication and dCBT-I were effective for the treatment of chronic insomnia, but their combination may result in significantly greater effectiveness.
Support (if any): This work was supported through a Patient-Centered Outcomes Research Institute (PCORI) Award (CER-2018C2-13262: "Comparative Effectiveness of Zolpidem/Trazodone and Cognitive Behavioral Therapy for Insomnia in Rural Adults" (COZI). DISCLAIMER: All statements in this report, including its findings and conclusions, are solely those of the authors and do not necessarily represent the views of PCORI, its Board of Governors or Methodology Committee.

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0541

DIGITAL CBT FOR INSOMNIA IS LINKED TO REDUCTIONS IN HEALTHCARE USE IN REAL-WORLD SETTINGS AT HENRY FORD HEALTH

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Introduction: Digital CBT-I offers a scalable solution for insomnia treatment, but evidence of its real-world adoption and impact in U.S. clinical settings is limited. This study evaluates the implementation and effects of digital CBT-I within a U.S. healthcare system, utilizing Normalization Process Theory to integrate it into clinical workflows. We compare healthcare utilization between patients who engaged with digital CBT-I and those who were offered but did not use it.

Methods: Patients with insomnia were offered digital CBT-I via electronic and clinical workflows at the Internal Medicine and Sleep clinics within Henry Ford Health, Detroit, Michigan. Normalization Process Theory guided implementation. Electronic order rates and patient sign-ups assessed implementation success and workflow acceptability. Clinician training sessions and educational materials supported uptake. A propensity-matched case-control design compared healthcare utilization rates between 340 digital CBT-I users and 340 matched controls, who were offered digital CBT-I but did not use it. We analyzed patient chart data and standardized time across patients. We evaluated the odds of medication fills and visits before and after.

Results: A total of 340 patients utilizing digital CBT-I from treating practitioners were matched with 340 controls who did not. Digital CBT-I patients exhibited a 64% reduction in medication fills (for any condition) during the post-treatment period relative to before ($p < 0.001$), and were 53% less likely to fill insomnia-specific prescriptions compared to pre-treatment ($p=0.013$). Controls showed no significant changes. Time-varied logistic regression indicated that digital CBT-I patients had 37% higher odds of using outpatient services within the initial 30-60 days ($p=0.048$), but subsequently showed 28% lower odds at 120-150 days ($p=0.041$), and 41% lower odds at 150-180 days ($p=0.039$).

Conclusion: Normalization Process Theory effectively facilitated the integration of digital CBT-I into clinical workflows, providing immediate access with minimal workflow disruptions. Training sessions and ongoing clinician reminders promoted patient uptake of standard care for insomnia management. Findings indicate that digital CBT-I is associated with reduced medication fills and decreased odds of outpatient visits over time, suggesting its potential as an effective, scalable treatment for insomnia in clinical settings.

Support (if any): Big Health Inc. provided access to SleepioRx for Insomnia at no cost.

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0542

EARLY FINDINGS FROM A NON-INFERIORITY TRIAL COMPARING TRADITIONAL VS. PROVIDER-GUIDED ASYNCHRONOUS DIGITAL CBTI

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Introduction: CBTI is the first-line recommended treatment for insomnia. However, the impracticability of CBTI protocols in real-world clinical settings and the scarcity of trained providers create significant CBTI capability gaps. This ongoing non-inferiority trial aims to compare CBTI as usual (CAU) and provider-guided asynchronous CBTI (PGAC) delivered via a clinical decision support platform in service members (SMs) diagnosed with insomnia who are receiving sleep care in a military treatment facility. Here, we report early observations on the primary outcomes of interest: the magnitude of improvements in insomnia severity, depression, and anxiety after 6 weeks of initiating treatment relative to baseline in CAU and PGAC.

Methods: Participating SMs were randomized to CAU (n = 38) or PGAC (n = 38). Clinical psychologists delivered CBTI in both groups. The CAU group received in-person CBTI, whereas PGAC was delivered via the COAST clinical decision support platform. At baseline and post-treatment, all participants completed the Insomnia Severity Index (ISI), the PHQ2 (depression), and the GAD2 (anxiety).

Results: All 38 PGAC patients (10 women; mean age = 32.9 + 8.5; baseline ISI:19 + 4.6; 20 endorsing current shift work) and 33/38 CAU patients (8 women; mean age 31.3 + 7.3; baseline ISI 18.7 + 4.7; 13 endorsing current shift work) initiated treatment. Six-week data was available for 94% of CAU participants and 87% of PGAC participants. At 6 weeks, the PGAC group showed greater improvements in insomnia (4.1 + 4.1) relative to CAU (1.7 + 5.7; Cohen's d = 0.48; 95% C.I: 0.01 - 0.96). At baseline both groups endorsed subclinical levels of depression and anxiety; and there was no significant change in depression and anxiety at the 6-week timepoint.

Conclusion: These preliminary findings suggest that PGAC delivered via a clinical decision support platform may be non-inferior to traditional CBTI. Tech-enabled PGAC could address current CBTI capabilities gaps in military and civilian healthcare settings and offer an additional option in an insomnia stepped care model. Ongoing follow-up data collection will ascertain non-inferiority, and the durability of benefits observed with PGAC and CAU over time.

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0543

HEALTH AND SLEEP OUTCOMES IN TRIAGED STEPPED-CARE FOR INSOMNIA: SECONDARY OUTCOMES FROM THE RESTING STUDY

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Introduction: Given the worldwide shortage of providers trained to deliver cognitive behavior therapy for insomnia (CBT-I), digital CBT-I (dCBT-I) may increase access to CBT-I. Determining how best to allocate digital and therapist-led resources is needed. Encouragingly, the parent study established the validity of a

Triage Checklist to classify patients projected to do better if they start treatment with a therapist (tCBT-I) compared to dCBT-I. The goal of the present study was to examine the impact of this triaged stepped-care approach on mental health, physical health, and sleep outcomes from baseline to 12-month follow-up.
Methods: 245 middle aged and older adults with insomnia were classified via the Triage Checklist (Manber et al., 2024). Those projected to do better starting treatment with tCBT-I versus dCBT-I constituted the YES stratum (n=137); the rest constituted the NO stratum (n=108). Participants were randomized within stratum to a strategy using dCBT-I only (ONLN) or a stepped-care strategy (STEP). The STEP strategy prospectively allocated the first step of care to dCBT-I or tCBT-I based on the Triage Checklist. Physical and mental health outcomes were measured via the PROMIS Global Health (physical and mental health subscales), Patient Health Questionnaire-4 (PHQ-4), Generalized Anxiety Disorder-7 (GAD-7), and Geriatric Depression Scale (GDS). Sleep was measured via the Epworth Sleepiness Scale (ESS), PROMIS Sleep-Related Impairment (PROMIS-SRI), and sleep diary- and actigraphy-derived sleep duration, total wake time, sleep efficiency, and sleep quality. Mixed effects models evaluated the effects of arm (STEP vs. ONLN) from baseline to 12 months.
Results: Compared to ONLN, STEP was associated with greater improvement on PROMIS mental health (Beta=0.13, p=.02), GAD-7 (Beta=-0.11, p=.002), GDS (Beta=-0.06, p=.01), PROMIS-SRI (Beta=-0.24, p=.0005), and sleep quality (Beta=0.01, p=.003). Within the YES stratum, compared to ONLN, STEP was associated with greater improvement on PROMIS mental health (Beta=0.17, p=.03), PHQ-4 (Beta=-0.07, p=.03), GAD-7 (Beta=-0.15, p=.003), GDS (Beta=-0.08, p=.01), PROMIS-SRI (Beta=-0.29, p=.002), ESS (Beta=-0.11, p=.03), and sleep diary-derived sleep quality (Beta=0.02, p=.02).
Conclusion: STEP was associated with greater improvements in mental health outcomes and select self-reported sleep outcomes compared to ONLN, offering further support for using a triaged stepped care approach.
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0544

TRAJECTORIES OF HYPNOTIC MEDICATION USE IN A TRIAGED STEPPED-CARE CBT-I TRIAL FOR INSOMNIA: RESULTS FROM THE RESTING STUDY

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Introduction: Previous research has demonstrated that patients with insomnia disorder who use hypnotic medication and engage in cognitive behavioral therapy for insomnia (CBT-I) decrease or eliminate prescription hypnotic medication use in the short-term. However, significant reductions of hypnotic use are not maintained long-term (> 3 months post-treatment). Little is known about longer-term trajectories of hypnotic medication use following CBT-I, and which patient or treatment-related factors may be associated with these trajectories. The current study utilized data from the RESTING trial (Manber et al., 2023), which tested use of a triaged stepped-care algorithm, to explore this question.
Methods: 245 middle-aged and older adults with insomnia received access to CBT-I for 12 months, either digitally or with a therapist, or both (sequentially). Therapist-led CBT-I included treatment components to support hypnotic tapering if this was a treatment goal. Latent class linear mixed model analyses were used to identify patterns of change in the amount of prescription hypnotic medications used over time among participants who used prescription hypnotics at baseline. Six potential baseline predictors were examined: age, gender, insomnia severity, sleep-impairment, and physical health and mental health at baseline.
Results: A three-class model was chosen based on Akaike Information Criterion, Bayesian Information Criterion, log-likelihood values and the size of the classes. The first class had low use at baseline with gradual decreasing use over time (LOW; n=60). The second and third classes had higher use at baseline; the second had decreasing use over time (DECR; n=31) and the third had increasing use (INCR; n=6). 148 participants never used prescription hypnotics. There were no significant differences between potential predictor variables (p-values >.05). Five out of the six participants in INCR had access only to digital CBT-I.
Conclusion: 94% of middle-to-older aged adults enrolling in a CBT-I trial who were using hypnotic medication at baseline were in sub-classes that were characterized by reduced medication use over the 12-month study period. Future research is needed to evaluate the value of including treatment components to support hypnotic tapering in CBT-I.
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0545

LONG-TERM SURVIVAL OF SLEEP MEDICATIONS IN PATIENTS WITH HEART FAILURE AND INSOMNIA: A RETROSPECTIVE ANALYSIS

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Introduction: Insomnia is highly prevalent in patients with heart failure (HF). Pharmacological therapy is commonly used in the management of insomnia. The long-term effects of insomnia medications in patients with HF and concomitant insomnia have been largely understudied. Particularly, whether differences in long-term survival exist between these medications is unknown. To compare survival in patients with HF and insomnia treated with different insomnia medications: benzodiazepine derivatives (BNZ), melatonin-agonists (MLT), tricyclic antidepressants (TCA), Z-drugs (zaleplon, zolpidem, and eszopiclone), orexin receptor-antagonists (OX), and control (no drugs).
Methods: Retrospective cohort study using TriNetX, a global network of medical records from healthcare organizations worldwide. Adults with HF (ICD10:I50) and insomnia (ICD10:G47.0) receiving insomnia medications were included. The propensity score was matched (1:1) using demographic variables and HF-related disease severity (i.e., NtproBNP). The outcome was all-cause mortality within 6 years from initiation of any of the sleep medication groups. Hazard ratios (HRs) and 95% Confidence intervals (CIs) were calculated using the Kaplan-Meier test between groups.
Results: Among 3,767,049 patients with HF, 249,571 had insomnia. After propensity score matching, OX was associated with lower mortality compared to TCA [HR=0.73, 95%CI=0.65,0.83; p< 0.0001], Z-drugs [HR=0.69, 95%CI=0.61, 0.78; p< 0.0001], MLT [HR=0.51, 95%CI=0.45,0.57; p< 0.0001], BNZ [HR=0.60,

95%CI=0.53,0.68; p< 0.0001], and control [HR=0.68, 95%CI=0.60,0.77; p< 0.0001]. Similarly, TCA was associated with lower mortality risk compared to Z-drugs [HR=0.90, 95%CI=0.88,0.93; p< 0.0001], MLT [HR=0.71, 95%CI=0.69, 0.73; p< 0.0001], BNZ [HR=0.86, 95%CI=0.83, 0.88; p< 0.0001], and control [HR=0.86, 95%CI=0.84,0.88; p< 0.0001]. Z-drugs were associated with lower mortality risk compared to MLT [HR=0.77, 95%CI=0.74, 0.77; p< 0.0001], and BNZ [HR=0.93, 95%CI=0.92,0.95; p< 0.0001] but no difference to control [HR=0.99, 95%CI=0.98, 1.02; p=0.915]. However, treatment with MLT or BNZ was associated with an increased mortality risk compared to control [HR=1.27, 95%CI=1.25,1.29; p< 0.0001], [HR=1.06, 95%CI= 1.05,1.08; p< 0.0001], respectively. MLT was associated with higher mortality risk compared to BNZ [HR=1.19, 95%CI=1.18,1.21; p< 0.0001].

Conclusion: In this retrospective study, treatment with orexin receptor agonists was associated with a more favorable survival compared to other insomnia medications in patients with HF and insomnia. Future randomized controlled studies are warranted to confirm these findings.

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0546

SLEEP MEDICATION USE TRAJECTORIES OVER 30 YEARS AND LATE-LIFE HEARING LOSS

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Introduction: Evidence regarding the potential adverse impact of sleep medications on hearing is inconsistent and limited. Potential mechanisms include decreased input from the auditory nerve and disturbed organization and integration of sensory information. This study aims to investigate the associations between trajectories of sleep medication use over nearly 30 years and late-life hearing among community-dwelling adults.

Methods: Participants in the Atherosclerosis Risk in Communities (ARIC) Study underwent hearing evaluations at visit 6 (2016-17) and provided medications used in the past four weeks for each visit from visits 1 (1987-89) to 6. Hearing outcomes included: (1) Peripheral auditory function: better-ear four-frequency (0.5, 1, 2, 4 kHz) pure-tone average (PTA, higher=worse) assessed by pure-tone audiometry in decibels (dB); (2) Central auditory function: Quick Speech-in-noise (QuickSIN) test measures the ability to understand speech in noise, with score ranging from 0-30 (higher=better). Sleep medication included barbiturates, benzodiazepine derivatives, non-selective serotonin reuptake inhibitor antidepressants, and hypnotics. Sleep medication use was considered as any vs. none at each visit and group-based trajectory modeling identified three trajectory groups: non-users (N=2,398), increasing users (N=449), and continuous users (N=255). Linear regression models were used to estimate differences in hearing associated with sleep medication use trajectory groups. Models adjusted for demographics, lifestyle, and cardiovascular factors. We further conducted stratification analysis by visit 2 (1990-92) self-reported insomnia symptoms, including having trouble falling asleep and waking up repeatedly (yes vs. no).

Results: Among 3,102 participants (mean visit 1 age=50.7 years, 59% female, 21% Black), when compared to non-users, increasing users had 1.61 dB (95% confidence interval [CI]: 0.38, 2.84) significantly worse PTA; no differences were observed in QuickSIN. The association was significant among participants without trouble falling asleep (1.93 dB, 95% CI: 0.53, 3.34), but not among those with the symptom (0.53 dB, 95% CI: -2.22, 3.28). However, for waking up repeatedly, the association was stronger among those with the symptom (Yes: 2.35 dB, 95% CI: 0.41, 4.29; No: 1.29 dB, 95% CI: -0.36, 2.94).

Conclusion: This study provides initial evidence linking sleep medication use from midlife to late life with worse late-life hearing, and the association might differ by sleep symptoms.

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0547

BZRA HYPNOTIC RECEPTOR SPECIFICITY AND REBOUND INSOMNIA

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Introduction: Discontinuing hypnotics after chronic use remains a concern, which has never been directly tested in a controlled, blinded, prospective study using self-administration choice procedures. We report on discontinuation predictors in a clinical trial in which persons with insomnia were instructed to stop taking medication after 6 months of nightly use.

Methods:: Insomnia participants aged 23-61 yrs, (n=41, 36 females), with no other sleep disorders, unstable medical or psychiatric diseases or drug dependency completed the trial. Following a NPSG participants were randomized to zolpidem XR (12.5 mg), eszopiclone (3 mg), or placebo nightly for 6 months. After 6 months nightly use, over a 2-week discontinuation, they were instructed to discontinue their hypnotic use, but if necessary, to self-administer either 1, 2, or 3 capsules of their assigned "blinded" medication (zolpidem XR 6.25 mg, 6.25 mg, placebo; eszopiclone 2 mg, 1 mg, placebo as capsules 1, 2 and 3 respectively; or 3 placebos). Sleep was recorded by actigraphy on a baseline week and during the two discontinuation weeks and scored for latency to sleep (LAT min), wake during sleep (WASO min), and sleep efficiency (SE %). Rebound insomnia was tested by comparing baseline nt 1 to discontinuation nts 1 & 2.

Results: Over the 14 nights 21 participants took zero (51%) capsules and among the 20 taking capsules the median total number chosen was 3. During the two-week discontinuation the BzRA receptor non-specific hypnotic, eszopiclone, was associated with a significantly greater (p<.005) number of capsule choices than the placebo group with the zolpidem group (BzRA receptor

specific) not different than placebo. Compared to baseline, on discontinuation night 1 the eszopiclone group had greater WASO (i.e. rebound insomnia +10.2 +/-8.4 min), differing ($p < .05$) from the placebo (-9.3 +/-6.3 min) and zolpidem (-12.2+/8.5 min) groups which did not experience rebound insomnia. No rebound insomnia on discontinuation nt 2 in any of the three groups.
Conclusion: Fifty-one percent discontinued 6-months of nightly hypnotic use. The BzRA receptor non-specific hypnotic group, eszopiclone, self-administered a greater number of capsules during the two-week discontinuation and experienced rebound insomnia on discontinuation night 1.
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0548

INSOMNIA SEVERITY FOLLOWING BENZODIAZEPINE RECEPTOR AGONIST DEPRESCRIBING AND CBTI: DOES SLEEP APNEA RISK MATTER?

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Introduction: Benzodiazepine receptor agonist (BZRA) deprescribing and cognitive behavioral therapy for insomnia (CBTI) are recommended for older adults with chronic insomnia, who often have co-occurring obstructive sleep apnea (OSA) symptoms or diagnosis (COMISA). Prioritization of OSA management may delay BZRA deprescribing and CBTI initiation. We hypothesized that Insomnia Severity Index (ISI) would improve with BZRA deprescribing and CBTI irrespective of OSA risk or monitoring of OSA treatment.
Methods: We pooled data from two arms of a randomized clinical trial that enrolled adults aged ≥55 years who chronically use BZRAs for insomnia (Mage 69.2 years, 34.6% female, 73.4% discontinued BZRA 1-week post-treatment [PTX] and 61.7% at 6 months [6M]). STOP-Bang, OSA diagnosis status, Epworth Sleepiness Scale (ESS), and ISI were collected at baseline (BL). Sleep testing was conducted if STOP-Bang was 5+ ("high risk"). Event index (apnea-hypopnea index [AHI] or respiratory event index [REI]) from prior sleep test reports was abstracted. All participants underwent CBTI and a gradual BZRA taper. Although participants continued to receive usual primary care and sleep care, OSA therapy was not monitored during intervention and only a prescription for therapy (e.g., positive airway pressure) for OSA was required for individuals with AHI≥30 or AHI≥15 plus ESS>10 to be eligible to receive CBTI. Follow-up ISI was administered at PTX and 6M. Linear mixed models examined changes in ISI from BL to PTX and 6M in participants at 1) "high risk"/any OSA (STOP-Bang 5+ or AHI or REI ≥5) and 2) moderate-severe OSA (AHI or REI ≥15).
Results: In participants at high risk for OSA based on STOP-Bang or with known AHI/REI >5 (n=87, 47%, BL MISI 14.8), ISI significantly improved at PTX (MISI 7.6, Δ-7.1, $p<.001$) and 6M (MISI 8.3, Δ-6.6, $p<.001$). In participants with moderate-severe OSA (n=23, 13%, BL MISI 15.7), ISI significantly improved at PTX (MISI 8.7, Δ-7.0, $p<.001$) and 6M (MISI 8.8, Δ-6.8, $p<.001$).
Conclusion: Insomnia severity improved with BZRA deprescribing and CBTI even in the context of unmonitored OSA symptoms and treatment. These results suggest that OSA status should not preclude BZRA deprescribing or CBTI initiation.
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0549

PATIENT-REPORTED OUTCOMES FOR LEMBOREXANT TREATMENT IN CHINESE PATIENTS WITH INSOMNIA (PROEM): A REAL-WORLD STUDY

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Introduction: Lemborexant (LEM) is a novel dual orexin receptor antagonist approved for treating adults with insomnia in the United States, Canada, Japan and some other countries. Except for one case report, there has been no published study of LEM treatment for patients with insomnia in China. This study assessed LEM treatment for patients with insomnia in routine clinical practice in China.
Methods: This multicenter, prospective, 12-week, real-world observational study (NCT06225947) plans to enroll 200 adult patients with insomnia who visited 1 of the 5 participating hospitals in China from Feburary2024. All patients were treated with LEM as per routine clinical practice. For the interim analysis, the primary endpoint was remitter rate after 4 weeks of treatment (patients with a post-treatment Insomnia Severity Index [ISI] score of < 8.). Treatment-emergent adverse events (TEAEs) were recorded.
Results: By the cut-off date of the interim analysis, 100 patients had been taking LEM for at ≥4 weeks (79) or withdrew from the study (21). They had a mean age of 45.18±13.17 years, mean insomnia duration of 6.35±7.71 years, and a mean baseline ISI score of 17.13±4.12 points. Sixty-four (64.00%) patients were female. Twenty-three (23.00%), 6 (6.00%) and 71 (71.00%) patients received LEM as initial monotherapy, transitioned to LEM, or added LEM to existing hypnotic therapy, respectively. The remitter rate was 33.00% (33/100) after 4 weeks of treatment, and the responder rates (ISI score decreased ≥6 points from baseline) after 1, 2 and 4weeks of treatment were 40.00% (40/100), 52.00% (52/100) and 54.00% (54/100), respectively. Mean ISI and Patient Health Questionnaire-9 scores decreased significantly after 1 week of treatment (-4.79±5.68, -1.03±4.04, respectively,

both P< 0.001) and continued to decrease (-8.10±5.21, -2.71±3.51 after 4 weeks of treatment, respectively). Mean General Anxiety Disorder-7 score decreased significantly after 2 weeks of treatment and continued to decrease during the study. Hence, LEM treatment improved their mood as well. Twenty-two (22.00%) patients experienced mild (21) or moderate (1) treatment-related TEAEs. The most common TEAE was somnolence (11.00%).
Conclusion: This first real-world observational study of LEM treatment in China demonstrated that LEM treatment was effective and safe in treating Chinese adult patients with insomnia.
Support (if any):

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0550

LEMBOREXANT'S EFFECTS ON RAPID EYE MOVEMENT (REM) SLEEP ARCHITECTURE IN ASIAN AND NON-ASIAN ADULTS WITH INSOMNIA: COMPARATIVE ANALYSIS FROM 3 STUDIES

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Introduction: Sleep architecture is altered in insomnia, including reduced rapid eye movement (REM) sleep. As REM sleep supports cognition and emotional regulation, its preservation has potentially important clinical implications. Treatment with lemborexant (LEM), a dual orexin-receptor antagonist, led to increased REM sleep compared with placebo (PBO) in adults with insomnia. This investigation evaluated the comparative effects of LEM on REM sleep parameters between Asian and non-Asian adults with insomnia, thereby evaluating potential effects of race.
Methods: This analysis incorporated data from 3 independent, 1-month, randomized, double-blind, PBO-controlled, parallel-group studies. E2006-J086-311 (Study 311; NCT04549168) included Chinese participants ≥18y. E2006-J082-204 (Study 204; NCT05594589) included Korean participants 19–80y. E2006-G000-304 (Study 304; NCT02783729) enrolled participants ≥55y (females)/≥65y (males) of any race; only non-Asian participants are presented here. Polysomnographic assessment of REM sleep and REM latency (REML) was conducted at baseline (during single-blind PBO run-in) and following 1 month of treatment with LEM 10mg (LEM10) or PBO.
Results: Mean (SD) baseline REM for LEM10 and PBO was 68.65(19.167) and 69.85(17.091) min, 67.37(28.695) and 58.96(36.077) min, and 61.58(20.409) and 65.32(19.591) min for Study 311 (LEM10, n=93; PBO, n=100), Study 204 (LEM10, n=26; PBO, n=13), and Study 304 (LEM10, n=264; PBO, n=206), respectively. At 1 month, least squares mean (LSM) (SE) CFB in REM for LEM10 and PBO was 24.05(3.451) and 8.59(3.176) min (P< 0.0001), 28.06(5.325) and 12.77(7.529) min (P=0.1035), and 21.82(1.368) and 5.10(1.528) min (P< 0.0001) for Study 311, Study 204, and Study 304, respectively. Mean (SD) baseline REML for LEM10 and PBO was 98.26(41.392) and 95.59(33.729) min, 125.63(68.727) and 131.42(91.967) min, and 100.14(54.320) and 99.60(51.803) min for Study 311, Study 204, and Study 304, respectively. Mean (SD) CFB in REML for LEM10 and PBO was −38.47(45.677) and −7.20(37.393) min (P< 0.0001), −42.15(73.471) and −0.83(59.514) min (P=0.0709), and −38.16(56.103) and −7.28(62.479) min (P< 0.0001) for Study 311, Study 204, and Study 304, respectively.
Conclusion: The magnitude of changes in REM sleep and REML was comparable between Asian and non-Asian participants, demonstrating LEM's consistent therapeutic effect across diverse patient populations. Given REM sleep's established role in cognition and emotional regulation, these findings suggest potentially significant clinical implications warranting further evaluation.
Support (if any): Eisai

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0551

CONSISTENCY OF OBJECTIVE RESULTS ON SLEEP ONSET AND SLEEP MAINTENANCE PARAMETERS FROM GLOBAL STUDIES OF LEMBOREXANT

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Introduction: When selecting a hypnotic for patients, it is important to know whether there are differences in response based on age, sex, and/or race. To increase patient diversity across the clinical development program for lemborexant (LEM), a dual orexin-receptor antagonist approved to treat adults with insomnia, 2 additional studies were conducted beyond the original Phase 3 studies that enrolled patients in North America, Europe, and Japan, but few from South Korea and none from China. Since studies have now completed in these latter countries, it is possible to compare results on polysomnography (PSG) from the 3 studies conducted globally with South Korea or China.
Methods: Each study was 1-month, multiple-site, randomized, and placebo-controlled enrolling participants with insomnia disorder. Study E2006-G000-304 (Study 304) included females ≥55 years/males ≥65 years with confirmed sleep maintenance insomnia. Studies E2006-J086-311 (Study 311) and E2006-J082-204 (Study 204) enrolled adults ≥18 and 19–80 years, respectively, with confirmed sleep onset and/or maintenance insomnia. PSGs were obtained during the placebo run-in (baseline) and at end-of-treatment. Each study included LEM 10 mg (LEM10) and placebo. Study 304 also included zolpidem extended-release, and Studies 204 and 304 included LEM 5 mg (not discussed here). Change from baseline to Day 30 in latency-to-persistent-sleep (LPS), sleep efficiency (SE), and wake-after-sleep-onset (WASO) were calculated. Safety and pharmacokinetics (PKs) were assessed.
Results: Results from the 3 PSG studies (204, 304, and 311) were compared using 95% confidence intervals (CIs). LEM10 led to larger changes from baseline in LPS, SE, and WASO compared to placebo. The CIs overlapped, demonstrating that the direction and magnitude of effect were similar. LEM PKs from Studies 204 and 311 were comparable to Study 304. Based on the totality of LEM data from clinical trials, analyses show that oral clearance was not affected by race. In Studies 204 and 311, like global Study 304, overall incidence of LEM10 treatment-emergent adverse events was similar to placebo. In all studies, most TEAEs were mild/moderate.
Conclusion: These data support the view that LEM is an effective and well-tolerated treatment for patients with insomnia without influence by race/national origin.
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0552

PRAZOSIN IMPROVES INSOMNIA AND LINKS SLEEP IMPROVEMENTS TO REDUCED HEADACHE SEVERITY IN POSTTRAUMATIC HEADACHES

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Introduction: Sleep disturbances, including poor sleep quality and insomnia, are critical factors affecting well-being and quality of life, particularly in individuals with posttraumatic headaches (PTH) following mild traumatic brain injury (mTBI). These issues are prevalent in military veterans and active-duty service members, contributing to significant impairment. This secondary analysis of a randomized controlled trial evaluating prazosin, an alpha-1 adrenergic receptor antagonist, for PTH prophylaxis aimed to assess changes in sleep quality and insomnia severity, as measured by the Pittsburgh Sleep Quality Index (PSQI) and Insomnia Severity Index (ISI), and their relationship with changes in headache impact, measured by the Headache Impact Test (HIT).

Methods: Participants were randomized to prazosin (n=26) or placebo (n=52). This analysis focused on changes in PSQI and ISI total and domain scores, collected at baseline and end-of-study to evaluate total sleep quality and insomnia severity. Correlations between changes in sleep measures and changes in HIT scores were also examined within each group. Comparisons and correlations were considered significant at $p < 0.05$.

Results: There were no significant differences between prazosin (age 40.6 ±11.9 years, 8.3% female) and placebo (age 39.2 ±9 years, 15.4% female) groups for changes in total PSQI score. However, the prazosin and placebo groups were significantly different in terms of changes in HIT (-5.04 vs -0.5, p=0.004) and total ISI (-3.46 vs -0.69, p=0.003) scores. Multiple ISI domains were also improved by prazosin, including falling asleep, staying asleep, and waking up too early, reflecting reduced insomnia severity. Additionally, changes in total PSQI (r=0.42, p=0.003), total ISI (r=0.31, p=0.03) and other ISI domains were significantly correlated with changes in HIT scores only in the prazosin group, indicating that sleep improvements were associated with reduced headache impact.

Conclusion: Prazosin improved insomnia severity and specific aspects of sleep initiation and maintenance, although overall sleep quality remained unchanged. The correlation between improved sleep outcomes and reduced headache impact in the prazosin group highlights its potential to address both sleep disturbances and headache-related disability in military personnel with mTBI-related PTH. Further research is needed to confirm these findings.

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0553

BEHAVIOUR, ATTITUDES, AND EXPERIENCES OF LONG-TERM BENZODIAZEPINE USERS DURING COVID-19: AN EXPLORATORY ANALYSIS

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Introduction: The COVID-19 pandemic disrupted daily routines and exacerbated stress, significantly affecting sleep and substance use behaviors. Benzodiazepine receptor agonists (BZRAs) are commonly prescribed for sleep disorders, yet their long-term use carries risks such as dependency, cognitive and psychomotor impairment. This study explores how the pandemic influenced the attitudes, behaviors, and experiences of long-term BZRA users in Belgium, focusing on substance use patterns, sleep management strategies, and psychosocial impacts.

Methods: Data from 723 unique long-term BZRA users about changes in hypnotics or sedatives, alcohol, tobacco, and pain medication use, and the impact of psychosocial symptoms was analyzed. The data were collected as part of a cluster randomized controlled trial in Belgian general practices, which started in 2019 and continued until 2021. The trial aimed to assess the effectiveness of blended care for discontinuing long-term BZRA use in patients with insomnia. Changes and symptoms were mapped using a specific COVID-19 questionnaire from June 2020 onwards. Descriptive analyses were performed, including prevalence rates and central tendency measures, along with thematic synthesis of qualitative data.

Results: At one year follow-up, 79 participants (10.9%) reported an increase in BZRA use and 70 (9.7%) a decrease, while most (n=426; 58.9%) reported no change. Common symptoms such as sleep problems, stress, and feeling anxious, impacted substance use in respectively 169 (23.4%), 162 (22.4%), and 136 (18.8%) participants. Coping strategies commonly included digital social interactions and new hobbies. While the contact limitations created an opportunity for some to taper BZRA, they resulted in social isolation for others. Findings particularly highlight the complex interplay between dependence, psychological distress, and social isolation, with significant variation in individual experiences.

Conclusion: The intricate interplay between lifestyle, social factors, and substance use during crisis periods was highlighted. Findings underscore the need for personalized, holistic interventions to manage sleep disorders and reduce long-term BZRA dependency, particularly during times of heightened stress.

Support (if any): The Big Bird trial, registered at clinicaltrials.gov (NCT03937180), was independent research (KCE-17016) funded by Belgian Health Care Knowledge Centre under the KCE Trials Programme.

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0554

NATIONAL PRESCRIBING TRENDS FOR INSOMNIA MEDICATIONS IN MEDICAID PATIENTS

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Introduction: Insomnia is a common condition among Medicaid recipients, with a prevalence of 74.3 per 1,000 recipients reported in a study analyzing state Medicaid fee-for-service claims. As a joint state-federal program, Medicaid significantly shapes treatment access and affordability for vulnerable populations. This study examines prescribing practices for insomnia medications across the United States, identifies regional variations, and evaluates implications for equitable care. Understanding these patterns is crucial for developing policies that enhance access

to effective, affordable, and equitable treatments for Medicaid beneficiaries.
Methods: Medicaid drug utilization data from 2023, spanning all 50 states and the District of Columbia, were analyzed to evaluate prescribing patterns for 10 insomnia medications: doxepin, eszopiclone, ramelteon, suvorexant, temazepam, tiagabine, trazodone, triazolam, zaleplon, and zolpidem. Average prescription rates per 1,000 enrollees and Medicaid reimbursement rates were compared. State-level variations were assessed using Kruskal-Wallis and PERMANOVA tests to identify statistical significance.
Results: Trazodone and zolpidem were the most prescribed medications, with average prescription rates of 130.9 (SD = 44.5) and 27.3 (SD = 13.3) per 1,000 enrollees, respectively. Ramelteon and eszopiclone had lower rates, at 0.9 (SD = 1.2) and 4.0 (SD = 3.2) per 1,000 enrollees. Moderate rates were observed for doxepin (mean = 9.1, SD = 5.7) and temazepam (mean = 3.2, SD = 2.3). Rarely prescribed medications included tiagabine (mean = 0.031, SD = 0.047) and triazolam (mean = 0.565, SD = 0.717). Medicaid reimbursement rates were highest for trazodone ($1.36 per enrollee), followed by zolpidem ($0.23) and doxepin ($0.26), while zaleplon had the lowest reimbursement ($0.01). Kruskal-Wallis and PERMANOVA tests (p = 0.336) found no significant state-level differences.
Conclusion: Although no significant regional differences in prescribing patterns were observed, variability in medication use and reimbursement highlights potential disparities in access to insomnia treatments. Trazodone's dominant use underscores the need for further research into its efficacy and optimal role in insomnia management. These findings raise questions about whether prescribing patterns reflect clinical appropriateness or broader systemic factors, such as cost, prescriber familiarity, or Medicaid policies. This study provides a foundation for future research and policy initiatives to address treatment disparities and improve insomnia care for Medicaid beneficiaries nationwide.
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0555
INSOMNIA MEDICATION PRESCRIBING PATTERNS AMONG MEDICARE SLEEP PHYSICIANS

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Introduction: Insomnia affects up to two-thirds of adults, often requiring medical intervention from a sleep specialist. While cognitive behavioral therapy for insomnia (CBT-I) is the gold standard, pharmacotherapy remains common due to limited access to trained CBT-I providers and other barriers. Despite the widespread use of insomnia medications, prescribing patterns among sleep medicine physicians remain underexplored. This study examines how physician demographics, training, and practice location influence prescribing practices, with the goal of identifying trends, regional variations, and opportunities for improving evidence-based care.
Methods: Data were collected on 10/16/2024 from 531 Medicare Part D sleep medicine physicians listed by CMS for 2022. Prescribing patterns for 10 insomnia medications—doxepin, eszopiclone, ramelteon, suvorexant, temazepam, tiagabine, trazodone, triazolam, zaleplon, and zolpidem—were analyzed. Comparisons by gender, degree type (MD, DO), specialty, graduation year (pre- and post-2011, marking the start of sleep medicine fellowship requirements), and geographic region (per the Electronic Residency Application Service map) were conducted using Mann-Whitney U, Kruskal-Wallis, and PERMANOVA tests.
Results: Zolpidem was the most prescribed insomnia medication (median: 23 prescriptions/physician) across all specialties except psychiatry, where trazodone was most frequently prescribed (median: 41 prescriptions, p=0.00185). Geographic factors significantly influenced prescribing practices (PERMANOVA, p=0.026). Physicians in the West South Central region favored trazodone over zolpidem compared to the Pacific (p=0.021) and South Atlantic (p=0.041) regions. Subgroup analyses revealed additional findings: MDs prescribed more ramelteon than DOs (p=0.000074). Zolpidem and ramelteon prescriptions decreased with graduation year, with zolpidem declining from a median of 24 to 14 prescriptions/physician (p=0.021) and ramelteon decreasing from 17 to 12 (p=0.045). Despite this decline, zolpidem remained the most prescribed medication across all groups.
Conclusion: This study highlights variations in prescribing practices for insomnia medications among sleep physicians. Zolpidem remains the most widely prescribed drug, followed by trazodone. Regional factors significantly influence prescribing trends, while physician demographics, degree type, and training appear to have limited impact. These findings emphasize the need to address regional variations and better align prescribing practices with evidence-based standards. Further research is needed to explore the drivers of these trends and assess the impact of educational initiatives promoting consistent, high-quality insomnia care.
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0556
ESTIMATES OF CANNABIS USE AS A SLEEP AID: RESULTS FROM A NATIONAL SLEEP FOUNDATION POPULATION SURVEY

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Introduction: National Sleep Foundation population research indicates that the majority of adults are not getting enough sleep and are dissatisfied with their sleep. Numerous potential solutions for sleep difficulties continue to be introduced to the public, ranging from digital therapeutics to prescription and over-the-counter medicines, to nutritional supplements and cannabis-based products. Among consumers, use of products generalized as cannabis (i.e., CBD, CBN, THC) represents a growing paradigm in sleep aids. Given the lack of established guidelines on cannabis use and sleep, it is important to monitor the public's current use and willingness to use cannabis-based products to promote sleep.
Methods: Data were drawn from an online, national survey utilizing a probability-based, random sample of 1,372 U.S. adults, oversampled for both Black and Hispanic individuals. The survey was administered in English or Spanish, and included demographic information, questions probing sleep duration and quality, and three items asking about (a) current, (b) past, and (c) future likelihood of cannabis use to help sleep. Descriptive statistics were used to summarize rates of cannabis use to help sleep. Sleep differences between individuals who did and did not endorse current or past use or a willingness to try cannabis to help sleep were examined via t-tests.

Results: Current and past use of cannabis to help with sleep was reported at 9% and 17%, respectively. Twenty-three percent of adults said they were likely to consider use of a cannabis product to help them sleep. Adults who currently use, have used, or are willing to use cannabis to help with sleep had significantly shorter sleep durations and lower sleep quality than their counterparts ($p<.05$ for all comparisons).
Conclusion: Over 23 million US adults currently use cannabis-based products to help them sleep, while nearly twice that number have previously tried cannabis-based products for sleep. Over 60 million adults are likely to consider cannabis products in attempts to improve their sleep. Unfortunately, there is a dearth of evidence-based guidelines on the use of cannabis for sleep. Much more work is needed to determine the short-term and long-term effects of cannabis products on sleep health to best inform public recommendations.
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0557

EFFECTS OF A CANNABIDIOL/TERPENE FORMULATION ON SLEEP IN INDIVIDUALS WITH INSOMNIA: A DOUBLE-BLIND, PLACEBO-CONTROLLED, RANDOMIZED, CROSSOVER STUDY

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Introduction: Cannabidiol (CBD) is increasingly used as a health supplement, though few clinical studies have demonstrated benefits. The primary objective of this study was to evaluate the effects of an oral CBD-terpene formulation on sleep physiology in individuals with insomnia.
Methods: In this double-blind, placebo-controlled, randomized clinical trial, 125 individuals with insomnia received an oral administration of CBD (300 mg) and terpenes (1 mg each of linalool, myrcene, phytol, limonene, α-terpinene, α-terpineol, α-pinene, and β-caryophyllene) for ≥ 4 days/week over 4 weeks using a crossover design. The study medication was devoid of β9-tetrahydrocannabinol. The primary outcome measure was the percentage of time participants spent in the combination of slow-wave sleep (SWS) and rapid eye movement (REM) sleep stages, as measured by a wrist-worn sleep-tracking device.
Results: This CBD-terpene regimen marginally increased the mean nightly percentage of time participants spent in SWS + REM sleep compared to the placebo (mean [standard error], 1.3% [0.60%]; 95% confidence interval, 0.1–2.5%; P =.03). More robust increases were observed in participants with low baseline SWS + REM sleep, as well as in day sleepers. For select participants, the increase in SWS + REM sleep averaged as much as 48 minutes/night over a 4-week treatment period. This treatment had no effect on total sleep time, resting heart rate, or heart rate variability, and no adverse events were reported.
Conclusion: Select CBD-terpene ratios may increase SWS + REM sleep in some individuals with insomnia and may have the potential to provide a safe and efficacious alternative to over-the-counter sleep aids and commonly prescribed sleep medications.
Support (if any): Funds to support this research were provided by Defined Research, Inc.

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0558

TRANSCRANIAL ALTERNATING ELECTRICAL STIMULATION IN SUBJECTS WITH INSOMNIA SYMPTOMS: A RANDOMIZED CONTROLLED STUDY

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Introduction: Transcranial alternating electrical stimulation (tACS) is non-invasive brain stimulation technique that delivers alternating microcurrent via electrodes. This study aimed to evaluate whether tACS could effectively improve symptoms of insomnia.
Methods: Participants with insomnia symptoms without meeting the criteria of insomnia disorder were recruited and randomized to 0.5 Hz, 100 Hz, or a sham group. In order to maximize the delivery of intracranial stimulation, a frequency of 10 kHz was used as the carrier frequency. Participants were required to use the device for 30 minutes, twice a day for 6 weeks. The Pittsburgh Sleep Quality Index (PSQI), the Insomnia Severity Index, sleep diary, and actigraphy were administered before and after the intervention.
Results: Eighty-seven participants (74 females, mean age = 54.15 ± 0.73 years) were randomized and finished the trial. The PSQI score showed significant improvement across all three groups without significant difference between groups (Sham: 9.93 to 6.72, $p < 0.001$; 0.5 Hz: 9.24 to 6.62, $p < 0.001$; 100 Hz: 9.34 to 6.93, $p = 0.001$). In the average sleep diary over four days, sleep latency (SL) and wake after sleep onset (WASO) decreased in all three groups (sham, 0.5 Hz, 100 Hz) without significant group by visit interaction (SL: -5.74 min, -8.94 min, and -16.53 min, respectively, $p = 0.345$; WASO: -10.74 min, -23.62 min, and -16.73 min, respectively, $p = 0.431$). No significant improvement in objective sleep measurements was observed in any group.
Conclusion: The tACS was not more effective than the sham treatment in reducing insomnia symptoms. Future study design should consider the strong placebo effect on sleep and the possibility that high carrier frequencies may confound the original frequencies.
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0559

CONTINUOUS THETA BURST STIMULATION AND PRE-SLEEP WORRY

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Introduction: Continuous theta burst stimulation (cTBS), a type of repetitive transcranial magnetic stimulation (rTMS), has been shown to reduce the severity of insomnia and anxiety in participants with insomnia. This study examined whether pre-sleep rumination impacts sleep onset latency (SOL) and whether these effects would be ameliorated following cTBS targeted to the default mode network (DMN), a brain system involved in self-focused cognition and ruminative thinking.
Methods: Twenty participants (12 female, 8 male) with insomnia symptoms completed two overnight in-lab sessions including the administration of either active or sham cTBS in a counterbalanced, cross-over, double-blind clinical trial. Participants

completed the Glasgow Content of Thoughts Inventory (GCTI) before and after cTBS administration, followed by eight hours of sleep in-lab monitored by polysomnography. The GCTI items assessed pre-sleep thought types (i.e., problem-solving, worries, and thoughts about sleep) and frequency. A paired samples t-test compared pre-cTBS and post-cTBS GCTI scores in the sham and active conditions. Another t-test examined SOL from sham to active cTBS. Two simple linear regressions examined the effect of the change in GCTI from pre-cTBS to post-cTBS on SOL during the sham and active visits, separately.

Results: There were no differences in SOL by treatment condition (p>0.05). GCTI scores post-cTBS (M=51.95, SD=10.95) were significantly higher than pre-cTBS (M=48.75, SD=10.99) in the sham condition (p=0.047); however, GCTI scores post-cTBS (M=49.85, SD=10.83) were not significantly different than pre-cTBS (M=48.20, SD=12.73) in the active condition (p=0.271). Two simple linear regressions showed that the change in GCTI from pre to post-cTBS administration had no significant effect on SOL in the sham condition (F(1,18)=3.677, B=2.154 p=0.071, R2=0.123) or active condition (F(1,18)=2.474, B=-1.593, p=0.133, R2=0.072).

Conclusion: There were no direct treatment-condition effects on pre-sleep rumination or SOL. However, pre-sleep rumination increased following sham cTBS only, suggesting that this increase may have been ameliorated in the active condition. However, the small sample size of this pilot study and single administration presents a limitation to statistical power. Future work should examine the effect of active cTBS for reducing pre-sleep rumination in larger clinical trials with multiple administrations.

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0560

PRE-SLEEP RUMINATION AND RESTING-STATE CONNECTIVITY WITH THE BED NUCLEUS OF STRIA TERMINALIS IN INDIVIDUALS WITH INSOMNIA SYMPTOMS

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Introduction: Projections from the central amygdala to the bed nucleus of the stria terminalis (BNST) are implicated in slower, longer-lasting perseverative anxiety symptoms. The BNST's role in sustained hyperarousal may delay sleep by promoting rumination prior to sleep onset, as is common in insomnia disorder. We hypothesized that BNST connectivity to regions of the default mode network (DMN) at baseline would be associated with elevated pre-sleep ruminations. Furthermore, we hypothesize that reductions in pre-sleep rumination following active continuous theta-burst stimulation (cTBS) will be associated with decreased, or no, BNST functional connectivity (FC).

Methods: Participants were 20 individuals (12 women; 19 to 39 years old) with self-reported insomnia (i.e., ISI≥15, PSQI≥6, and/or ESS≥11). To assess pre-sleep rumination, participants filled out the Glasgow Content of Thought Inventory (GCTI) prior to coming to the laboratory for cTBS overnight visits counterbalanced between one sham and the other active 40-second cTBS. The target region was the left inferior parietal lobule, a posterior region the DMN. MRI scans were conducted before and after each stimulation type.

Results: Seed-to-voxel connectivity with a seed placed in the BNST shows that higher baseline GCTI severity is associated with positive BNST FC to a precuneus cluster with center at +10 -40 + 06 (r =.701, p<.001, T =7.05, p-FDR < 0.001) and negative BNST FC connectivity to a left frontal pole cluster with center at -14 + 58 + 34 (r =-.657, p<.001; T = -6.25, p-FDR = 0.045). Reductions in GCTI following active cTBS, compared to pre-active and sham conditions, is associated with negative FC of the BNST with a cluster including the posterior cingulate gyrus and the precuneus with center at -02 -40 42 (r =-.736, p<.05, T = -5.48, p-FDR < 0.001).

Conclusion: BNST connectivity with the precuneus was associated with baseline levels of pre-sleep rumination and this effect was modulated only following active cTBS. Specifically, individuals with steeper reductions in pre-sleep rumination severity following cTBS exhibit more negative connectivity between the BNST and this posterior region of the DMN. As hypothesized, BNST connectivity to regions of the DMN predicts pre-sleep rumination and this connectivity reverses following cTBS.

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0561

INSOMNIA TREATMENT FOR ANTI-SUICIDAL RESPONSE IS ASSOCIATED WITH LOWER PERCEIVED STIGMA AND POSTTREATMENT IMPROVEMENTS IN HOPE: AN OPEN-LABEL TRIAL

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Introduction: Suicide has emerged as a public health emergency, but selective treatments remain scarce and unacceptable to those high in need. Perceived stigma represents a central barrier to treatment and thus prevention, but has yet to be evaluated in association with sleep, anti-suicidal treatment response, and other resiliency outcomes.

Methods: Comprehensive screening (n=310 participants screened, n=59 completed a full-battery eligibility assessment) for current suicide risk (CSSRS>1), DSM-V-defined MDD, and clinically-significant insomnia (ISI>10, PSQI>5) supported inclusion in an open-label suicide prevention clinical trial (iSleep: Insomnia Treatment for Improved Well-Being). A multi-component, non-pharmacological (5-week) treatment (integrating CBTi, IRT, and SRT interventions) was manualized according to session-by-session powerpoints, handouts, and therapist guide sheets. Measures: The Columbia Suicide Severity Rating Scale (CSSRS), Beck Scale for Suicide (BSS), Quick Inventory of Depressive Symptomatology (QIDS-SR), Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), Disturbing Dream and Nightmare Severity Index (DDNSI), Perceived Stigma Scale (PSS), and Rudd Hope Scale (RHS). Assessments occurred at Baseline, Treatment, and Posttreatment (2 weeks, 1,3 mos). Data and safety monitoring procedures supported risk assessment, triage, and outpatient safety planning.

Results: Thirty-five participants (aged 20-70; M=41 years) were allocated treatment. Perceived Stigma: Significant mean differences were observed in PSS scores at pretreatment among

participants, indicating lower perceived stigma ratings toward sleep treatment (PSS-SLP) relative to mental health treatment (PSS-MH) [M=10.0, SD=4.4; M=13.3, SD=6.35, respectively]: t(34)=3.94, p<.001; CI=1.60-5.02. Hope Measures: Paired t-tests revealed significant improvements in RHS scores from pre- to posttreatment phases [M=13.23, SD=4.03; M=16.03, SD=4.4, respectively]: t(30)=-3.03, p<.01; CI=-4.69—0.91. This paralleled large, posttreatment reductions (87%) in suicidal ideation, alongside depression, insomnia, sleep-quality, and nightmare improvements (p<.001).

Conclusion: Lower perceived stigma was associated with sleep treatment compared to psychological treatment, further supporting the utility of sleep as a modifiable, non-stigmatizing therapeutic target for suicidal behaviors. In addition, use of a rapid-action insomnia intervention (iSleep Treatment) resulted in significant posttreatment improvements in hope and overall well-being. This is the first known report testing perceived stigma in the context of a suicide prevention clinical trial, while demonstrating therapeutic impact to hope and resiliency measures underlying anti-suicidal response.

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0562

EFFECT OF AN ONLINE MEDITATION PROGRAM IN WOMEN WITH INSOMNIA: A RANDOMIZED CLINICAL TRIAL

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Introduction: An epidemiological study conducted by the Sleep Institute in 2007 revealed that 44.8% of the population in São Paulo exhibited symptoms of insomnia, with women being disproportionately affected (32%). Considering a global adaptation towards utilizing technology for health services, the present study evaluated the effects of an online meditation program on women with insomnia.

Methods: The study was a longitudinal, randomized and controlled trial. Participants include women aged 18 to 47 years with insomnia diagnosed by a sleep specialist. The sample was distributed into two groups: Intervention and Control. Both groups received an initial lecture about sleep hygiene. The Intervention group was invited to participate in eight virtual weekly sessions. During these sessions, participants received guidance to engage in meditation practice using the Anapana technique, which focuses on breath regulation to calm the mind. The Control group remained on a waitlist. The Insomnia Severity Index (ISI) was used to evaluate the main outcome. Measurements were taken at the baseline and at the end of the program. General Mixed Model (GMM) with within-subject random factor was utilized to assess the effects of meditation on ISI, comparing the Control and Intervention groups.

Results: A total of 307 women registered for the project, of which 120 were included. Of these, 62 completed the protocol. The overall sample had a mean age of 35.8 years, with a normal BMI and a high level of education. Results from the GMM indicated a significant effect of time, group, and the interaction of time*group. The intervention showed a decrease of 10.29 points in ISI at the end of protocol, with a mean score of 8.29 points on this instrument. The participants' results varied by 37.7% among them. Of the 34 participants who received intervention, 70.6% responded to treatment, and of those who responded, 66.7% had remission of ISI symptoms.

Conclusion: Online meditation appears to be a promising therapy for improving insomnia symptoms in women of reproductive age.

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0563

COGNITIVE TRAINING IN MILD COGNITIVE IMPAIRMENT AND INSOMNIA (TRAIN-MCI): PRELIMINARY EFFECTS ON COGNITION AND SLEEP

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Introduction: Nearly half of older adults with mild cognitive impairment (MCI) experience comorbid insomnia, which worsens cognitive symptoms. There are no pharmacological treatments for cognition and behavioral insomnia treatments require trained therapists, while sleep medications are associated with adverse side effects such as increased fall risk and cognitive disturbance. This study evaluated preliminary effects of computerized cognitive training for improving cognition and sleep in older adults with MCI and insomnia.

Methods: Older Adults (N=27, Mage=67.63±5.90, 21 women) with MCI (MoCA score of 18-26/30 or 1.5 SD below norms on 1+ cognitive task, intact activities of daily living) and insomnia [DSM-5 criteria plus sleep diaries showing >30 mins sleep onset latency or wake time after sleep onset (WASO) on 3+ nights/7] were randomized (2:1) to 8 weeks of cognitive training (n=19; Cognifit) or trivia control (n=8; answering questions online) for 45 mins, 3x per week. Cognition (Cambridge Brain Sciences battery), subjective sleep (Insomnia Severity Index, average 7-day diary-reported sleep onset latency, WASO, sleep efficiency, #awakenings, total sleep time) and objective sleep [WatchPAT; same metrics and %lighter, %deep, %Rapid Eye Movement (REM) sleep] were assessed at baseline and post-intervention. Planned baseline vs. post-intervention comparisons and effect size estimation across outcomes were conducted for cognitive training versus trivia control.

Results: Cognitive training significantly improved spatial planning (p=.028; hedges g=.54, moderate effect), and showed trends for improved visuospatial (p=.08; hedges g=.53) and verbal (p=.08; hedges g=.50) working memory, with no changes in controls (ps ranged from.27-.94). Cognitive training also significantly reduced diary-#awakenings (p=.007, hedges g=.46), improved objective sleep efficiency (p=.05, hedges g=.47), and trended towards reduced diary-WASO (p=.067, hedges g=.53), with no changes in controls (ps ranged from.29-.80). Objective REM% increased for trivia control (p=.02, hedges g=1.00), but not cognitive training (p=.23).

Conclusion: Preliminary findings suggest in older adults with MCI, at home computerized multimodal cognitive training leads to near transfer effects for non-trained cognition and far transfer effects for sleep maintenance and efficiency symptoms. Larger randomized controlled trials with longer follow-up and

evaluation of mechanisms underlying cognitive training transfer effects are warranted.
Support (if any): Triumph Initiative Award, University of Missouri School of Medicine (PI:Curtis).

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0564

TRAIT MINDFULNESS PROTECTS AGAINST THE HARMFUL EFFECTS OF NOCTURNAL COGNITIVE AROUSAL ON INSOMNIA AND DEPRESSION SYMPTOMS IN PREGNANCY AND POSTPARTUM

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Introduction: Perinatal women are highly vulnerable to insomnia and depression. High cognitive arousal (e.g., worry, rumination) at night is a key risk factor for developing insomnia and depression during this period. However, mindfulness skills have been proposed to reduce risk for negative health outcomes by protecting individuals against the harmful effects of cognitive arousal. This prospective study tested whether trait mindfulness protects perinatal women against the harmful effects nocturnal cognitive arousal on insomnia and depression.
Methods: Nine women (Age: 29.9±4.4y; Gestation at enrollment: 26.7±1.0w) completed weekly health surveys for 4 months across late pregnancy and early postpartum. Study outcomes included the revised cognitive and affective mindfulness scale (CAMS-R), pre-sleep arousal scale's cognitive factor (PSASC), insomnia severity index (ISI), and Edinburgh postnatal depression scale (EPDS). Linear mixed modeling was used to account for repeated measures and to test trait effects (between-person differences) and state effects (within-person changes) while controlling for relevant covariates.
Results: Lagged linear mixed modeling showed that women with high trait mindfulness reported lower levels of ISI (b=-5.37, p=.032) and EPDS (b=-14.25, p<.001) across the next four months. However, within-person analyses showed higher state PSASC predicted higher levels of next-week ISI (b=1.95, p.030) and EPDS (b=1.28, p=.047). Mixed modeling also revealed significant moderation effects for CAMS-R*PSASC on future ISI (b=.01, p<.001) and EPDS (b=.002, p=.012) such that the magnitude of PSASC's effects on ISI and EPDS were smaller for women with high trait mindfulness. Indeed, insomnia- and depression-risk were lowest when women endorsed high CAMS-R and low PSASC (3.9% insomnia, 9.8% depression), whereas disease-risk was highest when women endorsed low CAMS-R and high PSASC (62.2% insomnia, 83.8% depression).
Conclusion: Perinatal women with high trait mindfulness are protected against the harmful effects of high cognitive arousal on insomnia and depression, whereas women with low mindfulness are at higher risk for insomnia and depression when experiencing high cognitive arousal. These prospective data support trait mindfulness as a critical protective factor against the development of insomnia and depression during pregnancy and postpartum. Interventions promoting mindfulness skills may help expecting moms sleep and feel better.
Support (if any): Funding: American Academy of Sleep Medicine (198-FP-18, PI: Kalmbach).

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0565

BEHAVIORAL INSOMNIA TREATMENT ACCESSIBILITY IN THE US: A REAL-WORLD ASSESSMENT OF COST, LOCATION, AND AVAILABILITY

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Introduction: Cognitive Behavioral Therapy for Insomnia (CBT-I) is the gold-standard treatment for insomnia disorder. There have been consistent calls to increase patient accessibility to CBT-I. However, there have been few studies of what the experience is for patients who are recommended CBT-I and seek community-based care. Even less attention has been paid to this experience in patients and communities with lower incomes and poorer insurance coverage. We sought to examine the real-world access to providers with CBT-I expertise.
Methods: We contacted all clinicians listed on the Society of Behavioral Sleep Medicine's provider registry who met the following inclusion criteria: (1) US-based, (2) master's degree or above, and (3) eligible for state licensure. Initial data on treatment modality, insurance coverage, session costs, waitlist times, and practice locations were collected through internet searches, and were supplemented by contacting providers as potential patients through a maximum of three emails, with follow-up phone calls used as needed. Practice addresses were used to generate census-tract income data to compare to the 2022 family-of-four poverty line.
Results: Data from N=240 CBT-I providers were collected, spanning 42 states. Of these, 92.1% (n=221) were accepting new patients, but only 56.3% (n=135) accepted insurance. Among CBT-I providers accepting new patients, initial session costs averaged $260.71 (SD=$91.81, mode=$250.00, range=$100.00-$530.00); subsequent session costs averaged $227.74 (SD=$76.50, mode=$250.00, range=$75.00-$500.00), and wait times averaged 51.1 days (SD=61.9, range=0-300, mode=7). Average household income in practice areas was $95,246 (SD=$52,622). Only 5.0% (n=12) of CBT-I providers accepting new patients operated in communities at or below the poverty line, and just 3.3% (n=8) accepted insurance. Among these providers, only one accepted Medicaid.
Conclusion: This study underscores significant access disparities for behavioral insomnia treatment in the US, highlighting how high treatment costs and limited availability of CBT-I providers have disproportionate and negative impacts on lower-income populations and those with inadequate insurance coverage. A large proportion of CBT-I providers do not accept insurance, leaving 135 behavioral sleep providers to treat those millions of Americans with insomnia unable to afford private pay. Even with insurance, logistical barriers like provider location and nearly two-month wait times exacerbate insomnia care disparities.
Support (if any):

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0566

REDUCING BURNOUT IN FACULTY PHYSICIANS WITH SLEEP COACHING

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Introduction: Health workers are experiencing record rates of occupational burnout. A significant proportion of faculty physicians have impaired sleep that may affect wellbeing and contribute to burnout. Fortunately, there are simple, behavioral strategies that improve sleep, but their impact on burnout is unknown. We identified faculty physicians with mild sleep impairment and assessed the impact of a brief sleep coaching intervention on self-reported burnout using validated scales.
Methods: We delivered 30-minute educational presentations to Department of Medicine (DOM) faculty at an academic medical center. Using Research Electronic Data Capture (REDCap) we asked attendees to complete a Sleep Health Survey which included the Epworth Sleepiness Scale (ESS), Insomnia Severity Index (ISI), shiftwork, and the Maslach Burnout Inventory (MBI). Respondents were offered a single session of sleep coaching with a psychologist if they met one or more of the following criteria: ISI between 7-13 or yes to current shiftwork. We conducted post-intervention surveys one month after their appointment and compared pre-post changes in the ISI, ESS, and MBI using paired-samples t-tests.
Results: A total of N=226 faculty completed the REDCap survey and 79 (35%) met criteria for sleep coaching. N=63 had ISI between 7-13, N=9 said yes to shiftwork, and N=7 had both ISI between 7-13 and shiftwork. N=24 participants completed both a single session of sleep coaching and the post-intervention survey at 1 month. These faculty were 62.5% female and 75% White with an average age of 45.8 (8.9) years. There were significant improvements on the ISI (9.6 (1.8) to 5.3 (3.6); $p < 0.01$), and on the MBI Emotional Exhaustion (20.2 (9.7) to 15.3 (9.1); $p < 0.01$), Depersonalization (11.8 (8) to 9.3 (6.8); $p = 0.03$), and Personal Achievement (39.2 (5.8) to 41.5 (5.5); $p = 0.02$) subscales.
Conclusion: These exploratory data show how a simple targeted intervention can have significant benefits in terms of improving sleep and reducing burnout among faculty physicians. Larger scale studies are needed to examine scalability and effectiveness of delivering sleep coaching to address occupational burnout in physicians.
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0567

ACCEPTABILITY OF SLEEP INTERVENTIONS AMONG FIREFIGHTERS

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Introduction: Insufficient sleep disproportionately imposes significant health risks to firefighters. However, access to evidence-based sleep interventions, such as cognitive behavioral therapy for insomnia (CBTi), remains limited in this population. To build a foundation for the implementation of worksite sleep health coaching in fire departments, this study assessed firefighters' acceptability of nine CBTi-informed sleep interventions.
Methods: The Patient-Reported Outcomes Measurement Information System–Sleep Disturbance–Short Form 8b was used to screen for firefighters working 24-hour+ shifts who presented sleep disorder symptoms (T score ≥ 55). Eligible participants included 232 firefighters from 20 Arizona fire agencies who completed a cross-sectional online survey, which incorporated the Theoretical Framework of Acceptability measure to assess their perceived sleep intervention acceptability.
Results: Over half of the firefighters agreed or strongly agreed that the CBTi-informed sleep interventions were likable (percentage: 53%-74%), acceptable (61%-88%), and anticipated to be effective (54%-66%), except for timed exposure to ambient light and darkness, which only 35% liked and 42% perceived as effective. The top three interventions with the highest percentage of firefighters rating them as likable, acceptable, and being anticipated as effective were sleep education (64%, 88%, 58%), sleep extension (69%, 76%, 63%), and recovery sleep enhancement (74%, 80%, 66%). Interestingly, a higher percentage of firefighters also perceived sleep education (34%) and sleep extension (35%) as very effortful compared to other interventions (average: 23%). Firefighters with greater sleep symptoms were less likely to like sleep extension (Odds Ratio = 0.92, 95% CI = 0.87-0.98, p =.017) and recovery sleep enhancement (OR = 0.93, 95% CI = 0.87-0.99, p =.025) whereas more likely to perceive sleep education as effort-intensive (OR = 1.08, 95% CI = 1.02-1.14, p =.018).
Conclusion: A moderate to high percentage of firefighters demonstrated acceptability of the sleep interventions, with sleep education, sleep extension, and recovery sleep enhancement ranking the highest. Interestingly, sleep education and sleep extension were frequently viewed as acceptable despite being effort-intensive, highlighting the importance of assessing different dimensions of acceptability of sleep interventions. These findings suggest promise in translating these evidence-based interventions to the workplace to improve firefighter sleep health.
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0568

RACIAL/ETHNIC DIFFERENCES IN SLEEP OUTCOMES AFTER A BRIEF SLEEP INTERVENTION IN USAF TECHNICAL TRAINING STUDENTS

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Introduction: Racial and ethnic minorities in the military experience shorter sleep durations and higher rates of sleep problems compared to their Non-Hispanic White (NHW) counterparts. A group-based, single-session Brief Sleep Intervention (BSI) for United States Air Force Technical Training (USAFTT) students improved sleep duration, sleep quality, and sleep behavior. Sleep health disparities are well documented, thus this secondary analysis examined racial/ethnic differences in sleep outcomes and behavior change engagement following the BSI.

Methods: Non-randomized intervention assignment included a 2:1 allocation ratio (BSI:active control [brief tobacco] intervention). Participants completed the Self-Assessment of Sleep Survey-Split at baseline and 2-week follow-up for assessment of weekday sleep duration (< 6 vs. ≥6 hours), sleep quality (very poor/poor/fair vs. good/very good), and weekend catch-up sleep duration. At 2-week follow-up, BSI participants reported whether they engaged in their self-selected "Action Step' during the intervention. Propensity score-adjusted logistic/linear regression models were used to assess the intervention effects among different racial/ethnic groups in the outcomes of interest.
Results: The sample included 321 USAFTT students (mean age 20.9 ± 3.6; 81.9% men; 51.7% NHW; 24.3% Hispanic; 23.4% non-Hispanic People of Color). Among Hispanic students at follow-up, those in the BSI group were more likely to have a weekday sleep duration ≥6 hours (aOR 12.43, 95%CI, 8.70-17.76) and report good/very good weekend sleep quality (aOR 3.10, 95%CI, 2.48-3.87) compared to those in the active control group. Among those who received the BSI, Hispanic students at follow-up were more likely to have a weekday sleep duration ≥6 hours (aOR 6.28, 95%CI, 5.36-7.37; aOR 9.56, 95%CI, 3.02-30.27) and good/very good weekday sleep duration (aOR 1.83, 95%CI, 1.52-2.19; aOR 2.37, 95%CI, 1.60-3.52) compared to NHW or non-Hispanic People of Color, and have engaged in the 'Action Step' chosen during the intervention than NHW (aOR 1.54, 95%CI, 1.25-1.89). No group differences were found in weekend catchup sleep duration after Bonferroni multiple comparison adjustment.
Conclusion: Within the BSI group, Hispanic students exhibited better sleep outcomes and greater behavior change engagement than other racial/ethnic groups. Further research should explore the mechanisms underlying these differences and identify BSI features that promote treatment success among Hispanic USAFTT students.
Support (if any):

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0569

CHARACTERISTICS OF TREATMENT RESPONDERS IN A TRIAL OF BRIEF BEHAVIORAL THERAPY FOR CANCER-RELATED INSOMNIA

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Introduction: Nearly 80% of cancer patients undergoing treatment experience insomnia symptoms and disrupted sleep. Brief Behavioral Therapy for Cancer-Related Insomnia (BBT-CI) has shown to be efficacious for patients with breast cancer undergoing treatment. Few studies have characterized treatment responders from non-responders in oncology settings, which can help facilitate precision-based medicine. In this secondary analysis of breast cancer patients, we analyzed how baseline characteristics differ between treatment responders and non-responders to BBT-CI.
Methods: Patients with breast cancer (N=73, 51% stage II, M age=50.7 years) completed measures of insomnia severity (ISI), dysfunctional beliefs about sleep (DBAS), emotion regulation (DERS), fatigue (BFI), chronotype (OWL-Lark), and domains of health-related quality of life (HRQoL; EORTC-30) and 93.2% (Msession=5.82, SD=.78) completed all 6 sessions of BBT-CI. Given lack of consensus in the literature, we defined treatment response as either an 8- or 6-point change on the ISI from baseline to endpoint.
Results: Scores on the ISI reduced, on average, by 4.76 points. Treatment response rates varied widely based on the definition selected; 27% of participants achieved an 8-point reduction on the ISI, whereas 43% achieved a 6-point reduction. At baseline, both levels of responders were more fatigued and reported worse insomnia and sleep quality, had more eveningness tendencies, more unhelpful beliefs about sleep, and poorer social functioning. An 8-point reduction was uniquely associated with worse dyspnea and self-reported cognitive functioning as measured by EORTC-30 scales, whereas a 6-point reduction was associated with younger age and surgical status. Responders did not differ on other demographic or clinical characteristics (e.g., cancer stage or treatment with chemotherapy, hormone therapy, or radiotherapy).
Conclusion: Treatment responders to BBT-CI had more severe baseline sleep and fatigue symptoms and poorer self-reported HRQoL. Surgical history was associated with more limited treatment response. While regression to the mean remains possible, it may also be that those with more severe baseline symptomatology are more motivated to engage in BBT-CI, and therefore more likely to benefit. These preliminary findings may support the use of stepped care to match higher-intensity interventions to those who need them most.
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0570

EFFICACY OF BRIEF BEHAVIORAL THERAPY FOR INSOMNIA FOR VETERANS WITH PTSD VERSUS BBTI WITH ESZOPICLONE

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Introduction: In veterans with posttraumatic stress disorder (PTSD), comorbid insomnia and obstructive sleep apnea (COMISA) are responsible for detrimental effects on sleep and quality of life. In this investigation, we assessed the augmentation of brief behavioral therapy for insomnia (BBTI) with eszopiclone over BBTI alone for the treatment of chronic insomnia on sleep quality in veterans with PTSD experiencing COMISA.
Methods: Fifty-three PTSD patients aged 18 to 65 years old with COMISA were randomized to four sessions of BBTI over 6 weeks plus 2 weeks of eszopiclone (2 mg/d) or BBTI alone with follow-up visits conducted at 6 and 24 weeks. Study outcomes included the Pittsburgh Sleep Quality Index (PSQI) [primary], Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), Beck Depression Inventory-II (BDI-II), and PTSD Checklist (PCL) [secondary]. Actigraphy-derived sleep indices and CPAP adherence were also collected.
Results: A significant and comparable improvement in sleep quality was observed between baseline and 24 weeks for combination therapy (PSQI mean score change, -5.25; 95% CI, -6.59, -3.91) and BBTI (PSQI mean score change -5.45; 95%CI, -6.78, -4.12). Similar improvements were recorded for ISI, ESS, BDI, and PCL. Compared to BBTI alone, combination therapy showed higher reduction in insomnia symptoms (ISI mean score

difference -2.3; 95% CI, -4.95, 0.28) concomitantly with a drop in sleep latency (SL) (SL mean difference -8.21 minutes; 95% CI, -16.13, -0.29) at 6 weeks. The combination of BBTI plus eszopiclone produced a higher remission rate of insomnia at 6 weeks than BBTI (31% versus 7%, p=0.03), with both interventions achieving comparable rates at 24 weeks. Patients receiving combination therapy used on average CPAP 75.8 minutes/night (95% CI, 17.18,134.72) more than BBTI by week 6. However, CPAP adherence was no more different between the groups by week 24.
Conclusion: Veterans with PTSD and COMISA had comparable improvement in sleep quality of life with the combination of eszopiclone with BBTI to that achieved with BBTI-only therapy. Although the addition of eszopiclone to BBTI conferred an early benefit in the remission rate of insomnia and in CPAP usage relative to BBTI, both modalities achieved similar outcomes at long-term follow-up.
Support (if any): U.S. Department of Veterans Affairs

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0571

COGNITIVE BEHAVIORAL THERAPY FOR MENOPAUSAL INSOMNIA (CBT-MI) IMPROVES INSOMNIA SEVERITY AND VASOMOTOR SYMPTOMS IN PERI- AND POSTMENOPAUSAL WOMEN

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Introduction: Approximately 20-60% of peri- and postmenopausal women in the US have insomnia symptoms that can be exacerbated by vasomotor symptoms [VMS], including nocturnal hot flashes (nHF). While cognitive behavioral therapy for insomnia (CBT-I) has been shown to be effective in decreasing insomnia in this population, it is unclear how nighttime (e.g., difficulty falling asleep) versus daytime (e.g., daytime sleepiness) symptoms are impacted. This study examined the effect of CBT for menopausal insomnia (CBT-MI) on insomnia severity and symptoms as well as VMS in a randomized clinical trial.
Methods: Peri-and postmenopausal participants with insomnia and nHF (53.6y) were assigned to receive CBT-MI (n=18) or Menopause Education Control (MEC; n=25). The Insomnia Severity Index (ISI) and Hot Flash Related Daily Interference Scale (HFDRIS) were administered at baseline and post-intervention. Three factor analysis was used to look at changes in insomnia symptom types including Factor 1–ISI Sleep Symptoms (items 1,2,3), Factor 2–ISI Daytime Symptoms related to Insomnia (items 5,6), and Factor 3–ISI Perception of Symptoms (items 4,7). Generalized linear regression was performed to find the differences from baseline to post-treatment between the treatment groups.
Results: At baseline, total ISI score was not significantly different between the groups (15.1±3.5 vs. 15.0±4.4; P=0.34). Following the intervention period, ISI scores were significantly lower in the CBTI-MI group than the MEC group (4.9±1.1 vs. 8.8±1.1; P=0.01). With respect to VMS, there were significant differences between treatment group ratings of hot flash interference (HFDRIS) at post-treatment (P=0.01). The changes from baseline in ISI Sleep Symptoms (P=0.005) and ISI Perception Symptoms (p=0.002) was significantly greater in the CBT-MI group compared to MEC, while the change from baseline of ISI Daytime Symptoms was not significantly different (P=0.1).
Conclusion: CBT-MI significantly decreases menopause insomnia severity and improves vasomotor symptoms in midlife women primarily due to attenuating sleep symptoms and perceptions of insomnia symptoms. CBT-MI did not significantly improve daytime symptoms associated with insomnia.
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0572

PRELIMINARY INVESTIGATION INTO THE EFFECTS OF CBT-I ON SUBJECTIVE INSOMNIA AND CIRCADIAN REST/ACTIVITY RHYTHMS IN PERSONS WITH TBI

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Introduction: Disordered circadian rest/activity rhythms (RARs) and insomnia frequently co-occur. Aspects of cognitive behavioral therapy for insomnia (CBTI) aim at improving circadian RARs by establishing regular sleep times and consolidating sleep periods. Timing of sleep periods has also been associated with insomnia, wherein evening chronotype has been linked to greater sleep disturbance. However, there is limited research exploring whether CBTI improves insomnia via improved structure and timing of circadian RARs. We examined whether CBTI reduces insomnia severity via improved RAR structure or shifted RAR timing.
Methods: Our community sample of persons with a history of traumatic brain injury (TBI) and comorbid insomnia (N=38, Mage=38+/-12, 37% female) were randomized to a 4-session treatment group: CBTI or sleep education. Circadian RARs were continually estimated with actigraphy. Variables estimating RAR structure included interdaily stability (IS), intradaily variability (IV), and relative amplitude (RA). RAR timing was estimated as the sleep period midpoint. Effects of CBTI on RAR variables were estimated as the group difference in change in RAR variables from baseline to treatment end. Effect of CBTI on insomnia severity was estimated as the group difference in Insomnia Severity Index (ISI) score change from baseline to 12-weeks post-treatment. Secondary analyses explored whether RAR change moderated effects of treatment group on ISI change.
Results: Compared to controls, participants randomized to CBTI had improved long-term ISI scores (β= -0.851, SE=0.322, p=0.008). CBTI had no effect on change in sleep midpoint, IV, RA, or IS. However, a significant IV by group interaction suggested that individuals with greater reduction in sleep-wake rhythm fragmentation during CBTI experienced greater reduction in insomnia severity (β= -0.894, SE=0.401, p=0.026).

Conclusion: Results show that CBTI reduced insomnia severity. While CBTI did not affect IV, RA, IS, or the sleep midpoint, CBTI-induced reductions in insomnia severity were stronger in those who exhibited greater reductions in IV. This suggests that benefits of CBTI may be influenced by changes in RARs in those with TBI. Future analyses will explore factors associated with changes in circadian rhythm and insomnia severity, and examine CBTI effects on circadian rhythm and sleep phase in a larger sample.
Support (if any): AASM Foundation Strategic Research Grant Category I.

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0573

TREATMENT ENGAGEMENT OF COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA IN ADOLESCENTS: A QUALITATIVE ANALYSIS

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Introduction: Insomnia is common in adolescents, with a prevalence of 10-30%. Despite its high prevalence, many did not received treatment, and treatment engagement is suboptimal in the young population. Although there is a consensus on the importance of identifying potential barriers to treatment for insomnia, understanding on treatment engagement in adolescents is limited. The present qualitative study aimed to identify the factors related to the continued treatment engagement of cognitive behavioral therapy for insomnia (CBT-I) in adolescents.
Methods: Thirty-seven adolescents (age = 18.38 ± 1.64, 15-20; female: 70.3%) with DSM-5 insomnia disorder, as ascertained by the clinical interview, participated in individual semi-structured qualitative interviews. All participants received 6-session CBT-I, either delivered in a group or digital format. Interviews were conducted by trained interviewers for about 60 minutes via videoconferencing after the treatment. The interview asked about individual experiences and feedback about the treatment. All the interviews were audio-recorded and transcribed verbatim. Thematic analysis was used to identify themes related to continued treatment engagement in CBT-I.
Results: Six major themes were identified to understand factors that affect continued treatment engagement during the intervention period: drive to achieve treatment goal (e.g., wanting to improve sleep), personal strengths (e.g., sense of commitment), perceived benefits (e.g., symptom improvement during treatment), intervention/study design (e.g., time/place convenient), and social influence (e.g., peer influence), changes in life (e.g., busy personal schedule).
Conclusion: The current study enhanced our understanding of the factors related to continued treatment engagement among adolescents who received CBT-I. The themes cover individual, treatment-related, and environmental factors. The findings may inform clinical practice on how to better engage adolescents during sleep intervention to optimize treatment outcomes.
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0574

THE EFFECT OF COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA (CBTI) ON BURNOUT SYMPTOMS

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Introduction: Insomnia is increasingly recognized as both a contributing factor to burnout and a predictor of future disability leave. Despite this, little research has investigated whether treating insomnia can alleviate burnout symptoms. This study aimed to examine the impact of videoconference-delivered Cognitive Behavioral Therapy for Insomnia (CBTi) on burnout symptoms in a working adult population.
Methods: Thirty adult workers (mean age = 42.6) experiencing insomnia participated in HALEO's CBTi program, which consisted of five weekly, 30-minute video sessions with licensed therapists, supported by a digital platform. Insomnia severity was assessed using the Insomnia Severity Index (ISI), and burnout symptoms were measured with the Burnout Assessment Tool (BAT). Participants completed both measures at baseline and three months post-therapy. Data were analyzed using one-tailed paired t-tests to assess changes in ISI and BAT scores, and Pearson correlations to examine associations between changes in insomnia and burnout symptoms.
Results: ISI scores significantly decreased from baseline (M = 15.93, SD = 4.36) to post-therapy (M = 7.30, SD = 5.72; $t(29) = 7.68$, $p < .001$, $d = 1.40$). Similarly, BAT scores were significantly lower post-therapy (M = 2.03, SD = 0.54) compared to baseline (M = 2.54, SD = 0.48; $t(29) = 5.57$, $p < .001$, $d = 1.02$). A significant positive correlation was found between improvements in ISI and BAT scores ($r = 0.519$, $p = .003$), indicating that reductions in insomnia severity were associated with reductions in burnout symptoms.
Conclusion: The findings suggest that, beyond its established effectiveness in reducing insomnia symptoms, videoconference-delivered CBTi may also contribute to significant reductions in burnout symptoms among working adults. The observed correlation between reductions in insomnia and burnout symptoms highlights a potential interaction that warrants further exploration.
Support (if any): None

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0575

EFFICACY OF COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA IN PATIENTS RECOVERING FROM HIP OR KNEE JOINT ARTHROPLASTY

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Introduction: Insomnia symptoms are associated with increased pain intensity preceding or immediately following surgery. The present clinical trial (NCT04269239) examined the efficacy of cognitive behavioral therapy for insomnia (CBT-I) to reduce insomnia severity and explored the relationship between insomnia and pain in patients with insomnia recovering from hip or knee joint arthroplasty.
Methods: Participants (N=70; 68% Females; Mean age=67.3 years) were randomly assigned to receive CBT-I (n=35) or Health Education Control (HEC; n=35). The Insomnia Severity Index (ISI), PROMIS Pain, and Hip/Knee Osteoarthritis Outcome Score (HOOS/KOOS) were administered pre- and post-intervention. Three factors of ISI, including Factor1-Sleep Symptoms, Factor2–Daytime Symptoms, and Factor3–Perception Symptoms were also assessed.
Results: At baseline, ISI scores were not significantly different between groups (13.3±1.0 vs. 12.3±1.1; P=0.34). Post-intervention, ISI scores were significantly lower in the CBT-I group than the HEC group (7.2±1.5 vs. 2.7±2.1; P=0.03). Changes from baseline in ISI Sleep Symptoms (P=0.04) and Perception Symptoms (P=0.02) were significantly greater in the CBT-I group compared to HEC, while changes in Daytime Symptoms were not significant (P=0.3). There were no significant differences between treatment groups for measures of joint pain (PROMIS) and functioning (HOOS/KOOS). However, significant associations were found for change scores from pre- versus post-intervention for ISI and PROMIS Pain Intensity (P=0.03) and Pain Interference (P=0.006) and HOOS/KOOS Pain (P=0.03), Symptoms (P=0.03), Activities of Daily Living (P=0.01), and Quality of Life (P=0.002) for all participants combined.
Conclusion: The study demonstrates that CBT-I decreases insomnia severity in patients recovering from knee or hip joint arthroplasty primarily due to attenuating sleep symptoms and perceptions of insomnia. CBT-I did not significantly improve daytime symptoms associated with insomnia, pain, or functioning. Improvements in insomnia severity were associated with improvements pain intensity and interference, hip/knee pain, symptoms, activities of daily living, and quality of life independent of treatment group.
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0576

SEX DISPARITIES IN CBT-I TREATMENT RESPONSE IN PATIENTS RECOVERING FROM HIP OR KNEE JOINT ARTHROPLASTY

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Introduction: Sex disparities in both insomnia and perceived pain have been demonstrated, where female patients tend to report greater insomnia symptoms, pain sensitivity and higher prevalence to insomnia disorder and chronic pain conditions compared to male patients. The present trial examined the sex differences in response to cognitive behavioral therapy for insomnia (CBT-I) in patients with insomnia disorder undergoing hip or knee joint arthroplasty.
Methods: Participants (N=69; 68% Female; Mean age=67.3 years) were randomly assigned to receive CBT-I (n=23 female; n=11 male) or Health Education Control (HEC; n=24 female, n=11 Male). The Insomnia Severity Index (ISI), PROMIS Pain, and Hip/Knee Osteoarthritis Outcome Score (HOOS/KOOS) were administered at baseline and post-intervention. Generalized linear models were performed to detect sex and treatment group differences and sub-group analysis by sex.
Results: There were no significant differences between male versus female participants for pre-post intervention changes in ISI, PROMIS pain intensity or pain interference. In female participants, change in ISI from baseline to post-treatment was significantly lower in the CBTI group than the HEC group (-8.5±6.4 vs -2.1±7.6; P=0.02), but not in male participants (P=0.21). In female participants, there was a significant correlation in pre-post change in ISI with pre-post change in PROMIS pain intensity (r=0.5, P=0.03), pain interference (r=0.6, P=0.01), HOOS/KOOS activities of daily living (r=-0.4, P=0.04) and quality of life (r=-0.5, P=0.01). No significant associations between insomnia and pain were observed in male participants.
Conclusion: Among individuals with insomnia recovering from hip or knee joint arthroplasty, there was a greater decrease in insomnia severity following CBT-I compared to HEC in female participants but not male participants. Pain outcomes improved across both treatment conditions for male and female participants and no significant group differences were found. Regardless of treatment group of the female participants, improvements in insomnia severity were associated with improvements in pain intensity, pain interference, activities of daily living, and quality of life.
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0577

COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA IMPROVES PAIN SEQUELAE IN TRAUMATIC BRAIN INJURY: PRELIMINARY SUBGROUP ANALYSES

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Introduction: Persistent pain is a prevalent consequence of traumatic brain injury (TBI), with an estimated 51.5% of civilian populations experiencing chronic pain comorbidly. Sleep disturbance and pain are interrelated and share cognitive-emotional contributors. Their relationship is believed to be reciprocal, whereby pain disrupts sleep, and disturbed sleep exacerbates clinical pain via impaired functioning of endogenous pain modulatory systems. This cycle suggests that integrating sleep management strategies into chronic pain treatment could improve pain-related psychological outcomes (e.g., anxiety, depression). This study evaluates the effects of cognitive behavioral therapy for insomnia (CBT-I) on pain-related variables in individuals with TBI.
Methods: This cohort consisted of a community sample of TBI patients (N=49) participating in a parent randomized trial comparing 4-session CBT-I to 4-session sleep science and hygiene education. Participants completed sleep diaries and psychological measures before, during, and 3-months after treatment. Outcomes included anxiety and depressive symptoms, pain catastrophizing, cognitive pre-sleep arousal, and sleep quality. Linear mixed-effects models were analyzed to assess whether CBT-I improved pain sequelae in participants with Brief Pain Inventory (BPI) severity scores ≥3 at baseline (N=13).
Results: TBI participants randomized to CBT-I (N=6; Mage=42.0±14.2 years; MBPI=5.7±2.3; Range=3.3-8.5) were mostly female (66.7%) and equally white (50%) and black (50%). Sleep education participants (N=7; Mage=47.7±10.5 years; MBPI=4.2±1.4; Range=3.3-7.0) were predominantly female (71.4%) and white (71.4%). Analyses demonstrated a statistically significant group-by-time interaction for anxiety (b=-0.550[-0.870, -0.229], p=0.001), depression (b=-0.416[-0.686, -0.146], p=0.003), pain catastrophizing (b=-0.809[-1.529, -0.089], p=0.03), cognitive pre-sleep arousal (b=-0.680[-1.111, -0.249], p=0.002), sleep quality (b=-0.302[-0.494, -0.110], p=0.002), and sleep diary sleep efficiency (b=0.013, SE=.006, p=0.04) such that outcomes improved over time following CBT-I. No significant group differences emerged for pain severity.
Conclusion: In individuals with TBI, CBT-I significantly improved key correlates of pain, including anxiety, depressive symptoms, and sleep quality. While pain severity was not affected, alleviating psychological distress and improving sleep quality enhanced the quality of life for individuals with persistent pain. Given the limited research on nonpharmacological treatments for chronic pain in TBI and the preliminary nature of our findings, further research explicitly incorporating sleep interventions into pain management strategies is needed with larger samples.
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0578

COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA OUTCOMES: INSOMNIA IDENTITY AND INSOMNIA SEVERITY

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Introduction: Insomnia is defined as difficulty falling or staying asleep or waking earlier than desired with inability to return to sleep. Insomnia Identity is described as one's identification as "an insomniac," which can be measured independently of other sleep parameters or a diagnosis of insomnia disorder. This study investigated whether pathologizing sleep concerns through endorsement of Insomnia Identity may alter treatment outcomes.
Methods: Participants (N=87, 71 females, Mage=57.69±4.88 years) completed questionnaires about Insomnia Identity (InsID) and insomnia severity (ISI) pre- and post-cognitive behavioral therapy for insomnia (CBTi) in a 4-arm, randomized clinical trial with a 3:3:3:1 allocation ratio: in-person, telehealth, SHUTi, and waitlist. Change in InsID ratings after treatment and the relationships between baseline InsID and post-treatment ISI were examined.
Results: ANOVA results indicated participants did not differ between group on pre-treatment (BL) ISI or InsID ratings (p's>.05). There were significant differences between groups for ISI at post-treatment (PT), F (3,72)=4.09, p=.010, specifically between waitlist (mISI=14.57), in-person (mISI=7.22), and telehealth (mISI=7.17), but not SHUTi (mISI=8.52). There were significant differences between groups for PT InsID, F (3,72) = 3.52, p=.019, specifically between waitlist (mInsID=5.14), in-person (mInsID=2.91), telehealth (mInsID=2.96), and SHUTi (mInsID=2.90). The three treatment groups did not significantly differ for either analysis. Linear regression was used to determine if InsID ratings pre-treatment predicted post-treatment ISI and ISI pre-post change scores within the treatment groups only. Elevated pre-treatment InsID predicted higher posttreatment-ISI scores, F (1,65)=8.17, p=.006, R^2=.11, β=.34, but did not differ between groups (p=.14). InsID did not predict ISI change scores (p=.82).
Conclusion: Results indicate that Insomnia Identity is modifiable with CBTi treatment and appears to be related to the overall outcome of insomnia severity. Future treatment focused on reducing Insomnia Identity may lead to improved treatment outcomes.
Support (if any): University of Arizona

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0579

CHANGES IN NEURAL ACTIVATION UNDERLYING COGNITIVE CONTROL IN PATIENTS WITH CHRONIC INSOMNIA DISORDER AFTER CBT-I

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Introduction: This study investigated whether CBT-I alters neural activation during an emotional Stroop task in chronic insomnia disorder (CID). It also examined how changes in brain activation after CBT-I are linked to sleep or emotional-related symptom changes in CID.
Methods: This study included 23 CID patients and 11 controls who completed self-reported questionnaires, sleep diaries, actigraphy, and fMRI at both baseline and at the 5-week follow-up. CID patients received individualized face-to-face CBT-I once a week for 5 weeks. During fMRI, participants performed the emotional Stroop task with negative, sleep-related, and neutral words. Brain activation changes were compared pre- to post-CBT-I in the CID group and baseline to 5-week follow-up in the

control group, using a repeated measures ANOVA. Correlations neural activation changes and sleep or emotional-related symptom changes after CBT-I in the CID group were also analyzed.
Results: After CBT-I, scores on ISI, PSQI, and DBAS was significantly decreased. In addition, SOL and SE on sleep diary and WASO measured by actigraphy were significantly improved. Regarding psychiatric symptoms, scores on BAI and BDI were also reduced after CBT-I. CID patients showed increased activation in the right supratemporal gyrus (STG), right visual association area (VAA), and left supramarginal gyrus (SMG) during the emotional Stroop task with negative words (vs. neutral words) after CBT-I (STG, $p = 0.001$; VAA, $p < 0.001$; SMG, $p < 0.001$). However, no changes in these brain regions were observed in the control group. Neural activation changes in STG were negatively correlated with DBAS, and in VAA, they were negatively correlated with PSQI and ISI. Neural activation changes in STG and VAA were negatively correlated with BDI scores.
Conclusion: CBT-I enhanced activation in the right STG, VAA, and left SMG, which are known to be dorsal attentional networks, under the negative word condition. These findings may reflect improved attentional and cognitive processing of negative emotional stimuli, potentially linked to improved insomnia and depressive symptoms.
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0580

DETERMINANTS OF TREATMENT RESPONSE TO CBT-I IN VETERANS PRESENTING WITH COMORBID INSOMNIA AND SLEEP APNEA

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Introduction: Cognitive behavioral therapy for insomnia (CBT-I) is considered the preferred treatment for insomnia in patients with comorbid insomnia and obstructive sleep apnea (COMISA). The remission rates with CBT-I are generally considered lower than in insomnia-only populations and there is variability in individual treatment responses. In this study, we sought to identify specific clinical attributes that predict benefit from CBT-I in patients with COMISA.
Methods: We conducted a retrospective analysis of the national Veterans Health Administration (VHA) electronic medical records covering veterans with the diagnosis of COMISA between January 2021 and December 2023. A total of 131 eligible cases received brief behavioral therapy for insomnia (BBTI) over 6 weeks, 56 (43%) of whom did not achieve remission.
Results: Fifty-six patients (43%) did not meet ISI criteria for BBTI response. Patients who did not respond to BBTI had a higher sleep propensity at baseline than those who did respond to BBTI ($p=0.02$), however, both groups had comparable degree of insomnia severity ($p=0.78$). Prior to BBTI, there was no significant difference in the CPAP usage between BBTI responders (84.7±53.9 minutes) and BBTI nonresponders (78.9±77.5 minutes) (difference 5.7 minutes, 95% CI [-18.3, 29.7]; $p=0.62$). Post BBTI, patients in BBTI responders used CPAP for a longer duration compared with baseline (difference 63.6 minutes, 95% CI [51.1, 76.3]; $p< 0.001$] but not for BBTI nonresponders (difference 9.1 minutes, 95% CI [-10.2, 28.4]; $p=0.35$). Moreover, BBTI responders achieved higher CPAP use (148.3±84.4 minutes) than BBTI nonresponders (84.6β β 53.9 minutes), with a statistically significant difference between the two groups (60.3 minutes, 95%CI [30.3, 90.2]; $p< 0.001$) (Figure 2).Non-whites (OR 3.5, 95% CI [1.4, 8.8]) and shorter sleep time (OR 0.98, 95% CI [0.98, 0.99] were independent predictors of blunted response to BBTI. These findings remained true even when depression and AHI were forced into the regression model. Patients with a total sleep duration < 4.1 hours were at greatest risk for BBTI failure.
Conclusion: These findings buttress the need that identifying insomnia phenotypes in patients with COMISA would help deliver personalized care while maximizing CBT-I treatment resources.
Support (if any): U.S. Department of Veterans Affairs

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0581

PREDICTORS OF INSOMNIA SEVERITY IN A VETERAN POPULATION REFERRED FOR CBT-I

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Introduction: The Insomnia Severity Index (ISI) is a widely used measure assessing the subjective severity of insomnia symptoms. While sleep behaviors such as total sleep time (TST) and sleep efficiency (SE) contribute to the perception of insomnia severity, the role of patient-level characteristics in predicting ISI scores above and beyond these variables has not been fully elucidated. This study explores the relationship between common comorbidities, such as Obstructive sleep apnea (OSA), post-traumatic stress disorder (PTSD) and major depressive disorder (MDD) and insomnia severity in Veterans referred for CBT-I.
Methods: Data were obtained from the VA's Corporate Data Warehouse, a repository of clinical and administrative Veteran data aggregated from VA electronic health records. Our sample consisted of Veterans who had an outpatient cognitive behavioral therapy for insomnia (CBT-I) encounter, between 10/01/2015 and 06/15/2023. A regression model was built to test the contribution of age, sex, race, TST and SE (sleep diary), presence of OSA, PTSD, and MDD to baseline CBT-I session ISI score.
Results: A total of 7046 veterans had complete data, including TST, SE, ISI and OSA/PTSD/MDD diagnoses. Patients with PTSD were younger, had worse baseline ISI scores, shorter TST, and poorer SE. The regression results showed a small but significant negative relationship with age ($\beta = -0.032$, $p < 0.001$), notable racial differences, with "Hispanic" and "Other" Veterans reporting lower ISI scores ($\beta = -0.561$, $p = 0.030$; $\beta = -1.037$, $p < 0.001$ respectively), a negative association with TST ($\beta = -0.006$, $p < 0.001$), and SE ($\beta = -13.795$, $p < 0.001$). A diagnosis of OSA ($\beta = 0.827$, $p < 0.001$), PTSD ($\beta = 0.435$, $p = 0.002$) and MDD ($\beta = 0.345$, $p = 0.013$) were positive predictors of higher ISI scores. The model accounted for 22.1% of the variance in ISI scores ($R^2 = 0.221$).
Conclusion: Psychiatric and medical comorbidities significantly influence insomnia severity among Veterans. These relationships persist even when controlling for other variables, including TST and SE, suggesting a unique contribution of other patient-level factors, such as OSA, PTSD and MDD to the subjective insomnia-related distress and impairment.
Support (if any): Medical Education Grants from the Veterans Health Foundation

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0582

CBT-0601 0601 0601 0601 I FOR VETERANS WITH PSYCHOSIS: EVALUATING ADHERENCE AND FUNCTIONAL OUTCOMES

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Introduction: Veterans with psychosis experience environmental, psychological, and systemic barriers to receiving and benefiting from CBT-I. To promote delivery and adherence, we developed a 10-session guide (CBT-I for Psychosis) for tailoring CBT-I to address these barriers. We delivered CBT-I for Psychosis compared to an active control Health and Wellness (HW) intervention and assessed (1) functional outcomes, (2) characteristics of CBT-I adherence, and (3) the relationship between adherence and post-CBT-I outcomes.
Methods: The sample was N=47 Veterans with psychosis; 26 randomized to CBT-I for Psychosis and 21 to HW. Measures assessed at baseline, post-treatment, and 3-month follow-up included the Insomnia Severity Index (ISI), Functional Outcomes of Sleep Questionnaire-10 (FOSQ-10), and World Health Organization Disability Assessment Schedule 2.0 (WHODAS2.0). Adherence measures were 14-day standard deviation (SD) of out of bed-time (OBT) derived from participant-completed Consensus Sleep Log-Core (CSD-C) diaries at each timepoint, and therapist-rated Treatment Components Adherence Scales (TCAS) at final CBT-I session.
Results: A general linear model with correlated errors was used to test differences on outcome measures. Regression terms in the model included time, and intervention-by-time interactions. At post but not follow-up, CBT-I yielded greater ISI reductions (t[46]=-2.07, p=.044, d=-.70), and FOSQ-10 improvements (t[46]=2.21, p=.032, d=.46), whereas HW yielded FOSQ-10 deteriorations. There was a greater increase in participation in community activities in HW relative to CBT-I at post (t[46]=2.39, p=.021, d=.48) and follow-up (t[46]=2.33, p=.024, d=.52) as measured by WHODAS2.0. For OBT, there was a trend for larger SD decreases in CBT-I relative to HW at post (t[44]=-1.77, p=0.08, d=-0.55) but not follow-up. Scores on the TCAS were not associated with the FOSQ-10 at any timepoint, but were moderately correlated with the ISI at 3-month follow-up, (r[16]=-.57; p=.02).
Conclusion: CBT-I for Psychosis yielded substantial benefits to insomnia severity and sleep-related functioning, but not community engagement. Therapist-rated adherence may predict longer-term insomnia outcomes. Results demonstrated a trend with a medium effect size of CBT-I in reducing diary-derived OBT SDs, suggesting adherence to consistent rise times. Larger trials should use multimethod assessments to examine OBT variability and its relation to sleep-related functioning for Veterans with psychosis.
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0583

ACCEPTANCE AND BEHAVIORAL CHANGES TO TREAT INSOMNIA (ABC-I): TREATMENT EFFECTS IN WOMEN VETERANS WITH PROBABLE PTSD

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Introduction: Acceptance and Behavioral Changes to Treat Insomnia (ABC-I) is a promising acceptance- and behavioral-based intervention for the treatment of chronic insomnia disorder, with previously demonstrated non-inferiority to Cognitive Behavioral Therapy for Insomnia (CBT-I) for symptom reduction and superior adherence to behavioral treatment recommendations among women veterans. Comorbid posttraumatic stress disorder (PTSD) is a common clinical presentation that can hinder insomnia treatment engagement and outcomes. This analysis sought to determine whether ABC-I led to greater PTSD symptom improvement, compared to CBT-I, in women veterans.
Methods: We analyzed data from a subset of participants in a randomized comparative effectiveness trial of ABC-I vs CBT-I in women veterans with probable PTSD (NCT02076165). Analysis 1 included 30 participants who received ABC-I. Analysis 2 also included 23 participants who received CBT-I. PTSD symptoms were measured via PTSD Checklist (PCL-5) total and cluster scores (i.e., B: intrusion, C: avoidance, D: negative cognitions/mood, E: hyperarousal). Probable PTSD was defined by PCL-5 total score ≥ 33. For analysis 1 we used paired-groups t-tests, and for analysis 2 we used independent groups t-tests (comparing improvement for the ABC-I vs. CBT-I group). Effect sizes were computed for both analyses (Cohen's d). We employed 1-tailed testing and alpha =.20 as the a-priori threshold given the exploratory nature of these analyses.
Results: In Analysis 1, veterans who received ABC-I demonstrated a significant reduction in PCL-5 total and cluster (B-E) scores at both post-treatment and 3-month follow-up (ds = -0.71—1.50, ps < 0.01). In Analysis 2, ABC-I demonstrated greater PTSD symptom reductions (i.e., change-scores) than CBT-I at the 3-month follow-up (but not post-treatment) for PCL-5 total (Δd = -6.8, p = 0.08) and cluster C and D scores (Δd = -1.1, p = 0.10, Δd = -4.2, p = 0.03).
Conclusion: ABC-I holds promise for addressing insomnia and PTSD symptoms in trauma-exposed individuals, a population that has historically demonstrated sub-optimal responses to CBT-I. Further work should explore potential mechanisms by which ABC-I may confer ancillary treatment benefits.
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0584

DEVELOPMENT OF A TAILORED DIGITAL CBT-I PILOT INTERVENTION IN OLDER U.S. LATINO SURGICAL PATIENTS

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Introduction: Insomnia and sleep-related disturbances affect over one-third of older adults undergoing surgery. Insomnia increases the vulnerability to postoperative delirium (POD) and cognitive decline, impairing postoperative recovery. U.S. Latino/Hispanic older adults are disproportionately affected by these sleep-related disturbances, with over half reporting mild-to-severe insomnia symptoms. Cognitive Behavioral Therapy for Insomnia (CBT-I) is the first-line treatment for insomnia, but nearly all current digital versions are in English, making it endemically underutilized by minority groups due to linguistic and cultural barriers. This AASM-funded (352-DS-24) pilot study aims to culturally tailor a digital CBT-I intervention for older Latino/Hispanic surgical patients to evaluate its 1) feasibility and 2) preliminary efficacy.
Methods: Up to ten stakeholders (patients, caregivers/family, and healthcare professionals, including primary care, anesthesia, surgery, and behavioral sleep physicians) will be recruited to participate in two focus group sessions. Both groups will test the intervention and provide feedback on cultural and linguistic needs. After incorporating their feedback, we will recruit ten older U.S. Latino/Hispanic surgical patients (≥65 years old) with insomnia (Insomnia Severity Index≥8) to undergo a tailored digital CBT-I intervention comprising one in-person baseline session and three virtual sessions over four weeks. We will assess the feasibility, acceptability, and preliminary efficacy of the culturally tailored CBT-I intervention through adherence tracking, utility and satisfaction surveys, sleep diaries, preoperative anxiety, and postoperative cognitive and physical recovery.
Results: We will present our experiences and qualitative learning from the focus group sessions, such as cultural differences and barriers identified and any adaptations to the translated intervention. We also anticipate reporting our experiences with and preliminary findings from the first participants' adherence, satisfaction, and sleep efficiency results. Potential challenges include recruiting and retaining older Latino/Hispanic participants, technical literacy, and access to digital tools, which will be mitigated through technical support and simplified intervention designs.
Conclusion: This pilot study aims to adapt a well-established digital insomnia intervention for an underserved population, addressing critical gaps in perioperative care for older U.S. Latino/Hispanic surgical patients. If successful, this approach may reduce the burden of insomnia and postoperative cognitive decline, advancing equitable healthcare practices.
Support (if any):

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0585

A SOUND APPROACH: IS DIGITAL BEHAVIORAL INSOMNIA THERAPY ACCESSIBLE FOR THE DEAF COMMUNITY?

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Introduction: Prior research has demonstrated that digitally delivered CBT for Insomnia (dCBT-I) is highly effective for those who can access and complete treatment. However, there are significant accessibility challenges for many vulnerable populations. Extant studies have focused on those with low socioeconomic (SES) resources and/or low digital health literacy; however, the accessibility of dCBT-I for people with hearing disabilities has not been well-established. This study conducted qualitative interviews with dCBT-I patients from various backgrounds about treatment adherence and the addition of a nurse coach.
Methods: Patients (n=263) had an initial telehealth consultation with the coach, then completed six consecutive weeks dCBT-I sessions via a mobile health application alongside sleep diaries which tracked sleep efficiency, sleep restriction, and time in bed. Patients received personalized feedback from the coach after each session and had the option of booking additional telehealth coaching sessions. Qualitative interviews were conducted with a subsample of patients to assess adherence across ability, SES, and treatment completion barriers and facilitators using the NIMHD framework. Results specifically pertinent to those with hearing disability are presented here.
Results: While patients with hearing disabilities were able to successfully complete the treatment, there were several barriers and facilitators named. Patients found that specific digital tools that are usually not available (e.g., chat box, live closed captioning) were integral to their ability to fully participate in the treatment. Patients with a hearing disability often relied on their own tools and strategies (e.g., translation services, microphones) to make the treatment recommendations feasible. Patients also noted that having a coach aided in treatment adherence, specifically referencing the importance of receiving encouragement as an important factor in their own treatment continuation.
Conclusion: This feedback highlights the importance of augmenting dCBT-I with relevant tools and technology to increase accessibility to those with a hearing disability. Though the digital administration of CBT-I already has tools that increase accessibility compared to in-person treatment, those were not sufficient. Future research should further examine how implementation of dCBT-I can have greater equitable access for disabled communities.
Support (if any): R01HL159180 awarded to Dr. Philip Cheng.

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0586

EFFECTS OF DIGITAL CBT-I ON SELF-REPORTED SLEEP MEASURES: A META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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Introduction: Cognitive Behavioral Therapy for Insomnia (CBT-I) is the gold-standard treatment for this sleep disorder, but its implementation is limited due to the reduced number of trained professionals and high costs. Digital CBT-I (dCBT-I) has emerged as a viable alternative, and previous meta-analyses demonstrated its efficacy on insomnia outcomes. However, a gap remains in evaluating the effects of dCBT-I on sleep macroarchitecture. This study aimed to investigate it through meta-analyses of randomized clinical trials (RCTs).
Methods: Systematic searches were conducted in PubMed and Web of Science for RCTs evaluating dCBT-I in adults with

chronic insomnia. Studies were included if they assessed Total Sleep Time (TST), Sleep Onset Latency (SOL), Sleep Efficiency (SE), Wake After Sleep Onset (WASO), and Number of Awakenings (NWAK) either as self-reported information or polysomnography (PSG). Meta-analyses were conducted for active (in-person CBT-I or telehealth) and inactive (no treatment or minimal intervention) control groups. Effect size was calculated using raw mean differences and meta-analyses were performed using random-effects models.
Results: A total of fifteen RCTs were included, comprising sixteen analyses. They were conducted with data from sleep diaries only, as none of the included studies provided PSG data. When comparing dCBT-I with active control, no significant differences were detected. In comparison to inactive controls, statistically significant effects were observed. TST increased by 0.21 hours, SOL decreased by 15.52 minutes, SE improved by 10.51%, WASO reduced by 16.43 minutes, and NWAK decreased by 0.53.
Conclusion: DCBT-I was associated with improvements in sleep macroarchitecture parameters when compared to inactive control groups, but no significant differences were identified when compared to active control groups. This denotes that dCBT-I is as effective as in-person CBT-I. Future research should include objective sleep measures to enhance these findings.
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0587

EVALUATING PARTICIPATION IN COGNITIVE-BEHAVIORAL THERAPY FOR INSOMNIA IN VETERANS USING ELECTRONIC HEALTH RECORDS

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Introduction: Insomnia disorder is a chronic, debilitating disorder that is highly prevalent in US Veterans. Cognitive-Behavioral Therapy for Insomnia (CBT-I) is an effective, first-line treatment for insomnia across the Veterans Health Administration (VHA). However, early discontinuation of CBT-I is common, with estimates of 25-40% of Veterans discontinuing after one session in smaller samples of Veterans. Retention barriers may be experienced differently for Veteran subgroups at risk for health inequities, like people of color or those with serious mental illness. The current study leverages electronic health records across all CBT-I encounters in VHA to identify sociodemographic and clinical factors associated with CBT-I discontinuation and completion.
Methods: Data were obtained from VA Corporate Data Warehouse in Veterans with at least one CBT-I outpatient progress note between FY2015-FY2023. Extracted predictors include total sessions, age, sex, race, medical comorbidities, baseline insomnia symptom severity, concurrent sleep medication use, and mental health diagnoses. A series of chi-square tests were performed to evaluate differences in these predictors for two variables: a) discontinuation after 1 session, and b) completion of treatment (defined as achieving the minimally-recommended 4 sessions).
Results: Of the 82,214 Veterans (82.8% Male, mean age = 50.9 years, 46.3% non-White) who initiated CBT-I, 69.9% of Veterans discontinued CBT-I after the first session, and only 16.0% completed the minimally-recommended 4 sessions. Veterans of color, younger (< 45 years), and with a diagnosis of psychosis, substance use disorder, and alcohol use disorder completed fewer sessions and had lower rates of treatment completion (all p-values <.02). Female Veterans and Veterans with a diagnosis of anxiety disorders, depression, and PTSD completed more sessions and had higher rates of treatment completion (all p-values <.001).
Conclusion: Despite its effectiveness, most Veterans do not complete CBT-I. This study identified sociodemographic and clinical factors that contributed to engagement and discontinuation in CBT-I. These data suggest that greater efforts at patient retention may be needed for younger Veterans and those with psychosis or substance use problems. Further research is necessary to understand these facilitators and barriers to improve treatment engagement and outcomes for Veterans with insomnia.
Support (if any): Veterans Health Foundation, VISN 4 MIRECC.

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0588

CLIENT EXPECTATIONS OF DIFFERENT COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA MODALITIES AND RELATED TREATMENT OUTCOMES

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Introduction: Cognitive behavioral therapy for insomnia (CBTi) is considered the first-line treatment for insomnia, but access to this treatment is limited. Telehealth- or Internet-delivered CBTi are potential strategies for increasing access. This study investigated the perceived credibility and expectancy of treatment success across three CBTi modalities and explored the effects of credibility and expectancy has on treatment outcomes.
Methods: Sixty-two participants (84% Females, Mage=57.90 years; SD=4.75) between the ages of 50-65 who reported complaints of insomnia were recruited for this study. Participants completed the Credibility Expectancy Scale (CEQ) at the first session and the Insomnia Severity Index (ISI) pre- and post-treatment. Participants were randomly assigned into one of the three CBTi modalities: In-Person (n=21), Telehealth (n=22), and Internet (SHUTi; n=19) delivered CBTi. CEQ variables were separated into a credibility score, expectations based on feelings score, and expectations based on thoughts score.
Results: Differences between CEQ scores of credibility and expectations were compared across CBTi modalities, using one-way analyses of variance. Credibility scores were significantly higher for In-Person (M=7.59, SD=1.10) and Telehealth (M=7.36, SD=1.23) when compared to Internet-delivered CBTi (M=5.86, SD=1.74, p's <.05). Expectancy (thought-based) scores were significantly higher for Telehealth CBTi (M=6.41, SD=1.59) when compared to Internet-delivered CBTi (M=4.89, SD=2.31, p's <.05). All other comparisons did not meet statistical significance. A multiple linear regression analysis resulted in a significant model, R2=.23, F(1, 60)=18.18, p <.001. Further analysis revealed that the measure of

expectancy based on feeling was the only significant predictor of posttreatment ISI scores, β=-.48, p <.001.
Conclusion: Results reveal that patients expect more improvements from CBTi modes that involve a clinician. The pre-treatment expectancy predicts post-treatment ISI only with expectancy based on feelings, which indicates that expectations of CBTi outcomes based on thoughts and feelings are different, this may be affecting the overall treatment outcomes. Future research could explore this further. Results suggest that Telehealth CBTi may be an effective strategy to increase the accessibility of treatment for insomnia.
Support (if any): University of Arizona

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0589

STEPPED-CARE MANAGEMENT OF INSOMNIA: PATIENT TREATMENT CHOICES IN A PRAGMATIC CLINICAL TRIAL SETTING

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Introduction: Informing patients about prospective options for managing insomnia remains challenging in practice given the competing risk-benefit profiles between options. This study evaluated patient treatment choices for insomnia as part of a pragmatic clinical trial for a two-phase cognitive behavioral therapy for insomnia (CBT-I) intervention.
Methods: Upon enrollment, participants (N=154, 73% women, mean age: 51.8 ± 14.2 years) were guided by a patient decision aid (PtDA), outlining the risk-benefit profiles of in-person CBT-I, digital CBT-I (dCBT-I), and medication. In phase-1, participants were offered a choice between dCBT-I, dCBT-I + medication or medication only. Non-remitters were enrolled into phase-2 (N=69), choosing between in-person CBT-I, medication, or no further treatment. A secondary analysis was conducted evaluating patient treatment choices and the acceptability of the PtDA. The presence of decisional conflict with treatment choice(s) was screened using the 4-item SURE (Sure of myself; Understand information; Risk-benefit ratio; Encouragement) checklist.
Results: In phase-1, 47.4% (n= 73) of participants chose dCBT-I, followed by dCBT-I + medication (42.3% n=66) and medication (9.74%; n=15). The dCBT-I group were less likely to use medications compared to the other two treatment groups (p < 0.001). Men (p = 0.032) and individuals less motivated to change sleep habits (p=0.014) were more likely to choose medication only in phase-1. In phase-2, 60.9% (n=42) of non-remitters chose in-person CBT-I, followed by no further treatment (23.6%; n=16) and medication (15.9%; n=11). Non-remitters from the medication group were more likely to choose medication again in phase-2 (p< 0.001). Decisional conflict (i.e., SURE score < 4) was only observed in 6% (n=9/154) and 3% (n=2/59) of participants across phase-1 and phase-2, respectively. With respect to acceptability, over 90% of participants (n=145/154; n=57/59) endorsed the PtDA as easy to understand, easy to read, clarified their treatment preferences, and facilitated decision-making.
Conclusion: The PtDA was endorsed as acceptable and appeared to address the decisional conflict that often arises when choosing between insomnia treatments. This may explain the higher-than-expected uptake of dCBT-I and CBT-I, warranting further research on the impact of PtDAs on insomnia treatment outcomes.
Support (if any): This study was funded by the Canadian Institutes for Health Research (Grant #353509).

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0590

EFFECT OF A PRESCRIPTION DIGITAL THERAPEUTIC FOR CHRONIC INSOMNIA ON DAYTIME SLEEPINESS: RESULTS FROM THE REAL-WORLD DREAM STUDY

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Introduction: Digital Cognitive Behavioral Therapy for Insomnia (dCBT-I) delivers gold-standard treatment for chronic insomnia. Concerns about increased sleepiness during the sleep restriction phase of dCBT-I have limited its use, especially in safety-sensitive occupations like those regulated by the Department of Transportation (DOT); however, its impact on real-world populations has been underexplored. The Epworth Sleepiness Scale (ESS), a validated measure of daytime sleepiness, allows us to evaluate sleepiness throughout dCBT-I treatment. This study investigates the impact of dCBT-I on ESS-measured sleepiness.
Methods: Real-world data was derived from a prospective, single-arm, pragmatic clinical study (DREAM [USA; N=1565, aged 22-75]). The intervention was a dCBT-I program delivered through the FDA-cleared Somryst® mobile application. The program delivered 6 interactive treatment Cores over 6-9 weeks covering key CBT-I principles, with sleep restriction implemented between Cores 2-3. Participants completed the ESS and Insomnia Severity Index (ISI) at the beginning of each Core and entered daily sleep diaries used to tailor sleep restriction windows.
Results: Contrary to concerns about sleepiness post-sleep restriction implementation, ESS scores did not increase at Core 3. Instead, ESS scores demonstrated significant reductions from Core 1 to Cores 3-6, indicating decreased daytime sleepiness throughout the intervention. ESS scores decreased from a mean of 9.14 at Core 1 to 7.30 at Core 6. Relative to Core 1, the mean differences for each core were: Core 3 (-0.66, p < 0.001), Core 4 (-0.81, p < 0.001), Core 5 (-1.37, p < 0.001), and Core 6 (-1.84, p < 0.001). ISI scores decreased from a mean of 18.83 in Core 1 to 9.87 at Core 6; the mean difference from Core 1 to 6 was -8.96, p < 0.001.
Conclusion: Evaluation of ESS scores throughout dCBT-I treatment revealed no increase in subjective sleepiness, even during sleep restriction. In fact, real-world participants demonstrated resilience and adaptation to the intervention, reflected by significant progressive reductions in ESS scores across cores. These findings support further discussion on utilizing dCBT-I programs for safety-sensitive populations.
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0591

APPLICATION OF DECENTRALIZED CLINICAL TRIAL TO VALIDATE THE EFFICACY OF DIGITAL THERAPEUTICS FOR INSOMNIA

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Introduction: Cognitive behavioral therapy for insomnia (CBT-I) has proven to be an effective treatment, however, its accessibility is limited. To address this issue, digital therapeutics for insomnia (DTx-I) have emerged as potential solution to enhance access. We have opted to conduct a decentralized clinical trial (DCT) which can minimize the necessity for participants to in-person hospital visits. This study aimed to evaluate the clinical efficacy of a proprietary DTx-I, "WELT-I", and assess the feasibility and utility of DCTs for validating DTx-I.
Methods: A double-blind, sham-controlled randomized DCT was conducted with 68 participants meeting DSM-5 criteria for insomnia (n=33 for WELT-I group, n=35 for control group). Sleep metrics and self-reported psychiatric questionnaires, including dysfunctional beliefs and attitudes about sleep (DBAS-16), were measured over 7 weeks. All trial procedures except one on-site visit for written consent were conducted remotely. The primary outcome for efficacy was sleep efficiency. For the utility of DCTs, time to reach recruitment goal, retention rates, and participants' satisfaction were evaluated.
Results: WELT-I significantly improved sleep efficiency compared to the sham app (least square difference=8.28, p value=0.04) and DBAS-16 score (least square difference=-1.03, p value=0.01). Recruitment was completed within 73 days, with a retention rate of 82.14% and a mean satisfaction score of 7.21 out of 10.
Conclusion: This study provides evidence that WELT-I, a CBT-I-based digital therapeutics, is a safe and effective approach to managing insomnia disorder. The DCT approach enabled rapid recruitment, high retention, and strong participant satisfaction, highlighting its potential as a scalable and efficient method for validating DTx-I.
Support (if any): The present study was supported by the National Research Foundation of Korea, funded by the Ministry of Science, ICT & Future Planning, Republic of Korea, under grant number 2022R1A2B5B03002611 (Eun Lee); the Daegu-Gyeongbuk Medical Innovation Foundation under grant number B0081115000708 (Eun Lee); the Korea Health Industry Development Institute under grant number RS-2023-00266002 (Eun Lee); and Korea Medical Device Development fund, under grant number RS-2023-00255005 (Kyung Mee Park). The funding sources were not involved in study design, data collection, analysis, decision to publish, or manuscript preparation.

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0592

SPONSORSHIP BIAS AND METHODOLOGICAL QUALITY IN RANDOMIZED CONTROLLED TRIALS ABOUT DIGITAL CBT FOR INSOMNIA

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Introduction: Industry sponsorship bias refers to distortions that can occur at any point in a study to favor its sponsor. Digital cognitive behavioral therapy for insomnia (CBT-I) is a nonpharmacological treatment whose studies are often sponsored by the developer companies. The aim of this study was to assess whether sponsorship bias in digital CBT-I studies predicts more favorable outcomes on randomized controlled trials (RCTs).
Methods: A systematic review of PubMed and Web of Science databases was conducted to identify RCTs on digital CBT-I in adults. Information was collected on the type of publication, methodological quality, and involvement of the authors with the company developing the digital CBT-I studied. Industry sponsorship bias was measured on a 0 to 4 scale, based on the number of authors primarily affiliated to the companies developing the digital CBT-I interventions, or to mentions of sponsorship or funding received from these companies. The methodological quality of the RCTs was evaluated using the van Tulder scale
Results: Twenty-eight RCT analyses were included. The most frequent intervention was SHUTi (39.28%), followed by non-specified digital interventions for insomnia. The mean insomnia severity index (ISI) scores were 15.04±4.89 in the control group, 10.75±5.06 in the experimental group, and the mean effect size was 1.06±1.66. There was no correlation between the sponsorship bias level and the ISI effect size (ρ=1.000; p=0.198). The ISI effect size was equivalent among studies with and without sponsorship bias (p=0.405). The presence of sponsorship bias was associated with both open access publication (p=0.022) and lower methodological quality (p=0.027).
Conclusion: Sponsorship bias did not favor the results of digital CBT-I interventions, as no correlation was found between industry sponsorship bias and the ISI score. However, sponsorship bias was significantly associated with both open access publication and with lower methodological quality.
Support (if any): This work was supported by the Associação Fundo de Incentivo à Pesquisa (AFIP), São Paulo, Brazil. IPAL and VAK receive scholarship grants from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). ST is a grant recipient from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq).

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0593

INVESTIGATING BEHAVIOR CHANGE IN THERAPIST-LED VERSUS DIGITAL CBT-I AND ITS MEDIATING ROLE ON CLINICAL OUTCOMES

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Introduction: This study analyzed data from a subset of participants from the RESTING Study who were previously shown have differential reduction in insomnia severity (ISI) following digital CBT-I (dCBT-I) or therapist delivered CBT-I (tCBT-I). Given the centrality of behavioral change in sleep interventions, we examined whether the changes in time awake during the period allocated for sleep and lingering in bed differed by treatment modality, and whether these changes mediated the differential reductions in insomnia severity between the two arms.

Methods: Adults 50 years or older identified as likely to derive better benefit from tCBT-I were randomized to dCBT-I (n=69) or tCBT-I (n=68) (M age=63.26 years [SD=7.79], 69% female). Time awake during the period allocated for sleep (Total Wakefulness) was computed as the average difference between the number of hours from 'lights out' until 'rise time' and 'total sleep time'; lingering (Linger) was average of hours between 'into bed' and 'lights out' plus hours between 'wake time' and 'rise time', both derived from the consensus sleep diary. Participants were assessed at baseline, 2,4,6,9, and 12 months. Quadratic mixed effects models were tested, one per behavioral variable of interest. MacArthur mediation model was used to examine whether changes in these variables at 2 months predicted subsequent trajectory of change in insomnia severity index (ISI).
Results: Participants who received tCBT-I had significantly greater reduction in Linger than those receiving dCBT-I (B=-0.013, p=0.047, partial η2=0.003) but not in Total Wakefulness (p=0.053). The mediation model revealed that early change in Linger (from baseline to two months) predicted subsequent change (slope) in ISI from 2 to 12 months (B=-0.28, p=.046 for the three-way interaction between treatment arm, time, and early change in excessive lingering).
Conclusion: Findings indicated that tCBT-I may support greater changes in using bed only for sleep than dCBT-I. These findings may be unique for a subset of individuals with insomnia disorder predicted to have a better response to tCBT-I and may not be generalized to individuals who were predicted to respond equally as well from the two treatment modalities.
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0594

EFFECTS OF A TRIAGED CBTI APPROACH USING DIGITAL OR THERAPIST DELIVERY ON PRESCRIPTION HYPNOTIC USE: RESULTS FROM THE RESTING STUDY

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Introduction: Use of prescription hypnotic medications and the negative impacts of their use increase in older age. This study aimed to compare the effects of two delivery strategies for CBT-I on prescription medication use among adults aged 50 and older with insomnia disorder.
Methods: Participants (N=245) were classified at baseline by a Triage-Checklist. Those projected to do better if they were to start treatment with therapist versus digitally delivered CBT-I (tCBTI versus dCBTI) constituted the YES stratum (n=137); the rest constituted the NO stratum (n=108). The YES stratum included individuals with one of the following: high daytime sleepiness, high psychological distress, use of prescription sleep medication on most nights, very short sleep durations, or extreme sleep schedules. Access to CBT-I was available for 12 months. tCBTI included the same components as dCBTI plus a module to promote circadian alignment of sleep schedules and another to offer support for medication taper (when identified as a treatment goal). Participants were randomized within stratum to a strategy that utilized only dCBTI (ONLN) or to a stepped-care strategy that prospectively allocated the first step of care to dCBTI or tCBTI based on the Triage-Checklist and switched dCBTI-non-responders at 2-months to tCBTI (STEP). The average nightly amount of prescription hypnotic medications used (MEDS) was computed by first converting each dose to the number of minimal available doses, thus accounting for the variability in type of medication both across and within participants. Mixed effects models with experimental arm, time (0,2,4,6,9, and 12 months), and their interaction were tested.
Results: Compared to ONLN, participants in STEP had greater reductions in MEDS (p=0.019). Within the YES stratum, compared to ONLN, those in STEP had greater reductions in MEDS (p=0.018). Within the NO stratum MEDS was low and did not change differentially between STEP and ONLN (p =.91). Within the ONLN arm, change in MEDS was minimal and did not differ between strata. Results did not change with treatment-dose covariate adjustment.
Conclusion: A triaged-stepped care approach to CBT-I can help reduce prescription medication use among middle age and older adults, particularly among those with complex presentations.
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0595

FACTOR ANALYSIS OF FEAR OF SLEEP AND EXPERIENTIAL AVOIDANCE IN TRAUMA-RELATED INSOMNIA

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Introduction: Fear of sleep (FoS) often develops following trauma exposure and may play a key role in maintaining insomnia symptoms. While fear of sleep has been operationalized within the Fear of Sleep Inventory - Short Form, prior studies have reported inconsistent factor structures. Experiential avoidance (EA), a trait-based measure of avoidance behavior, is associated with post-traumatic stress disorder (PTSD) and insomnia, and further shares conceptual overlap with FoS and may help clarify its unique contributions to trauma-induced insomnia.
Methods: This study evaluated the psychometric properties of the FoSI-SF in a sample of college students (N = 197), examining its factor structure, convergent validity with EA, and discriminant validity with sleep hygiene, a sleep-related factor linked to insomnia. A subset of participants (n = 50) with clinically-significant PTSD symptoms and sub-threshold insomnia was analyzed to test a conceptual model of FoS.
Results: Exploratory factor analysis revealed a three-factor structure for the FoSI-SF: 1. Fear of loss of control/vulnerability; 2. Fear of darkness; and 3. Fear of re-experiencing traumatic nightmares. The FoSI-SF demonstrated convergent validity with EA, but lacked discriminant validity with sleep hygiene. In the subset sample, trauma-related hypervigilance significantly predicted fear of loss of control/vulnerability, while nightmares significantly predicted fear of re-experiencing traumatic nightmares.
Conclusion: This study identified a three-factor structure of the FoSI-SF and highlighted the construct's relationship with EA and trauma-related processes (i.e., hypervigilance and nightmares). While FoS appears to overlap conceptually with EA, its distinct role in insomnia warrants further exploration, particularly in trauma-exposed populations.
Support (if any):

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0596

FINANCIAL TOXICITY, RACIAL DISPARITIES, AND HEALTHCARE ACCESS IN PREGNANT WOMEN WITH INSOMNIA

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Introduction: Insomnia affects half of women during pregnancy, which reduces quality of life and harms maternal health. As awareness of prenatal insomnia increases, more pregnant women are seeking help for their sleep. However, little is known about real-world barriers pregnant women face when seeking insomnia treatment. The present study explored associations of race and financial toxicity with clinical morbidity and care access among pregnant women seeking insomnia care.

Methods: Three-hundred-and-ninety-three pregnant women (Age: 30.7±4.9yrs; Gestation: 25.7±3.4wks) seeking treatment for insomnia in a large health system completed an online survey. Outcomes included sociodemographics, the Comprehensive Score of financial Toxicity survey, Edinburgh Postnatal Depression Scale, and Perinatal Rumination Scale-Night. We employed chi-square analyses and multivariate linear and logistic regression.

Results: Half of treatment-seeking patients identified racially as white (52.7%), whereas 21.7% identified as Black (most well-represented groups). Nearly half of the sample reported no/mild financial toxicity, whereas 39.2% endorsed moderate financial toxicity and 13.9% endorsed severe financial toxicity. Regarding health insurance, 29.9% of patients had public insurance. Relative to white patients, non-white patients reported higher levels of moderate-to-severe financial toxicity (62.4% vs 45.0%) and greater utilization of public insurance (40.9% vs 20.1%). Multivariate regression showed that financial toxicity was independently associated with depression (b=-.252, p<.001), perinatal rumination (b=-.491, p<.001), and suicidal ideation (SI; OR=1.07, p<.001), whereas race was not. Indeed, more severe financial toxicity was associated with greater disease burden as indicated by higher rates of comorbid depression (Severe toxicity: 80.0%; Moderate: 61.9%; No/Mild: 29.7%), perinatal rumination (Severe: 80.0%; Moderate: 56.8%; No/Mild: 28.1%), and SI (Severe: 23.6%; Moderate: 16.8%; No/Mild: 5.4%). Unfortunately, patients with greater financial toxicity were less likely to be able to afford copays for psychotherapy services (Severe toxicity: 69.1% cannot afford copays; Moderate: 57.1%, No/Mild: 27.2%).

Conclusion: Pregnant women seeking insomnia treatment present with high rates of depression, perinatal rumination, and SI. Non-white women are over-represented among those with moderate-to-severe financial toxicity, and greater financial toxicity is associated with greater clinical morbidity. Despite this greater disease burden, patients with greater financial toxicity are disproportionately unable to afford care, thereby severely limiting treatment access for those with highest need.

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0597

RATES OF COMORBID INSOMNIA AND SLEEP APNEA (COMISA) IN TWO DIFFERENT TRAUMATIC BRAIN INJURY POPULATIONS: MILITARY AND CIVILIAN

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Introduction: Insomnia and sleep apnea (SA) are common sleep disorders, with approximately 11-13% of the global population experiencing comorbid insomnia and sleep apnea (COMISA). COMISA substantially increases risk for both medical and psychiatric morbidity relative to having either disorder alone. Moreover, sleep disorders are notably common in those with a traumatic brain injury (TBI; insomnia rates of 71% and SA of 25%). This study explored COMISA rates in military and civilian TBI populations.

Methods: Data came from two different randomized trials of cognitive behavioral therapy for insomnia in persons with TBI and comorbid insomnia symptoms. One trial is ongoing in military personnel while the other trial was completed in civilians. Participants completed self-report measures of insomnia severity, sleepiness, and sleep quality. Participants also underwent a structured interview for sleep disorders to establish diagnostic criteria, and cognitive and home sleep apnea testing.

Results: The cohort consisted of 19 military personnel (Mage=35.0 [SD=± 11.14]) and 49 civilians (Mage=39.6 [SD=± 12.84]). The military sample was mostly male (68%) and white (74%), whereas the civilian sample was mostly female (63%) and white (69%). Average cognitive testing scores were 25.7 (SD=± 2.12) for military and 25.3 (SD=± 3.07) for civilians. Both samples endorsed moderate insomnia (M=18.6 [SD=± 4.30] military; M=19.1 [SD=± 5.43] civilians), poor sleep quality (M=10.5 [SD=± 3.15] military; M=12.3 [SD=± 3.45] civilians), and daytime sleepiness (M=9.7 [SD=± 6.65] military; M=6.2 [SD=± 4.60] civilians). Comorbid SA (Apnea-Hypopnea Index [AHI] ≥ 5) was prevalent, with approximately, 86% of military (AHI: M=12.1 [SD=± 8.96]; range: 5.8-34.3) and 45% of civilians (AHI: M=6.1 [SD=± 6.09]; range: 5.0-26.5) experiencing COMISA. Body mass index (BMI) was similar in both groups (M=26.5 [SD=± 3.38] military; M=29.3 [SD=± 5.67] civilians).

Conclusion: COMISA and poor sleep quality were prevalent in military and civilian TBI populations, with military personnel exhibiting nearly double the rate of COMISA despite a lower BMI. However, the optimal treatment sequence for managing insomnia and SA in these patients remains unclear. Future research should focus on identifying the most effective treatment approach and consider patient subgroups to better inform clinical practice.

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0598

MEASURES OF SLEEP, PSYCHIATRIC, AND NEUROBEHAVIORAL SYMPTOMS IN POST-9/11 VETERANS WITH HISTORY OF MILD TRAUMATIC BRAIN INJURY AND INSOMNIA

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Introduction: Traumatic brain injury (TBI) has been deemed the "signature wound" of the Iraq and Afghanistan conflicts and continues to be a common occurrence for active-duty personnel. For many Veterans, mild traumatic brain injury (mTBI) is associated with persistent post-concussive symptoms, of which sleep, and psychiatric disturbances are among the most common. In this investigation we describe and evaluate baseline sleep and clinical symptomatology in a sample of post-9/11 Veterans with mTBI who participated in a clinical trial for insomnia.

Methods: 67 Veterans completed baseline assessment measures. Each participant was assessed on a battery of self-report questionnaires evaluating sleep (Insomnia Severity Index [ISI]; Pittsburgh Quality Sleep Index [PSQI]), psychiatric (Patient Health Questionnaire [PHQ-9]; Generalized Anxiety Disorder Scale [GAD-7]); PTSD (PTSD Checklist for DSM 5 [PCL-5]), and neurobehavioral symptoms (Neurobehavioral Symptom Inventory [NSI]). Veterans also completed a one-week baseline sleep diary and underwent two nights of polysomnography (PSG; data from second night analyzed).

Results: Veterans (55M/12F; age=35.8+/-7.3) showed moderately elevated insomnia severity (ISI=20.2+/-4.3) and general sleep disturbance (PSQI=14.6+/-2.7). Psychiatric and post-concussive measures also indicated clinically meaningful impairment (PHQ-9=14.5+/-5.3; GAD-7=11.3+/-5.2); PCL=40.1+/-18.5; NSI=42.8+/-16.3). On prospective sleep diaries (one-week averaged data) Veterans reported sleep latencies (SL) of 43.9+/-32.0 mins, wake after sleep onset times (WASO) of 39.4+/-34.9 mins, total sleep times (TST) of 308+/-126 mins, and sleep efficiencies (SE) of 75.1+/-13.7 percent. On PSG Veterans exhibited better sleep relative to sleep diaries (SL=16.4+/-13.7mins, WASO=31.9+/-19.8mins, TST=391.8+/-45.2mins, SE=87.9+/-6.3%). Pearson correlations were conducted to examine the relationship between NSI scores and objective/subjective sleep measures. Results found that post-concussive symptoms were positively corelated with insomnia severity (ISI:r=0.56, p<.001) and general sleep disturbance (PSQI:r=0.54,p<.001) and negatively correlated with sleep efficiency on PSG (r=-0.47,p=.009).

Conclusion: In this investigation, post-9/11 Veterans with history of mTBI showed clinically relevant self-reported sleep disturbance (retrospectively and prospectively) and elevated psychiatric and neurobehavioral symptomatology. Whether observed discrepancies in subjective vs objective sleep measures reflect bias in reporting, reactivity to laboratory testing, or other factors warrants further investigation. Understanding the reasons for such discrepancies could help inform interventions designed to assist Veterans with mTBI and sleep disturbance.

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0599

REAL-WORLD DATA ON PATIENTS WITH INSOMNIA, OBSTRUCTIVE SLEEP APNEA (OSA), OR BOTH (COMISA)

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Introduction: Insomnia and OSA, comorbidly known as COMISA, are the two most common sleep disorders. There is limited real world evidence comparing these patient groups and understanding their burden on the US healthcare system. This study compares real world data from patients with COMISA to those with OSA or insomnia alone from a US national sample.

Methods: This retrospective study used insurance claims data (commercial, Medicare Advantage, Medicaid) from patients with insomnia and patients with OSA. COMISA patients were identified from the OSA patients that had evidence of insomnia (ICD-9/10 diagnosis code or insomnia prescription fill) in the year prior to and year post OSA diagnosis. The index date for patients with insomnia was the first evidence of insomnia. The index date for patients with OSA and COMISA was the sleep test with an OSA diagnosis. Demographics, comorbid conditions, and healthcare costs were described for each patient group.

Results: Overall, 14.5% of patients with insomnia also had a diagnosis of OSA, and 23.0% of patients with OSA also had a diagnosis of insomnia. After applying inclusion/exclusion criteria, the study had 1,075,339 patients with insomnia only, 1,272,333 patients with OSA only, and 157,894 with COMISA. Patients with insomnia were more commonly female (64%), OSA more commonly male (59%), and COMISA more evenly split (53% female/47% male). Patients with COMISA had a higher number of conditions (aside from OSA and insomnia) than patients with OSA or insomnia alone (mean number of conditions: 3.3 vs OSA: 2.6, insomnia: 2.1). Patients with OSA or COMISA had a markedly higher prevalence of cardiac conditions, respiratory conditions, and hyperlipidemia. Those with insomnia or COMISA had a markedly higher prevalence of depression and anxiety. COMISA patients were the most expensive to the healthcare system with total annual costs averaging $12,492 per patient (insomnia: $9,672, OSA: $9,589), stemming from increased costs in outpatient hospitalizations, office visits, and prescription medications.

Conclusion: Patients with COMISA have more conditions and cost the healthcare system more than patients with OSA or insomnia alone. Further research and treatment innovation is needed to support sustainable treatment options to mitigate this cost burden.

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0600

ASSOCIATIONS BETWEEN REM OSA, WHITE MATTER MICROSTRUCTURE, AND COGNITION IN COMMUNITY-DWELLING COGNITIVELY UNIMPAIRED OLDER ADULTS

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Introduction: Obstructive sleep apnea (OSA) severity increases Alzheimer's disease (AD) and cognitive decline risks. OSA during rapid eye movement (REM) sleep is sometimes more severe than non-REM OSA, however the relationship between REM-OSA severity and cognition is not well characterized. Emerging evidence also suggests that white matter microstructure alterations may contribute to cognitive deficits in patients with OSA. We examined associations between white matter tract integrity, cognition, and REM-OSA severity in cognitively unimpaired older adults.

Methods: This cross-sectional study included 70 community-dwelling cognitively unimpaired older adults (35 non-OSA,35 REM-OSA; mean±SD: age=66.3±4.9y) participating in NYU studies of sleep, aging, and memory. Participants had diffusion-weighted imaging, neuropsychological battery tests, overnight polysomnography, and clinical data. REM-OSA was characterized as REM AHI4% (>15 events/hour). Neuropsychiatric testing included processing speed, working memory, and visuospatial ability measures. Cingulum, uncinate fasciculus (UF), and fornix microstructure properties were estimated using diffusional tensor imaging metrics. Multivariable linear regression models examined associations of white matter microstructure (exposure) on cognitive measures (outcome measure) between OSA and non-OSA, and white matter microstructure by REM-OSA severity on cognition. Models were adjusted for age, race, education, sex.

Results: Of the 70 participants (35 non-OSA, and 35 REM-OSA),68.8% and 62.9% were female, respectively. Mean±SD education was 16.5±2.4y REM-OSA (vs. 16.3±2.5y controls). Participants with REM-OSA had lower attention (β[REM AHI4%]=-1.07[-2.1 - -0.04],p< 0.050) and slower processing speeds (β[REM AHI4%]=0.29[0.05 – 0.54],p< 0.050) compared to controls. REM-OSA was associated with white matter microstructure alterations within both hemispheres of the cingulum(p=0.01) and fornix(p=0.040). Furthermore, decrements in the UF were associated with worse working memory β[UF] = -0.25 [-0.45 - -0.05], p < 0.050) and slower processing speed β[UF] = 0.26 [0.04 – 0.50], p < 0.050). Moreover, REM-OSA severity interaction with white matter microstructure demonstrated lower working memory β[REM AHI4% x cingulum, right]=-0.20[-0.37- -0.03],p < 0.050; β[REM AHI4% x cingulum, left]=-0.23 [-0.44 - -0.02], p< 0.050) and reduced visuospatial ability β[REM AHI4% x fornix]=-0.23 [-0.44 - -0.01], p< 0.050).

Conclusion: Our findings demonstrate the critical role of white matter microstructure in the relationship between REM-OSA and cognition. Longitudinal studies are needed to investigate the mediating role of white matter microstructure alterations between REM-OSA and cognitive decline.

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0601

ASSOCIATIONS BETWEEN LIMBIC WHITE MATTER TRACK INTEGRITY AND COGNITION IN OBSTRUCTIVE SLEEP APNEA

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Introduction: Obstructive Sleep Apnea (OSA) severity raises the risk of Alzheimer's disease (AD) and cognitive decline. Recent data suggest white matter integrity alterations may contribute to cognitive deficits in OSA patients. We examined the association between white matter integrity and cognition in cognitively unimpaired older adults.

Methods: This cross-sectional study involved 133 cognitively normal adults average age 66.6 [5.2] years) from NYU sleep, aging, and memory studies. Participants underwent diffusion tensor imaging (DTI), neuropsychological tests, overnight polysomnography, and clinical assessments. OSA was defined by an Apnea-Hypopnea Index (AHI) >15 events/hour. Cognitive tests assessed processing speed, working memory, and visuospatial ability. DTI metrics estimated white matter microstructure (WMM) in the cingulum, uncinate fasciculus (UF), and fornix. Multivariable linear regression analyzed WMM's impact on cognition, adjusting for age, race, education, sex, and time between polysomnography and MRI.

Results: Of the 133 participants, 69.9% were female 52.6% were Black and mean [SD] for education was 16.5±2.4y. OSA severity was associated with poorer visual-spatial scores (β[AHI4%]=-0.27 [-0.48 - -0.06],p< 0.050), working memory (β[AHI4%]=-0.24 [-0.48 - -0.0004],p< 0.050), and processing speed (β[AHI4%]=0.28[0.01 – 0.55],p< 0.050) than controls. OSA severity was associated with WMM alterations within the fornix (p=0.038). Furthermore, UF decrements were associated with poorer working memory (β[UF] = -0.24 [-0.44 - -0.05], p < 0.050) and processing speed (β[UF] = 0.28 [0.04 – 0.50], p < 0.050). OSA severity interaction with WMM demonstrated worse visuospatial ability (β[AHI4% x cingulum, right] = 0.25 [0.03- 0.47], p < 0.050; β[AHI4% x UF, Left] = -0.22 [-0.43 - -0.02], p < 0.050; β[AHI4% x fornix}=-0.34 [0.08- 0.60],p< 0.050) and processing speed (β[AHI4% x cingulum, left] = 0.33 [0.03 – 0.63], p < 0.050; β[AHI4% x UF, left]=0.26 [0.03 -0.49],p< 0.050).

Conclusion: OSA severity was associated with greater WMM alterations. Both OSA severity and WMM alterations were independently associated with poorer cognitive outcomes. OSA severity and WMM alteration interacted in a synergistic manner on specific cognitive domains, thus demonstrating the critical role of white matter integrity in the relationship between OSA and cognition. Longitudinal studies are needed to investigate the role of OSA severity on WMM alterations and cognitive decline.

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0602

NONINVASIVE MRI-BASED PARENCHYMAL CSF (PCSF) MAPPING SHOWS INCREASED GLYMPHATIC FLUID VOLUME IN UNTREATED OSA

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Introduction: Obstructive sleep apnea (OSA) is one of the most prevalent sleep disorders, affecting an estimated 936 million adults globally. When left untreated, OSA increases the risk for co-morbidities including cardiovascular and metabolic disease, mood disorders, cognitive impairment, and neurodegenerative diseases including Alzheimer's disease. Moreover, while continuous positive airway pressure (CPAP) therapy presents an effective treatment option, ameliorating sleep apnea and reducing downstream risk of co-morbidities, non-compliance occurs in 30-80% of patients. Therefore, defining the mechanism by which CPAP therapy proves effective may identify alternative therapeutic interventions. Recent studies highlight the glymphatic system, a brain-wide network of CSF-filled perivascular spaces (PVS), in facilitating the clearance of metabolic waste from the brain during sleep. Due to the dynamic and microscopic nature of PVS, evaluating the glymphatic system clinically has proved difficult. Parenchymal CSF (pCSF) mapping, a non-invasive MRI-based approach, offers a novel clinically feasible modality for evaluating parenchymal perivascular glymphatic fluid volume. This study aims to assess differences in pCSF mapping among normal healthy controls (HC) and age matched subjects with either CPAP treated or untreated OSA.

Methods: Our cross-sectional analysis involved three groups (n=32): HC, CPAP-treated OSA, and untreated OSA participants. Neuroimaging included 3T-derived T1W, multi-echo FAST-T2 for pCSF, and T2-FLAIR sequences. Image processing was performed with FreeSurfer for ROI parcellation and an in-house MATLAB code for pCSF mapping.

Results: Across multiple regions individuals with untreated OSA exhibit a significantly higher burden of pCSF compared to both CPAP-treated OSA and HC participants. In the temporal lobe, for example, untreated OSA participants exhibited 6.01% pCSF compared to 5.26% in CPAP-treated (p=0.011) and 5.32% in HC (p=0.0013). Whereas CPAP treatment appeared to mitigate this pCSF increase, aligning closely with HC. No difference in cortical volumes was observed across groups, suggesting these pCSF findings are not related to brain atrophy. Together these findings support a role of glymphatic impairment in OSA.

Conclusion: These findings underscore the impact of OSA on the brain's glymphatic system, highlighting glymphatic dysfunction as a potential contributor to the downstream effect of untreated OSA. Further research is necessary to substantiate these findings in a longitudinal within subject cohort before and after CPAP treatment.

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0603

HYPOXIC BURDEN IN OSA IS CORRELATED WITH THE GAMMA BAND SPECTRAL SLOPE DURING AROUSALS

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Introduction: Obstructive sleep apnea (OSA) causes intermittent hypoxia during sleep, which in turn is associated with increased risks of cognitive impairment. However, the mechanism by which intermittent hypoxia impairs the brain is unclear, since there is no salient neurophysiological change during the hypoxia. Recent studies established the gamma-band (30-45 Hz) spectral slope as a novel electroencephalography (EEG) marker of the arousal level (Lendner et al, PubMed ID 32720644). Here we use this EEG marker to study whether intermittent hypoxia increases the arousal level in OSA.
Methods: We analyzed the dataset of Cleveland Family Study, which was obtained from the National Sleep Research Resources database, and comprised of single-night polysomnography studies for 730 subjects (age: 41 +/- 19 years), along with denotations of sleep stages and respiratory events (apneas and hypopneas). We pooled together 60175 respiratory events during non-REM sleep for analysis. Using a shifting temporal window of 5 s, EEG power spectral density was computed using Welch's method, and spectral slope was computed from linear fitting of logarithm of power to logarithm of frequency over 30-45 Hz range. The severity of intermittent hypoxia was quantified as the hypoxic burden (Azarbarzin et al, PubMed ID 30376054).
Results: Across all respiratory events, hypoxic burden was strongly correlated with the increase of 30-45 Hz spectral slope during the 10 seconds after the end of respiratory events (Spearman's correlation coefficient r = 0.14). The averaged increase of spectral slope was 0.52 for events with >= 4% hypoxic burden, vs. 0.26 for events with <= 2% hypoxic burden. Hypoxic burden was also strongly correlated (r = 0.21) with the increase of gamma-band EEG power, but critically was only weakly correlated (r = 0.03) with the increase of alpha-band (8-13 Hz) EEG power. Thus, our findings cannot be explained as electromyographic artifacts in EEG.
Conclusion: Previous studies showed that gamma-band spectral slope reflects the neuronal excitation-inhibition balance, and acute hypoxia generally inhibits synaptic activity. Thus, our findings support the hypothesis that intermittent hypoxia in OSA impairs the brain by disrupting the neuronal excitation-inhibition balance, intensifying neural inhibition during apnea/hypopnea and intensifying neural excitation during the arousal immediately after apnea/hypopnea.
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0604

AROUSAL THRESHOLD ESTIMATED BY PHENOTYPING USING POLYSOMNOGRAPHY IS LOWER USING AUTOMATED AROUSAL SCORING COMPARED TO MANUAL AROUSAL SCORING

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Introduction: Phenotyping using polysomnography (PUP) is a computer-based method for "endotyping" obstructive sleep apnea (OSA) using clinical sleep study data. PUP provides estimates of mechanisms causing upper airway collapse in sleep: arousal threshold (ArTH), loop gain, and upper airway collapsibility and muscle response. PUP analyses have typically depended on manual scoring of sleep stages, respiratory events, and arousals. However, PUP has an automated arousal scoring capability based on electroencephalography (EEG) power analysis. We hypothesized that automated arousal scoring may produce systematic differences in ArTH estimates compared to manual arousal scoring.
Methods: Three methods of arousal scoring were separately conducted before full PUP analysis: 1) traditional manual scoring; 2) fully automated scoring using PUP's internal methodology; 3) a hybrid manual-automated method, also built into PUP, which "touches up" manually-scored arousals using automated analysis. ArTH was estimated from non-rapid eye movement (NREM) sleep. ArTH estimated in the context of manually scored arousals (ManArTH) was compared to ArTH estimated under fully automated arousal scoring (AutoArTH) and to ArTH estimated under hybrid arousal scoring (HybridArTH).
Results: PUP analysis was completed in 99 individuals (age 56.4±7.5 years; 10 female; BMI 31.3±4.9 kg/m2) with OSA (apnea-hypopnea index, AHI3A 31.77±19.1, range 10.6—104.3 events/hr) according to in-lab diagnostic (n = 80) or split-night (n = 19) sleep studies. Arousal index (ArI) was higher using automated scoring (median 42.7 [25th—75th percentile 37.8—56.2] arousals/hr) compared to manual scoring (23.2 [19.0—37.3] arousals/hr, $p < 0.001$ for difference). AutoArTH (106.2 [101.6—111.6] %Veupnea) and HybridArTH (111.1 [104.6—120.3] %Veupnea) were both significantly lower than ManArTH (111.3 [105.9—120.7] %Veupnea, $p< 0.05$ for both comparisons). Intraindividual differences between ManArTH and AutoArTH (7.4±13.4 %Veupnea) were larger than that between ManArTH and HybridArTH (1.5±6.1 %Veupnea). In separate univariate regression analyses, neither age, sex, BMI, AHI3A, study type (diagnostic verse split-night), nor intraindividual difference in ArI were associated with intraindividual difference in ArTH.
Conclusion: In a cohort of predominantly middle-aged men with OSA of varying severity, PUP-estimated ArTH was systematically lower using automated scoring compared to manual scoring. Hybrid manual-automated arousal scoring produced ArTH estimates very similar to manual scoring, though also systematically lower.
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0605

LOW AROUSAL THRESHOLD REDUCES HYPOGLOSSAL NERVE STIMULATION USAGE IN OBSTRUCTIVE SLEEP APNEA PATIENTS

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Introduction: Hypoglossal nerve stimulation (HGNS) is an effective alternative to continuous positive airway pressure (CPAP) for obstructive sleep apnea. Although adherence to HGNS is generally high, approximately 15-27% of patients exhibit suboptimal adherence, limiting effectiveness. Adherence is particularly important for HGNS, as it involves a surgical procedure with inherent risks and significant costs. Low arousal threshold has been identified as a predictor of non-adherence to CPAP. Similarly, this study tests the hypothesis that a low arousal threshold is associated with decreased HGNS usage.
Methods: We performed a secondary analysis of the Stimulation Therapy for Apnea Reduction (STAR) Trial. Arousal threshold and pharyngeal collapsibility (i.e., endotype traits) were estimated from baseline polysomnography studies. HGNS usage was calculated from cumulative hours of stimulation pulse duration recorded by the device and downloaded at the 12-month follow-up. Since this value reflects the hours of active stimulation during inspiration, it was divided by 40%, assuming a respiratory duty cycle of 40%, to estimate total HGNS on time (i.e., usage). To test our hypothesis, we used multiple linear regression to quantify the association between arousal threshold and HGNS usage, adjusting for age, sex, neck circumference, and total sleep time. Sensitivity analysis evaluated the effect of adjusting for collapsibility. The mediating effect of HGNS efficacy (%reduction in AHI from baseline) was also studied.
Results: HGNS usage data was available from 64 patients at the 12-month follow-up, among whom 50 had a baseline PSG to compute the endotype traits (median[IQR] Age: 53[45,60] years, 43 men, BMI: 27.8[26.0,30.0] kg/m2, AHI: 33.8[25.1,40.0], Usage: 6.2[4.2,8.4] hours). As hypothesized, a lower arousal threshold by 1SD (25.8 %eupneic ventilation), was associated with >1 hour less of HGNS usage (Beta [95%CI]: 1.1[0.17,2.0] hours, p=0.011). Including collapsibility in the model increased the effect of arousal threshold on usage (Beta [95%CI]: 1.2[0.26,2.2] hours). Including HGNS efficacy in the model did not mediate the effect of arousal threshold on usage (1.1[0.17,1.9]).
Conclusion: Patients with a lower arousal threshold—those who wake from sleep more easily—show significantly reduced HGNS usage, an effect that is independent of HGNS efficacy. These findings uncover a critical mechanism driving suboptimal adherence to HGNS therapy.
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0606

DEMOGRAPHIC DIFFERENCES IN THE PHYSIOLOGICAL BURDENS OF SLEEP APNEA

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Introduction: Diagnosis of obstructive sleep apnea (OSA) depends on the Apnea-Hypopnea Index (AHI), a metric with acknowledged limitations, but known variation across demographic groups. Novel methodologies may better quantify OSA pathophysiology, but differences in these metrics across age, sex, and race/ethnicity remain yet to be explored. Leveraging data from the Sleep Heart Health Study (SHHS) and the Multi-Ethnic Study of Atherosclerosis (MESA), we investigated potential variations in the emerging physiological metrics of OSA across participant demographics.
Methods: High-quality signals of participants from SHHS (n=5407) and MESA (n=1544) were analyzed for four physiological metrics: 1) Hypoxic Burden (area under oxygen desaturation ≥ 3% dips), 2) Ventilatory Burden (proportion of breaths with < 50% normalized amplitude), Autonomic Burden (increase in heart rate by ≥ 3 beats/min, independent of respiratory events), and Arousal Burden measured by ΔSWAK (change in delta power across K-complexes in N2 sleep). We only assessed participants with Ventilatory Burden > 25% to examine only those exhibiting some degree of abnormal overnight breathing. Each metric was regressed against age, sex, and race/ethnicity in separate univariate analyses. Multivariate analyses were adjusted for AHI3A or AHI4. A significance level of 0.05 was used and statistical analyses were done with RStudio v.4.4.2.
Results: Within the study population, participants were predominantly female (n=3635/6951, 52.3%), with a mean age of 64.4 ± 11.0 years. Most participants were self-reported as White (n=5143/6951, 74.0%). Sex differences were observed across all the physiological domains with males showing significantly higher Hypoxic, Ventilatory, Autonomic, and Arousal Burdens ($p < 0.05$). All physiological burden values increased with age, with the highest severity observed in the ≥80 years age group. Differences were also found significant among the race/ethnicity groups ($p < 0.05$). After adjusting for AHI3A and AHI4 separately, there was no change in the findings or significance of the analyses.
Conclusion: There were significant differences in OSA-related physiological burdens with variations across age, sex, and race/ethnicity, independent of AHI severity. These findings appear to be in addition to known differences in OSA severity and may offer insight into varying pathophysiologies across demographic groups.
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0607

VISCERAL ADIPOSITY PREDICTS INCIDENT OBSTRUCTIVE SLEEP APNEA: A 9-YEAR FOLLOW-UP OF WISCONSIN SLEEP COHORT

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Introduction: It has been reported that visceral adiposity is associated with obstructive sleep apnea (OSA). However, no longitudinal study has examined the association between visceral adiposity and OSA in adults. The aim of this study was to examine the association between visceral adiposity and incident OSA in the Wisconsin Sleep Cohort (WSC).
Methods: In this study, we included 311 subjects without OSA at baseline with a median follow-up duration of 9 years. OSA was defined based on apnea-hypopnea index (AHI) ≥ 5/hour. Body roundness index (BRI) was used to assess visceral adiposity. BRI is an anthropometric index that combines height and waist circumference and reflects both visceral adipose tissue and body fat percentage. Higher BRI indicates more visceral adiposity. Visceral obesity was defined as BRI level higher than the 75th percentile of the overall sample. Linear and logistic regression models were used to examine the association between visceral adiposity and incident OSA after adjusting for age, gender, race, baseline AHI, change of

BMI, and overweight at baseline. We stratified the sample based on the median age of the overall sample (55 years) to examine whether age influences the association between visceral adiposity and OSA.
Results: Baseline greater BRI values predicted higher AHI levels at follow-up after adjusting for confounding factors (β=0.194, p=0.004). In a sensitivity analysis, we found that baseline visceral obesity was associated with 1.9-fold increased risk of incident OSA compared to those without visceral obesity (odds ratio [OR]=1.888, 95% confidence interval [95%CI]= 1.05- 3.41). Interestingly, we found this association was influenced by age (interaction-p< 0.05). The association between baseline visceral adiposity and incident OSA was only observed in adults < 55 years old (β=0.382, p< 0.001), but not in adults ≥55 years old (β=-0.005, p=0.964).
Conclusion: Visceral adiposity is a significant risk factor for the development of OSA. These data suggest that visceral adiposity, a central etiologic factor of metabolic syndrome, is the primary mechanism leading to OSA in young/middle aged individuals and should be the target in our preventative and treatment strategies for this prevalent sleep disorder.
Support (if any):

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0608

VISCERAL ADIPOSITY INDEX IS ASSOCIATED WITH HYPERTENSION RISK IN PATIENTS WITH MILD-TO-MODERATE OBSTRUCTIVE SLEEP APNEA: AGE AND SEX EFFECT

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Introduction: It has been shown that mild-to-moderate obstructive sleep apnea (mmOSA) is associated with cardiometabolic risks. Although visceral adiposity has been suggested as a primary pathophysiologic factor leading to OSA, the predictive value of visceral adiposity for cardiovascular problems in OSA has not been examined. The aim of this study is to assess the utility of visceral adiposity index (VAI), in identifying the risk of hypertension across a wide age range of patients with mmOSA.
Methods: Adults (n =216, 56% men) of a wide age range (28–90 years old, mean age 52.64 ± 12.74) with mmOSA (5 ≤ AHI < 30) completed in-lab polysomnography or home testing, medical history and complete physical examination, and a blood draw for lipid profile. VAI, a sex-specific mathematical index type based on waist circumference, Body Mass Index (BMI), triglycerides and HDL cholesterol levels, was used to assess visceral adiposity. Hypertension was defined based on blood pressure ≥140/90 mmHg. Since there was a significant sex and age effect, binary logistic regression analysis was performed separately for men vs women to investigate the association between VAI and risk of hypertension, while controlling for BMI, AHI, diabetes and antihypertensive medication.
Results: In men < 60 years, lnVAI but not AHI or BMI were associated with greater odds for hypertension (odds ratio [OR] =3.043, 95% CI =1.012-9.152, p =0.048; OR =0.98, 95% CI =0.887-1.098, p =0.807; OR =0.388, 95% CI =0.91-1.65, p =0.2, respectively). In contrast, in men ≥ 60 years neither lnVAI, AHI nor BMI were associated with increased odds for hypertension. In women, a trend was observed in the association of BMI ([OR] =1.143, 95% CI =0.98-1.330, p =0.083), but not of lnVAI or AHI with hypertension risk.
Conclusion: Visceral adiposity based on routinely obtained clinical measures, improves the ability to detect hypertension risk in young and middle-aged, but not older men with mmOSA, suggesting that our therapeutic goal should be the reduction of visceral adiposity and its metabolic correlates. In contrast, in women it appears that global adiposity is the stronger predictor of hypertension and weight loss may be sufficient.
Support (if any):

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0609

CARDIOVASCULAR DISEASE RISK FACTORS IN FORMER NATIONAL FOOTBALL LEAGUE PLAYERS: IMPACT OF OBSTRUCTIVE SLEEP APNEA

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Introduction: Cardiovascular disease (CVD) remains the leading cause of death in the United States. We previously showed a high prevalence of obstructive sleep apnea (OSA) among former National Football League (NFL) players. Further, we hypothesized that post-career OSA impacts CVD risk among retired professional athletes, even though these former NFL players are often near peak physical fitness for a significant portion of their lifespan. The Living Heart Foundation Heart-Obesity-Prevention-Education Group aimed to provide an in-depth health assessment for CVD risk factors among former NFL players to examine the role of OSA on blood pressure (BP) and echocardiographic measurements.
Methods: Forty-three former NFL players completed an at-home sleep study and outpatient health assessment to determine CVD risk including office BP and transthoracic echocardiogram (TTE) measurements. Seated BP readings were made in triplicate, TTE measurements, including ejection fraction, left atrial size, left ventricular size and thickness, and ascending aortic diameter, were obtained in 17 former NFL players without OSA (age: 46±10 years, BMI: 32±5 kg/m2, apnea-hypopnea index: 3±1 events/hour) and 26 with OSA (age: 51±9 years, BMI: 33±5 kg/m2, apnea-hypopnea index: 17±12 events/hour). Independent sample t-tests were utilized to determine differences in blood pressure and TTE measurements between OSA and non-OSA groups (α=0.05).
Results: Systolic BP was similar in non-OSA vs. OSA groups (131±12 vs. 135±16 mmHg, p=0.443), while diastolic BP was higher in former NFL players with OSA (78±8 vs. 86±9 mmHg, p=0.007). Ejection fraction, left atrial size, left ventricular size, and left ventricular thickness were similar between groups (p>0.05 for all). However, ascending aortic diameter was modestly larger in former NFL players with OSA (3.3±0.19 vs. 3.5±0.40 cm, p=0.048).
Conclusion: These findings suggest OSA may be a primary driver of increased BP and increased aortic diameter in former NFL players, and impact cardiac structural health, suggesting augmented CVD risk in former NFL players. Future work is warranted to investigate impact of race and player position on OSA-mediated CVD risk in retired NFL players.
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0610

DIFFUSION IMAGING MARKERS OF RESIDUAL EXCESSIVE DAYTIME SLEEPINESS IN TREATED OBSTRUCTIVE SLEEP APNEA

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Introduction: OSA-related hypoxemia and sleep fragmentation disrupt arousal and attention, processes largely facilitated by interhemispheric communication via the corpus callosum (CC), the brain's largest white matter (WM) pathway. The Psychomotor Vigilance Test (PVT) objectively measures attention and is a useful assay for excessive daytime sleepiness (EDS). Altered WM integrity and microstructure has been previously reported in OSA, however whether these metrics vary as a function of CC cross-section or severity of EDS is unclear. We hypothesize that the Neurite Orientation Dispersion and Density Imaging (NODDI) model of white matter will be more sensitive than traditional diffusion, but both metrics will predict the severity of EDS.
Methods: This cross-sectional study included 54 OSA patients treated with PAP therapy for ≥6 hours mean nightly use (mean age 60.7; 35% female). Residual EDS was measured via PVT, defined as lapses ≥500ms. We used multi-modal imaging to acquire diffusion weighted WM metrics. The NODDI metric of Fractional Isotropic Volume (FISO), a marker of neuroinflammation, assessed WM microstructure. DTI pre-processing and WMI metrics (Fractional Anisotropy (FA), Mean Diffusivity (MD), Radial Diffusivity (RD), Axial Diffusivity (AD)) were extracted for the CC and subregions (body, genu, splenium) using automated tractography. FISO was derived for the body, genu and splenium. Multiple regression analyses tested PVT associations and WM metrics, controlling for AHI, BMI, and age.
Results: Increases in PVT lapses was associated with greater AD (β =.30, p =.037) in the CC. Subregional analyses revealed that PVT showed the strongest associations with diffusivity metrics (AD, MD, RD) in the splenium (β's =.31 -.33), then genu (β's =.22 -.28), then the body (β's = -.03 -.09). PVT correlations with FISO were highest in the splenium (β =.35), then the body (β =.26) and genu (β =.18).
Conclusion: Residual EDS in PAP-adherent OSA patients is linked to persistent white matter damage in the corpus callosum, particularly the splenium. The observed differences between FISO and traditional diffusion metrics underscore the utility of advanced imaging models like NODDI in identifying microstructural changes associated with EDS.
Support (if any): Axsome Therapeutics, Jazz Pharmaceuticals

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0611

SLEEP-DISORDERED BREATHING DURING RAPID EYE MOVEMENT SLEEP IS ASSOCIATED WITH SUBJECTIVE COGNITIVE DECLINE

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Introduction: The relationship between sleep-disordered breathing (SDB) and cognition in the aging population remains a subject of debate. While research has linked non-rapid eye movement (NREM) sleep to cognition, fewer studies have explored the impact of rapid eye movement (REM) sleep. Preliminary evidence reveals different impact of REM and NREM respiratory events on cognition. Hence, this study aims to 1) examine the relationship between REM sleep and perceived cognitive decline (PCD), and 2) compare the impact of respiratory severity in REM vs. NREM on PCD.
Methods: Cross-sectional analysis was conducted with 46 participants balanced by sex (mean age= 56.0, SD=18.7) with untreated obstructive sleep apnea (mean sAHI3%= 20.6, SD=14.3) who were asked to wear a sleep wearable device that measured respiratory metrics for 15 consecutive nights. Respiratory metrics included cyclic variation of heart rate and apnea hypopnea index. Cardiopulmonary coupling characterized sleep stages were divided into unstable NREM, stable NREM, and REM. Respiratory and sleep metrics were aggregated the across 15 nights as means and standard deviations. The Everyday Measurement of Cognition, administered at baseline, measured perceived cognitive decline in the past 20 years in memory, language, visual-spatial and perceptual, as well as executive function (planning, organization, and divided attention). Partial correlation was used to analyze PCD and REM% and duration with control of age and education, and Steiger's Z to compare the association between respiratory metrics and PCD in NREM vs. REM.
Results: After controlling for age and education, there is positive association between executive organization decline (EOD) and variability in REM% (r=.327, p=.030) and variability in REM duration (r=.389, p=.009). Additionally, there is positive association between average AHI in REM and EOD (r=.348, p=.020) after controlling for age and education. The association between AHI in REM and EOD was significantly stronger than the corresponding association with NREM (Z=-1.92, p=.027).
Conclusion: Greater variability in REM% or duration is linked to greater PCD, highlighting the role of REM-related respiratory severity on cognition. Recruitment is ongoing to strengthen findings.
Support (if any): University of Pittsburgh School of Nursing Research Catalyst Award; Sleep and Circadian Science & Aging Research Hubs; SleepImage System& Sleep Research Society Foundation.

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0612

OSA INFLUENCES LOCUS COERULEUS STRUCTURAL INTEGRITY ON 7T MRI IN COGNITIVELY NORMAL OLDER ADULTS

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Introduction: The locus coeruleus (LC), an important sleep/wake regulating structure and site of early change in neurodegenerative

disease, is best measured in humans with ultra-high field 7-Tesla MRI due to its small size. We hypothesized that obstructive sleep apnea (OSA) would negatively influence LC structural integrity and volume in cognitively normal elderly individuals.
Methods: We examined the LC using 7T MRI with a computational LC localization and segmentation algorithm in 30 cognitively normal older subjects: 17 with a new OSA clinical diagnosis and 13 from the community without sleep complaints. Obstructive sleep apnea was assessed by WatchPAT home sleep study or in-lab polysomnography. We evaluated associations between OSA severity/hypoxic burden and LC structural metrics: absolute volume, volume normalized to brainstem or whole brain volume, and LC integrity, a relative measure of MRI contrast enhanced neuromelanin.
Results: Of the 30 subjects, mean age was 66 years and 53% were women. The cohort was dichotomized using an OSA cutoff of AHI4%>=5 (OSA+, n=22, OSA-, n = 8). Total sleep time was not significantly different between the OSA- and OSA+ groups. As expected, AHI4%, REM AHI4%, and min. oxygen saturation during sleep were all significantly different in the OSA- and OSA+ groups, though time below 90% oxygen saturation (T90) was not. We observed a significant negative association between LC integrity and T90 [R=-0.45, p=0.035] in the OSA+ group, but not the OSA- group [R=0.58, p=0.132]. We did not observe differences between the OSA+ and OSA- groups for the absolute LC volume [OSA-: 145± 63mm3, OSA+: 132± 74, p=0.44], LC volume normalized to brainstem volume [OSA-: 0.0052± 0.0032, OSA+: 0.0055± 0.0032, p=0.83], LC volume normalized to whole brain volume [OSA-: 8.0e-05± 4.8e-05, OSA+: 7.6-05± 4.7e-05, p=0.83], or LC integrity [OSA-: 1.60± 0.09, OSA+: 1.58± 0.14, =0.94].
Conclusion: This study presents some of the first evidence that greater hypoxic burden as assessed by T90 is associated with reduced LC integrity in older adults, potentially implicating a role for nocturnal hypoxemia in the pathological decline of the LC with aging.
Support (if any): AASMF Bridge award, AARGD award, NIH

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0613

THE ROLE OF SEROTONERGIC SIGNALING IN LIFE QUALITY, DEPRESSION, AND INSOMNIA AMONG OBSTRUCTIVE SLEEP APNEA PATIENTS

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Introduction: The serotonergic system, including serotonin and serotonin transporter (SERT), might play a complex, yet still elusive role in obstructive sleep apnea (OSA) and its psychiatric comorbidities.
Methods: This study recruited 76 participants at the Department of Sleep and Metabolic Disorders, Medical University of Lodz. Polysomnography (PSG) assessed sleep-related parameters, participants with apnea/hypopnea index (AHI)>30 were assigned to the OSA group (n=36), and those with AHI< 5 to the healthy controls (HC, n=40). Venous blood was collected in the evening before PSG and in the morning after. Serum levels of serotonin and SERT were measured using enzyme-linked immunosorbent assay (ELISA). SERT mRNA expression analysis from peripheral blood leukocytes was performed with qRT-PCR (reference gene: β-actin) following RNA isolation and cDNA synthesis. Participants were evaluated for depressive symptoms (Beck Depression Inventory, BDI), insomnia severity (Insomnia Severity Index, ISI), and quality of life (QoL, Short Form 36, SF-36) with the cut-off points: ISI>14 for insomnia, BDI>13 for presence of depression symptoms, and SF-36< 64 for low QoL.
Results: This study found no significant differences in any of the studied laboratory variables between OSA and HC (all p > 0.05). Depressive symptoms were unrelated to serotonergic parameters in the OSA group but in HC individuals without mood disorders had higher baseline SERT level and evening/morning SERT ratio than their depressed counterparts (p=0.044, p=0.005, respectively). Among OSA participants, those with a good QoL showed elevated serotonin levels in both the evening (p=0.028) and morning (p=0.043) than those with lower QoL. In the insomnia group, baseline SERT protein levels were significantly greater in the HC group compared to the OSA group (p=0.045). Baseline SERT mRNA expression (insomnia group) was higher in the OSA than in the HC (p=0.032).
Conclusion: Serotonergic signalling might be related to the QoL, depression, and insomnia in OSA patients. Stratifying this group of patients into different phenotypes based on subjective and objective, might open new avenues for treatment and allow for more personalized approach.
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0614

METABOLIC EFFECTS OF ACUTE SUSTAINED HYPOXIA IN HEALTHY VOLUNTEERS

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Introduction: Obstructive sleep apnea (OSA) causes recurrent periods of hypoxia during sleep and is associated with disorders of glucose homeostasis including glucose intolerance and diabetes. In OSA patients, CPAP withdrawal increased glucose, insulin and free fatty acids (FFA). In healthy volunteers, hypoxia during wakefulness reduced insulin sensitivity, suggesting that hypoxia causes metabolic abnormalities in OSA patients. In this study, we exposed healthy volunteers to hypoxia during sleep to examine the effects of hypoxia on nocturnal plasma glucose and FFA.
Methods: We conducted a randomized cross-over study in healthy volunteers of 1 night each of breathing room air (RA) vs. hypoxic gas (HG) (Hypoxico, Ltd) while undergoing polysomnography. Each study night before sleep, participants ate a standardized iso-caloric meal. On hypoxia nights, FiO2 was titrated to maintain oxyhemoglobin saturation (SPO2) of approximately 83 ± 2% during sleep. We measured venous glucose, insulin and free fatty acids (FFA) every 30 minutes between 22:00 and 06:00. Mean plasma metabolite levels compared between using Wilcoxon rank-sum tests.
Results: 12 participants (8 male, mean age 29.8 ± SD 5.6 of years and mean BMI 25.4 ± 4.5 kg/m2) completed both nights of the study. On RA, participants slept for 368 minutes and had a mean apnea hypopnea index (AHI) of 4.0 ± 2.7 events/hr with mean SPO2 of 96.2 ± 1.1%. On HG, mean SPO2 fell to 85.4 ± 1.1% and AHI increased to 29.3 ± 29.4/hr (almost exclusively

central apneas). Nevertheless, mean glucose (86 ± 7 on RA, vs. 85 ± 7 mg/dL on HG), insulin (5.3 ± 2.2 vs. 5.3 ± 2.4 µU/mL) or FFA (323 ± 132, vs. 322 ± 131 mmol/L) did not differ between RA and HG.
Conclusion: In healthy volunteers, one night of hypoxia was insufficient to stimulate glucose, insulin or FFA elevations. These findings are in contrast to glucose and/or FFA found in other experiments in sleep apnea patients, suggesting that factors including hypoxia patterns, exposure duration, sleep fragmentation, sex or body composition may account for sleep-apnea-related nocturnal metabolic abnormalities.
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0615

BREATHING CONTROL ALTERATIONS AND SLEEP APNEA IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS

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Introduction: Obstructive Sleep Apnea (OSA) is highly common among patients with Idiopathic Pulmonary Fibrosis (IPF), but data on mechanisms whereby IPF-related features impact OSA pathogenesis are lacking. We hypothesized that IPF patients experience more disturbances in control of breathing (COB) because of poor lung function, contributing to OSA.
Methods: Pulmonary function tests (PFTs) were performed on IPF patients, followed by overnight polysomnography. Standard PFT and sleep-disordered breathing (SDB) measures, along with segments of quiet breathing (≥2 minutes) during stable N2/N3 sleep were extracted, the latter for analysis of ventilatory parameters (respiratory frequency [f], tidal volume [Vt] and minute ventilation [Ve], and inspiratory duty cycle [inspiratory/ breath time, Ti/Ttot]) using custom software. Spearman's Rank test was used to test correlations between variables of interest.
Results: Data from 7 patients (6 males) aged (mean±SD) 68±6.3 years were available. Lower FVC (%predicted) correlated with lower respiratory frequency (p-value=0.023), higher Forced Expiratory Volume in the first second (FEV1) of forced vital capacity (FVC) maneuver expressed relative to FVC (FEV1/FVC) correlated with lower Ti/Ttot (p-value=0.0234), and lower lung diffusing capacity corrected for hemoglobin (%predicted) with higher respiratory frequency (p-value< 0.0001). Higher Ve correlated with higher AHI (p-value=0.0005) and ODI (p-value=0.007).
Conclusion: In this initial dataset, IPF-associated pulmonary dysfunction increased breathing frequency and Ve, and prevented the increase in the duty cycle during sleep. These breathing alterations may promote instability and limit compensatory mechanisms for preserving ventilation under conditions of inspiratory flow limitation during sleep, setting the stage for OSA. Larger samples are needed to consolidate these preliminary results.
Support (if any): Boehringer Ingelheim Pharmaceuticals, Inc., Investigator Initiated Award.

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0616

CONCURRENT DYSFUNCTIONAL COGNITIONS ABOUT SLEEP AND EXCESSIVE DAYTIME SLEEPINESS TYPICAL IN COMORBID INSOMNIA AND SLEEP APNEA: A JAPANESE PSG DATABANK

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Introduction: Comorbid Insomnia and Sleep Apnea (COMISA), the co-occurrence of Chronic Insomnia Disorder (CID) and Obstructive Sleep Apnea (OSA), often has worse clinical symptoms and poorer treatment outcomes than either condition alone. Despite their importance, dysfunctional cognitions about sleep are not necessarily prominent in CID. Similarly, excessive daytime sleepiness is not always prominent in OSA, despite potential sleep debt. However, given the possible mechanism by which CID and OSA mutually deteriorate, poor clinical outcomes of COMISA could be simultaneously influenced by these psychobehavioral hallmarks. This study examined associations of dysfunctional cognitions about sleep and excessive daytime sleepiness to a unique characteristic of COMISA, potentially its challenging clinical manifestations.
Methods: We analyzed data from 346 patients, consisting of CID alone (n = 55, median age: 44.0), OSA alone (n = 195, median age: 52.0), and COMISA (n = 96, median age: 65.0) using the National Center Hospital of NCNP database, which is part of a polysomnography databank for sleep disorders in Japan. Participants were classified into 4 groups based on the combinations of high/low Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS) and Epworth Sleepiness Scale (ESS) scores, each dichotomized by median split. The relationship between DBAS/ESS combinations and COMISA was examined using two separate logistic regression analyses: one predicting COMISA vs. CID and another predicting COMISA vs. OSA, with DBAS/ESS combinations as independent variables, and age and sex as covariates.
Results: In unadjusted analyses, compared to the low DBAS/low ESS combination, the high DBAS/high ESS combination was associated with a higher probability of having COMISA vs. OSA, but not vs. CID. After adjusting for age, we found significant associations between the high DBAS/high ESS combination and COMISA for both comparisons: COMISA vs. CID (adjusted odds ratio [AOR] = 5.14; p= 0.007) and COMISA vs. OSA (AOR = 3.29; p = 0.004). These associations remained significant after sex adjustment.
Conclusion: Results suggest a concurrent worsening of sleep cognition and daytime sleepiness in COMISA. These findings highlight the need for comprehensive assessment and treatment approaches that address both cognitive and physiological aspects of COMISA.
Support (if any): Research Grants From Japan Foundation of Institute for Neuropsychiatry

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0617

INVESTIGATION OF THE INTERPLAY OF HYPOXIA-INDUCIBLE FACTOR AND CIRCADIAN CLOCK SIGNALING IN OBSTRUCTIVE SLEEP APNEA PATIENTS

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Introduction: Obstructive sleep apnea (OSA) due to recurrent episodes of hypoxia is characterized by changes in the Hypoxia-inducible factor 1 (HIF-1) signaling pathway and thus may affect the expression of circadian clock genes and proteins in this group of patients. This relationship may have a bidirectional relationship with circadian mechanisms. This study aimed to investigate the relationship between the circadian clock and HIF-1 in OSA patients versus controls.
Methods: The study included 70 participants, who underwent polysomnography (PSG) and were assigned into OSA (apnea-hypopnea index (AHI)≥5, n=54) or control (AHI< 5, n=16) groups. BMAL1, CLOCK, PER1, CRY1, HIF-1α, and HIF-1β gene expressions and protein levels were measured in evening and morning samples, collected respectively before and after PSG. This study was funded by the National Science Centre, grant number 2018/31/N/NZ5/03931.
Results: The OSA group was characterized by increased protein levels of CLOCK, CRY1, PER1, and HIF-1a, both in the morning and evening (all $p < 0.05$), and decreased morning gene expression of BMAL1 ($p=0.02$) compared to the control group. No statistically significant correlations between gene expression and protein levels were observed either in the morning or in the evening in the case of all evaluated circadian clocks (all $p > 0.20$). Associations between almost all circadian clock gene expressions and both HIF-1 subunits were observed in the OSA group at both time points (all $p < 0.05$), with the exception of the association between PER1 and HIF-1α in the morning ($R=0.050$, $p=0.73$). In the control group, only a correlation between HIF-1α levels and CRY1 expression in the morning ($R=0.588$, $p=0.02$) was found.
Conclusion: OSA appears to affect the circadian clock and HIF-1 signaling pathway, with increased CLOCK, CRY1, PER1, and HIF-1α protein levels observed in OSA patients. Results suggest that the interplay between these signaling pathways may involve complex posttranscriptional and posttranslational mechanisms.
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0618

HYPOXIA AND METABOLIC DYSREGULATION IN OBSTRUCTIVE SLEEP APNEA: INSIGHTS INTO HIF-1 SIGNALING AND INSULIN RESISTANCE

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Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder associated with intermittent hypoxia, disrupted sleep architecture, and metabolic dysfunction, contributing to increased cardiovascular risk. Hypoxia-inducible factor 1 (HIF-1) and its downstream targets, glucose transporter 1 (GLUT1) and insulin receptor (INSR), play a crucial role in cellular adaptation to hypoxia and glucose metabolism. This study investigated the expression of HIF-1 subunits, GLUT1, and INSR at the genetic and protein levels in individuals with OSA and their associations with insulin resistance markers, including the homeostasis model assessment of insulin resistance (HOMA-IR).
Methods: 89 participants underwent overnight polysomnography (PSG) and were classified into two groups based on their apnea-hypopnea index (AHI): OSA (AHI≥5, n=47) and control (AHI< 5, n=42) groups. Morning blood samples were analyzed for HIF-1α, HIF-1β, GLUT1, and INSR gene expression levels, as well as serum protein levels, insulin, and glucose concentrations. HOMA-IR was calculated as a marker of insulin resistance. This study was supported by the Ministry of Science and Higher Education under the "Diamond Grant" program (grant no. 0067/DIA/2018/47).
Results: The OSA group exhibited significantly lower expression levels of HIF-1α and GLUT1 ($p = 0.046$ and $p = 0.007$, respectively) and a decreased protein level of INSR ($p < 0.001$) compared to the control group. No statistically significant correlations were observed between gene expression levels and their respective protein products. The OSA group also demonstrated elevated serum insulin and glucose concentrations alongside increased HOMA-IR values ($p < 0.001$ for all). Additionally, in the OSA group, AHI was positively correlated with insulin ($R=0.303$, $p=0.041$), glucose ($R=0.327$, $p=0.026$), and HOMA-IR ($R=0.378$, $p=0.01$). Significant associations between the expression of HIF-1α, HIF-1β, INSR, and GLUT1 were observed in both groups, except for the relationship between HIF-1α and INSR ($p=0.089$), which was absent in the OSA group.
Conclusion: OSA is associated with reduced HIF-1α and GLUT1 expression, decreased INSR protein levels, and elevated markers of insulin resistance. These findings suggest a potential role for HIF-1 signaling in metabolic dysfunction in OSA and highlight the need for further research into targeted therapeutic strategies.
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0619

SHALLOWER SLEEP BY ODDS RATIO PRODUCT IS ASSOCIATED WITH LOW AROUSAL THRESHOLD WHEN ADJUSTED FOR CONFOUNDING OBSTRUCTIVE SLEEP APNEA SEVERITY

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Introduction: Odds ratio product (ORP) is an electroencephalography-based method for capturing sleep depth. Higher ORP

indicates greater probability of sleep interruption by wakefulness ("shallower sleep"). A potential source of sleep interruption is arousal in response to respiratory events due to obstructive sleep apnea (OSA). Phenotyping using polysomnography (PUP) is a computer-based method to estimate the mechanisms contributing to OSA from routine sleep study data. We hypothesized that shallower sleep (higher ORP) would be associated with easier arousal by respiratory events (low PUP-estimated ArTH).
Methods: Automated ORP analyses were conducted for in-lab sleep studies using the Cerebra Sleep System. Separately, studies were manually scored for sleep, arousals, and respiratory events prior to PUP analyses. As PUP estimates ArTH from non-rapid eye movement (NREM) sleep, mean ORP during NREM sleep was used as the representative ORP metric for each study. Individuals with PUP-estimated ArTH in the lowest tertile were considered to have low ArTH. Associations between ORP and low ArTH were examined using univariate and multivariate logistic regression analyses.
Results: Full ORP and PUP analyses were completed for 54 individuals (age 54.8±7.7 years; 6 female; BMI 31.9±4.9 kg/m2) with untreated OSA (AHI3A 30.1±19.7 events/hr). Mean ORP in NREM sleep was 0.82±0.23. Low PUP-estimated ArTH was present in 17 individuals. Univariate logistic regression did not demonstrate a significant association between low ArTH and ORP (OR for 1 SD increase in ORP = 1.59 [0.89—3.03], p = 0.127). However, with adjustment for OSA severity according to AHI3A, low ArTH was associated with rise in ORP (OR = 2.58 [1.24—6.47], p =0.021). The association remained with further adjustment for age, sex, and BMI (OR = 2.73 [1.17—7.98], p = 0.034).
Conclusion: ORP and PUP-estimated ArTH did not have a clear relationship in a cohort of predominantly male, middle-aged individuals with OSA. However, with adjustment for OSA severity, rising ORP was associated with greater odds of low ArTH, suggesting complex relationships among ORP, ArTH, and OSA. Further investigation should determine whether OSA confounds the relationship between ORP and ArTH by both disrupting sleep (raising ORP) and producing resistance to sleep disruption (raising ArTH).
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0620

BASELINE PATHOPHYSIOLOGIC TRAITS OF PEDIATRIC OBSTRUCTIVE SLEEP APNEA TO ASSESS RESPONSE TO ADENOTONSILLECTOMY

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Introduction: Adenotonsillectomy is the first-line treatment for pediatric obstructive sleep apnea (pOSA) as adenotonsillar hypertrophy is a major risk factor for pOSA. However, the response rate to adenotonsillectomy varies from 20% to 70%. Pathophysiological determinants of OSA (endotypes), including greater pharyngeal collapsibility, reduced dilator muscle compensation, elevated chemoreflex loop gain, and altered arousal threshold, have shown promise in predicting responses to OSA treatment in adults. We aimed to determine whether the characterization of pOSA pathophysiologic traits estimated from polysomnography could predict response to adenotonsillectomy.
Methods: Endotypes were estimated during REM and NREM sleep from baseline polysomnography in children with OSA who received adenotonsillectomy in the Childhood Adenotonsillectomy Trial (CHAT; N=194; mean age:6.56 years; Black:54.12%; Asian:2.58%; female:58.25%; obese:34.54%). The primary outcome was the difference between baseline and follow-up REM-AHI (events/hour). Secondary outcomes were changes in NREM-AHI, and AHI reduction ≥50% (estimated for both REM- and NREM-sleep) and pOSA resolution (AHI < 2 events/hr) (estimated for both REM- and NREM- sleep). Multivariable regression models assessed associations of REM and NREM endotypes (per standard deviation) with primary and secondary outcomes derived from REM and NREM sleep.
Results: The sample had a baseline total AHI of 6.92 ± 5.73 (events/hr)(mean ± SD); REM-AHI of 16.43 ± 19.02; NREM-AHI of 4.76 ± 4.33, and a follow-up AHI of 1.59 ± 3.01; REM-AHI of 3.93 ± 8.50; NREM-AHI of 1.02 ± 2.00. Univariable analyses showed that higher REM-collapsibility at baseline was associated with greater REM-AHI reduction (REM: β:-6.39[95% CI:-9.47, -3.30] events/hr), and improvement in REM-AHI≥50% (odds ratio:1.63[95% CI:1.01, 2.65]). Multivariable analyses adjusting for other endotypes yielded similar results - greater collapsibility at baseline associated with a greater reduction in REM-AHI (β^adj:-9.66[95% CI:-18.82, -0.51]) and the association persisted after additional adjustment for age, sex, BMI-z, and Black race (β^adj:-10.52[95% CI:-19.68, -1.37]). No significant associations between endotypes and secondary outcomes were observed in multivariable analyses.
Conclusion: Quantifying pOSA traits using clinical polysomnography can identify an endotype-based subgroup of patients with increased pharyngeal collapsibility who are more responsive to adenotonsillectomy. These results suggest opportunities for targeting mechanistic traits to improve the outcomes of surgical therapies for pOSA.
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0621

THE IMPACT OF BARIATRIC SURGERY ON OBSTRUCTIVE SLEEP APNEA ENDOTYPIC TRAITS

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Introduction: Obesity is an important risk factor for obstructive sleep apnea (OSA) development. Likewise, obesity management is an important component of OSA treatment. We evaluated the impact of sleeve gastrectomy on OSA endotypes in prospective and retrospective cohorts.
Methods: The SLIM-OSA trial (NCT04793334; IRB#191948) seeks to elucidate the mechanisms for why weight loss improves OSA in some but not all individuals. Participants underwent baseline polysomnography. Six months following sleeve gastrectomy, polysomnography was repeated. A separate cohort with a history of sleeve gastrectomy and polysomnography received updated polysomnography. We pooled these cohorts for comparison.
Results: Of 55 individuals undergoing baseline studies, 20 received surgery and repeated polysomnography; 15 had baseline

OSA with follow-up data. In the retrospective cohort, 19 had baseline OSA and post-op data. Across 34 individuals with paired data, the cohort was 82% female, 52% Hispanic, with a median age of 44 years. Pre-op BMI was 42 kg/m², decreasing to 34 kg/m² post-op ($p < 0.0001$). AHI decreased from 18/h to 15/h ($p = 0.12$). VpassiveT improved (72% to 80% Veupnea, $p < 0.001$), Vmin increased (67% to 76% Veupnea, $p < 0.001$), and chemoreflex delay rose (9.7 to 11.7 seconds, $p = 0.018$). No significant changes were seen in Vactive (101% to 102%, $p = 0.5$), upper airway gain (1.42 to 1.73, $p = 0.08$), Lg1 (0.52 to 0.47, $p = 0.15$), or hypoxic burden (34% to 24%min/h, $p = 0.2$). ArthresT decreased from 149 to 133 ($p = 0.007$). Linear models revealed significant associations between ΔAHI and ΔBMI ($r = 0.33$, $p = 0.052$), ΔVpassiveT ($r = -0.35$, $p = 0.045$), ΔVactive ($r = -0.34$, $p = 0.049$), Δupper airway gain ($r = -0.54$, $p = 0.0026$), and Δhypoxic burden ($r = 0.64$, $p = 0.0001$). Similar trends were observed with ΔBMI as the independent variable.

Conclusion: Passive collapsibility and chemoreflex delay tended to improve after sleeve gastrectomy. Some participants with obesity did not have OSA, and there are sex differences with respect to how obesity impacts OSA. The mechanisms for weight loss improving OSA are complex.

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0622

ANALYSIS OF POLYSOMNOGRAPHY IN PATIENTS WITH SLEEP DISORDERS ACCOMPANIED BY TINNITUS

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Introduction: Tinnitus is a symptom characterized by the perception of sound generated within the body, specifically by the spontaneous depolarization of auditory nerve fibers, without any external auditory stimulus. Although the exact etiology of tinnitus remains unknown, there is a strong electrophysiological hypothesis suggesting that functional changes in the limbic system's amygdala and the cerebral cortex, as well as the subcortical structures, lead to tinnitus through autonomic nervous system dysfunction. Sleep disorders are also known to be influenced by and to influence the complex interactions among the ascending reticular system, central arousal system, cognitive system, and emotional regulating system in the central nervous system. Therefore, based on these theoretical foundations, we aimed to analyze the relationship between tinnitus and sleep by examining the association between tinnitus and polysomnography (PSG) results using the Tinnitus Handicap Inventory (THI).

Methods: A retrospective analysis was conducted on patients who visited the clinic and underwent both PSG and the Korean version of the THI. The clinical characteristics, PSG results, and scores from psychiatric symptom questionnaires were compared between the group with tinnitus and the group without tinnitus. Additionally, the PSG results and questionnaire scores were compared based on the THI scores.

Results: There were statistically significant differences in the Periodic Limb Movement (PLM) index, sleep latency, and lowest SpO2 between the group with tinnitus and the group without tinnitus. The tinnitus group exhibited lower PLM index, higher sleep latency, and higher lowest SpO2 compared to the group without tinnitus. When analyzing the PSG results based on THI scores, a significant negative correlation was found between THI and REM latency. There were no significant differences in the average scores of questionnaires between the group with tinnitus and the group without tinnitus. Multiple regression analysis also did not reveal any significant correlations between THI scores and questionnaire scores.

Conclusion: Tinnitus, sleep disorders, and depression are associated with autonomic nervous system overactivity through the limbic system. Studies that examine the relationship between tinnitus, sleep disorders, depression, anxiety, and stress using PSG and questionnaires can provide a better understanding of sleep patterns, autonomic nervous system function, and electrophysiological models.

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0623

DIFFERENCES IN SLEEP QUALITY IN INDIVIDUALS RECEIVING OPIOID MEDICATION FOR OPIOID USE DISORDER VERSUS CHRONIC PAIN

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Introduction: Chronic pain is a prevalent condition often treated with opioid medication. Opioids, such as methadone, are also used to treat opioid use disorder (OUD). As central nervous system depressants, opioids can exacerbate sleep problems, particularly those due to respiratory issues. This study investigates sleep quality and respiratory distress measures in adults with Chronic Pain (CP) receiving opioid medication and those with OUD receiving methadone.

Methods: Adults (18years+) in the CP group had a "moderate" daily level of pain (≥5 on a 0-10 Numeric Pain Scale [NPS]) and were prescribed opioids. Adults (18years+) in the OUD group were enrolled in an opioid treatment program and taking methadone daily. All participants rated their pain intensity and interference scales using the PROMIS. NightOwl mini disposable home sleep tests (Ectosence, Leuven, Belgium) were used to record total sleep time (TST), time in bed (TIB), sleep efficiency (SE), and apnea-hypopnea index (AHI) for all participants.

Results: In total, N= 17 (12 women) provided data, N=9 (6 women 60y±12y [Mean ± SD]) in the CP group and N=8 (6 women 45.5y±12.3y) in the OUD group. Average pain intensity and interference T-scores were 69.4±8.1 and 69.72±6.5 for CP and 59.6±7.9 and 58.4±9.1 for OUD ($t>-2.45$, $p< 0.02$). CP participants spent 8.6±2.8h TIB and 5.08±2.3h asleep, resulting in an SE of 61.4±24.9% and a predicted AHI of 6.6±6.4, indicative of mild sleep apnea. OUD participants spent 8.27±2.93h TIB and 4.19±2.03 hours asleep, resulting in an SE of 54.86±19.35% and a predicted AHI of 21.4±27.7, indicative of moderate sleep apnea (all $p>0.05$).

Conclusion: Although the CP group reported significantly higher pain intensity and interference scores, objective sleep data showed the OUD group had higher measures of sleep apnea and worse sleep efficiency. This preliminary data warrants further exploration of sleep quality and respiratory status among adults with chronic pain and OUD receiving maintenance treatment with opioids.

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0624

EFFECT OF ACETAZOLAMIDE ON BREATHING STABILITY IN OPIOID-ASSOCIATED SLEEP-DISORDERED BREATHING

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Introduction: The mechanisms of opioid-induced sleep disordered breathing (SDB) are unclear. Reduced cerebral vascular responsiveness to CO2 may increase breathing instability. Whether acetazolamide (ACZ) can enhance breathing stability in opioid-SDB by reducing loop gain and/or enhancing cerebrovascular responsiveness to CO2 (CVR) has not been studied. We hypothesized that in patients with opioid-SDB, ingestion of ACZ will alleviate breathing instability during NREM sleep by reducing the apneic threshold (AT) and plant gain, and/or by increasing CVR

Methods: Seven participants with opioid-associated SDB (age 48.4±15.8 yr, BMI 32.1±6.9 kg/m2, 4 male, 2 female, 1 transgender, apnea-hypopnea index 39.2±21.8/hr, central apnea index 3.2±5.2/hr, morphine equivalent dose: 29.8±9.2 mg) were randomized to oral ACZ 500 mg vs. placebo twice a day for 6 days. On day-4, while on the drug, middle cerebral artery velocity (MCAV) was measured while awake using transcranial doppler ultrasound. Multiple trials with hyperoxia hypercapnic breathing determined cerebrovascular conductance (CVC): ΔMCAV/Δmean arterial pressure, where Δ=trial minus baseline values, and slope of CVR: ΔCVC/ΔPETCO2. This was followed by measurement of AT using noninvasive mechanical ventilation during NREM sleep, and PSG on a subsequent night while still on the drug. Plant gain (PG) and controller gain (CG), components of loop gain, were determined using published methods. Average data from multiple CVR trials and AT trials are reported. Serum opioid levels were measured on experimental nights. Serum bicarbonate levels: ACZ: 19.7±2.6 mEq/L vs. placebo: 27.2±3.3 mEq/L.

Results: Four participants have completed both arms of the study. Data are presented as ACZ vs. placebo (n=4): CVC 68.1±16.3 vs. 72.9±21.1 units, CVR 1.9±0.4 vs. 2.0±0.6 unit/mmHg; AT trials: eupneic PETCO2 33.3±4.4 mmHg vs 41.1±3.4 mmHg ($p< 0.001$), eupneic minute ventilation 11.8±3.6 L/min vs. 7.4±1.5 L/min ($p=0.08$), AT-PETCO2 29.8±4.7 mmHg vs 38.0±3.4 mmHg ($p=0.002$), PG 3.1±0.7 vs. 5.8±0.7 mmHg/L/min ($p=0.02$), CG 2.6±0.8 vs. 2.0±0.9 L/min/mmHg.

Conclusion: In participants with opioid-associated SDB, compared with placebo, ACZ significantly decreased the AT during NREM sleep, indicating increased breathing stability related to a significantly reduced PG, with reduced eupneic PETCO2. However, there was no change in CVR with ACZ. Additional studies will determine the role of ACZ therapy in opioid-associated SDB.

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0625

A BREATHLESS PUZZLE: CENTRAL SLEEP APNEA AND SUBCLINICAL BRAINSTEM COMPRESSION

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Introduction: Sleep breathing disorders (SBDs) are characterized by recurrent episodes of apnea (cessation of breathing) or hypopnea (reduced breathing) during sleep, arising from overlapping pathophysiological mechanisms. Central sleep apnea is not a singular disorder but can occur independently or as part of other clinical syndromes. It is primarily caused by a transient loss of output from the pontomedullary pacemaker, affecting respiratory muscles such as the diaphragm, thorax, and abdomen. Various pathophysiological classifications exist, including high loop gain associated with conditions like heart failure, and rhythm generation failure due to brainstem disorders. Among the latter, Chiari malformation is well-documented, though data are limited. The exact mechanism remains unclear, but it is hypothesized that central apneas may result from dysfunction of the respiratory center due to medulla oblongata compression or vascular compression causing ischemia. Brainstem compression may also affect the reticular activating system, and compression or stretching of the glossopharyngeal nerve could impair afferent input from the carotid bodies, affecting the chemoreflex. Damaged chemoreceptors may reduce responsiveness to CO2, leading to central apneas.

Methods: Case presentation

Results: We present a case of a 40-year-old male with predominantly central sleep apnea, evaluated for Chiari malformation. MRI revealed a 3mm tonsillar herniation, which did not meet the criteria for Chiari malformation Type I but suggests a potential cause for the central sleep apnea.

Conclusion: This case highlights the need for further investigation into the pathophysiology of central sleep apnea, particularly regarding the severity of anatomical brainstem disorders that might trigger such apneas.

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0626

ELEVEN-YEAR PREVALENCE OF SLEEP-DISORDERED BREATHING IN COMMUNITY-BASED HEALTH CENTERS ACROSS THE UNITED STATES

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Introduction: Sleep-disordered breathing (SDB) disproportionately affects socioeconomically disadvantaged populations, including minoritized racial and ethnic groups and rural communities. Community-based health centers (CBHCs) are critical to help address structural healthcare inequities by providing care to socioeconomically disadvantaged populations. However, little is known about the prevalence of SDB in CBHCs, although these data can inform resource allocation and intervention by identifying high-need populations and prioritizing areas with the greatest burden of SDB.

Methods: We investigated the prevalence of SDB among adults seeking care at CBHCs between 2012 and 2022 using electronic health record data from the OCHIN network of community health organizations, comprised of >34,500 providers at >2,000 healthcare delivery sites across 40 states. SDB cases were identified using ICD-9-CM/ICD-10-CM and CPT/HCPCS codes. Central sleep apnea (CSA), obstructive sleep apnea (OSA), or other/unspecified sleep apnea subtypes were identified using ICD-9-CM/

ICD-10-CM codes. Demographic data were obtained from patient's initial encounter during the study period. Comorbidities were identified using ICD-9-CM/ICD-10-CM codes, vital measures (i.e., blood pressure, height, weight), and medications. We used descriptive statistics to obtain frequencies and percentages.
Results: Among 4,167,921 adults, the median age at first encounter was 39 [IQR: 27-54] years. Most (57%) were women, White (60%), non-Hispanic (NH, 62%), non-Veteran (57%), and resided in the Western region (59%). Additionally, 30% reported incomes < 25% of the federal poverty level, and 36% had Medicaid. SDB was diagnosed in 168,937 (4%) patients. The OSA subtype was most prevalent (3%), followed by other/unspecified apnea (2%), and CSA (0.1%). Among OSA patients, 42% were aged 50–65 years, 54% were NH-White, 52% were men, and 45% never smoked. Hypertension (74%), obesity [BMI ≥30 kg/m2] (65%), and diabetes (38%) were prevalent comorbidities among individuals diagnosed with OSA. The prevalence of SDB increased among patients aged 18-34 years (9% to 15%), NH-Black patients (12% to 16%), and Hispanic patients (9% to 20%), while in other groups the prevalence either decreased or remained stable between 2012 and 2022.
Conclusion: At 4%, SDB is prevalent among patients seeking care in CBHCs, especially among those with comorbidities. Expanding adequate and high-quality sleep medicine services through CBHCs may advance sleep health equity.
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0627

SOCIAL RISK FACTORS, SLEEP APNEA AND CARDIOVASCULAR RISK: CLINICAL PREDICTORS IN COMMUNITY HEALTH CENTERS

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Introduction: Racial, ethnic and socioeconomically disadvantaged minorities are more likely to experience insufficient sleep, sleep disorders, and negative cardiovascular (CV) outcomes. However, pathways linking health disparities to sleep disturbances and CV outcomes are largely underexplored. We leveraged electronic health record (EHR) data from the Accelerating Data Value Across a National Community Health Center Network (ADVANCE) Clinical Research Network (CRN) to identify social risk factor clusters, assess their association with obstructive sleep apnea (OSA), and determine relevant clinical predictors of cardiovascular (CV) outcomes among those experiencing OSA.
Methods: Geographically informed social indicators were used to define social risk factor clusters via latent class analysis. EHR-wide diagnoses were used as predictors of 5-year incidence of major adverse CV events (MACE) using STREAMLINE, an end-to-end rigorous and interpretable automated machine learning pipeline.
Results: Analyses among over 1.4 million individuals revealed three major social risk factor clusters: lowest (35.7%), average (43.6%) and highest (22.7%) social burden. In adjusted analyses, those experiencing highest social burden were less likely to have received a diagnosis of OSA when compared to those experiencing lowest social burden (OR [95%CI]=0.85[0.82-0.88]). Among those with OSA and free of prior CV diseases (N=4,405), performance of predicting incident MACE reached a AUC of 0.70 overall but varied when assessed within each social risk factor cluster. Feature importance also revealed that different clinical factors might explain predictions among each cluster.
Conclusion: Results suggest relevant health disparities in the diagnosis of OSA and across clinical predictors of CV diseases among those with OSA, across social risk factor clusters, indicating that tailored interventions geared toward minimizing these disparities are warranted.
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0628

DISTRIBUTION OF CARDIOMETABOLIC COMPLICATIONS IN U. S. VETERANS BEFORE AND AFTER SLEEP TESTING

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Introduction: Obstructive sleep apnea (OSA) is a prevalent condition among Veterans affecting 24% and ranking among the top five most common diagnoses in the Veterans Health Administration (VHA). Epidemiologic studies demonstrate a strong association between OSA and cardiometabolic disease. This study describes the temporal distribution of common cardiometabolic comorbidities in relationship to the first sleep test within VHA.
Methods: This study is a sub-analysis of data from a larger project leveraging Artificial Intelligence (AI) to predict which Veterans with OSA are most likely to develop cardiometabolic comorbidities. Data from 24 million Veteran records collected between 1999 and 2022 were analyzed using Current Procedural Terminology for diagnostic sleep testing, and International Classification of Disease 9 and 10 codes for OSA and cardiometabolic comorbidities. Prevalence of comorbidities was documented within two years prior to the first sleep study (T0) and for up to 22 years afterwards. A preliminary logistic regression model was used to predict the likelihood of developing an additional comorbidity after T0.
Results: The analysis identified 1.3 million Veterans who underwent sleep testing within VHA, with 939,954 having at least one comorbidity. Within two years prior to T0 the following comorbidities were observed: hypertension 54%, diabetes mellitus 29%, coronary artery disease 22%, heart failure 8.5%, stroke 8.9%, and atrial fibrillation 7.4%. After T0 the number of Veterans with these comorbidities increased: hypertension 60%, diabetes mellitus 42%, coronary artery disease 33%, heart failure 18%, stroke 16%, and atrial fibrillation 15%. At T0 44% had at least two comorbidities, 21% had at least three comorbidities, 9% had at least four comorbidities. An initial logistic regression predictive model has an AUROC of 0.74 with OSA having an odds ratio of 2.13 for developing a new comorbidity after T0.
Conclusion: These findings suggest many Veterans have already developed significant cardiometabolic comorbidities by the time of OSA diagnoses, with additional diagnoses occurring subsequently. This may reflect increased healthcare engagement

leading to the diagnosis of comorbidities or potentially indicate a causal relationship. Additional research is needed to better define the relationship between OSA and incident comorbidities.
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0629

SLEEP APNEA PATHOPHYSIOLOGICAL TRAITS AND CARDIOVASCULAR OUTCOMES: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS

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Introduction: Identifying which patients with obstructive sleep apnea (OSA) are at elevated risk for major adverse cardiovascular events (MACE) may help target treatment to those most likely to benefit. Here we evaluated whether OSA-related MACE risk differs by underlying pathophysiology. Since augmented cardiopulmonary responsiveness to respiratory events may contribute to adverse cardiovascular outcomes of OSA, we tested the hypothesis that OSA patients with increased loop gain (OSAHighLG) are at increased MACE risk, whereas those without elevated loop gain (OSALowLG) are not.
Methods: At-home polysomnography from Multi-Ethnic Study of Atherosclerosis provided measures of pathophysiological traits (loop gain, collapsibility, muscle compensation, and arousal threshold). MACE was defined as incident myocardial infarction, resuscitated cardiac arrest, stroke, or cardiovascular mortality. Cox proportional hazard modeling evaluated the association between MACE and OSAHighLG (apnea-hypopnea index [AHI]≥15 events/hr and loop gain>median) and OSALowLG compared to non-OSA controls (AHI< 15) adjusting for age, sex, body mass index, race, hypertension, diabetes, and smoking. Sensitivity analyses assessed severe OSA (AHI>30) separately. Secondary analyses 1) redefined OSA severity subgroups using hypoxic burden >32 %min/hr (i.e. HBHighLG, HBLowLG), 2) examined other endotypic traits, and 3) evaluated a simplified biomarker of loop gain (periodicity per event cycle length variability).
Results: In the sample (N=1968, age:68.5±9.1 years, AHI:24.3±19.4 events/hr, follow-up:8.3±1.9 years), 11.4% exhibited MACE events. Increased MACE risk was observed in OSAHighLG (hazard ratio [95%CI] vs controls: 1.79[1.17-2.73], N=586) but was less evident in OSALowLG (1.46[0.94-2.27], N=586; difference ratio:1.23[0.83-1.82]). MACE risk was markedly increased in severe OSAHighLG (2.23[1.40-3.54], N=333) but not in severe OSALowLG (1.32[0.74-2.35], N=252). Defining OSA severity using hypoxic burden yielded similar results (HBHighLG:1.82[1.19-2.78] vs. HBLowLG:1.35[0.86-2.12]). OSA-related MACE risk also tended to be higher with greater vs. milder collapsibility (1.81 vs. 1.47) and good vs. poor compensation (1.80 vs. 1.48), but not with high vs low arousal threshold (1.68 vs. 1.57). MACE risk was higher in OSAHighLG compared to OSALowLG based on periodicity (2.15[1.42-3.26] vs. 1.15[0.72-1.82]; difference ratio: 1.87[1.25-2.80]).
Conclusion: Elevated MACE risk in OSA is particularly evident in patients with elevated loop gain. Pathophysiological trait measures may improve identification of OSA patients who are at elevated risk of adverse cardiovascular outcomes.
Support (if any):

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0630

COMPARING ACCURACY, SENSITIVITY, AND SPECIFICITY OF ACTIGRAPHY TO POLYSOMNOGRAPHY IN COGNITIVELY NORMAL OLDER ADULTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: There is continued research interest in determining the concordance between polysomnography (PSG) and actigraphy, particularly in individuals with Obstructive Sleep Apnea (OSA). We investigated the accuracy, sensitivity, and specificity of actigraphy-measured sleep vs. PSG in a cohort of older adults with and without OSA.
Methods: PSG for each participant was recorded overnight at bedside. During a separate period of seven consecutive nights, actigraphy was collected for each participant at home using wrist-worn actigraphs on the non-dominant hand. Sleep time was validated with participant-provided sleep logs. Statistical analyses, including t-tests, chi-square tests, and sensitivity-specificity assessments, were performed. Lin's concordance correlation coefficient (CCC) and reduced major axis regression (RMAR) were utilized as measures of agreement and proportional bias, respectively.
Results: The study included 151 community-dwelling older adults (ages 47-84) evaluated at the NYU Alzheimer's Disease Research Center and enrolled in studies investigating sleep health and aging. Of the 151 participants, 108 (71.5%) were white, 43 (28.5%) were Black/African American, and 71 (47.0%) had OSA (defined as apnea hypopnea index [AHI] > 5%). Among mean PSG-measured sleep parameters, Sleep Efficiency was 81.2% (SD 11.81%), Total Sleep Time (TST) 373.4 (76.06) minutes, Sleep Latency 12.4 (22.34) minutes, and Wake Time 72.6 (45.4) minutes. Sensitivity, specificity, and accuracy of actigraphy compared to PSG were low: 0.646, 0.220, and 0.500, respectively. Among participants with OSA, sensitivity was slightly lower (0.634), and specificity slightly higher (0.234), with similar accuracy (0.500). The largest difference among measures was in TST in both OSA and non-OSA participants: actigraphy overestimated TST by 26.23 (100.13) minutes overall, and 16.47 (102.47) minutes in OSA participants. Lin's CCC was low (< 0.9) for all actigraphy-measured parameters compared to PSG, regardless of OSA status. In addition, RMAR slopes (≠ 1) suggest proportional bias across all measures, while RMAR intercepts (≠ 0) for all measures show fixed bias, regardless of participant OSA status.
Conclusion: In this study population, there was low accuracy and concordance of actigraphy measured sleep parameters compared to PSG, with both proportional and fixed bias across measures, regardless of OSA status. This suggests that OSA status is not a factor in PSG/Actigraphy concordance.
Support (if any):

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0631

APPLICATION OF REDUCED TIDAL VOLUME INDEX AND VENTILATION LOSS DERIVED FROM EIT FOR DIAGNOSING AND ASSESSING SEVERITY OF OSA

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Introduction: Overnight polysomnography (PSG) is an old standard study used to diagnose obstructive sleep apnea (OSA), and apnea- hypopnea index (AHI) is usually used to define the severity of OSA. However, the severity of OSA may be too complex to be accurately defined solely based on the AHI. We aimed to explore new parameters (reduced tidal volume index and ventilation loss) for measuring respiratory events during sleep and assessing the individual severity of OSA using electrical impedance tomography (EIT) technology.
Methods: PSG and EIT were simultaneously performed on 30 adult male subjects with snoring and sleep apnea symptoms. The outcome parameters of PSG were AHI, oxygen desaturation index (ODI), and mean and lowest SpO2. The outcome parameters of EIT were the detection of low tidal volume (LTV) or very low tidal volume (VLTV), reduced tidal volume index (RTI), and ventilation loss (VL). LTV and VLTV were defined as respiratory events measured by EIT, characterized by abnormally reduced tidal volume during sleep. The RTI was defined as the average number of LTV and VLTV events per hour of sleep. The VL was calculated as the percentage of ventilation depleted by all detected LTV and VLTV events. The agreement of detected respiratory events between PSG and EIT was compared. And the relationship between AHI and RTI was evaluated. Finally, the correlation between the outcome parameters of PSG and EIT was assessed.
Results: Respiratory events detected between PSG and EIT in the Bland-Altman plot were in good agreement. Linear regression analysis demonstrated a statistically significant correlation between AHI and RTI ($R2 = 0.798$; $p < 0.001$). RTI showed a statistically significant correlation with AHI ($r = 0.893$), ODI ($r=0.894$), lowest SpO2 ($r = -0.815$), and mean SpO2 ($r = -0.711$) (all $p< 0.001$). VL varied considerably between subjects. However, VL also showed a significant statistical correlation with AHI ($r=0.819$), ODI ($r=0.830$), lowest SpO2 ($r = -0.720$), and mean SpO2 ($r = -0.618$) (all $p< 0.001$).
Conclusion: The combination of RTI and VL in EIT might be a promising tool for supplementing PSG limitations in diagnosing OSA and understanding its individual severity.
Support (if any):

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0632

A MACHINE LEARNING APPROACH FOR TARGETED OBSTRUCTIVE SLEEP APNEA CASE-FINDING IN OUTPATIENT CLINICS

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Introduction: OSA is a disease characterized by repeated apnea, oxygen desaturation, and fragmented sleep, with an estimated population prevalence of 12%. Most OSA patients are undiagnosed, contributing to a substantial health and economic burden; however, no standardized screening protocol has been recommended. This study proposes a novel two-step, machine learning-enabled approach to OSA case-finding in outpatient settings.
Methods: Two models were developed using data from 5,761 patients in the Sleep Heart Health Study. The first step leverages routinely available electronic health record (EHR) data, enabling automatic risk score generation in the EHR user interface. High-risk patients are flagged for further evaluation to identify unrecognized symptoms and refine the risk prediction. This process enables targeted use of clinical resources while identifying patients at elevated OSA risk. Available features included demographic information, hypertension incidence, body size measurements, and engineered indices. OSA was defined using AHI>15, measured by 4% oxygen desaturation with or without arousal. Feature selection was conducted using lasso regularization and recursive feature elimination with repeated 5-fold cross-validation, retaining features selected by both models. The final model employed XGBoost with monotonic constraints and shapely additive values for interpretability. Hyperparameters were tuned using Bayesian optimization with repeated cross-validation at each iteration before testing on a hold-out dataset to measure model performance.
Results: The first and second steps of the approach achieved AUROC scores of 0.721 and 0.793, respectively. The performance was analyzed sequentially to simulate a low-cost case-finding workflow. Using only EHR data, 40.2% of patients had significant OSA risk (>12%). Following sleep-specific data collection, 72.7% of flagged patients had a predicted OSA risk of >25%. At these risk thresholds, the combined approach yielded a positive predictive value of 39.8%, a sensitivity of 68.7%, and a specificity of 77.8%, successfully identifying over two-thirds of OSA cases.
Conclusion: This study demonstrates the feasibility of a machine learning approach for efficient and targeted OSA case-finding in outpatient settings. Viewing personalized risk scores, clinicians can decide whether to pursue further action according to clinical judgment, care priorities, and time constraints.
Support (if any): Data used was from the Sleep Heart Health Study, supported by NHLBI funding grants.

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0633

A COMPARISON OF HOME SLEEP APNEA TESTING ORDERED BY PRIMARY CARE PROVIDERS AND SLEEP SPECIALISTS

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Introduction: United States (U.S.) sleep centers face workforce shortages, declining reimbursement, and growth in value-based care payment models. Thus, alternative options for obstructive sleep apnea (OSA) care that reduce cost and better utilize resources are needed. Expanded primary care provider (PCP) roles in OSA care lower costs and achieve similar clinical outcomes to specialists, but are less common in the U.S. This study compared performance metrics and OSA diagnosis for PCP and specialists utilizing home sleep apnea testing (HSAT).
Methods: A retrospective cohort study compared PCP referrals for specialist consultation or HSAT; Group 1 was referred for consultation with subsequent HSAT ordered by the specialist

while Group 2 had PCP-ordered HSAT before specialty clinic consultation. Full pathway completion included encounters for both clinic and HSAT. Electronic health record data were extracted and analyzed using Pearson χ^2 for completion and proportion diagnosed or Mann Whitney U independent samples test for wait times.
Results: Of the 1,535 referrals placed, completion rates for Groups 1 and 2 were similar for first encounter (36% vs. 42%, p =.10) and second encounter (23% vs. 22%, p =.95), respectively. For the 565 completed first encounters, referral rates were similar for the second encounter for Groups 1 and 2 (78% vs. 79%, p =.77). Diagnosis rates were lower in Group 1 compared to Group 2 (21% vs. 37%, p <.001). Full pathway was completed by 347, median days to pathway completion were longer for Group 1 compared to Group 2 (84 [IQR: 50-99] vs. 40 [27-56], p <.001). Respective OSA diagnosis rates were similar (94% vs. 100%, p =.10). For these groups (n=347), demographic and disease characteristics did not differ, including age 45 years [27-38], 55% male, BMI 32 kg/m2, respiratory event index (3% criteria) 21/hr [10-39], and nadir oxygen saturation 78% [74-82%], with all p >.05.
Conclusion: Similar or better diagnosis rates and performance metrics were achieved by HSAT ordered by PCP compared to sleep specialists for uncomplicated OSA. Expanding PCP roles in ordering HSAT prior to referral for specialist consultation appears to be a feasible alternative to specialist consult prior to HSAT.
Support (if any): none

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0634

A REMOTE-PATIENT-MONITORING (RPM) SYSTEM USING FDA CLEARED WEARABLE TECHNOLOGY FOR OSA MANAGEMENT OVERCOMES DEFICIENCIES FOUND IN PAP AHI RPM DATA

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Introduction: Advancements in OSA treatment monitoring now include nightly Remote Patient Monitoring (RPM), typically from PAP machines (PAP-RPM). Recognizing PAP-RPM's limitations, we present practical examples of a superior approach implemented at CSMA using the REST-Tracker RPM (RT-RPM) system for capturing nightly OSA-metrics.
Methods: The REST-Tracker employs a Ring-Oximeter with Cardiopulmonary Coupling (CPC) analysis through SleepImage™, an FDA-cleared cloud-computing system. It provides OSA metrics at two sensitivity levels (sAHI_3% and sAHI_4%) with longitudinal viewing and automated data surveillance for workflow optimization.
Results: From about 300 RT-RPM patients with OSA, managed by a variety of treatment methods, ranging from PAP, Inspire-HGNS, Oral-Appliance-Therapy to orthodontics, we present three cases, all on PAP in whom PAP data, available from ResMed Airview platform, demonstrating RT-RPM's ability to capture treatment deficiencies not observed by PAP-RPM: Case 1: A 74-year-old male with OSA, using Inspire and PAP therapy, showed increased sAHI on RT-RPM (sAHI_3% 14.7/SD 5.7, sAHI_4% 8.4/SD 4.1) despite normal PAP-RPM data (pAHI 3.7/SD 2). Investigation revealed correlation with intermittent alcohol use, detected only through RT-RPM. Case 2: A 76-year-old female's RT-RPM detected elevated sAHI (sAHI_3% 27.5/SD 12.9, sAHI_4% 16.4/SD 7.8) while PAP-RPM remained normal (pAHI 3.4/SD 1.8). Investigation revealed high-altitude vacation effects, leading to PAP pressure adjustments and oxygen supplementation. Case 3: A 78-year-old female with severe OSA on combination therapy showed normal PAP-RPM data (pAHI 0.8/SD 1.4) but elevated RT-RPM readings (sAHI_3% 26.2/SD 6.7, sAHI_4% 15.9/SD 5.9), matching persistent symptoms and necessitating treatment modifications.
Conclusion: These cases demonstrate PAP data's inadequacy in identifying intermittent OSA exacerbations. Our group has demonstrated a clear distinction between the pAHI and sAHI sensitivities, reported in a separate abstract. Besides the significantly lower sensitivity identifying residual OSA by the pAHI, PAP-RPM is limited to only provide OSA metrics while the patient is on therapy, were as RT-RPM provides metrics regardless of therapy type or usage, giving a more significant indication of morbidity impact from OSA status. We conclude that relying solely on PAP data for OSA patient monitoring is not sufficient to be deemed a standard of care goal since better methods are now becoming available with advanced wearable technologies.
Support (if any):

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0635

UNMASKING OBSTRUCTIVE SLEEP APNEA: ESTIMATED PREVALENCE AND IMPACT IN THE UNITED STATES

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Introduction: Obstructive sleep apnea (OSA) is a serious, chronic sleep-related breathing disease, characterized by repeated upper airway obstructions during sleep, leading to episodes of disrupted breathing, sleep fragmentation, and reduced oxygen saturation. Adjusting for obesity as a major risk factor, we aimed to estimate the up-to-date prevalence of OSA in United States (US) adults in 2024.
Methods: We conducted a literature-based analysis to identify studies of OSA prevalence in the general or community adult population, using the AHI4 criteria (all apneas plus hypopneas with ≥ 4% oxygen desaturation) from polysomnography or home sleep apnea test. OSA was defined as having an AHI4 ≥ 5 events/hour. For the total prevalence, we estimated age- and gender-specific rates based on eligible studies and extrapolated missing data (e.g., age-group) from studies where data were available. The base-year estimation for 2004 was calculated by averaging age-specific total OSA prevalence data from these studies, accounting for methodological and population differences, to establish a foundational baseline for further adjustments. We calculated the obesity population attributable fraction (PAF) which was applied to base year estimates to project OSA prevalence in year 2024 adjusting for obesity and extrapolated to the US Census population data. The AHI distribution of mild (5-< 15), moderate (15-< 30) and severe (>30 events/h) were also estimated.
Results: Total of 80.6 million individuals were estimated to be living with OSA in the US in 2024, of whom 47,623,848 (59%) were males and 32,967,117 (41%) females. This translates to

32.2% overall prevalence in the US among adults aged 20 years and older, with 39% males and 25.8% females, adjusting for obesity. The AHI severity distribution was estimated to be 61% mild, 24% moderate, and 15% severe.
Conclusion: Our findings indicate that OSA is highly prevalent among US adults. Despite its substantial prevalence, OSA remains largely undiagnosed, highlighting the urgent need for improved screening and diagnosis as well as greater awareness about the chronic and serious complications of untreated OSA.
Support (if any): Apnimed Inc.

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0636
ESTIMATING UNDERDIAGNOSIS OF OBSTRUCTIVE SLEEP APNEA IN MEDICARE CLAIMS DATA

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Introduction: Claims-based measurement often underestimates the prevalence of chronic diseases, such as obstructive sleep apnea (OSA), due to the underreporting of diagnosis codes on billing records. Despite this limitation, claims data remain a valuable source for understanding disease burden due to their large sample sizes and patient-level, longitudinal follow-up capabilities. To address the underestimation of chronic disease prevalence in claims data, a mathematical framework can be applied to leverage the longitudinal diagnosis information and adjust the estimates for undiagnosed cases.
Methods: We applied the method described by Stocking et al (2023), which identifies latent individuals—those likely to have the condition but not yet diagnosed—to estimate the corrected prevalence of OSA in 2023. This study used a 100% sample of Medicare fee-for-service (FFS) beneficiaries ≥65 years who were continuously enrolled between January 1, 2018, and December 31, 2023 (1-year baseline and 5 years of follow-up). OSA was defined as ≥1 inpatient claim or ≥2 outpatient claims with relevant diagnosis codes in any position (ICD-10: G47.30, G47.33, or G47.39). Using 2019 as the first follow-up year and assuming patients first diagnosed with OSA in 2020 or later also had the condition in 2019, we calculated the ratio of latent to diagnosed prevalence for 2019. This ratio was then applied to a separate cohort of beneficiaries continuously enrolled in 2023 to estimate the corrected prevalence of OSA for that year.
Results: The 5-year cohort included 14,939,076 beneficiaries, of whom 2,371,642 were identified as having OSA between 2019 and 2023, with approximately 49% initially diagnosed in 2019. Applying the ratio of latent to diagnosed prevalence to the 2023 cohort (N=22,121,159), the prevalence estimate of OSA increased from a diagnosed prevalence of 9.2% to a corrected prevalence of 18.9%.
Conclusion: By using a cohort of Medicare FFS beneficiaries and applying a mathematical approach to correct for underdiagnosis, the corrected prevalence of OSA in 2023 (18.9%) was estimated to be approximately 2.1-times higher than the diagnosed prevalence derived from cross-sectional claims data alone. This corrected epidemiologic estimate can help decision-makers better assess the budget impact of emerging therapeutics for OSA.
Support (if any):

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0637
PREVALENCE AND UNMET NEED OF OBSTRUCTIVE SLEEP APNEA IN THE UNITED STATES

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Introduction: Obstructive sleep apnea (OSA) is a serious, chronic sleep-related breathing disease characterized by repeated upper airway obstructions during sleep, leading to disrupted breathing, sleep fragmentation, impaired sleep quality, and reduced oxygenation. Despite growing awareness, OSA remains underdiagnosed and undertreated, especially in mild to moderate cases and among non-obese individuals with the disease. Positive airway pressure (PAP) is the standard treatment, but its use is limited by patient satisfaction, convenience, comfort, and OSA underdiagnosis.
Methods: An epidemiologic model was developed to estimate the number of adults aged ≥18 with OSA in the United States with a current unmet need for OSA treatment due to intolerance or refusal of PAP, or lack of PAP treatment being offered. The prevalence of OSA was calculated from U.S. Census and published age, sex, and BMI-based prevalence rates from the Wisconsin Sleep Cohort Study (AASM 2007 criteria) adjusted to AASM 2012 scoring criteria and a published model predicting change in OSA incidence up to year 2025. Diagnosis rate was obtained from the 2016 AASM study on the clinical and economic burden of OSA in the U.S which utilized data from the Wisconsin Sleep Cohort Study. Treatment rates were obtained from analyses of real-world data from commercial, Medicare and Medicaid medical and pharmacy claims, and clinical practice settings.
Results: With prevalence estimates ranging from 24% to 33%, up to ~85.6M adults in the U.S. have OSA, of whom 68.5M (80%) are undiagnosed. Among the 1 in 5 individuals with OSA who are diagnosed (~17.1M), up to 4.5M (26%) remain untreated. Additionally, of those who initiate PAP therapy, more than half (63%; ~10.8M) discontinue treatment or fail to meet Medicare treatment adherence criteria. Overall, among the 20% of patients who are diagnosed, between 9M and 12.5M adults in the U.S. may not be adequately managed with PAP.
Conclusion: OSA in the U.S. poses a substantial challenge, with millions of diagnosed OSA patients potentially not receiving adequate treatment. Additionally, a significant portion of OSA cases remain undiagnosed. The variability in published OSA prevalence rates underscores the need for more accurate estimates to better understand and address the true unmet need.
Support (if any): Apnimed Inc.

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0638

OBESITY HYPOVENTILATION SYNDROME IN A HISPANIC POPULATION: NEED TO ACT

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Introduction: Obesity hypoventilation syndrome (OHS), is characterized by obesity, sleep-disordered breathing such as obstructive sleep apnea (OSA), and chronic daytime hypercapnia. Its prevalence is increasing in parallel with obesity rates, yet epidemiological data on OHS remain limited, particularly among minority groups like Latinos, who are disproportionately affected by obesity. This study aims to address the gap in characterizing obese patients with and without OHS admitted to the Medical Intensive Care Unit (MICU) at the VA Caribbean Health Care System (VACHS).
Methods: A retrospective record review of electronic health records from the VACHS which included obese patients admitted to the MICU between January 1, 2019, and December 31, 2022 was done. Demographics, body mass index (BMI), diagnosis of OHS, comorbidities, and other health parameters was collected.. Quantitative data was analyzed for central tendency, dispersion, and association, while qualitative data was assessed for frequency distribution. The aim was to characterize epidemiological differences between patients with and without OHS in order to address future healthcare strategies.
Results: 378 obese patients admitted to the MICU were evaluated. 15 met the criteria for OHS, approximately 4% of the total sample. None of these patients had been previously diagnosed with OHS, highlighting a critical gap in clinical awareness and diagnosis. This underdiagnosis is particularly concerning given the high mortality rate of 73.3% observed in the OHS group. The study also identified a trend toward non-compliance with CPAP therapy, which, combined with changes in pCO2 levels from baseline to acute settings, suggests that improved adherence to CPAP could potentially enhance patient outcomes.
Conclusion: This study underscores the critical need for increased awareness and early diagnosis of OHS in the ICU setting of this predominant Hispanic population. The high mortality rate among these patients suggests that OHS is a significant contributor to poor outcomes, potentially exacerbated by non-compliance with CPAP therapy. Although the study did not find statistically significant differences in pCO2 levels upon admission, the observed trends warrant further investigation. Future research should focus on larger sample sizes and explore strategies to improve diagnosis and treatment adherence, potentially reducing mortality and improving the quality of care in patients with OHS.
Support (if any): None

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0639

DEMOGRAPHIC, CLINICAL, AND TREATMENT CHARACTERISTICS IN A LARGE COHORT OF PATIENTS EVALUATED FOR SLEEP APNEA

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Introduction: Sleep apnea is a sleep-related breathing disorder characterized by repeated interruptions in breathing, encompassing two main types: obstructive sleep apnea (OSA), caused by airway obstruction, and central sleep apnea (CSA), resulting from diminished respiratory effort. Sleep apnea is associated with significant health risks, including cardiovascular disease, metabolic dysfunction, and reduced quality of life. Polysomnography (PSG) is the diagnostic gold standard, with positive airway pressure (PAP) therapy as the primary treatment. This study evaluates the demographic, clinical, and treatment characteristics of patients assessed for sleep apnea in a large cohort.
Methods: A retrospective chart review was conducted for patients referred for sleep studies for evaluation of sleep apnea from November 2020 to March 2024 at an academic medical center. Diagnoses were determined using PSG or home sleep apnea testing (HSAT) and categorized as OSA, CSA, a combination of OSA and CSA, or no sleep apnea. Heart failure comorbidities were identified through transthoracic echocardiograms (TTE) and medical records.
Results: Of 1,103 patients evaluated (mean age: 54 ± 16 years; mean BMI: 34.2; 49% male; 61% Caucasian), 76% were diagnosed with OSA, 4% with combined OSA and CSA, and 0.7% with CSA alone. Nineteen percent had no sleep apnea. The mean apnea-hypopnea index (AHI) for patients with available PSG results was 43.9 ± 33.9, indicating severe disease. PAP therapy was prescribed to 69% of patients, including 49% on CPAP, 18% on BiPAP, 1.5% on adaptive servo-ventilation (ASV), and 0.5% on oral appliances. Heart failure was observed in 13.3% of patients, with 9.7% presenting with heart failure with preserved ejection fraction (HFpEF) and 3.6% with heart failure with reduced ejection fraction (HFrEF).
Conclusion: This study demonstrates the high prevalence of OSA and its significant association with comorbidities, such as heart failure. These findings highlight the need for early diagnosis and individualized treatment strategies to improve patient outcomes and mitigate the broader health impacts of sleep apnea.
Support (if any): AASM Foundation (203-JF-18)

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0640

RACIAL AND ETHNIC DISPARITIES IN THE DIAGNOSIS AND TREATMENT OF OBSTRUCTIVE SLEEP APNEA IN MIDDLE-AGED AND OLDER ADULTS

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Introduction: Racial and ethnic disparities exist in the prevalence of obstructive sleep apnea (OSA); however, research on racial and ethnic differences in the diagnosis and treatment of OSA in older populations is limited. We examined whether the likelihood of being undiagnosed or untreated for OSA differed by race/ethnicity among middle-aged and older adults with probable OSA or self-reported OSA diagnosis.

Methods: Data came from the 2016 wave of the Health and Retirement Study (HRS), a nationally representative study of middle-aged and older adults in the United States. We categorized participants as: "probable OSA" based on a modified STOP-Bang measure; self-reported diagnosis of OSA; or self-reported OSA treatment (i.e., CPAP, oral appliance, surgery). We further classified participants as probable-undiagnosed OSA, diagnosed-untreated OSA, or diagnosed-treated OSA. Participants without a self-reported diagnosis who had a total score of ≥4 on the modified STOP-Bang measure or who had a score ≥3 and endorsed 2 items from the STOP portion of the scale were considered probable-undiagnosed OSA.
Results: Among 5,007 participants (mean 63.5 ± 9.16 years; 46.2% female), 39% of non-Hispanic White (NHW), 53% of non-Hispanic Black (NHB), and 66% of Hispanic participants had undiagnosed OSA. After adjustment for factors related to demographics, health, and insurance, compared to NHWs, NHBs had 42% higher odds of probable-undiagnosed OSA (AOR=1.42, 95% CI [1.15, 1.74], p< 0.001) and Hispanics had 95% higher odds of probable-undiagnosed OSA (AOR=1.95, 95% CI [1.50, 2.54], p< 0.001). Among those reporting OSA diagnosis, compared to NHWs, Hispanic participants had 50% higher odds of being untreated (AOR=1.50, 95% CI [1.02, 2.19], p=0.038); odds of treatment did not differ between NHBs and NHWs.
Conclusion: Among middle-aged and older adults, Hispanics are markedly more likely to be undiagnosed than NHWs and NHBs. Moreover, when diagnosed, Hispanics are the most likely to be untreated. If replicated, these findings indicate a critical sleep health disparity.
Support (if any): This work was supported by the National Institute on Aging (R01AG079391, K01AG061239).

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0641

SLEEP APNEA RISK IN PATIENTS WITH PULMONARY HYPERTENSION AND INTERSTITIAL LUNG DISEASE ASSOCIATED WITH SCLERODERMA

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Introduction: Scleroderma (SSc) is a rare, chronic, multi-system connective tissue disorder characterized by excessive collagen deposition in the skin and internal organs. SSc is associated with interstitial lung disease (SSc-ILD) and pulmonary hypertension (SSc-PH). SSc, ILD, and PH have each been individually associated with an increased risk of obstructive sleep apnea (OSA). However, the relationships between SSc-ILD, SSc-PH, and SSc-ILD-PH and sleep apnea remain unclear. SSc is also associated with malnutrition and a low average BMI, decreasing the presence of typical sleep apnea symptoms. The objectives of this study are to better characterize the risk of sleep apnea in this cohort and to identify an effective screening tool.
Methods: We retrospectively reviewed records of 78 patients seen in the Pulmonary Clinic at Tufts Medical Center from May 1, 2020 through February 1, 2024 for scleroderma. We used right heart catheterizations (RHC), pulmonary function tests, computed tomography, and sleep studies from their electronic medical records.
Results: Of 78 patients with SSc (83.3% female), 22 (28.2%) had SSc-PH, 13 (16.7%) had SSc-ILD, and 43 (55.5%) had SSc-PH-ILD. The diagnosis of PH was made by RHC for all patients. Of the 78 patients, 18 (23.1%) were tested for OSA and 14 (77.8%) had positive sleep studies. There was no statistically significant difference in the rate of positive sleep studies among the 3 groups. Of the 78 patients, 27 (34.6%) reported chronic insomnia. Patients with SSc-PH-ILD had statistically higher rates of chronic insomnia compared to patients with SSc-PH (p = 0.021). 10 of the 27 patients who reported chronic insomnia completed sleep studies – all 10 (100%) tested positive for sleep apnea.
Conclusion: Although only a fifth of patients were tested for OSA, the majority had positive sleep tests. Among those with chronic insomnia, all who were tested had positive sleep studies. Patients with SSc-ILD-PH had concomitant chronic insomnia more often than those with SSc-PH alone, bringing into question the impact of having all three disease processes simultaneously. Future prospective studies are needed to examine the relationship of SSc with sleep apnea and to understand chronic insomnia as a screening tool for patients with SSc.
Support (if any):

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0642

RISK FACTORS FOR SLEEP DISORDERED BREATHING AMONG HISPANICS AND NON-HISPANICS – A RETROSPECTIVE STUDY

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Introduction: Sleep Disordered Breathing (SDB) is highly prevalent in the Hispanic population. However, limited research exists on the risk factors associated with SDB. This study examines the risk factors among SDB patients in Hispanic and non-Hispanic (NH) populations.
Methods: Retrospective data from Baptist Health's sleep study database (September 2020–September 2022) were analyzed. Adult patients diagnosed with SDB via polysomnogram, split-night polysomnogram, or home sleep apnea testing were included. SDB was classified based on apnea-hypopnea index (AHI), as negative/mild (AHI < 15) or moderate/severe (AHI ≥ 15). AHI category, age, sex, BMI, ethnicity, average and minimum blood oxygen saturation (SpO2), and secondary diagnoses were compared between Hispanic and NH patients. Multivariate logistic regression analyses were used to calculate the odds ratio (OR) for moderate/severe SDB.
Results: Of 9,111 patients, 5,816 (63.8%) were Hispanic, and 3,295 (36.2%) were NH. Males comprised 53% of Hispanic and 57.4% of NH (P< 0.001). Obesity was observed in 59.4% of Hispanic vs. 57.4% of NH (P< 0.001). Among Hispanic patients, 47.8% had moderate/severe SDB vs. 45.6% NH patients (P=0.04). Median AHI was 14.2 among Hispanic and 13.5 among NH patients (P=0.01). Similarly, average SpO2 was 94.1% in Hispanic vs. 93.9% in NH patients (P=0.03). Overall, Hispanic ethnicity (OR 1.20 [CI 1.09–1.31]), male sex (OR 2.07 [CI 1.89–2.28]), obesity (OR 3.81 [CI 3.24–4.49]), hypertension (OR 1.22 [CI 1.10–1.36]), and respiratory illnesses (OR 1.28 [CI 1.15–1.42]) were associated with moderate/severe SBD. Among Hispanic patients, male sex (OR 2.00 [CI 1.78–2.25]), obesity (OR 4.70 [CI 3.78–5.84]), hypertension (OR 1.22 [CI 1.06–1.39]), and respiratory illnesses (OR 1.35 [CI 1.18–1.54]) were the key risk factors for moderate/severe SDB, whereas in NH patients, male sex (OR 2.39 [CI 2.04–2.80]), obesity (OR 2.94 [CI 2.29–3.77]), and diabetes (OR 1.29 [CI 1.06–1.58]) were significant risk factors for moderate/severe SDB.

Conclusion: Overall, Hispanic ethnicity, male sex, obesity, and hypertension were significantly associated with moderate/severe SDB category. In addition, respiratory illness was a risk factor among Hispanic patients, while diabetes was more significant in NH patients.
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0643

DIFFERENCES IN CLINICAL PRESENTATION OF OBSTRUCTIVE SLEEP APNEA IN NATIVE HAWAIIAN AND PACIFIC ISLANDER PATIENTS

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Introduction: Obstructive sleep apnea (OSA) is the most common sleep-related breathing disorder in the U.S. Disparities in OSA severity have been identified in minority groups, but little is known about its impact on Native Hawaiian and Pacific Islander (NHPI) populations. NHPIs are disproportionately affected by obesity, a significant risk factor for OSA morbidity. However, no studies have compared OSA clinical presentations in NHPIs to other racial groups. This study evaluates OSA severity in NHPIs relative to Whites in Hawaii, aiming to better understand its effects on this understudied population.
Methods: This study was conducted at a single-center outpatient neurology clinic and included White or NHPI patients, based on self-reported race, diagnosed with OSA between January 1st, 2013, and June 1st, 2023. Pearson's Chi-squared and Fisher's exact tests were used to identify associations between apnea-hypopnea index (AHI), race, and clinical characteristics such as body mass index and Mallampati score. Logistic regression models were utilized to estimate associations between OSA severity and race.
Results: The study included 91 NHPI and 129 White OSA patients. Among NHPIs, 78.0% were obese compared to 48.8% of Whites ($p< 0.001$). Moderate or severe OSA was present in 72.5% of NHPIs compared to 52.7% of Whites ($p< 0.001$). No significant differences in Mallampati scores or retrognathia were found. After adjusting for BMI, STOP-BANG scores, neck circumference, and history of MI, NHPIs were 3 times more likely to have moderate to severe OSA than Whites (adjusted OR = 3.01 [95% CI: 1.31, 7.23]).
Conclusion: This study demonstrated increased severity of OSA in NHPIs compared to Whites. Although obesity was more prevalent among NHPIs and likely contributed to OSA severity, differences persisted after adjusting for BMI, suggesting other contributing variables. Socioeconomic barriers, including limited healthcare access, low CPAP adherence, and delayed diagnoses, are potential contributors to OSA severity in minority groups. Future studies should explore late detection, management gaps, and craniofacial differences in NHPIs. This is the first study to compare the severity of OSA in NHPIs with that of other racial groups, highlighting the need for more inclusivity of this population in sleep medicine research to improve clinical outcomes.
Support (if any):

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0644

PREVALENCE AND RISK FACTORS OF SLEEP-DISORDERED BREATHING IN THE SECOND TRIMESTER OF PREGNANCY

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Introduction: Sleep-disordered breathing (SDB) encompasses abnormal respiratory patterns during sleep which can negatively affect maternal and fetal health. While late pregnancy is known to carry a heightened risk for SDB, less research focuses on the second trimester, a critical period for maternal physiological changes. This study aims to estimate the prevalence of SDB in the second trimester and explore their relationship with demographic and sleep-related factors.
Methods: This study is a secondary analysis of the LifeON Study, which recruited pregnant women aged 18-55. A total of 353 women underwent home-based polysomnography at 23-25 weeks of gestation and completed sleep assessments (ESS, ISI and PSQI). Women were categorized with SDB if their respiratory disturbance index (RDI) was ≥5, and OSA was defined as RDI ≥5 plus ESS ≥10.
Results: Fifteen women (4.2%) were diagnosed with SDB (mean AHI = 8.61 ± 3.44), mostly mild cases except for one moderate; of these, 4 (1.1%) were classified as OSA. Women with SDB had higher BMI (28.39 ± 3.15 vs. 24.49 ± 3.67, $p < 0.001$) and neck circumference (34.46 ± 1.81 cm vs. 33.18 ± 4.19 cm, $p = 0.006$) than those without. No significant differences emerged in subjective sleep scores. ODI 3% correlated with BMI ($\rho = 0.364$, $p < 0.01$) and neck circumference ($\rho = 0.159$, $p < 0.01$); similar correlations were observed for AHI. BMI predicted ODI 3% ($\beta = 0.275$, $p < 0.001$), while neck ($\beta = 0.151$, $p = 0.01$) and abdominal circumference ($\beta = 0.27$, $p < 0.001$) predicted AHI. Furthermore, supine AHI was higher compared to the non-supine position and greater in women who spent more time in the supine position.
Conclusion: Although lower than in late pregnancy, the prevalence of SDB in the second trimester highlights the importance of identifying pregnant women at risk, particularly those with higher BMI or neck circumference. These anthropometric measures, along with the supine position, emerged as significant predictors and could serve as simple, non-invasive tools for early screening. Timely identification and management of SDB during pregnancy may help reduce maternal and fetal complications, emphasizing the need for routine evaluation in clinical practice.
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0645

REAL-WORLD INCREMENTAL ECONOMIC BURDEN OF FATIGUE AMONG PATIENTS WITH OBSTRUCTIVE SLEEP APNEA IN THE MEDICARE FEE-FOR-SERVICE POPULATION

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Introduction: Fatigue, distinct from sleepiness, is one of the most common obstructive sleep apnea (OSA) symptoms, and is associated with diminished quality of life, poor psychological and physical functioning and increased risk of occupational and motor vehicle accidents. The aim of this study was to estimate the incremental healthcare cost burden of fatigue among patients with OSA in the Medicare fee-for-service (FFS) population.
Methods: Retrospective observational claims analysis was conducted comparing newly diagnosed OSA patients with fatigue to matched OSA patients without fatigue. Medical and pharmacy claims from the 2017-2022 Medicare FFS database were used to identify incident cases of fatigue among newly diagnosed OSA patients who met the following criteria: ≥1 inpatient or ≥2 outpatient claims (with ≥7 days apart) with an ICD-10-CM diagnosis code of OSA (G47.33, G47.30, G47.39); ≥1 procedure code for polysomnography or home sleep apnea test in 12 months prior to OSA diagnosis index date; continuous insurance coverage ≥12 months before OSA diagnosis index (baseline period) and ≥12 months after fatigue index date (follow-up period). Fatigue cases had ≥1 claim for fatigue (R53.1, R53.81, R53.82, R53.83) after the OSA diagnosis index date. Controls had no diagnosis of fatigue and were propensity score matched to fatigue cases.
Results: Total of 71,710 newly diagnosed OSA patients met eligibility criteria, of whom ~36% had ≥1 diagnosis claim for fatigue. Mean (SD) age was 72.8 years (5.3), 51% male, and 88% White. After OSA diagnosis, all-cause healthcare costs were significantly higher (all $p< 0.001$) for patients with fatigue vs. matched controls: Per-patient-per-year (PPPY) all-cause hospitalization ($7,721 vs $1,998); outpatient visits ($5,225 vs $3,004); emergency department visits ($882 vs $291); other medical visits ($11,005 vs $5,455); and pharmacy costs ($5,192 vs $3,643). Overall, the PPPY all-cause total costs ($30,025 vs $14,390, $p< 0.001$) in OSA patients with fatigue were significantly higher than those without fatigue.
Conclusion: Fatigue is significantly associated with an increase in all-cause total healthcare costs in newly diagnosed OSA patients as compared with matched patients without fatigue. Addressing fatigue may be useful as part of OSA screening, diagnosis and treatment due to the incremental humanistic and economic burden.
Support (if any): Apnimed Inc.

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0646

ESTIMATED PREVALENCE OF OSA WITH SLEEPINESS BY OCCUPATIONS AND INDUSTRIES IN ENGLAND: A DESCRIPTIVE STUDY

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Introduction: Sleepiness due to Obstructive sleep apnea (OSA) may cause work-related injuries and low productivity. Because most such individuals are undiagnosed, workplace screening would allow identification and treatment with CPAP to improve both health and productivity. Screening in occupations/industries with a higher prevalence of disease would identify more people with OSA at a lower cost per head. Although prior studies focused on drivers, our previous study (Sleep Advances 2024 18;5(1):zpae069) showed a relatively higher prevalence of OSA in other occupations/industries in England. However, the prevalence of OSA with sleepiness (OSA+S) by occupations/industries remains unknown. This study aimed to estimate the prevalence of OSA+S by occupations and industries in England.
Methods: To estimate OSA+S in the English population aged 40-64, we applied multiple imputation to a dataset that combined the Health Survey for England 2019 dataset (n=21791) and Sleep Heart Health Study dataset (n=5804). The analysis was validated against the Wisconsin Sleep Cohort dataset (n=1123). OSA with sleepiness: AHI≥15 + sleep latency < 8 min or ESS >10. Covariates were: age, sex, ethnicity, BMI, alcohol, smoking, hypertension, diabetes, Standard Occupation Classification (SOC), and Standard Industry Classification (SIC). Separating samples by SOC and SIC, we estimated the pooled prevalence of OSA+S by occupations and industries with 95% CIs. Survey weights were incorporated throughout the analysis.
Results: The overall estimated prevalence of OSA+S in individuals aged 40-64 was 11.9% (95%CI: 10.3%-13.6%). The estimated prevalence by industries and occupations varied widely. Descriptively, relatively higher prevalences were estimated in occupations of Protective Service (14.5%: 4.6%-37.1%), Construction Trades (14.4%: 8.5%-23.3%), Crafts & Printing (13.6%: 6.0%-28.0%), Machine operatives (13.4%: 7.0%-24.1%), and Transport & Drivers (13.3%: 6.5%-25.4%). Among industries, Accommodation & Food (14.5%: 7.0%-27.4%), Agriculture, Mining, Energy, Utilities & Waste (13.6%: 6.7%-25.7%), Transportation & Storage (12.9%: 7.4%-21.6%), Public Services (12.7%: 7.0%-22.1%), and Financial Activities (12.7%: 5.8%-25.4%) showed relatively higher prevalences.
Conclusion: Our data show that is possible to estimate the prevalence of OSA+S, although the confidence intervals were wide, especially in groups with smaller numbers. Relatively higher prevalences were estimated in some safety-sensitive occupations, suggesting that those occupations may be suitable target populations for workplace screening.
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0647

A PROSPECTIVE PILOT STUDY OF OBSTRUCTIVE SLEEP APNEA AMONG GREEK AMERICANS IN THE UPPER MIDWEST

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Introduction: Obstructive sleep apnea (OSA) has been linked to metabolic syndrome, heart failure, atrial fibrillation, and hypertension. Although ethnic differences related to OSA have been reported, no studies have evaluated the impact of OSA among Greek-Americans.
Methods: This prospective cross-sectional study, in partnership with the Greek-American community, employed a community-based participatory research framework. Individuals who were of Greek descent and ≥18 years of age were recruited. Anthropometric measurements, Mallampati score, BMI, and adiposity (DEXA scan) were determined. All subjects were administered the Epworth Sleepiness Scale (ESS) and underwent home sleep apnea test (WatchPAT ONE), using a desaturation

threshold of 4% as diagnostic. Descriptive statistics were computed to describe the study population and data were analyzed using the student t-test and chi-squared test.
Results: A 76 Greeks, 34 males (44.8%) and 42 females (55.2%), were enrolled in this study with a mean ± SD age and BMI of 42.6±17.5 years (p< 0.01) and 27±6 kg/m2, respectively. A total of 22 (29%; 14 males and 8 females) individuals were diagnosed with OSA, of whom 13 (59.1%) had mild, 5 (22.7%) had moderate and 4 (18.2%) had severe OSA. Subjects with OSA were older (58.8±11.9 vs 36.0±15.1 years, p< 0.01), had higher BMI (32±7 vs 25±4 kg/m2, p< 0.01), larger neck circumference (40±4 vs 35±4 cm, p< 0.01) and higher waist-to-hip ratio (0.94±0.08 vs 0.84±0.07, p< 0.01). Body fat percentage was significantly higher among those with versus without OSA (38.8±9.6 vs 34.0±9.2%; p=0.04) while Mallampati and ESS scores were similar.
Conclusion: This is the first study to assess sleep metrics of Greek-Americans suffering from OSA. Characteristics of those with OSA are similar to other populations. However, the commonly used ESS screening appears to have limited application in this cohort of subjects. Greek-Americans with elevated body fat percentage when associated with concurrent OSA, may be at higher risk of developing cardiometabolic adverse events. Additional studies are required to further elucidate the effect of sleep physiology, cardiometabolic dysfunction and health outcomes.
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0648

SOCIAL FACTORS AND DISPARITIES IN OBSTRUCTIVE SLEEP APNEA SELF-REPORTING AND CLINICAL DOCUMENTATION: THE ALL OF US RESEARCH PROGRAM

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Introduction: Obstructive sleep apnea (OSA) is a prevalent condition, but a significant proportion of cases remain undiagnosed and untreated, likely due to disparities in access to care. Identifying factors contributing to these disparities is fundamental. This study aims to understand social domains that explain disparities between self-reported and clinically diagnosed cases of OSA among participants in the All of Us Research Program.
Methods: We used the All of Us Research Program electronic health records (EHR) data, self-report of sleep apnea ("Have you ever been diagnosed with the following conditions? – Sleep Apnea"), and social determinants of health survey responses. We identified 93 unique questions assessing healthcare access, social connectedness, neighborhood characteristics, and individual socioeconomic factors. Latent class analysis was applied to identify distinct clusters within social domains based on these questions. The associations between social domain clusters and self-reported or EHR-derived OSA were evaluated using logistic regression adjusted for age, sex, race, and ethnicity.
Results: A total of 24,493 adults with available data were included in the analysis (63.7% women, mean [SD] age 54.5 [16.7], 76.1% White, 8.2% Black, 2.8% Asian, 12.9% other). The prevalence of self-reported OSA was 18.2%, while EHR-based diagnoses were reported in 13.2% of participants. Disparities in the odds of self-reporting OSA (OR [95%CI] = 2.3 [2.0-2.7]) and EHR-derived OSA (1.5 [1.3-1.8]) were observed among those with highest burden of healthcare access and quality, as compared to those with lowest. Similar trends were observed among those with overall lower social connectedness and higher community burden (2.2 [2.0-2.6] and 1.8 [1.6-2.1]), and overall higher economic instability (2.1 [1.8-2.4] and 1.6 [1.4-1.9]).
Conclusion: All of Us participants experiencing higher social risk are more likely to self-report a diagnosis of OSA than they are to have documented diagnoses of OSA in the EHR. These findings underscore the influence of social and healthcare access factors on the likelihood of reporting of OSA but having no clinical record of OSA diagnosis and therefore no treatment for this common, high-risk condition.
Support (if any): All of Us Research Program is supported by the NIH, Office of the Director.

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0649

THE RELATIONSHIP BETWEEN MARITAL STATUS AND OSA IN BLACK/AFRICAN AMERICANS

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Introduction: Obstructive sleep apnea (OSA) has become increasingly prevalent since the COVID-19 pandemic, highlighting the risks associated with impaired breathing. Social and interpersonal factors, such as marital status or co-sleeping, may influence health-related outcomes, including severity of OSA symptoms. This study aims to fill that gap by investigating whether marital status influences the frequency of apnea events (oxygen desaturation ≥3% and 4%) in Black/African American (AA) populations.
Methods: Data collected from the MOSAIC and ESSENTIAL studies were used in this analysis. These studies examine sleep in Black/AA populations in South Florida and include baseline surveys, seven days of sleep monitoring using the Sleep Image Ring, and a blood draw. A total of 316 participants were included in the analysis from varying marital statuses: married/cohabitating, separated, widowed, never married, divorced, and single. Oxygen desaturation counts and other sleep parameters were analyzed.
Results: Analyses showed that marital status was significantly associated with sleep parameters. Compared to married participants, separated participants had lower quality sleep (r2 =.02 95% CI: [-17.82, -0.66]), widowed participants had longer total sleep times (r2 =.01, 95% CI: [851.76, 6511.82]) and durations (r2 = <.01, 95% CI: [283.27, 8142.92]), and divorced individuals had more total 3% (r2 =.02, 95% CI: [10.05, 69.03]) and 4% apnea desaturation counts (r2 =.03, 95% CI: [7.81, 52.21]).
Conclusion: Marital status impacts sleep health with separated, widowed, and divorced individuals showing notable differences compared to married/cohabitating participants. The higher apnea-related desaturation events observed in divorced individuals underscore the influence of marital status on OSA severity. These findings emphasize the need to consider social and interpersonal factors in sleep health research and interventions in Black/AA.

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0650

TRENDS IN OBSTRUCTIVE SLEEP APNEA DIAGNOSTICS IN BRAZIL

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Introduction: Obstructive Sleep Apnea (OSA) is a global health concern, with Brazil ranking third worldwide in the number of affected individuals. Despite an estimated 25 million Brazilians having OSA, recent data revealed significant disparities in access to OSA diagnosis and treatment in Brazil. Type III home sleep apnea testing (HSAT) offers a scalable alternative to address diagnostic gaps. This study aims to map trends in OSA diagnostic growth in Brazil.

Methods: Data on polysomnography (PSG) procedures were extracted from public health records (DATASUS), and HSAT data were sourced from anonymized ApneaLink Air test records in a cloud-based platform (AirView). The analysis covered the period from January 2018 to June 2024 across public and private healthcare settings, assessing diagnostic volumes, growth rates, density per 100,000 inhabitants, and modality-specific trends.

Results: From 2018 to mid-2024, 77,764 PSG tests (38.35 tests per 100,000 inhabitants), and 154,407 HSAT exams, (76.14 tests per 100,000 inhabitants) were performed in Brazil. While PSG diagnostics showed a 67% growth, HSAT experienced a dramatic 2,502% increase potentially driven by its adaptability and scalability. Regional analysis revealed that 87% of HSAT diagnostics were concentrated in the Southeast and South macro-regions, whereas the North and Central-West regions remained underserved, highlighting significant inequities in diagnostic access.

Conclusion: The exponential growth of HSAT underscores its transformative potential in addressing diagnostic barriers for OSA in Brazil. Cloud-based platforms may have played a pivotal role, facilitating remote interpretation by experts. The COVID-19 pandemic likely accelerated HSAT adoption by emphasizing the need for decentralized, remote diagnostic solutions. While HSAT represents a significant advance in diagnostic accessibility, achieving equitable diagnostic coverage will require continued investments in infrastructure, professional training, and public awareness. This study highlights the importance of leveraging technology-enabled solutions to address OSA diagnosis gaps in Brazil and other underserved regions.

Support (if any): Anonymized data hosted on the cloud-based platform were made available by ResMed for the purposes of this study.

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0651

ASSOCIATION BETWEEN RACE, ETHNICITY, AND NEIGHBORHOOD SOCIOECONOMIC DISADVANTAGE WITH CONTINUOUS POSITIVE AIRWAY PRESSURE ADHERENCE

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Introduction: Racial and ethnic differences in continuous positive airway pressure (CPAP) therapy are well documented, yet the influence of neighborhood socioeconomic disadvantage on these disparities remains unclear. We investigated the extent to which area deprivation index (ADI) relates to racial/ethnic differences in CPAP usage while adjusting for basic demographics and sleep apnea severity.

Methods: A retrospective cohort of adult patients who initiated CPAP therapy at a large health system between January 2017 and January 2024 was analyzed. Adherence was defined as CPAP usage ≥4 hours for ≥70% of nights with average nightly usage in minutes analyzed over 90, 183, and 365-day periods after setup. ADI was analyzed in national rank quintiles (Q1-Q5). Multivariable logistic regression models were conducted to assess the association between race/ethnicity and ADI with CPAP adherence, adjusting for age, sex, insurance, marital status, apnea hypopnea index (AHI) and Epworth sleepiness scale (ESS). Statistical interaction effects between ADI and race/ethnicity was assessed.

Results: The study sample included 7,556 adults with average age 53.0 ± 13.8, 45% female, 15% non-Hispanic Black (NHB), and 4% Hispanic. NHB were more likely to live in areas of greatest deprivation compared to non-Hispanic Whites (NHW) (63.4%vs12.6%, p< 0.001). The average CPAP usage in minutes was lower among NHB vs NHW at 3-month (with similar results at 6- and 12-month): [median 295.6, interquartile range (208.4-363.6) vs 353.5 (274.4, 420.2), p< 0.001]. In adjusted models, NHB patients were less likely to be adherent to CPAP therapy compared to NHW patients at 3-, 6-, and 12-month independent of ADI (3-month: adjusted odds ratio (aOR)=0.64,95%CI:0.54-0.76, p< 0.001; 6-month: aOR=0.62,95% CI: 0.53-0.73, p< 0.001; 12-month: aOR=0.66,95%CI:0.55-0.78, p< 0.001). Likewise, living in the most disadvantaged neighborhoods was associated with reduced CPAP therapy adherence at all 3 time points independent of race/ethnicity (3-month: aOR=0.59,95%CI:0.44-0.80, p< 0.001; 6-month: aOR=0.60,95% CI:0.46-0.79, p< 0.001; 12-month: aOR=0.63,95%CI:0.48-0.83, p=0.001). Interactions of race/ethnicity and ADI were not statistically significant (p>0.46).

Conclusion: CPAP adherence is lower in NHB patients independent of neighborhood socioeconomic disadvantage. This highlights the need to better understand individual-level clinical and psychosocial factors that are driving these disparities in OSA treatment.

Support (if any):

Abstract citation ID: zsaf090.0652

0652

ENVIRONMENTAL BURDEN AND SLEEP-DISORDERED BREATHING PREVALENCE AMONG PATIENTS OF COMMUNITY-BASED HEALTH CENTERS

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Introduction: Environmental conditions can impact sleep-disordered breathing (SDB), through, for instance, pollutants

contributing to inflammation in the respiratory tract. However, limited research has comprehensively examined environmental features in relation to sleep disorders, especially among underserved populations who are more vulnerable to facing environmental injustices.

Methods: We assessed associations between cumulative environmental injustice and SDB using 2022 electronic health record data (EHRD) from socioeconomically disadvantaged patients in the OCHIN network of community-based health centers (CBHCs). We linked the census tract-level Environmental Justice Index (EJI) comprised of the submodules- Social Vulnerability Module [SVM] (e.g., poverty), Health Vulnerability Module [HVM] (e.g., pre-existing chronic disease), and Environmental Burden Module [EBM] (e.g., toxic sites; air pollution)- to the EHRD patients' geocoded census tracts at their first 2022 visit. Percentile ranks for the EJI, SVM, HVM, and EBM ranged from 0-1, higher ranks represented increased burden/vulnerability. SDB and subtypes, including obstructive sleep apnea (OSA), central sleep apnea (CSA), and other/unspecified sleep apnea (OUSA), were defined using ICD-9/10-CM and CPT/HCPCS codes. Adjusted for age, sex, gender identity, race, and ethnicity, log-binomial models were used to estimate prevalence ratios and 95% confidence intervals (PR[CI]).

Results: Among 1,957,775 patients, median age was 43.0 [IQR=30.0-58.0] years. There were more males than females in the study. The prevalence of SDB was 5.5% and 3.8% for OSA, 0.1% for CSA, and 2.2% for OUSA. Higher EJI rank was associated with a higher prevalence of SDB (PR=1.05 [1.02–1.07]) and OUSA (PR=1.06 [1.03–1.10]). Higher SVM and HVM were associated with a higher prevalence of SDB (PR-SVM=1.15 [1.13-1.18]; PR-HVM=1.22 [1.19-1.24]) and its subtypes (ranges: CSA PR=1.09 [1.05-1.13] to OUSA PR=1.39 [1.10-1.74]). Higher EBM was associated with a lower prevalence of SDB (PR=0.73 [0.72-0.75]) and its subtypes (range: CSA PR=0.44 [0.33-0.55] to OUSA PR=0.75 [0.73-0.78]).

Conclusion: Patients of CBHCs living in communities more affected by socioeconomic and health burdens had a higher prevalence of SDB. However, higher environmental burden was associated with lower SDB prevalence, which may be due to systematic underdiagnoses of SDB even in CBHCs, meriting further investigation. These findings inform future interventions designed to reduce SDB among socioeconomically disadvantaged populations.

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0653

HIGH INCIDENCE OF UNDIAGNOSED OBSTRUCTIVE SLEEP APNEA IN HOSPITALIZED PATIENTS WITH CONGESTIVE HEART FAILURE

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Introduction: Sleep-disordered breathing (SDB) is highly prevalent in hospitalized patients. This is also true for patients with congestive heart failure (CHF) who get hospitalized with either stable or decompensated CHF. We aim to understand the prevalence, and severity of obstructive sleep apnea (OSA) in the various subtypes of CHF namely heart failure with reduced ejection fraction (HFrEF) and heart failure with preserved ejection fraction (HFpEF) in the hospital setting.

Methods: Through a retrospective review of 2251 patients from 09/2019-12/2023 in a hospital-based sleep medicine program registry, 1023 patients were noted to have a history of CHF. From these, patients were divided into HFrEF and HFpEF subtypes. Patient underwent portable sleep study or high resolution pulse-oximetry testing during their hospital stay. Data on AHI, ODI, time spent less than 88% as well as incidence and severity of OSA was obtained and compared between the two groups.

Results: Of the 1023 CHF patients, 482 patients (47%) had HFrEF and 541(53%)had HFpEF. The mean age was 60.9± 13.9 and 63.4±12.5 yrs respectively with 70% and 51.1% males in the 2 groups. HFrEF had a slightly lower BMI at 34.4± 10.5 compared to 40.2± 12.7 Kg/m2. HTN, DM, HLD and coronary artery disease were highly prevalent in both the groups (55-89%). In the HFrEF group, Apnea link was performed in 361 pts(78.8%) and HRPO in 97 (21.2%). In the HFpEF group, Apnea link was performed in 308 (62.5%) and HRPO only in 185 (37.5%). Interestingly, 75.9% HFrEF pts were diagnosed with OSA and 60.8% in the HFpEF group. These were predominantly, moderate- severe OSA in HFrEF compared to HFpEF group (60.35% vs 52.67%) with mean AHI 19.9± 19.5 vs 14.6± 16.8. Also noted was the time spent < 88% (T88) on HRPO which was shorter in the HFrEF group compared to the HFpEF group (47.7± 68.8 vs 77.3 ± 303.2 minutes).

Conclusion: There is a high incidence of undiagnosed obstructive sleep apnea in patients hospitalized with congestive heart failure. It was severe in the HFrEF group compared to the HFpEF group. It is recommended that patients admitted to the hospital with underlying CHF be screened for sleep apnea.

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0654

SLEEP APNEA IN HOSPITALIZED PATIENTS WITH SYSTOLIC HEART FAILURE (SLEEP-HEART STUDY)

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Introduction: Sleep disordered breathing(SDB) is common in patients with heart failure(CHF) and is subtyped into obstructive (OSA) and central sleep apnea(CSA). Based on prior studies,CSA occurs in 25-40% of patients with CHF with reduced ejection fraction (HFrEF). With the implementation of quadruple therapy for management of HFrEF in the recent years, we aim to understand the current prevalence of CSA in our hospitalized patients both with stable and decompensated HFrEF as well as compare outcomes data.

Methods: Through a retrospective review of patients from 09/2019-12/2023 in a hospital-based sleep medicine program registry. patients admitted with a history of HFrEF, who underwent inpatient Apnea link followed by outpatient polysomnography (PSG) were reviewed. Patients were subdivided into those admitted with stable HFrEF and decompensated HFrEF. Data on in-hospital AHI, time spent< 88% (T88), PSG AHI, sleep apnea type, medications and outcomes data were compared.

Results: Of the 77 HFrEF pts on whom complete data on inpatient screening and post-discharge PSG was available, 50 had decompensated and 27 were stable HFrEF. Mean BMI was 35.3 ±11.8 vs 35.2 ± 9.2 while mean EF was 27 ± 11 vs 32.5 ± 9.7. Interestingly, apnea link AHI was lower in the decompensated

group compared to the outpatient PSG AHI (27.6 ±18.4 vs 34.5 ±27.5) though it was the opposite for stable HFrEF (34.5 ±26.7 vs 23 ±21.65). T88 was 76.3 ± 91.8 vs 73.6 ±109.3 min in decompensated patients and 65.9 ± 78.5 vs 59.5 ± 97.5 min in stable patients, with the former group desaturating more. The prevalence of CSA was notably low (6%,11%) with predominance of OSA (68% and 55%), mixed sleep apnea(8% and 11%). Quadruple therapy was prescribed more in the decompensated group, which also had higher 180-day ED and hospital readmissions (21/30 and 26/31) and mortality (12/50 vs 3/27).
Conclusion: The incidence of CSA for HFrEF was significantly lower compared to prior studies in ambulatory settings. This could be due to availability of better therapy. The decompensated group was observed to have worse AHI on PSG than with in-hospital portable sleep study as well as high 180-day ED and hospital re-admission and mortality.
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0655
TRENDS AND IMPACT OF OBSTRUCTIVE SLEEP APNEA ON IN-HOSPITAL OUTCOMES IN PATIENTS WITH END-STAGE RENAL DISEASE

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Introduction: Obstructive Sleep Apnea (OSA) is a common condition marked by repeated airway obstructions during sleep, leading to arousals, oxygen drops, and hypoxia. Chronic kidney disease (CKD), a leading cause of death, may progress due to overlooked sleep disturbances. OSA affects 50-60% of CKD patients with End-Stage Renal Disease (ESRD), with its prevalence in CKD patients being 10 times higher than the general population. Although studies have explored the CKD-OSA link, no research has focused on how OSA impacts mortality in ESRD patients. This study uses national inpatient data to analyze trends and outcomes of OSA in ESRD patients on dialysis.
Methods: This retrospective study used data from the National Inpatient Sample (NIS) database (2018-2020) to examine ESRD patients on dialysis. The study included adults diagnosed with Stage 5 CKD (ICD-10 codes N18.5xx) or ESRD (N18.6xx), excluding those with active cancer, HIV, or under 18. Patients were grouped based on whether they had obstructive sleep apnea (OSA). Primary outcomes included in-hospital mortality, hospital length of stay, and total charges, while secondary outcomes focused on cardiac arrest and gastrointestinal hemorrhage rates. Demographics, hospital characteristics, and comorbidities (e.g., hypertension, obesity, CAD) were adjusted for in the analysis.
Results: The study identified 3,385,755 hospitalization cases, with 362,855 (10.7%) involving patients with obstructive sleep apnea (OSA). Significant differences were found between the OSA and non-OSA groups in terms of inpatient mortality, sex (female), age, length of stay, race, income, and health insurance. Inpatient mortality was lower in the OSA group (4.0%) compared to the non-OSA group (5.5%). Cardiac arrest occurred less frequently in the OSA group (1.9% vs 2.4%, p< 0.001). OSA patients had a longer median length of stay (5.0 days vs 4.0 days). Total hospital charges were similar between the groups ($52,011 vs $51,542, p=0.2).
Conclusion: Our study in contrast to previous data showed that patients with OSA in ESRD patients on dialysis had improved mortality outcomes compared to those without OSA. However, a limitation in our study was that the presence of CPAP therapy in the OSA group could not be confirmed and the potential mortality benefit of CPAP therapy should be further studied.
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0656
A NARRATIVE REVIEW OF THE RELATIONSHIP BETWEEN HEAD AND NECK CANCER AND OBSTRUCTIVE SLEEP APNEA: CLINICAL STUDIES AND STATISTICAL ANALYSIS

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Introduction: Obstructive sleep apnea (OSA) is an underestimated and overlooked comorbidity in head and neck cancer (HNC) care. Refining HNC-OSA management requires an improved grasp of the HNC-OSA relationship. Thus, this paper reviews the current course of HNC therapy, causal and associative relationships before and after treatment, and statistical methods quantifying HNC-OSA interactions.
Methods: The preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines are tailored to establish a systematic and rigorous narrative review, ensuring transparency and methodological rigor in selecting and analyzing pertinent literature in this study. PubMed, Google Scholar, Web of Science, Microsoft Academic, Semantic, Europe PMC, Scopus, and Crossref databases were used to collect articles related to OSA in patients with HNCs.
Results: The investigation confirms a positive correlation between the apnea-hypopnea index (AHI) and primary tumor size, consistent with prior findings. However, causality between the two disease processes could not be confirmed based on the current level of evidence in the literature.
Conclusion: This paper provides an overview of existing statistical models and offers suggestions for model selection and a framework for designing experiments that delve into research questions surrounding the link between OSA and HNC across various stages of cancer treatment. Despite progress, understanding the HNC-OSA interplay remains incomplete due to limited histological, molecular, and clinical data. Future studies with longitudinal data are crucial for comprehensive insights.
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0657
COMPARATIVE ANALYSIS OF OBSTRUCTIVE SLEEP APNEA AND DESATURATION IN COPD AND OBESITY

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Introduction: Patients with both chronic obstructive pulmonary disease (COPD) and obesity are at a higher risk of developing severe sleep-related breathing disorders. This study aims to compare key sleep-related variables and demographics among three groups: patients with COPD, patients with BMI ≥ 40 kg/m2, and patients with both COPD and BMI ≥ 40 kg/m2.
Methods: A retrospective analysis was conducted on sleep study data from three patient groups: (1) patients with COPD, (2) patients with BMI ≥ 40, and (3) patients with both COPD and BMI ≥ 40. Variables analyzed included obstructive apnea-hypopnea index (AHI), oxygen desaturation levels (% time under: T

90, T 80, T 70), Epworth Sleepiness Scale (ESS), and demographics. Statistical comparisons were performed using ANOVA, with p-values considered significant at < 0.05.
Results: A total of 2,876 patients were analyzed, and divided into three groups: COPD (n = 1,020), BMI ≥ 40 (n = 1,278), and COPD+BMI ≥ 40 (n = 578). OAHI (Obstructive Apnea-Hypopnea Index) was highest in the COPD+BMI ≥ 40 group (mean 18.85 ± 18.63, 75% female, n = 578), followed by the BMI ≥ 40 (mean 17.47 ± 19.09, 68% female, n = 1,278), and COPD group (mean 15.61 ± 16.10, 62% female, n = 1,020) (p = 0.001). Desaturation were more severe in the COPD+BMI ≥ 40 group. Oxygenation: T 90, the mean was 101.22 ± 175.76 (75% female, n = 578), significantly higher than both the BMI ≥ 40 (71.24 ± 168.24, 68% female, n = 1,278) and COPD groups (65.70 ± 127.37, 62% female, n = 1,020) (p < 0.001). Desats T 80, with the highest mean in the COPD+BMI ≥ 40 (23.28 ± 80.51), compared to the BMI ≥ 40 (17.14 ± 87.81) and the COPD group (11.40 ± 54.69) (p = 0.02). ESS scores were significantly elevated in the COPD+BMI ≥ 40 group.
Conclusion: Patients with both COPD and obesity exhibit more severe obstructive sleep apnea, greater oxygen desaturation, and increased daytime sleepiness compared to those with either condition alone. Further phenotyping of morbidly obesity patients with COPD is needed.
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0658

EXPLORING DRIVERS OF PAP THERAPY ADHERENCE AND OSA SEVERITY: INSIGHTS FROM A SEQUENTIAL ANALYSIS IN NHPI POPULATIONS IN HAWAII

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Introduction: Native Hawaiian and Pacific Islander (NHPI) populations are disproportionately affected by more severe obstructive sleep apnea (OSA), often complicated by higher comorbidity rates and limited access to healthcare resources. This study utilized a sequential analysis approach to investigate drivers of OSA severity, demonstrated by initial apnea-hypopnea index (AHI) scores, adherence patterns among Hawaii's White, Asian, and NHPI populations, and a further segmentation into socioeconomic factors.
Methods: A retrospective chart review was performed on 340 patients diagnosed with OSA at Hawaii Pacific Neuroscience, a single-center clinic in Hawaii. Three stages of sequential analysis were performed: BMI vs initial apnea-hypopnea index (AHI) score to assess the relationship between body mass and OSA severity across ethno-racial groups, adherence vs AHI to assess positive airway pressure (PAP) therapy adherence patterns, and a census-derived zipcode-level analysis to assess socioeconomic drivers of adherence. Statistical significance was determined using linear regressions alongside two-tailed Student's t-tests, as well as Mann Whitney U tests (Wilcoxon rank-sum).
Results: The first sequential analysis demonstrated that BMI was a significant driver of initial AHI severity across all ethno-racial groups, with NHPI patients presenting with higher initial AHI scores due to elevated BMI scores. However, the BMI-AHI relationship showed similar slopes across all ethno-racial groups analyzed (p > 0.05). The second sequential analysis revealed higher PAP therapy adherence in NHPI patients with worsening initial AHI severity, a trend more pronounced than in Asian and White counterparts (p < 0.05). The third sequential analysis found limited associations between socioeconomic variables and adherence; notably, the employment rate was negatively correlated with adherence (p = 0.007) in NHPI populations, suggesting external stressors like work schedules may play a potential role.
Conclusion: This study indicates BMI as a significant contributor to initial OSA severity across ethno-racial groups and presents unique adherence patterns exhibited by NHPI populations that may suggest potential sociocultural influences on adherence, warranting further qualitative investigation. These findings highlight the importance of interventions addressing obesity and qualitative studies to further explore unique patient-level drivers of adherence in NHPI populations.
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0659

A STUDY ON THE DEVELOPMENT OF LONG-TERM MONITORING DEVICE USING RELIABLE NON-CONTACT SENSORS WITH AI ON SLEEP APNEA

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Introduction: Obstructive sleep apnea (OSA) is a significant health concern affecting an estimated 936 million individuals globally, with approximately 60% of cases exhibiting moderate to severe symptoms. The condition is typified by recurrent episodes of partial or complete obstruction of the airway during sleep, resulting in intermittent hypoxemia and disrupted sleep patterns. Although polysomnography (PSG) is the gold standard for diagnosing OSA, it is an expensive, intrusive, and often uncomfortable procedure for patients. The objective of this study is to investigate the potential of frequency-modulated continuous wave (FMCW) radar, when used in conjunction with an ensemble artificial intelligence (AI) framework, for the accurate, non-contact detection of OSA events.
Methods: A diagnostic framework was developed which utilises a 60 GHz TI AOP6843 FMCW radar and the Differentiate and Cross Multiply (DACM) algorithm for the extraction of respiratory signals. Our approach integrates an ensemble of machine learning methods, including Convolutional Recurrent Neural Networks (CRNN) for log-spectrogram analysis, Continuous Wavelet Transformation (CWT) for R-R intervals (RRI) and R-R amplitudes (RRA), and random forest analysis for heart rate variability (HRV) metrics. Validation was conducted using overnight recordings from 66 subjects, employing a leave-one-out cross-validation approach.
Results: The ensemble framework exhibited promising performance, achieving an average accuracy of 81.14% and an F1 score of 73.7%. Specifically, the CRNN (spectrogram) achieved an accuracy of 77.48% with an F1 score of 69.67%, the CWT

(RRI/RRA) achieved 76.06% accuracy with an F1 score of 67.13%, and the HRV random forest analysis reached 74.84% accuracy with an F1 score of 65.53%. Moreover, our approach demonstrated a correlation coefficient of 92.4% with the Apnea-Hypopnea Index (AHI), indicating a high degree of clinical relevance.
Conclusion: Our non-contact radar and AI-based ensemble framework represents a viable alternative to traditional PSG for the detection of OSA. This approach offers a cost-effective, non-invasive solution that enhances patient comfort and accessibility to diagnostics. The results indicate the existence of a significant potential for the enhancement of clinical management and early intervention for patients diagnosed with OSA.
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0660
PRECISION SLEEP CARE USING LONGITUDINAL SLEEP TESTING

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Introduction: Traditionally, single-night sleep studies have been the primary tools used to understand sleep health and sleep disorders. While these diagnostic devices are valuable tools for obtaining sleep data, they are only a snapshot of overall sleep health. Although not the standard of care, research from multi-night sleep testing has demonstrated the dynamic nature of sleep physiology and sleep pathology. In this presentation we demonstrate the pragmatic use of longitudinal home sleep testing to provide endotype directed personalized sleep care.
Methods: Empower Sleep is a treatment agnostic telemedicine platform/clinic that uses software processing, data aggregation, and longitudinal sleep testing to derive insights for personalized sleep care. We utilize tools such as the SleepImage system, to understand sleep health, diagnose sleep disorders and track progress to sleep optimization. All patients in the program own a Sleep Image ring and use it as a nightly sleep testing device. By applying software processing on data from a clinical history, 10-14 night baseline sleep study and data from health exchanges we are able to understand co-morbidities and sleep biology. Through sleep testing data and objective "responses" to specific modalities we are able to cluster patients into different endotypes. Care plans are depended on the identified disorder, burden of disorder and treatments trialed. During the patient journey, patients meet with their provider via telemedicine. Patients view their processed results in the patient facing app similar to how they view data from other consumer grade devices.
Results: 1. Over the last 2.5 years over 2000 patients have received care and collected over 600,000 hours of longitudinal sleep testing data. 2. We share the observations of wide discrepancies of sleep data (AHI) from PAP downloads and sleep testing data. 3. We share observations of identifying and modifying high loop gain or low arousal thresholds with changes in sleep fragmentation/stable sleep/SQI on PAP or other sleep apnea therapies. 4. As a byproduct of personalized care we have achieved PAP compliance of ~ 80%.
Conclusion: In this presentation the authors share their experience of using longitudinal sleep testing to diagnose, endotype, provide care and measure outcomes.
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0661
ASSESSMENT OF DISEASE BURDEN IN PAP-INTOLERANT OSA PATIENTS USING HOME POLYSOMNOGRAPHY: A PILOT STUDY

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Introduction: While Positive Airway Pressure (PAP) therapy remains the gold standard for treating Obstructive Sleep Apnea (OSA), 30-50% of patients cannot maintain consistent usage. This pilot study investigated the residual disease burden and sleep impairments in patients who discontinued PAP therapy, utilizing self-applied home polysomnography.
Methods: This exploratory cross-sectional study included 50 adults (61% male, mean age 57.4±9.9 years) with confirmed OSA diagnosis who previously attempted PAP therapy. Polysomnography was performed using a self-applied patch-based system (Onera STS), enabling assessment of sleep staging and respiratory events in the patient's natural sleep environment. Data collection included standardized questionnaires (ESS, FOSQ) and structured medical history. Primary endpoint was the prevalence of residual OSA after PAP termination. Secondary endpoints included objective parameters like Oxygen Desaturation Index and sleep architecture, as well as subjective measures such as daytime functioning.
Results: Polysomnographic findings showed a mean AHI of 22.7±23.5/h, with questionnaire data indicating significant daytime sleepiness (ESS 12.3±4.5). Sleep architecture analysis revealed increased N1 (12.1%), reduced N3 (12.9%) and REM sleep (15.6%), and prolonged REM latency (120.3±87.3 min). Respiratory parameters showed significant nocturnal hypoxemia (ODI 23.5±18.6/h, time < 90% O2 saturation 9.9±16.8% TST, O2 nadir 81.6±6.8%). FOSQ scores (82.4±23.8) indicated marked functional impairment. Despite an average disease duration of 86.9±65.8 months, 75.7% of patients received no alternative therapy after PAP discontinuation.
Conclusion: This pilot study demonstrates substantial residual disease burden in PAP-intolerant OSA patients, characterized by altered sleep architecture, moderate OSA, significant nocturnal hypoxemia, and impaired daytime functioning. The findings suggest an urgent need for structured therapeutic alternatives in PAP-intolerant individuals and validate the feasibility of comprehensive sleep assessment in the home environment.
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0662
CO-MORBID INSOMNIA AND SLEEP APNEA INCREASE THE RISK OF UNCONTROLLED HYPERTENSION IN A MIDDLE-AGED POPULATION

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Introduction: Co-morbid insomnia and sleep apnea (COMISA) is associated with poorer health outcomes and increased all-cause mortality. We investigated the relationship between COMISA

and uncontrolled hypertension in the population-based Swedish CardioPulmonary BioImage Study (SCAPIS).

Methods: A cross-sectional analysis was conducted on 3832 SCAPIS participants (54.2% females, age 57.5±4.3 years, body mass index 26.6±4.2 kg/m²). Subjects underwent comprehensive assessments, including an overnight home sleep apnea testing. Obstructive sleep apnea (OSA) was defined using a respiratory event index >10 events/hour per European Respiratory Society guidelines, while COMISA was defined as OSA combined with an Insomnia Severity Index score ≥15. Blood pressure (BP) was categorized into three groups: uncontrolled hypertension (office systolic/diastolic BP ≥140/90 mmHg), controlled hypertension (physician-diagnosed hypertension treated with antihypertensive medication and systolic/diastolic BP < 140/90 mmHg), or normotension (systolic/diastolic BP < 140/90 mmHg without antihypertensive treatment).

Results: The prevalence of COMISA was 3.1% in the population and 14.5% among OSA patients. The rate of uncontrolled hypertension was 4.4%, 4.5%, 7.9%, and 10.2% in the non-insomnia/OSA, insomnia-only, OSA-only, and COMISA group, respectively (P< 0.001). A generalized ordinal logistic regression model revealed a significantly increased risk of uncontrolled hypertension in the OSA-only group (odds ratio [OR] [95% CI]: 1.35 [1.06–1.73], P=0.017) and the COMISA group (OR: 1.90 [1.22–2.96], P=0.004), compared to the non-insomnia/OSA group, after adjusting for anthropometric, lifestyle, comorbidities, sleep duration, excessive daytime sleepiness, and 4% oxygen desaturation index. Mediation analysis indicated that the percentage of time spent with SpO_2 ≤90% mediated the relationship between OSA and uncontrolled hypertension.

Conclusion: OSA is associated with an increased risk of uncontrolled hypertension in the general population, with COMISA further elevating the risk. These findings highlight the importance of identifying COMISA patients for tailored treatment approaches.

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0663

MORTALITY ASSOCIATED WITH SLEEP APNEA, INSOMNIA, AND COMISA MAY BE LOWER FOR TREATED RACIAL AND ETHNIC MINORITIZED VETERANS

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Introduction: Few data exist exploring the relationship between treatment of sleep apnea (SA), insomnia, comorbid insomnia and sleep apnea (COMISA) with mortality among racial and ethnic minoritized (REM) US veterans receiving sleep care. We compiled a large Veterans Health Administration (VA) database to compare all-cause mortality among veterans with these sleep disorders by race-ethnicity.

Methods: The study included veterans with confirmed diagnoses and prescribed treatment for insomnia and/or SA, within the VA, from 1999 to 2023. Self-reported race and ethnicity were extracted from the medical record and categorized as Non-Hispanic White (NHW), Non-Hispanic Black (NHB), White Hispanic (WH), Non-Hispanic Asian (NHA), or Indigenous (Native American/Alaskan/Hawaiian/Pacific Islander [NAAHPI]). Insomnia diagnosis required sleep medication prescription or CBT-I while SA diagnosis required PAP prescription. All-cause mortality was extracted from national databases. For each sleep disorder, multivariable logistic regression was used to determine the association between race-ethnicity and all-cause mortality. Models were adjusted for demographics, comorbidities, sleep medications, and time from the initial insomnia or SA diagnosis. NHW served as the reference group for analyses.

Results: This cohort contained 1,544,541 veterans; 70% of the cohort was NHW, 20% NHB, 6.8% WH, 1.8% NAAHPI, and 1.2% NHA. OSA prevalence was highest for NHAs (53.3%) and lowest for NHWs (47.3%). Insomnia prevalence was highest for NHWs (42.1%) and lowest for NHAs (34.8%) while COMISA prevalence was most common among NHBs (13.4%) and least among NHWs (10.7%). In adjusted analyses, compared to NHWs, mortality risk was lower for NAAHPI (HR [95%CI] 0.85 [0.82-0.89]), NHB (0.71 [0.70-0.72]), WH (0.64 [0.62-0.66]), and NHA (0.40 [0.37-0.44]). Similarly, REM veterans with insomnia had lower mortality risk than NHWs (NAAHPI HR 0.91 [0.88-0.95], WH 0.72 [0.70-0.74], NHB 0.69 [0.68-0.70], NHA 0.48 [0.45-0.52]). Furthermore, REM veterans with COMISA also had lower mortality risk than NHWs (NAAHPI HR 0.79 [0.71-0.87], NHB 0.65 [0.62-0.67], HW 0.59 [0.55-0.62], NHA 0.39 [0.32-0.48]).

Conclusion: Overall, racial and ethnic minoritized veterans had lower mortality rates than NHWs. These counterintuitive findings may not be representative of REM veterans with sleep disorders at-large given inherent biases in sleep referrals and acceptance/uptake of therapies. Further clarification of these findings within the VA is needed.

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0664

OBSTRUCTIVE SLEEP APNEA COMORBID WITH INSOMNIA WITH OBJECTIVE SHORT SLEEP DURATION PHENOTYPE IS ASSOCIATED WITH INCIDENT HYPERTENSION

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Introduction: Co-morbid insomnia and obstructive sleep apnea (COMISA) is associated with higher cardiovascular risks than its individual components. Recent findings in a clinical sample suggest that increased cardiometabolic risks in COMISA appear to be primarily driven by the insomnia short sleep duration (ISSD) but not insomnia with normal sleep duration (INSD) phenotype. The aim of this study is to investigate whether COMISA with ISSD phenotype is associated with an increased risk of incident hypertension in a large random general population sample.

Methods: From the 1741 subjects of the Penn State Adult Cohort, 1395 were followed-up after 7.5 years and 786 (55% women, aged 49.68± 12.98) did not have hypertension at baseline. Hypertension was determined by a self-report of receiving treatment for high blood pressure. Chronic insomnia was defined

as a complaint of insomnia lasting ≥ 1 year or presence of complaint of difficulty falling asleep, staying asleep, nonrestorative sleep, or early morning awakening. All subjects underwent 8-hour polysomnography. Obstructive sleep apnea (OSA) was defined as an obstructive apnea/hypopnea index ≥ 5. Objective short sleep duration was defined as < 6 hours' sleep based on polysomnography. Binary logistic regression was performed while controlling for gender, race, age, BMI, mental health problems, smoking, alcohol consumption, diabetes, sampling weight and follow-up duration.

Results: Compared with normal sleepers with normal sleep duration, the highest risk of incident hypertension was in the COMISA with ISSD phenotype (OR = 4.40, 95% CI = 1.60–12.07, p=0.004), followed by OSA only group, and by ISSD only group (OR= 3.34, 95% CI = 1.87–5.94, p=0.001, OR= 2.23, 95% CI = 1.26–3.94, p=0.005, respectively). The risk of incident hypertension was not significantly increased in normal sleepers with short sleep duration or in those with COMISA INSD phenotype or INSD only group.

Conclusion: These findings suggest that the additive adverse effects of COMISA on hypertension risk are driven primarily by the ISSD phenotype. Furthermore, they underline the need for phenotyping COMISA based on objective sleep duration which differs in terms of pathophysiology, adverse cardiometabolic outcomes and possible differential treatment response.

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0665

IMPACT OF BODY MASS INDEX ON THE ASSOCIATION BETWEEN SLEEP-DISORDERED BREATHING AND HYPERTENSION AMONG WOMEN

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Introduction: Sleep-disordered breathing (SDB) is associated with hypertension (HT) by enhancing sympathetic neuronal activity (SNA) among men. Recently, body mass index (BMI) is a mediator of the association between SNA and HT (Chen B, Somers VK, et al. 2021). However, their association in the female population has not been well investigated. The purpose of this study was to examine the impact of BMI on the association between SNA and HT in women.

Methods: A total of 582 women working in nursing homes were included in the study. Demographics and a clinical history of hypertension were examined by questionnaire. Those having the systolic blood pressure ≥150mmHg, diastolic blood pressure >90mmHg or those who were previously diagnosed as HT were determined as those with HT. Sympathetic and parasympathetic activity levels were evaluated using the Orthostatic Master, using Kiritsu Meijin(r), in which the L/H ratio and HF respectively indicates sympathetic and parasympathetic activity. L/H ratios and HF were devided into quartiles. Based on an over-night type III sleep monitoring, respiratory event index (REI) was determined. Logistic regression analysis was used to examine the association between SNA and HT. Covariates included age, body mass index and menopausal condition.

Results: The odds ratio and 95% confidence interval for hypertension were 4.92 (2.08 to 11.65) and 4.75 (2.00 to 11.27) in those with the third and top quartiles of L/H ratio, compared to the bottom, suggesting the significant association between HT and SBD. This association remained statistically significant after adjustment for age or in those whose REI was ≥10/hour. Furthermore, adjusted OR (95%CI) for HT was 0.40 (0.19 to 0.86) in the thrid qurtaile and 0.27 (0.10 to 0.68) in the top qurtaile of HF, respectively, suggesting that para-sympathetic neuronal activation is singnificantly and imbersely associated with HT. This resulted in the dominance in sympathetic neuronal activation related to HT.

Conclusion: There was an association between SNA and HT in women, which was more evident in those with REI ≥10/hour. However, BMI did not seem to be a meditor in this epidemiologic cohort. Furthermore, the reduction in para-sympathetic neuronal activity was associated with HT.

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0666

HIGHER INCIDENCE OF CARDIOMETABOLIC COMORBIDITIES IN U.S. VETERANS WITH OBSTRUCTIVE SLEEP APNEA AND WARTIME AIRBORNE HAZARDS EXPOSURE

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Introduction: Forty percent of Veterans express concern about military toxic exposures (TEs) which may include airborne hazards. Veterans with overseas wartime service and TEs show increased rates of cardiometabolic disorders, including heart disease, stroke, and type 2 diabetes mellitus (T2DM). Additionally, 24% of Veterans have been diagnosed with Obstructive Sleep Apnea (OSA), which is epidemiologically linked to cardiometabolic disease. However, the extent to which OSA modifies the risk of developing cardiometabolic comorbidities after military TEs remains unknown

Methods: Using data from the VA Corporate Data Warehouse (CDW), we identified Veterans receiving care in the past five years with a wartime record indicating service overseas in an area where TEs were reported. These Veterans were further stratified based on OSA diagnosis and cardiometabolic comorbidities.

Results: Of the 8.53 million Veterans receiving care within VA between 2019 and 2024 and who had an overseas wartime service record, 1.32 million (16%) had potential TEs. Among these, 452,140 (34%) had a diagnosis of OSA. In the group with both potential TEs plus OSA, 205,646 (45%) had one or more cardiometabolic comorbidities compared to only 210,468 (25%) in those with no OSA.

Conclusion: Veterans with an overseas deployment and potential TEs had higher rates of OSA compared to the general VA population. Furthermore, they were more likely to have at least one or more comorbidities compared to those with an overseas wartime deployment but no OSA. This data suggests that the combination of OSA and military TEs is associated with a higher incidence of cardiometabolic comorbidities, warranting further investigation in this area.

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0667

GENDER-SPECIFIC INSIGHTS: ASSOCIATION BETWEEN SLEEP APNEA SEVERITY AND MORTALITY IN FEMALE VETERANS, ACCOUNTING FOR RACE, ETHNICITY, AND AGE

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Introduction: Our previous study in an overwhelmingly male population demonstrated a U-shaped relationship between sleep apnea (SA) and mortality, with mild to moderate SA associated with the lowest mortality risk. We aim to investigate the association between SA and all-cause mortality in a large cohort of female veterans and its interplay with race/ethnicity, and age.

Methods: Using data from the Veterans Health Administration (1999–2022), a validated natural language processing tool extracted Apnea-Hypopnea Index (AHI) values from electronic medical records. Female veterans were categorized by SA severity: no SA (n-SA, AHI < 5), mild to moderate SA (m-SA, 5 ≤ AHI < 30), and severe SA (s-SA, AHI ≥30). We propensity score matched the patients based on demographics, body mass index (BMI), and 38 factors of Elixhauser comorbidity index. Subgroup analyses included stratification by race/ethnicity (White, Black, and Hispanic) and age (≤40, >40 to < 65, ≥65). Logistic regression models estimated odds ratios (ORs) for mortality using m-SA as the reference.

Results: Among 37,448 female veterans (mean age: 43.0±11.2 years, mean BMI: 30.5±6.0 kg/m², 52.1% White), comorbid conditions were prevalent, with 78% having psychiatric, 34% cardiovascular, 38% metabolic, 28.5% neurologic, and 27.6% pulmonary conditions. Positive airway pressure therapy was prescribed to 43.6% of the m-SA group and 35.7% of the s-SA group. Mortality rates were lowest in the m-SA group, but comparisons between n-SA and s-SA versus m-SA showed no significant differences (n-SA OR: 1.13; 95%CI: 0.98,1.3; s-SA OR: 1.11; 95%CI: 0.96,1.29). Stratification by age did not alter these findings. However, White females with n-SA exhibited significantly higher odds of mortality compared to those with m-SA (OR: 1.32; 95%CI: 1.1,1.58).

Conclusion: A previously observed U-shaped relationship between SA and mortality appears influenced by gender, race/ethnicity, and age. This study identified significantly higher mortality odds for n-SA in White females, while other subgroups showed no significant associations. Further research is needed to explore potential mechanisms, including sex-specific responses to intermittent hypoxia and the effects of PAP therapy in females.

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0668

SLEEP APNEA AND RISK OF GESTATIONAL DIABETES AND PREECLAMPSIA: A MENDELIAN RANDOMIZATION STUDY

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Introduction: Sleep apnea has been associated with increased risks of gestational diabetes and preeclampsia. However, it remains unclear whether these associations are causal or influenced by confounding factors. To address this uncertainty, we employed Mendelian Randomization (MR), a robust method for inferring causal relationships using genetic data, to investigate the potential causal effects of sleep apnea on these adverse maternal outcomes.

Methods: We conducted a one-sample MR analysis to evaluate causality between sleep apnea and the risk of three particularly adverse maternal outcomes. Genome-wide association study (GWAS) summary data for sleep apnea were obtained from the FinnGen biobank (16,761 cases and 201,194 controls). We used MR-Egger, weighted median, inverse-variance weighted (IVW), and weighted mode methods, with IVW (multiplicative random effects) as the primary analysis. The Cochran's Q statistic (IVW) and Rucker's Q statistic (MR Egger) were used to detect the heterogeneity of our MR analysis. The horizontal pleiotropy was detected by MR Egger. The sensitivity was investigated by the leave-one-out analysis. To avoid the inflation of false-positive findings, we calculated the false-discovery rate (FDR) corrected p-values for the main analyses. Significance was determined as FDR-corrected p-values< 0.05, whereas p-values < 0.05 that did not meet the FDR-corrected threshold were regarded as suggestive evidence of an association. All cited GWAS, epigenome-wide association studies and summary-level data had been approved by related relevant review boards.

Results: Sleep apnea was associated with an increased risk of gestational diabetes (OR=1.43, 95%CI=1.05-1.95, p=0.024, FDR corrected p-value=0.036) and preeclampsia/eclampsia (OR=1.48, 95%CI=1.08-2.05, p=0.016, FDR corrected p-value=0.036). Sleep apnea did not increase the increased risk of gestational hypertension (OR=1.37, 95%CI=0.991.90, p=0.061, FDR corrected p-value=0.061). No heterogeneity or horizontal pleiotropy was found among the tests. Leave-one-out analysis indicated that the causal estimates of sleep and psychiatric disorders were not driven by any single single-nucleotide polymorphisms (SNPs).

Conclusion: These results provide genetic evidence suggesting a causal relationship between sleep apnea and the increased risk of gestational diabetes and preeclampsia/eclampsia. Addressing sleep apnea before or during pregnancy could be a potential avenue for preventing these adverse maternal outcomes. Further studies are needed to confirm these findings and to explore underlying biological mechanisms.

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0669

SLEEP ARCHITECTURE AND OBSTRUCTIVE SLEEP APNEA DIFFERENCES AMONG PACIFIC ISLANDERS: A SINGLE-CENTER STUDY IN SAIPAN

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Introduction: Saipan, the largest island in the U.S. Commonwealth of the Northern Mariana Islands (NMI) and home to a predominantly native Pacific Islander population, has a high prevalence of obesity and chronic conditions which

increase obstructive sleep apnea (OSA) risk. OSA often goes unrecognized and untreated, especially in minority communities. Additionally, unique craniofacial structures in this population influence the prevalence of OSA and pose challenges for effective management. No prior study has looked at the frequency and characteristics of OSA in this population. We aimed to fill this gap by looking at age, BMI, and sex differences in sleep architecture and OSA frequency.
Methods: Retrospective cross-sectional analysis of polysomnographic data was collected between 2009-2020, in adults aged 18-82, from the only sleep testing center on the island. Variables including sleep architecture, respiratory variables, demographic data, and Epworth Sleepiness Scale scores were assessed. Statistical analyses included descriptive statistics, group comparisons, and logistic regression.
Results: Severity and prevalence of apnea was greater in men than women (94 vs 86%). Obstructive apnea index was 3 times higher in men vs women. Mean oxygen saturation was also lower in men vs women. We also redemonstrated the age impact on OSA severity in women with higher AHIs in older women particularly rising around 50 – 59 years old.
Conclusion: Our findings reveal that males tend to experience more severe forms of OSA compared to females; however, OSA severity in females increases with age, likely due to hormonal fluctuations. This study lays the groundwork for future research to further explore and address OSA in this unique population.
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0670
RESPIRATORY EVENT-RELATED HYPOXEMIA, ELECTROENCEPHALOGRAPHIC RESPONSE AND SUBJECTIVE SLEEPINESS IN OSA

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Introduction: Standard metrics of obstructive sleep apnea (OSA) severity, such as apnea-hypopnea index (AHI), do not correlate well with daytime sleepiness. In OSA patients, there is considerable variability in the severity of hypoxemia and the electroencephalographic (EEG) response associated with respiratory events. We hypothesized that nocturnal hypoxemia and EEG responses would be associated with subjective daytime sleepiness in patients with moderate-to-severe OSA.
Methods: We used cross-sectional data from participants enrolled in a Canadian Sleep and Circadian Network's clinical cohort of patients with suspected OSA who had moderate-to-severe OSA (AHI>15/hr). Event-related hypoxemia was quantified as the mean event-related hypoxic burden (HBev): mean area under the oxygen desaturation curve. EEG responses to respiratory events were quantified by calculating the power ratio (log(mean absolute power 6s after / mean absolute power 6s before the event)) across EEG frequency bands; subject-specific responses were defined as the mean EEG response across all events. We calculated an overall Brain Response to Events (BReTE) metric by summing power ratios across all frequency bands. Subjective daytime sleepiness was assessed by the Epworth Sleep Scale (ESS) with an ESS>10 considered indicative of daytime sleepiness). Logistic regression, controlling for age, body mass index, race, sex, AHI and comorbidities was employed to investigate hypothesized associations.
Results: We studied 468 patients (40%female) with a median [IQR] age=56 years [46,63], AHI=43events/hr [23,87], HBev=1.87%min [1.24,2.69]. More severe hypoxemia and a lower EEG response were independently associated with higher odds of daytime sleepiness. One standard deviation (SD) increase in HBev was associated with 41% higher odds of daytime sleepiness (95% CI: 1.14-1.75,p< 0.01), while a one SD increase in BReTE was associated with 27% lower odds of daytime sleepiness (95%CI: 0.58-0.91,p< 0.01). Blunted EEG responses were more prevalent across beta and gamma EEG frequencies. AHI was not associated with daytime sleepiness.
Conclusion: Greater event-related hypoxemia and blunted EEG responses were independently associated with subjective daytime sleepiness in moderate-to-severe OSA, emphasizing the pivotal roles of hypoxemia and EEG in evaluating daytime sleepiness in OSA. EEG findings could be the result of adaptations to chronic OSA exposure, resulting in reduced arousal responses. Future prospective studies should explore these intricate associations further.
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0671
THE SHINE SURVEY: UNCOVERING GENDER DIFFERENCES IN PSYCHOSOCIAL BURDEN OF OBSTRUCTIVE SLEEP APNEA

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Introduction: Obstructive sleep apnea (OSA) is a serious, chronic sleep-related breathing disease in which the airway is obstructed during sleep causing disrupted breathing, sleep fragmentation, and reduced oxygenation. OSA may present differently by gender, potentially causing differential underdiagnosis and disease experience. The objective of this study was to assess the psychological and social impact of OSA by gender in U.S. adults with diagnosed OSA.
Methods: The SHINE online patient survey, developed in consultation with patient advocates and OSA experts, was administered to 1,500 OSA patients in the U.S. Results were assessed via generalized linear models with binomial distribution and logit link function, adjusted for age group, BMI category, race, region, income level, comorbidities, and time since diagnosis. Outcomes of interest were whether patients experienced ≥2 negative OSA symptoms in the past 30 days, experienced ≥2 negative feelings with OSA in the past 30 days and agreed (6 or 7 on a 7-point Likert scale) with ≥2 statements of OSA negatively affecting relationships.
Results: Of 1,500 respondents, 755 were men and 745 were women, with mean ages (SD) 50.7 (14.5) and 41.2 (14.4) years, respectively. Of seven listed OSA symptoms (daytime sleepiness, fatigue, irritability, mood changes, loud snoring, morning headaches, inability to concentrate), women were 1.52 times

more likely than men to report ≥2 symptoms in the past 30 days (p=0.04). When asked whether OSA negatively affected relationships (overall impact, impact on care for family/friends, ability to be present, and social engagement), women were 1.42 times more likely than men of agreeing with ≥2 of 5 statements (p=0.01). Of 13 listed negative feelings (hopeless, depressed, frustrated, misunderstood, anxious, irritable, angry, not dependable, isolated, ashamed, embarrassed, scared, and low self-esteem), women were 1.61 times more likely than men to experience ≥2 feelings in the past 30 days (p=0.01).

Conclusion: OSA manifests differently in women compared to men. Our study further supports gender differences in patient reported outcomes, with women experiencing a higher psychosocial burden and more severe lived experiences, even after adjusting for baseline characteristics. These findings underscore the critical need for gender-specific approaches in the screening, diagnosis and treatment of OSA.

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0672

IMPACT OF OBSTRUCTIVE SLEEP APNEA ON DAILY LIFE BY DISEASE SEVERITY LEVEL: ANALYSIS FROM THE SHINE SURVEY

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Introduction: Obstructive sleep apnea (OSA) is a serious, chronic, sleep-related breathing disease characterized by intermittent airway blockage during sleep, leading to disrupted breathing, fragmented sleep, and reduced oxygenation. OSA is often underdiagnosed particularly in mild cases, despite its significant negative impact on daily functioning and quality of life. This analysis aimed to evaluate the impact of OSA on daily life of people living with OSA, based on self-reported OSA severity levels.

Methods: The SHINE online patient survey, developed in consultation with patient advocates and OSA experts, was administered to 1,500 OSA patients in the United States. Data were analyzed using generalized linear models with a binomial distribution and logit link function, adjusted for age group, BMI category, race, region, income level, comorbidities, and time since diagnosis. Model outcomes included: (1) whether OSA limited patients' ability to engage in regular, non-work activities (rated 3, 4 or 5 on a 5-point scale), (2) whether OSA affected work productivity (rated 3, 4 or 5 on a 5-point scale), and (3) experienced ≥2 negative OSA symptoms in the past 30 days.

Results: Among respondents, 13% reported mild, 54% moderate, and 30% severe OSA. Results showed that patients at all levels of severity experienced symptoms and negative impact to daily activities and work productivity. The percentage of patients who reported ≥2 symptoms in the past 30 days was 84%, 91% and 86% (p=0.003) among mild, moderate and severe patients, respectively. Mild (48%), moderate (64%) and severe (62%) patients also reported that OSA affected their non-work activities (p< 0.01). Among employed patients, 39%, 51%, and 48% of mild, moderate and severe patients, respectively, reported that OSA negatively impacted work productivity (0=0.002). Comorbidities, including COPD, diabetes, and insomnia, were significantly associated with increased odds of OSA affecting work and non-work activities (p< 0.05).

Conclusion: Patients with OSA across the severity spectrum experienced daily life challenges, with severity generally correlating with greater impact. Surprisingly, even those with mild OSA experienced significant negative impact on their daily work and non-work activities. These findings emphasize the importance of early screening, diagnosis and treatment to delay the progression to severe OSA.

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0673

ASSOCIATION BETWEEN REM SLEEP DEPENDENT OSA AND FATIGUE IN POPULATION WITH NORMAL RANGE OF AHI

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Introduction: The population with an overall apnea-hypopnea index (AHI) in the normal range are not diagnosed with obstructive sleep apnea syndrome (OSAS), even if their AHI during REM sleep period is above 5. The clinical significance of REM sleep-dependent OSA (REM-OSA) remains controversial. We investigated the association between REM-OSA and fatigue and factors related to fatigue in population with normal range of AHI.

Methods: 3,061 patients underwent polysomnography (PSG) for suspected OSA. Among them, 480 patients had an overall AHI of less than 5. After excluding patients with total sleep time (TST) less than 120 minutes or the duration of REM sleep less than 30 minutes, 316 patients were retrospectively studied. REM-OSA was defined as a REM-AHI/NREM-AHI of 2 or greater and a REM-AHI of 5 or greater. Demographic data and sleep questionnaires such as Epworth Sleepiness Scale (ESS), Fatigue Severity Scale (FSS), Insomnia Severity Index (ISI), Patient Health Questionnaire (PHQ-9), Pittsburgh Sleep Quality Index (PSQI), and Sleep Apnea scale of the Sleep Disorders Questionnaire (SASDQ) were collected.

Results: 108 patients (34.18%) were classified as REM-OSA and the mean age was 45.69 ± 14.26 (vs. 43.79 ± 15.58), with 67 females (62.04% vs. 57.69%). The BMI was found to be significantly higher in the REM-OSA group (24.89 ± 4.98) (vs. 22.98 ± 3.40) (p=0.001). The SASDQ score was higher in the REM-OSA group (23.27± 6.79 vs. 21.29 ± 7.04) (p=0.017). In univariate regression analysis, REM-OSA was not associated with fatigue (OR, 0.771; 95% CI, 0.481 - 1.236). Age (OR, 0.954; 95% CI, 0.925 - 0.984), ESS (OR, 1.228; 95% CI, 1.105 - 1.364), ISI (OR, 1.081; 95% CI 1.015 - 1.151), PHQ-9 (OR, 4.647; 95% CI, 1.649 - 13.101), and REM-AHI/NREM-AHI (OR, 0.951: 95% CI, 0.906 - 0.999) were statistically significantly associated with fatigue. After adjustment, factors related to fatigue were age (OR, 0.903; 95% CI, 0.823 - 0.991), BMI (OR, 0.812; 95% CI, 0.686-0.962) and EDS (OR, 15.498; 95% CI, 1.673 -143.523).

Conclusion: There was no association between REM OSA and fatigue in the normal range of AHI. Age, BMI, and EDS were related to fatigue in this population.

Support (if any):

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0674

SHORT-TERM RELIABILITY OF OBSTRUCTIVE SLEEP APNEA SYMPTOM SUBTYPES

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Introduction: Over 10 years ago, a seminal study using cluster analysis in the Icelandic Sleep Apnea Cohort (ISAC) identified subtypes of patients with obstructive sleep apnea (OSA) defined as excessively sleepy (presenting with multiple sleepiness complaints), disturbed sleep (characterized by insomnia-related complains), and minimally symptomatic. These subtypes have since been shown to generalize in clinical and population samples worldwide. An important step towards clinical translation is understanding the short-term (e.g., weeks) reliability of these subtypes. We describe results from an ongoing study to answer this question across sites in the Sleep Apnea Global Interdisciplinary Consortium (SAGIC).

Methods: We used a prospective test-retest study of subjects with newly diagnosed or suspected OSA prior to initiating therapy. Participants completed a questionnaire on OSA symptoms twice (at least two weeks apart). A patient's 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 of subtypes, we calculated the percent agreement and simple kappa coefficients. Kappa values indicate 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.

Results: Our sample included 116 participants from 4 SAGIC sites: Ohio State (n=43), Kansas (n=7), Sydney (n=37) and Perth (n=29). The sample was 50% male, 55.2±13.9 years-old, had a BMI of 31.8±6.8 kg/m2, and an AHI of 22.3±18.5 events/hour. Questionnaires were completed an average (±SD) of 18.8±7.8 days apart. At the first visit, 51 (44.0%) patients had the disturbed sleep subtype, 42 (36.2%) were minimally symptomatic, and 23 (19.8%) were excessively sleepy. At the second visit, 47 (40.5%) had the disturbed sleep subtype, 43 (37.1%) the minimally symptomatic and 26 (22.4%) the excessively sleepy. Overall, 84.5% (95% CI: 77.9%, 91.1%) of patients fell within the same subtype at both timepoints. The Kappa (95% CI) was 0.759 (0.657, 0.853), indicating substantial short-term reliability.

Conclusion: While recruitment is ongoing across all SAGIC sites, this early analysis suggests substantial reliability of symptom subtypes over a short timeframe (without treatment). This further supports the potential clinical utility of the symptom subtype framework in advancing more personalized patient care.

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0675

THORACOABDOMINAL ASYNCHRONY IN MILD SLEEP-DISORDERED BREATHING: PEDIATRIC ADENOTONSILLECTOMY FOR SNORING (PATS)

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Introduction: Mild Sleep-disordered Breathing (mSDB), characterized by habitual snoring, is associated with adverse health outcomes, possibly due to increased inspiratory effort despite few apneas and hypopneas. Thoracoabdominal asynchrony (TAA) has been used to quantify inspiratory effort in children with obstructive sleep apnea, but has not been evaluated in children with mSDB. Hence, in the Pediatric Adenotonsillectomy for Snoring study, we aimed to quantify TAA in children with mSDB and examine its responsiveness to intervention by studying changes after adenotonsillectomy.

Methods: Children with mSDB (snoring, apnea-hypopnea index < 3) and ages 3 to 12 years were studied with polysomnography at baseline and at 12-months after randomization to adenotonsillectomy (AT) or watchful waiting (WW). TAA was calculated from the Fourier transforms of the abdomen and thoracic respiratory inductance plethysmography band signals as the phase angle difference at the dominant frequency. Regions that included noise, movements, respiratory events, and arousals were excluded to obtain periods of quiet sleep. The TAA's effect of adenotonsillectomy was assessed via repeated measures ANCOVA using a linear mixed-effects model, with and without adjustment for race, BMIz, change in BMIz, age, and sex.

Results: 304 participants (n=149 WW; n=155 AT) were analyzed (age: 6.5±2.26 years; BMIz: 0.52±1.25; 48% females; 63% White, 29% Black; AHI 1.29±1.03 events/hour). Median TAA was 29 [IQR: 18,47] degrees at baseline and did not differ between intervention groups but were higher in females (vs. male) and lower with higher BMIz. Children who underwent AT showed TAA reduction during NREM sleep at follow-up (vs. baseline) compared to WW by -6 degrees (95% CI: [-11, -1], p-value=0.016). There was no change in TAA during REM sleep. Adjustment for covariates yielded similar results.

Conclusion: The potential utility of TAA in children with mSDB was supported by demonstrating improved asynchrony following adenotonsillectomy in NREM sleep. Future work will investigate TAA's role as a predictor of behavioral and physiological outcomes in children with mSDB.

Support (if any): The Pediatric Adenotonsillectomy Trial for Snoring (PATS) study was supported by the U.S. NIH, NHLBI (1U01HL125307, 1U01HL125295). The National Sleep Research Resource was supported by the U.S. NIH, NHLBI (R24 HL114473, 75N92019R002).

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0676

ADOLESCENT PATIENTS WITH OSA HAVE GREATER SLEEP DISTURBANCES EVEN AT LOW AHI

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Introduction: The AASM Scoring Manual permits the use of adult criteria for diagnosing obstructive sleep apnea in patients 13 and older. There is a lack of consensus regarding the preferred criteria in adolescent patients. WASO (wake after sleep onset, as a marker of sleep disruption) and percentage of TST (total sleep time) with saturations less than 89% (as a marker of degree of hypoxia) can be used as surrogate criteria for severity of sleep apnea in adolescents and may be associated with OSA comorbidities.
Methods: Data was collected from the EMR for the census of pediatric patients using sleep lab records at the Geisinger Wilkes-Barre Sleep Lab between December 2023 and August 2024. Measures collected included gender, age, AHI, WASO, and total sleep time (TST). Average WASO and percentage of TST with saturations less than 89% were calculated for adolescents and younger pediatric patients at AHI of 1-4.9 (identified here as pediatric criteria) and 5.0 and greater (identified here as adult criteria).
Results: Application of the full pediatric criteria led to increased diagnosis of OSA in adolescents, as an AHI of 1-4.9/hr was adequate to lead to a diagnosis of OSA. Average WASO was relatively unchanged for patients younger than 13 regardless of which criteria were utilized with an average WASO of 51.2 minutes by pediatric criteria for mild OSA and 52.6 minutes by the adult criteria. For adolescent patients, WASO increased from 79.5 minutes by pediatric criteria for mild OSA to 88.5 minutes by the adult criteria. The hypoxic burden worsened in both groups as AHI increased. For patients younger than 13, hypoxia was 0.28% of TST by pediatric criteria for mild OSA and 1.66% by the adult criteria. For adolescent patients, the same measure was 0.04% by pediatric criteria for mild OSA and 4.34% by the adult criteria.
Conclusion: Among adolescent patients (13-17), when utilizing the "pediatric criteria" for OSA diagnosis, there was a lower burden of hypoxia, but a greater degree of sleep disturbance as measured by WASO. More studies are needed to demonstrate whether treatment of OSA established by this criteria will help improve WASO and daytime functioning.
Support (if any):

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0677

VALIDATION OF A NOVEL PATCH-BASED TYPE II POLYSOMNOGRAPHY SYSTEM

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Introduction: While in-laboratory polysomnography (PSG) remains the benchmark for sleep assessment, it faces challenges of high cost, time requirements, and the limited availability of trained technicians. A novel home-based alternative, the Onera Sleep Test System (STS), offers patch-based monitoring for unattended sleep evaluation.
Methods: A multi-site clinical investigation enrolled 206 participants (66% male) with potential sleep disorders. Each participant underwent simultaneous monitoring with traditional PSG and the patch-based system during one night. Sleep data was evaluated independently by three scorers using AASM guidelines in a blinded manner.
Results: Setup time showed marked differences: 19.5±6.8 minutes for traditional PSG versus 5.8±1.8 minutes for the patch system. Statistical analysis revealed strong correlation between the two methods across key metrics including total sleep time (0.87), NREM sleep (0.80), REM sleep (0.80), AHI with 3% desaturation (0.90), and oxygen desaturation index (0.80). The patch system demonstrated robust diagnostic performance at various AHI thresholds: for AHI≥5, accuracy measures were 0.86 (precision), 0.85 (sensitivity), and 0.75 (specificity). Similar strong performance was observed at higher thresholds. No safety concerns emerged during testing.
Conclusion: The patch-based system offers significantly faster setup while maintaining strong agreement with traditional PSG measurements. Its performance metrics support its potential as a reliable tool for home-based sleep assessment.
Support (if any): Supported by Onera Health.

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0678

PATIENT PERCEPTION OF A NOVEL PATCH-BASED TYPE II POLYSOMNOGRAPHY SYSTEM

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Introduction: The demand for in-laboratory polysomnography (PSG) is expected to outgrow the amount of dedicated beds, PSG equipment and trained personnel over the next 10 years. The Onera Sleep Test System (STS) is a patient applied, patch-based, type II PSG system, which enables PSG studies to be performed unattended at the patient's home. We report patient perception of the patch-based system and confidence in using it to perform an unsupervised home study.
Methods: 356 patients (age: 50.6 ± 12.7, male/female: 66.7%/33.3%, BMI: 30.2 ± 7.9) were recruited for a multicentre trial in Germany validating the Onera STS patch-based PSG system against traditional PSG in the sleep laboratory. 333 patients completed a first impressions questionnaire in full, and 328 completed a user perception questionnaire in full. 204 patients completed the second phase of the study where they used the patch-based system unsupervised at home, from which 172 patients completed the At-Home questionnaire in full. Demographics for each subset of participants were similar to the original cohort.
Results: Upon first impression, 84.1% of patients liked the size of the patch-based PSG system, 93.7% had no concerns about wearing it and 82.6% were confident that they could fit the device at home, unsupervised. Following at-home use, 77.3% reported no difficulties in applying the system, 90.7% were confident that they had placed the sensors correctly and 90.7% were satisfied with the system in general. Comfort with the patch-based system was high with the majority of patients agreeing that the leg (90.1%), flow (90.7%), chest (89.4%) and head sensor (80.1%) were comfortable.
Conclusion: Upon first impression, the majority of patients were not intimidated by the patch-based PSG and were confident that they could fit it unsupervised at home. The level of issues experienced during unsupervised home use was low and most patients were satisfied with their experience. The majority of patients rated the patch-based PSG as comfortable following overnight use.
Support (if any): Onera Health

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0679

ENHANCING PREDICTION OF SLEEPINESS, INSOMNIA, AND COGNITIVE IMPAIRMENT USING MACHINE LEARNING ON POLYSOMNOGRAPHY

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Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder affecting approximately a billion people globally. Traditional diagnostic metrics from polysomnography (PSG) such as the apnea hypopnea index (AHI) are limited in predicting OSA-related impacts. This study aims to leverage machine learning (ML) methods to enhance PSG prediction of three outcomes: daytime sleepiness (defined as Epworth Sleepiness Scale >10), insomnia (Insomnia Severity Index >15) and cognitive impairment (Montreal Cognitive Assessment < 25) in patients with moderate to severe OSA.

Methods: This pilot study utilized a subset of Canadian Sleep and Circadian Network participants (patients with suspected OSA recruited from academic sleep centres). Advanced signal processing was used to derive 790 features from PSG European Data Format (edf) files including: respiratory events, heart rate variations, limb movements, and EEG based metrics from leads C3/C4 (e.g., sleep stages, spindle metrics, power frequencies, sleep depth, arousal intensity). 541 participants with moderate to severe OSA (AHI>15/hr) were included. Python 3.11.6 was used for analysis. For each outcome, dimensionality reduction was done using Lasso Regression, Principal Component Analysis (PCA), and Recursive Feature Elimination (RFE). Binary classification models with Logistic Regression (LR), Support Vector Classification (SVC), Random Forest (RF), Multi-Layer Perceptron (MLP), Gaussian Naïve bayes, and XGBoost were then used (18 models tested). Model accuracy was assessed using 5-fold cross validation.

Results: Models that employed RFE for feature selection and LR for classification (based on 50-70 features depending on outcome) yielded the best performance. The average accuracy/F1 values across all target outcomes were 0.71/0.71 for sleepiness, 0.68/0.61 for insomnia, and 0.62/0.62 for cognitive impairment. However, accuracy of all the ML models surpassed the predictive accuracy of AHI alone (accuracy of 0.55, 0.60, 0.53 using logistic regression).

Conclusion: This preliminary study supports the concept of applying advanced signal processing and ML techniques to PSG to help predict OSA-related outcomes. Future research with larger sample sizes, more diverse patients, more refined ML methodologies, and better feature engineering should further improve accuracy of these models.

Support (if any): CIHR, BC Lung Association

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0680

CLINICAL VALIDATION OF ECG-BASED OBSTRUCTIVE SLEEP APNEA SCREENING USING MACHINE LEARNING

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Introduction: Obstructive sleep apnea (OSA) is an underdiagnosed sleep-related breathing disorder. It is strongly associated with cardiovascular disorders, suggesting a moderate-to-high incidence of co-occurrence among cardiovascular diseases and OSA in patients indicated for multi-night cardiac diagnostic testing. This presents an opportunity to screen for sleep disorders during ambulatory cardiology testing, referring flagged patients for further sleep testing, ultimately increasing the diagnosis and treatment throughput of sleep disorders.

Methods: A Machine Learning (ML) system was developed utilizing over 100,000 diagnostic polysomnography (PSG) studies with concurrently recorded electrocardiogram (ECG) signals. The system leveraged multiple deep neural network models to identify respiratory and sleep-stage-specific ECG patterns, forming an automated tool for ECG-based sleep quality assessment and OSA screening. Clinical validation was performed on a dataset of 185 subjects from a prospective clinical study. PSG results were scored by three RPSGTs, with board-certified sleep physicians providing quality assurance. The ML system's performance was evaluated against the gold-standard OSA diagnosis using an AHI threshold of 15 events per hour to identify positive OSA cases. Furthermore, to assess ECG-based sleep staging performance, sleep stages were reduced to Wake, Light Sleep (N1 + N2), Deep Sleep (N3), and REM, and agreement was evaluated utilizing an epoch-by-epoch approach.

Results: The ML system achieved a sensitivity and specificity of 90.1% (81.7%, 96.7%) and 84.9% (78.4%, 90.4%) for OSA screening. Furthermore, the ML system produced a sleep staging epoch-by-epoch agreement with a sensitivity and specificity of 91.3% (91.0%, 91.5%) and 95.5% (95.4%, 95.6%) for Wake, 78.7% (78.4%, 78.9%) and 91.2% (91.0%, 91.4%) for Light Sleep, 83.5% (82.7%, 84.3%) and 93.2% (93.1%, 93.3%) for Deep Sleep, and 89.2% (88.7%, 89.6%) and 97.6% (97.5%, 97.6%) for REM.

Conclusion: The ECG-based ML system demonstrated its potential as a scalable solution for automated OSA screening with high sensitivity and specificity in comparison to the gold-standard. The results highlight the ML system's capability to expand OSA screening, facilitating further diagnosis and treatment of sleep disorders in the broader patient population with cardiovascular disease.

Support (if any):

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0681

IT'S THE HEART: NOVEL SUBTYPE OF OBSTRUCTIVE SLEEP APNEA SYNDROME USING OXYGEN SATURATION AND HEART RATE

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Introduction: Studies predicting survival using the apnea-hypopnea index (AHI) have not produced consistent results in Obstructive sleep apnea syndrome (OSAS) patients. Authors conducted this study to subtype OSAS using heart rate and oxygen saturation, which reflect cardiac health that has a significant impact on survival.

Methods: We conducted the study using the PSG and clinical information of the sleep heart health study dataset (Quan SF, et al., 1997). Only subjects with an AHI ≥ 5/hour on the first PSG were included in the analysis. K-means clustering was performed using the variance of oxygen saturation and heart rate during sleep after the uniform manifold approximation projection (UMAP). We also calculated a brain age index using electroencephalography channel (C3A2) (Sun H, et al., 2019). Cox proportional hazard analysis was performed using the cluster revealed along with the other variables (gender, age, body mass index [BMI], AHI, and brain age index).
Results: 4803 subjects (male 52.3%, 64.2 [standard deviation, SD 11.1] year-old at the first visit) were included in the analysis. We revealed distinctive 2 clusters (average silhouette score = 0.44, Calinski-Harabasz score = 6837.92). Cluster 2 (n=2688, male 56.2%, 64.9 [SD 10.8] year-old) showed lower BMI, AHI, average heart rate, and higher average oxygen saturation compared to cluster 1 (n=2089, male 47.4%, 63.4 [SD 11.3] year-old). In the cox proportional hazard model, each variable showed the following hazard ratio (HR) and 95% confidence interval (95% CI): cluster 2 (0.70 [95% CI 0.62, 0.79]), male gender (1.43 [95% CI 1.27, 1.62]), age (1.13 [95% CI 1.12, 1.13]), BMI (0.99 [95% CI 0.98, 1.00]), AHI (1.00 [95% CI 1.00, 1.01]), brain age index (1.02 [95% CI 1.01, 1.03]).
Conclusion: Authors identified the novel subtype of OSAS using variance of heart rate and oxygen saturation in PSG. And that have a greater impact on survival prognosis than AHI and brain age index reported in previous studies.
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0682

RECOGNITION OF HIGH LOOP GAIN RESPIRATION: COMPARISON OF SELF-SIMILARITY ANALYSIS AND CLINICIAN INTERPRETATION

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Introduction: High Loop Gain (HLG) respiration noted on diagnostic Polysomnography (PSG) or during positive airway pressure titration is a marker of treatment complexity for Obstructive Sleep Apnea (OSA). Self-Similarity (SS) software analysis of breathing cycles occurring in association with respiratory events has been shown to be an accurate and clinically useful tool to detect HLG; however, little data exist regarding identification by sleep medicine physicians. Our goal was to compare SS scores with clinician interpretation of periodic breathing or central sleep apnea.
Methods: SS analysis was run on a selection of polysomnograms from a data archive with a calculated central Apnea Hypopnea Index (SScAHI) in addition to %SSany index representing self similarity in breathing cycles. Demographic data and basic PSG values including AHI, and oxygenation data were recorded from the archived reports. Clinician interpretations from the archived studies were also examined for identification of key terms including "periodic breathing" and "high loop gain". Chi square analysis was performed to examine the relationship between clinician recognition of HLG and %SSany.
Results: Data from 148 patients (81 female, 67male) (mean ± SD) age 58.2 ± 18.2 years with BMI 29.7 ± 7.4. PSG revealed mean AHI (18.0 ± 15.4), cAHI (2.6 ± 6.0). SS analysis revealed mean %SS 10.9 ± 11.2. When stratified across 3 separate categories of SS 5% (Pearson chi2 = 9.50 Pr = 0.002), 10% (Pearson chi2 = 5.59 Pr = 0.018) and 20% (Pearson chi2 = 16.1509, Pr = 0.000) clinician interpretation lacked mention of HLG. Taking into account cAHI at even the SS 20% category also failed to elicit recognition of high loop gain (Pearson chi2 = 5.07, Pr = 0.024).
Conclusion: High Loop Gain respiration is often overlooked in clinician interpretation of polysomnography, and thus the potential benefit of adjunctive therapies including pharmacotherapy and CO2 modulation which target HLG are being lost. This highlights the benefits of methods such as SS analysis which can be used to detect HLG independent of clinician recognition of breathing cycle patterns.
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0683

EVALUATING THE IMPACT OF MULTI-NIGHT HOME SLEEP APNEA TESTING FOR OBSTRUCTIVE SLEEP APNEA DIAGNOSIS

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Introduction: Obstructive sleep apnea (OSA) is a prevalent sleep-related breathing disorder. The majority of adults with OSA remain undiagnosed and untreated, highlighting the importance of accurate diagnosis to ensure timely and effective treatment. While single-night polysomnography remains the gold standard for diagnosing OSA, the lack of access coupled with night-to-night variability contributes to underdiagnosis and inconsistent results, compromising diagnostic accuracy and increasing patient management cost.
Methods: A non-randomized all-comers retrospective dataset of 4,527 patients was collected throughout 2024 from clinical home sleep apnea testing using FDA-cleared wearable PPG devices. Each patient had at least three nights of recordings, and only nights with a minimum of four hours of technically adequate PPG signals and at least one hour of sleep were included. The mean number of nights was 3.29 and the maximum number of nights was 16. Furthermore, the dataset had an overall mean AHI of 15 events/hour and a median AHI of 9 events/hour. Night-to-night variability was assessed by determining whether the first night's results would have resulted in misdiagnosis. Additionally, maximum difference in OSA severity (None, Mild, Moderate, Severe) across all nights was evaluated. The overall pooled standard deviation of multi-night AHI was also calculated to provide a comprehensive assessment of variability in OSA severity.
Results: When comparing the first night to subsequent nights, 11.8% of OSA patients would have been missed, and 26.4% of patients experienced an increase in OSA severity by at least one severity category. When assessing overall variability across all nights, 50% of patients showed no change in OSA severity, 46% experienced an increase of one severity category, and 4% showed an increase of two severity categories. Additionally, the dataset revealed a pooled AHI standard deviation of 5.8 events per hour.

Conclusion: Multi-night sleep testing revealed a level of variability that could negatively affect diagnostic accuracy when conducting single-night sleep studies. Multi-night sleep testing can mitigate this issue by aggregating the sleep quality and respiratory disturbance information across multiple nights, providing a more comprehensive assessment of a patient's condition, and reducing the risk of misdiagnosis by ensuring that treatment decisions are based on a fuller understanding of OSA severity.
Support (if any):

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0684

MODIFIED SCORING CRITERIA TO IMPROVE ACCURACY OF THE HOME SLEEP APNEA TEST

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Introduction: The Home Sleep Apnea Test (HSAT) has good diagnostic performance for patients with a high pretest probability of moderate to severe obstructive sleep apnea (OSA). However, the false negative rate has been reported to range from 17% - 46%, and the false positive rate is estimated to be 5-10%. For this reason, the American Academy of Sleep Medicine (AASM) recommends polysomnography (PSG) after nondiagnostic HSAT results (AHI < 5/hr). Our objective in this study is to improve the accuracy of HSATs by using hyperpneas as a surrogate for arousals.
Methods: A retrospective analysis was conducted on 69 patients with non-diagnostic Type 3 HSATs who underwent subsequent PSG. Original HSATs were re-scored using the recommended hypopnea scoring rule as defined by the AASM. For the purposes of this study, a hyperpnea was used as a surrogate for an arousal. A hyperpnea is defined in this study as a breath with ≥ 50% increase in amplitude over baseline breathing. Hypopneas were scored when there was a >30% decrease in flow for at least 10 seconds followed by a hyperpnea without significant oxygen desaturation (< 3%). The AHI from the experimental scoring criteria was compared to the original AHI from HSAT as well as the AHI from the PSG.
Results: Using the modified scoring criteria, the mean difference in AHI between HSAT and PSG was of 3.7/hr. Comparatively, the originally scored HSAT showed a mean difference in AHI of 5.9/hr from the PSG. Additionally, the modified scoring criteria HSAT had a false negative rate of 5% for this population, and had a false positive rate of 17%.
Conclusion: Incorporating a surrogate indicator of a cortical arousal such as a hyperpnea following an obstructive respiratory event can improve the accuracy of the HSAT AHI, decrease the false negative rate, and prevent repeat testing. One limiting factor in this study is that the HSAT and PSG were performed on different nights and in different environments. Further studies using these criteria on the same night as the PSG can validate this as a more accurate method to diagnose OSA using an HSAT.
Support (if any):

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0685

AI-POWERED BELUN RING FOR STRATIFYING OSA AND COMORBID INSOMNIA SYMPTOMS IN INDIAN MONODISCIPLINARY CLINICS

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Introduction: Co-morbid insomnia and obstructive sleep apnea (COMISA) pose significant healthcare challenge due to their combined association with more severe cardiovascular outcomes than either condition alone. In India, diagnosis and treatment are often delayed due to restricted access to multidisciplinary care. The AI-powered Belun Ring (BR), a medical-grade wearable device, has shown promise in addressing this gap by facilitating OSA severity stratification and aiding COMISA management. This study explores the feasibility of using the BR for OSA diagnosis and sleep stage classification to triage patients with insomnia symptoms in resource-constrained monodisciplinary clinical settings.
Methods: A total of 257 participants (median age: 54 years, BMI: 27.9, 40% female) were recruited from a neurology clinic and monitored for 1-3 nights using the BR. Participants were classified into four groups based on BR-derived AHI4% (≥15 events/h) and sleep efficiency (< 80%): Normal (AHI < 15), OSA (AHI ≥15), COMISA (AHI ≥15 & SE< 80%), or Insomnia (SE < 80%). Sleep metrics such as sleep onset latency (SOL), wake after sleep onset (WASO), and heart rate variability (HRV) metrics were compared using the Mann-Whitney test. Co-morbidity frequencies, including diabetes and hypertension, were analysed with the Mantel-Haenszel Chi-Squared test.
Results: Among participants, 49% were Normal, 25% OSA, 10% COMISA, and 16% Insomnia. COMISA and Insomnia groups had significantly higher WASO than the OSA group ($p< 0.001$). The Insomnia group exhibited longer SOL compared to OSA and COMISA ($p< 0.001$, $p< 0.01$), along with the lowest SDNN ($p< 0.01$, $p< 0.05$). Among 155 patients with comorbidity data, COMISA had the highest rates of co-morbidities ($P< 0.001$) among OSA-alone ($p< 0.05$) and Insomnia-alone ($p< 0.05$) (Diabetes: 41%, 21%, 26%; Hypertension: 53%, 42%, 42%; ≥2 comorbidities: 35%, 12%, 26%) compared to normal respectively (Diabetes: 15%; Hypertension: 32%, ≥2 comorbidities: 12%).
Conclusion: The AI-powered BR effectively stratifies high-risk OSA patients with comorbid insomnia symptoms, highlighting their increased comorbidity burden. This scalable and reliable tool provides a novel solution for triaging high-risk patients in monodisciplinary clinical settings with limited access to comprehensive sleep care.
Support (if any):

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0686

WHO HAS OSA? AN UPDATED DESCRIPTION OF PEOPLE THAT ARE BEING DIAGNOSED

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Introduction: The biggest barrier to adequate treatment for obstructive sleep apnea (OSA) is the underdiagnosis of the condition. It is important to understand the diversity of clinical characteristics of people with OSA, so that clinicians can better screen for OSA and improve the rate of diagnosis. Using real-world data of people diagnosed with OSA who go on to receive positive airway pressure (PAP) treatment, we sought to describe the presentation of OSA at the time of diagnosis.
Methods: This was a retrospective cohort study conducted among people who had a OSA confirmed by a sleep test (index date) between January 2019 and February 2023 and later started on PAP therapy. De-identified insurance claims data were linked

with PAP data and electronic medical records. Characteristics from the year prior to index included demographics, body mass index (BMI), presence of comorbid conditions, and laboratory results. BMI and laboratory results were averaged only amongst those who had a measurement.
Results: The final sample included 211,089 people with newly diagnosed OSA. Of these, 47% were female, 61% were between the ages of 45 and 64, with an average age of 51.5 years. On average, patients had 3.3 other conditions at the time they were diagnosed with OSA and 90% were managing at least one other chronic condition (60% hypertension, 54% hyperlipidemia, 31% anxiety, 31% gastroesophageal reflux disease, 29% depression, and 26% type 2 diabetes). Average blood pressure readings were 131/80 indicative of stage 1 hypertension. Average total cholesterol was in normal range at 184mg/dL, and average A1C was 6.4 indicative of prediabetes. 59% had at least class 1 obesity, and the average BMI was 35.0 kg/m2. Compared to men, women were older, had more conditions, lower blood pressure, and higher cholesterol. The prevalence of women and mean number of conditions increased by age, while BMI and cholesterol decreased by age.
Conclusion: These real-world data show that diagnosis of OSA typically occurs during middle-age for women and men, and commonly presents with mild hypertension or prediabetes. These data should be used to raise awareness of the presentation of OSA to improve the rate of diagnosis.
Support (if any): ResMed

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0687

SEX-BASED DIFFERENCES IN PULSE OXIMETRY FROM THE SNOOZZZE COHORT

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Introduction: Pulse oximetry has been under scrutiny due to recent findings that SpO2 accuracy is worse in non-white individuals. Dynamic SpO2 changes may be particularly impacted, which may lead to bias in OSA diagnosis and severity determination (e.g. hypoxic burden). OSA may be underdiagnosed in women, but little is known about sex-based differences in pulse oximetry performance during polysomnography.
Methods: We utilized the San Diego Multi-Outcome OSA Endophenotype (SNOOzzzE) Cohort which comprises adults who underwent clinical in-laboratory PSG at UCSD between 2015 and 2022 (IRB #182136). Raw PSG signals were used to determine oximetry-independent Apnea-hypopnea index ("AHIflow"), which was compared with AHI using AASM AHI3A and AHI4 criteria, as well as hypoxic burden. Differences between men and women were compared using multivariable models adjusted for BMI, wake oxygen saturation and percent hypopneas.
Results: 2,583 individuals were included in the analysis (1,145 women, 1,438 men). Female participant median age was 57(IQR 45,66) years, BMI 33(27,41) kg/m2, and AHI3A 20(11,38) events/hr. Male participant median age was 55(42,68) years, BMI of 30(26,35) kg/m2, and AHI3A 29(14,57) events/hr. AHIflow was significantly associated with AHI3A ($p< 0.001$), but there was no significant difference in the relationship between AHIflow and AHI3 between women and men ($p=0.269$). AHIflow was significantly associated with AHI4 ($p< 0.001$), and there was a statistically significant difference between AHIflow and AHI4 between women and men ($p=0.041$) but the absolute difference was very small (i.e., difference between men and women of 0.3 events/hr if AHI was 100 events/hr). AHIflow was significantly associated with hypoxic burden ($p< 0.001$), but there was no significant difference in the relationship between AHIflow and hypoxic burden between women and men ($p=0.878$).
Conclusion: This analysis does not reveal major differences in pulse oximetry performance in the detection of OSA severity between men and women, particularly when adjusting for other factors that might influence propensity for desaturation. Nonetheless, there is potential for unmeasured imbalances that obscure differences in ability to detect a true desaturation. There may be differences in propensity for oxygen desaturation during respiratory events between men and women; Our findings suggest that oximetry should be technically reliable for evaluating these biological differences.
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0688

ASSESSING LOW AROUSAL THRESHOLD IN OBSTRUCTIVE SLEEP APNEA: INSIGHTS FROM A GENERAL POPULATION STUDY

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Introduction: Obstructive sleep apnea (OSA) results from a combination of anatomical and non-anatomical endotypes. Among the non-anatomical factors, a low arousal threshold (LAT) can make it challenging for individuals to tolerate and adhere to certain treatments. The aim of this study was to determine the prevalence of the LAT endotype among the participants in the 4th edition of the Sao Paulo Epidemiological Sleep Study (EPISONO), and analyze the sociodemographic characteristics associated with LAT.
Methods: We used the algorithm proposed by Edwards et al. (2014) to identify LAT that is based on polysomnographic (PSG) parameters, namely the apnea-hypopnea index (AHI), peripheral oxygen saturation (SpO_2) and the percentage of hypopneas. Questionnaires on quality of life, fatigue, daytime sleepiness, and insomnia were also applied to assess gender-related differences between male and female non-OSA, LAT and high arousal threshold (HAT) participants.
Results: The groups differed significantly in terms of age and body mass index; however, there were no significant differences between ethnicities and for most of the assessed symptoms. A higher frequency of symptoms was observed in women, especially in those belonging to the LAT (OSA) group compared to men in the same group. Clinically significant insomnia was also more prevalent in females. In respect of the LAT (OSA) participants, no differences were observed between participants with and without clinically significant insomnia in the OSA group.
Conclusion: The characterization of the LAT endotype, and the higher frequency of symptoms in OSA women highlight

the importance of valuing polysomnographic findings and the symptoms reported by women during clinical assessment. LAT showed no relationship with worsening arousability among participants with co-morbid insomnia and sleep apnea (COMISA) compared to those with OSA-only in this study.

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0689

EXPLORATORY STUDY OF THE EFFECT OF ALCOHOL ON HOME SLEEP APNEA TESTING UTILIZING PERIPHERAL ARTERIAL TONE

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Introduction: A previously published case report suggested that alcohol might cause false-negative results in home sleep apnea testing (HSAT) utilizing Peripheral Arterial Tonometry (PAT). Alcohol is consumed by nearly a third of people globally. Based on this, along with rapid growth in PAT HSAT utilization, we aimed to prospectively study the interaction between alcohol consumption and PAT HSAT technology. We hypothesized that alcohol use would significantly attenuate sleep disordered breathing metrics in contrast to existing literature suggesting alcohol may exacerbate sleep apnea.

Methods: We planned to recruit subjects (N=100) from Mayo Clinic Arizona sleep clinic who were being evaluated for sleep-disordered breathing and elected to undergo home sleep apnea testing (WatchPAT ONE). Participants were required to report social alcohol use (no more than 1-3 drinks per day). The first and second home sleep apnea test were conducted on separate nights (night 1: without alcohol; night 2: with alcohol). Patients also completed a questionnaire, detailing their normal alcohol intake as well as intake during the respective sleep tests. Statistical analysis included paired sample t-test as well as a descriptive analysis.

Results: A total of 75 subjects were recruited (mean age [± SD] 56.8 ± 11.9; 90.7% male; mean BMI 29.8 ± 5.8) and 56 patients completed both sleep tests. The mean apnea hypopnea index (AHI) was not statistically different (p=0.784) between night 1 and night 2 (without alcohol: 19.6/hour ± 21.0; with alcohol: 19.3 ± 21.5, respectively). Similarly, no statistically significant difference was found in the AHI during REM and NREM sleep.

Conclusion: Preliminary data does not suggest a statistically significant difference in AHI without or with alcohol. While no significant change in AHI was observed, this study highlights the need for further investigation into the impact alcohol may have on PAT technology. Further analyses and data enrichment are underway.

Support (if any): Mayo Foundation

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0690

EXAMINING THE DIAGNOSTIC VALIDITY OF PAT DEVICE AGAINST CONCURRENT NOCTURNAL POLYSOMNOGRAPHY RECORDING IN A COMMUNITY DWELLING COHORT OF OLDER ADULTS

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Introduction: In a cohort of community dwelling participants, we previously showed a modest correlation for Obstructive Sleep Apnea (OSA) severity between WatchPAT™(WP) and polysomnography (PSG) used on separate night recordings. Given the known night-to-night variability in OSA, we reassess the diagnostic validity of simultaneous peripheral arterial tonometry (PAT) and PSG.

Methods: 65 participants recruited from the community without a prior diagnosis of OSA (39 Female, mean Age=67 yrs (range 56-85), 95% black, mean BMI=29.4 (SD=6.56 kg/m2), mean ESS=7 (SD±3.8) underwent 1-night concurrent in-lab PSG and WP (event detection using PAT), with both oximeters on the same hand. AHI4 by PSG=8.2 (SD 12.9 events/h); 60% had AHI4< 5, 26% mild OSA and 14% moderate-severe OSA. Diagnostic accuracy was assessed using 3 definitions for OSA: AHI4 ≥ 5 events/h, AHI4>15, and RDI ≥ 15. AHI4, RDI, total respiratory events, total sleep time (TST), and percentage TST with oxygen saturation< 90% (O2Sat90) were compared between PSG and WP by correlation and bland Altman plots.

Results: WP data was invalid in three participants. The mean TST assessed by WP was 344mins versus 320mins by PSG (mean ΔPSG-WP=-24.1mins, 95%CI -38 to-10, ICC=0.73). The average number of events for AHI4 detected by WP was 96 vs 50 by PSG (mean ΔPSG-WP=-46, 95%CI -60 to -32, ICC=0.8). The mean pAHI4 assessed by WP was 17.9 events/h versus 8.4 by PSG (mean ΔPSG-WP= – 9.5 events/h, 95%CI -12.4 to -6.5, ICC=0.74). The mean pRDI assessed by WP was 33.3 events/hr versus 13.4 by AHI3A (mean ΔPSG-WP= –19.9 events/h, 95%CI -24 to -15.8, ICC=0.57). The mean O2Sat90 by WP was 0.7% versus 1.0% by PSG (mean ΔPSG-WP = -0.3%, 95%CI 0.2 to -0.7, ICC=0.46). Sensitivity, specificity, PPV, and NPV for OSA using AHI4≥5 were 92%, 38%, 50%, 88%; for AHI4≥15 were 100%, 70%, 36%, 100%, and for RDI≥15/hr were 89%, 30%, 34%, 87%.

Conclusion: The PAT OSA severity metrics were consistently higher than PSG due to detection of greater number of respiratory events by WP and cannot be explained by the slightly higher TST detected by WP. These findings call into question the uncritical use of PAT severity in community dwelling cohorts.

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0691

RETROSPECTIVE CHART REVIEW ON ACCURACY HOME SLEEP APNEA TESTING AND EFFECTIVENESS OF STOPBANG: A COMPARISON TO POLYSOMNOGRAPHY

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Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder caused by intermittent collapse of the upper airway, leading to disrupted ventilation while asleep. A type-III home sleep apnea test (HSAT) can be a convenient way to diagnose OSA due to its ability to detect obstructive apneas and hypopneas. The limitation in a pretest probability tool like STOP-BANG results in underdiagnosis of atypical OSA.
Methods: This is a retrospective chart-review study in a single sleep center conducted at Complete Sleep Solution, Temecula, California, from December 2022 to 2023. Patients selected for this review were 18 and older without comorbidities that required in-lab polysomnography (PSG). All patients had an initial HSAT with records of respiratory events index (REI), apnea hypopnea index (AHI), age, gender, and BMI, respiratory disturbance index (RDI), Epworth, hypertension diagnosis (HTN), snoring symptoms, witness apnea, and STOP-BANG score. Included individuals had an initial HSAT REI< 5 and returned for in-lab PSGs for the confirmation study. The HSAT and PSG results were compared to verify the accuracy of the HSAT.
Results: Among the 1815 charts reviewed, 231 showed negative HSAT results with REI< 5. Only 75 out of 231 patients with negative HSAT results returned to the lab for confirmatory testing. Upon follow-up, 71% of these patients had confirmed diagnoses of OSA via AHI or RDI criteria. With correlation analysis, there is essentially no correlation with the STOP-BANG score (average of 4.3 in the false-negative HSAT group and an average of 3.7 among the true-negative HSAT group). There was further break down on the correlation of AHI, RDI, and REI with each component of the STOP-BANG score (age, sex, gender, snoring, witness apnea, Epworth, HTN, and collar size), and none of each component shows any statistical significance within the correlation analysis.
Conclusion: HSAT is a quick, convenient tool for OSA diagnosis, but due to this, it may lead to delayed diagnosis in patients. In this group of patients, STOP-BANG appears to be an inadequate predictor for negative HSAT testing. Further modification to the screening tool can help screen individuals for whom a home test is inappropriate.
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0692

VALIDITY OF THE NEW GENERAL PRACTICE SLEEPINESS SCALE "GPSS" WITHIN A LARGE COMMUNITY SAMPLE

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Introduction: The GPSS is a new tool for screening at risk patients for obstructive sleep apnoea (OSA) at primary healthcare. However, the GPSS was designed and developed amongst a relatively small and young population with a high pre-test probability of OSA. To better define the accuracy and validity of this tool, broader, community sampled populations are needed.
Methods: We utilised first visit data from the Sleep Heart Health Study (SHHS), defining OSA as an AHI≥15. Questions 5-8 of the GPSS (snoring, witnessed apnoeas, sleepiness and presence of hypertension/diabetes/heart disease/depression) were not directly assessed in the SHHS, thus derived from composites. We compared the GPSS against the STOP-Bang (derived in a similar manner to the GPSS) and the Epworth sleepiness scale (ESS).
Results: 3959 (47.6% female median age 63-years, BMI 27.8) participants had data available to be included. 943 (23.8%) recorded OSA. The median GPSS was 8 (IQR 5, 11), STOP-Bang 3 (IQR 2, 4) and ESS 8 (5, 11). The total continuous GPSS score was significantly associated with OSA (OR 1.24 (95% CI 1.21, 1.26)). GPSS moderate (>7) significantly increased odds for OSA compared to mild (≤7) (OR 3.18 (95% CI 2.59, 3.90)), and GPSS severe (>13) did so compared to moderate (OR 2.59 (95% CI 2.16, 3.11)). Sensitivity and specificity of GPSS moderate was 85.8 & 41.9% respectively, correctly classifying 52.3%, and of GPSS severe was 35.1 & 87.7% respectively, correctly classifying 75.2%. Sensitivity and specificity of STOP-Bang ≥3 was 77.8 & 54.8% respectively, correctly classifying 60.3%, and ESS ≥11 was 34.6 & 74.3% respectively, correctly classifying 64.9%. The ROC, AUC for the 3-level GPSS was 0.69 (95% CI 0.67, 0.71). For the 2-level STOP-Bang this was 0.66 (95% CI 0.65, 0.68) and for the 2-level ESS 0.55 (95% CI 0.53, 0.56). Due to the higher age in the SHHS compared to the GPSS development cohort, we tested adding additional scores for age thresholds 60-75 & >75. This slightly improved the 3-level GPSS AUC to 0.70 (9%% CI 0.68, 0.72).
Conclusion: The GPSS is a valid and reliable tool in a community setting and appears to outperform both the STOP-Bang and the ESS.
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0693

MODIFIED STOP-BANG QUESTIONNAIRE TO DETECT OBSTRUCTIVE SLEEP APNEA IN INDIVIDUALS WITH BMI OF LESS THAN 35 KG/M2

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Introduction: Obstructive sleep apnea (OSA) is a common disease in clinical practice. Due to high prevalence of OSA, a waiting list for polysomnography is long. Using a screening tool to select the high-risk for OSA to be tested for polysomnography is needed. A previous study showed that the STOPBANG questionnaire has a good sensitivity to detect OSA at 83.6%. However, 34 patients out of 177 patients (19.21%) included in the study had body mass index of more than 35 kg/m2. Obese patients grade II, indicated for bariatric surgery, may have different clinical features of OSA. This study aimed to evaluate if the STOPBANG questionnaire needed to be modified in patients with body mass index of less than 35 kg/m2.
Methods: This was a retrospective, analytical study. The inclusion criteria were adult patients who were suspected of OSA and

tested for OSA by polysomnography. Those who were pregnant or met the criteria for bariatric surgery with a body mass index of more than 35 kg/m2 were excluded. Patients were categorized into two groups; OSA and non-OSA group. The STOPBANG factors were calculated to predict presence of OSA by using logistic regression analysis.
Results: There were 188 patients included in the study. Of those, 158 patients (84.04%) were diagnosed as OSA. Among eight factors in the STOPBANG criteria, only age was independently associated with presence of OSA after adjusted by other variables. An adjusted odds ratio for age was 1.04 (95% confidence interval of 1.02, 1.08). The cut-off points of three numerical factors to predict presence of OSA including age, body mass index, and neck circumference were as follows: age of 40 years with sensitivity of 84.18%, body mass index of 23 kg/m2 with sensitivity of 82.91%, and neck circumference of 35 cm with the highest sensitivity of 86.08%.
Conclusion: The STOPBANG questionnaire may need to be modified for individuals with body mass index of less than 35 kg/m2 who were suspected for OSA. Age, neck circumference, and body mass index cutpoints were 40 years, 35 cms, and 23 kg/m2, respectively.
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0694
REMOTE PATIENT MONITORING (RPM) OF OBESE OBSTETRIC PATIENTS TO IDENTIFY ONSET OF OSA USING THE REST TRACKER: MONITORING AT RISK POPULATIONS

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Introduction: Obstructive-Sleep-Apnea (OSA) can develop during pregnancy and is associated with gestational-diabetes, hypertension, preeclampsia, and eclampsia risk. Continuous evaluation is necessary throughout pregnancy; however, this is not currently a standard practice. The REST-Tracker, a Remote Patient Monitoring platform for OSA management is being assessed for the feasibility to identify the onset of OSA in the obese pregnant population.
Methods: The REST-Tracker utilizes data from a Ring-Oximeter worn nightly, using Cardiopulmonary Coupling (CPC)analysis, an FDA cleared cloud-based computing system called SleepImage™. It provides OSA metrics with two levels of sensitivity (sAHI_3% & sAHI_4%). Inclusion-criteria: BMI >27, entry < 16 weeks gestational-age, (GA) no prior OSA diagnosis. Analysis: paired t-test of average AHI prior to 16 weeks gestation compared to Ave AHI from the last 4 collection points prior to delivery.
Results: 30 subjects screened of which 27 subjects completed the study to delivery, 1 suffered an early termination, 2 excluded for lack of compliance. Statistics from those completing the study: Initial BMI: 36.7 (+/- 5.91), GA on initiation of monitoring 12.39 weeks (+-3.29), GA at Delivery 36.8 (+/- 2..6). The initial sAHI3% sleep was 5.01 (+/-2.79), the final sAHI3% 9.35 (+/-5.74) with a significant increase across pregnancy (p< 0.001). The initial sAHI4% was 2.94 (+/-1.56), the final sAHI4% 5.48 (+/-3.40), with a significant increase across pregnancy (p< 0.001). Initial High Frequency Coupling (Stable-Sleep) Average was 52.04 (+/-17.60) and final was 39.44 (+/-18.18) with a significant decrease in Stable Sleep (< 0.001)
Conclusion: This study demonstrates the REST-Tracker provides OSA monitoring of at-risk maternal patients in a fashion that may provide the ability to help mitigate obstacles in managing OSA during pregnancy. OSA tends to evolve through the course of pregnancy. The REST-Tracker can become a routine method to monitor at-risk maternal patients to identify the onset of OSA, allowing quick interventions to be implemented when necessary, such as CPAP or dental appliances. This approach can also be used to further assess the relationship between OSA adverse gestational outcomes, including hypertension, diabetes and eclampsia. This approach can translate to address other at-risk populations and improve treatment decisions.
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0695
UNDERDIAGNOSIS OF OBSTRUCTIVE SLEEP APNEA IN HOSPITALIZED PATIENTS WITH HEART FAILURE DETECTED BY RESPIRATORY POLYGRAPHY AT TERTIARY HOSPITAL IN PERU

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Introduction: Obstructive Sleep Apnea (OSA) is often undiagnosed in heart failure (HF) patients. Early identification using affordable sleep studies could improve patient outcomes in resource-limited clinical settings like Peru. Therefore, the main objective of this study was to determine the frequency of OSA in hospitalized HF patients using respiratory polygraphy (RP) (Sleep Study Type III).
Methods: A cross-sectional study was conducted. We included patients >18 years, with exacerbated HF, and STOP-BANG ≥ 3. Enrolled patients underwent overnight RP using ApneaLink Air™. Data collected included clinical parameters, Epworth Sleepiness Scale, and echocardiography results. Statistical analysis was carried out using R Studio.
Results: From 46 enrolled patients, 39 underwent successful RP; 84.61% were diagnosed with OSA. Patients exhibited a mean Apnea-Hypopnea Index (AHI) of 14.41 ± 10.08/h with mild (51.28%), moderate (25.64%), and severe (7.69%) cases. Symptoms associated with OSA included lack of restorative sleep and concentration problems. RP data showed a mean minimum SpO2% of 76.85 ± 9.99% and an Oxygen Desaturation Index (ODI) of 20.01 ± 10.66. Correlation analysis indicated a strong positive correlation association between AHI and ODI (r = 0.73, p < 0.001) and a moderate negative correlation between AHI and LVEF (r=- 0.64, p= 0.056)
Conclusion: This study highlights a high frequency of OSA among HF inpatients in our institution, emphasizing its relationship with symptoms and cardiovascular parameters
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0696

RESULTS OF AN INPATIENT SLEEP APNEA SCREENING PILOT WITH STOPBANG IN PATIENTS ADMITTED TO A CARDIOLOGY WARD

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Introduction: Obstructive sleep apnea (OSA) is a widely prevalent but underrecognized condition that shares many risk factors with major cardiac disease. OSA is an independent risk factor for cardiac readmissions with an effect size exceeding that of other known predictors in heart failure readmissions. The STOP-BANG questionnaire represents an easy and cost-effective screening tool for OSA, but the feasibility and utility of implementing this screening in hospitalized cardiac patients at scale is unknown. We hypothesized that STOP-BANG can be successfully administered by nursing staff and higher STOP-BANG is associated with hospital readmission in patients admitted to a cardiac specialty ward.

Methods: We conducted a prospective quality improvement project in patients admitted to the Johns Hopkins Hospital Progressive Cardiac Care Unit (PCCU) from May 2022 through May 2024. Patients underwent screening with STOP-BANG upon admission intake by nursing-administered questionnaire. We analyzed proportion of patients screened and readmission rates from internal and external health record databases. Patients with known sleep disordered breathing adherent to positive airway pressure therapy were excluded from analysis.

Results: We screened a total of 1981 patients admitted between May 2022 and May 2024, of whom 36.7% were extended surgical recovery, 53.6% were inpatient and 9.7% were observation status. Initial screening rate was 92%; however this gradually declined through the study. 13.7%, 37.1% and 49.2% of respondents were classified by risk of OSA as high (STOP-BANG scores 5-8), intermediate (3-4), and low (≤2), respectively. The net 30 day readmission rate was 8.7%. Elevated STOP-BANG score was not associated with higher 30 day, 90 day or 1 year readmissions, or total days of hospitalization. Analysis by admission class, presence of comorbid conditions and severity of illness did not identify subgroups in whom STOP-BANG predicted elevated re-admission risk.

Conclusion: Among patients admitted to a cardiac ward, systematic OSA screening by nursing was feasible but OSA risk assessed by STOP-BANG did not predict hospital readmission or cumulative hospitalization days. Since cardiac patients are at risk for central sleep apnea, current screening tools may misclassify these patients. Alternative scalable methods are necessary to discern the impact of untreated sleep apnea on readmission risk in this population.

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0697

EVALUATING THE LONGITUDINAL UTILITY OF THE BERLIN QUESTIONNAIRE FOR OBSTRUCTIVE SLEEP APNEA RISK: A SEQUENCE ANALYSIS APPROACH

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Introduction: The Berlin Questionnaire (BQ), validated cross-sectionally and widely used, identifies Obstructive Sleep Apnea (OSA) risk. Its longitudinal performance remains unexamined. We used Sequence Analysis to evaluate temporal trajectories of BQ-identified-OSA risk, distinguish clusters with similar trajectories, and characterize cluster differences.

Methods: Retrospectively, we studied Fire Department of the City of New York World Trade Center Program participants who completed BQ across multiple time points from 2009-2024. At each exam, participants scored into one of four categories based on their number of positive BQ domains – snoring, fatigue, blood pressure/body mass index: no-risk (0/3), low-risk (1/3), high-risk (2/3), extreme-risk (3/3). We applied Sequence Analysis to identify longitudinal sequences of BQ risk classifications, clustering participants with similar risk trajectories. We calculated relative risk (RR) using log-binomial regression and computed p-for-trend for all outcomes. Models adjusted for age at first BQ, race, sex, and smoking status.

Results: From 13,038 participants with 3 or more BQ exams (Mean=11), we identified 6 distinct sequence clusters: mostly no-risk (20.4%), mostly low-risk (29%), mostly high-risk (14.7%), mostly extreme-risk (8.1%), intermittent survey gaps (16.7%), and truncated follow-up (11.1%). 80% of participants consistently scored into their cluster's corresponding BQ-risk category >50% of surveys, with the mostly extreme-risk cluster showing similar results, doing so 80% of the time. Increasing risk severity cluster is associated with having a polysomnogram (PSG), PSG-diagnosed OSA, and self-reported use of positive airway pressure (PAP) (p-for-trends< 0.0001, separate model per outcome). Respectively, those in mostly high-risk and mostly extreme-risk clusters had 6.38 (RR=6.38; 95%CI=5.56-7.32) and 9.10 (RR=9.10; 95%Cl=7.95-10.42) times greater likelihood to have PSG-AHI>15 events/hour compared with the mostly no-risk cluster. Those in the mostly extreme-risk cluster had 43% greater likelihood of PSG-diagnosed OSA compared with the mostly high-risk cluster (RR=1.43; 95%Cl=1.35-1.51).

Conclusion: Generally, most participants remained consistent in BQ-OSA-risk category over 15 years of study. Increasing risk severity cluster is associated with PSG-diagnosed OSA outcomes. Extreme- and high-risk clusters differed significantly, providing rationale for the use of three BQ risk categories in research settings. These findings suggest potential use of BQ risk as an OSA proxy in longitudinal studies.

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0698

PREDICTION OF OBSTRUCTIVE SLEEP APNEA BASED ON HEAD AND NECK MORPHOLOGY

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Introduction: Craniofacial morphology is a significant predisposing factor in the pathogenesis of obstructive sleep apnea (OSA). A screening tool for OSA that can be used by individuals or primary care physicians before overnight sleep studies would be beneficial. This study aimed to develop an artificial

intelligence (AI)-based OSA prediction tool using head and neck photographs and clinical information.
Methods: We analyzed a retrospective cohort of 2,538 subjects from the sleep clinic of Kangwon National University Hospital in Korea. The center routinely collected frontal and lateral face and neck photographs, age, sex, body mass index (BMI), and Epworth Sleepiness Scale (ESS) scores before polysomnography. Of these, 855 subjects with photographs of suitable quality were included in the study. To predict OSA status, we employed logistic regression and machine learning techniques, including random forests (RF), gradient boosting (XGBoost and LightGBM) and neural networks.
Results: The study included 616 men and 239 women, with a mean age of 50.2 years (standard deviation: 17). The distribution of apnea-hypopnea index (AHI) categories was as follows: AHI < 5 (n=246), 5–15 (n=204), 15–30 (n=202), and >30 (n=297). When classifying into AHI < 15 versus ≥15 groups, models incorporating age, sex, and BMI achieved the following accuracies: 0.72 (RF), 0.68 (XGBoost), 0.72 (LightGBM), and 0.70 (logistic regression). Adding the ESS reduced accuracy across all methods. For models that included head and neck photographs, accuracy remained at 0.72 without ESS but improved to 0.79 when ESS was added using a neural network model. When differentiating between AHI < 5 and AHI >30), the accuracy further increased to 0.79 without ESS and 0.88 with ESS.
Conclusion: Head and neck photographs enhance the accuracy of AI-based models for predicting OSA. ESS improved performance when photographs were included in the model. AI-driven prediction tools show potential as screening methods for differentiating between normal and severe OSA.
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0699

EXPLORING KNOWLEDGE ABOUT OBSTRUCTIVE SLEEP APNEA (OSA) AMONG HEALTHCARE PROVIDERS: A NARRATIVE REVIEW OF RESEARCH USING THE OSAKA QUESTIONNAIRE

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Introduction: Obstructive Sleep Apnea (OSA) is a concerning sleep disorder, yet awareness about OSA remains low among many healthcare clinicians. A global study of medical schools revealed that the average medical student receives only 2 hours of sleep education during their medical education. Given this training gap, we conducted a systematic review of published research assessing OSA knowledge and attitudes among primary care clinicians using the Obstructive Sleep Apnea Knowledge and Attitudes (OSAKA) questionnaire.
Methods: We conducted a review of the published literature to identify studies that administered the OSAKA questionnaire to samples of primary care clinicians and/or resident physicians. The population was not restricted to U.S providers and included providers in rural communities. The search strategy included ("OSAKA," apnea, and "primary care"). The search was implemented in PubMed on August 16, 2024. Studies conducted in English were eligible, excluding 10 papers written in Spanish. Studies that met inclusion criteria underwent rigorous qualitative data extraction. Data extracted included details about the participants, sample size, country of origin, and summary statistics for OSAKA questionnaire responses. Low and high mean responses are reported. All but 2 studies provided mean values for OSA knowledge and attitude responses. We provide an overall mean for OSA knowledge and attitude sub scales, calculated as the aggregate mean of studies reporting these statistics.
Results: The search resulted in 10 articles that included data collected in cross-sectional studies of 2,623 providers. Among the studies included in this review, 60% recruited primary care clinicians, 20% recruited physician residents, 10% recruited cardiologists, and 10% recruited general practitioners. Provider OSA knowledge, according to the OSAKA ranged from 54% to 77% with an average knowledge score of 66.6%. OSA attitudes ranged from 46% to 75% with an average OSA attitude score of 60.1%.
Conclusion: The results of this review reveal significant gaps in OSA knowledge and attitudes among primary care clinicians. Primary care clinicians can serve as an integral role in identification and screening of OSA in the general population. These findings suggest an urgent need for expanded medical education that can bolster OSA knowledge and attitudes among providers.
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0700

MEASURING SLEEP BETWEEN SEX: ACCURACY, SENSITIVITY, AND SPECIFICITY OF WRIST ACTIGRAPHY COMPARED TO POLYSOMNOGRAPHY

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Introduction: Sleep patterns differ between sex, so it is imperative that sleep metrics used are consistent across sex. We investigated the accuracy, sensitivity, and specificity of actigraphy-measured sleep vs. PSG in older males and females.
Methods: PSG for each participant was recorded overnight at bedside. During a separate period of seven consecutive nights, actigraphy was collected for each participant at home using wrist-worn actigraphs on the non-dominant hand. Sleep time was validated with participant-provided sleep logs. Statistical analyses, including t-tests, chi-square tests, and sensitivity-specificity assessments, were performed. Lin's concordance correlation coefficient (CCC) and reduced major axis regression (RMAR) were utilized as measures of agreement and proportional bias, respectively
Results: The study included 151 community-dwelling older adults (ages 47-84) evaluated at the NYU Alzheimer's Disease Research Center and enrolled in studies investigating sleep health and aging. Of the 151 participants, 108 (71.5%) were white, 97

(64.2%) were females, and 71 (47.0%) had OSA (defined as apnea hypopnea index [AHI] > 5%). Among mean PSG-measured sleep parameters, Sleep Efficiency was 81.2% (SD 11.81%), Total Sleep Time (TST) 373.4 (76.06) minutes, Sleep Latency 12.4 (22.34) minutes, and Wake Time 72.6 (45.4) minutes. Among male participants, sensitivity was moderate (0.637), and specificity was low (0.238). Among female participants, sensitivity was moderate (0.642), and specificity was low (0.206). The largest difference among measures was in TST in both males and females: actigraphy overestimated TST by 23.06 (85.92) minutes in males, and 27.99 (107.61) minutes in females. Lin's CCC was low (< 0.9) for all actigraphy-measured parameters compared to PSG, regardless of sex. In addition, RMAR slopes (≠ 1) suggest proportional bias across all measures, while RMAR intercepts (≠ 0) for all measures show fixed bias, regardless of participant's sex.
Conclusion: In this study population, there was low accuracy and concordance of actigraphy measured sleep parameters compared to PSG, with both proportional and fixed bias across measures, regardless of sex. Additional research with a larger sample size is needed to ensure PSG/Actigraphy concordance across sex.
Support (if any):

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0701

PERFORMANCE OF SLEEP APNEA QUESTIONNAIRES AMONG DIFFERENT SKIN TONES USING SANSA DEVICE

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Introduction: Obstructive sleep apnea (OSA) is a common condition associated with multiple co-morbidities, however, diagnostic challenges limit its recognition. Sleep screening has improved our recognition, and Home Sleep Apnea Testing (HSAT) has improved access to testing for OSA. The SANSA© device is an FDA cleared novel HSAT patch device that records 8 essential physiologic parameters (pulse oximetry, actigraphy, ECG-based heart rate and rhythm, respiratory effort, chest movement, snoring, and body position) to diagnosis OSA. We aimed to evaluate the performance of validated sleep apnea screeners, STOP-Bang (SB) and DOISNORE50 (DIS), in predicting OSA using the SANSA device and in-lab polysomnogram (PSG) comparing the results with lighter and darker skin tones.
Methods: In this multi-centered prospective trial, patients referred for PSG underwent simultaneous SANSA testing and completed the SB and DIS questionnaires. An AHI of > 5 was diagnostic of OSA, and skin tones were graded on the Fitzpatrick scale. SB and DOISNORE50 thresholds of disease (> 3 and > 4, respectively) were used to identify a patient at risk of OSA.
Results: Analysis included 154 patients who completed sleep screening questionnaires of whom 141 (91.6%) of patients tested positive for OSA. Receiver operating characteristic (ROC) curve analysis demonstrated that both SB and DIS questionnaires performed similarly in identifying patients who tested positive for OSA by SANSA, with area under ROC (AUROC) values of 0.711 and 0.677 among lighter skin tones (Fitzpatrick < 3), and AUROC values of 0.520 and 0.515 among darker skin tones (Fitzpatrick ≥ 3), respectively. Further, AUROC for each questionnaire improved by increasing the questionnaire positivity threshold by one (SB > 4, DIS > 5) in patients with darker skin tones for SB (0.520 to 0.716, $p < 0.001$) and DIS (0.515 to 0.714, $p < 0.001$) respectively.
Conclusion: These data demonstrated similar performance of the STOP-BANG and DOISNORE50 to predict OSA across skin tone with both Sansa and in lab polysomnogram. Additionally, adjusting the previously validated thresholds of SB and DIS for patients with darker skin tones improved test performance for OSA. Further study is needed.
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0702

SINGLE-NIGHT SLEEP STUDIES SHOW REDUCED SENSITIVITY IN CLASSIFYING MILD OSA IN WOMEN COMPARED TO MEN

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Introduction: Studies assessing obstructive sleep apnea (OSA) across multiple nights indicate that single-night studies may misclassify up to 50% of diagnoses. This discrepancy may result from sex-based differences in classification using diagnostic devices (i.e. home sleep studies, wearables). This study aimed to 1) evaluate how night-to-night variability in OSA severity affects diagnostic classification using cardiopulmonary coupling derived metrics, and 2) assess the impact of sex differences on classification accuracy over multiple nights.
Methods: In this prospective study of 44 adults (20 men, 24 women) mean age 53.5±18.6 years; range 22–78) with untreated OSA, participants wore a sleep tracker (SleepImage®) at home for 15 nights ≥2 hours per night. The apnea-hypopnea index(-sAHI) was measured using cardiopulmonary coupling derived metrics (mean sAHI3%= 20.6, SD=14.3; sAHI4% = 14.0, SD=11.9). In participants with at least 13 nights, the 1st, 3rd,7th, & 12th night averages for sAHI3% and sAHI4% were classified as no OSA (AHI ≤ 5), mild (5< AHI< 15), moderate (15≤ AHI< 30), & severe (AHI≥ 30) with a confusion matrix used to evaluate classification accuracy as compared to the average metrics across all nights.
Results: In the total sample, sAHI3% and sAHI4% overall sensitivity respectively was 75% and 71% for 1 night, 84% and 71% for 3 nights, 96% and 89% for 7 nights, and both were 96% for 12 nights. Sensitivity of women classified as mild OSA (sAHI3%) over one night was 57%, compared to 80% for men. Sensitivity of mild OSA in women (sAHI4%) over one night was 64%, compared to 86% for men. When averaging 7 nights, the sensitivity of mild OSA was 100% for both men and women at sAHI3% and 100% in women and 91% in men at sAHI4%.
Conclusion: Sleep apnea classification is more accurate in men than in women with mild OSA when measured ≤7 nights. Greater variability in women's sAHI may reduce the accuracy of standard OSA severity classification for both sexes.
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0703

CONCORDANCE OF PSG AND ACTIGRAPHIC MEASUREMENT OF SLEEP AND WAKE IN A PRELIMINARY SAMPLE OF COGNITIVE NORMAL BLACK/AFRICAN AMERICAN OLDER ADULTS

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Introduction: This study evaluated the concordance between polysomnography (PSG) and actigraphy in assessing sleep and wake patterns among cognitively normal Black/African-American older adults. Specifically, the study sought to evaluate the precision of actigraphy as a screening tool compared to PSG and determine whether actigraphy yields comparable accuracy to PSG across different racial groups.
Methods: The study analyzed data from 43 Black/African Americans aged 60 years or older, all participants in NYU Langone studies on sleep and aging. Each participant wore an actigraph for seven days and underwent one or two nights of PSG in a supervised laboratory setting. Key variables assessed included sleep efficiency (proportion of time spent asleep relative to time in bed), total sleep time (duration from sleep onset to awakening), sleep latency (time taken to fall asleep after lights-off), and wake-up time (time of awakening from sleep).
Results: For Black/African American participants, the actigraph showed mixed agreement with PSG across sleep variables. Overall, sensitivity (0.641) was moderate, whereas specificity (0.220) was low; similarly, for blacks the sensitivity (0.624) was moderate, and specificity (0.254) was low. The mean difference (±SD) for total sleep time was 4.21 (11.98), with a 95% CI of -213 to 222. Sleep efficiency demonstrated a mean difference of -3.05 (14.15), with a 95% CI of -30.7 to 24.6. Wake time had a mean difference of 2.53 (57.92), with a 95% CI of -111 to 116. Sleep onset latency exhibited a mean difference of 8.32 (21.06), with a 95% CI of -33 to 49.6. The actigraph showed limited agreement with PSG across sleep variables in both racial groups, with lower concordance observed for Non-Hispanic White participants compared to Black/African American participants.
Conclusion: Actigraphy demonstrated limited agreement with the gold-standard PSG in both Black/African American and non-Hispanic White participants. Among Black participants, the actigraph overestimated total sleep time, highlighting a discrepancy in accuracy. These findings suggest further research to concurrently evaluate actigraphy and PSG in diverse populations to improve actigraphy's reliability as a sleep assessment tool.
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0704

DEVELOPMENT OF SLEEP APNEA SCREENING TOOL USING ECG AND OXIMETRY FROM POLYSOMNOGRAPHY: APPLICATION IN STROKE UNIT

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Introduction: We previously conducted a retrospective analysis of polysomnography (PSG) electrocarttiography (ECG) data to classify obstructive sleep apnea (OSA) using deep learning analysis (DLA). The study achieved a ROC AUC score of 0.7077 and an F1 score of 0.67, demonstrating its potential as a screening tool for OSA. In this study, we further analyzed oximetry data extracted from PSG and explored the integration of ECG- and oximetry-based screening tools into vital sign monitoring devices within the stroke intensive care unit (SU) to evaluate their clinical utility in real-world settings.
Methods: We retrospectively analyzed PSG data collected between 2015 and 2023. OSA was classified into two categories: normal/mild and moderate/severe, based on the apnea-hypopnea index (AHI). For DLA, oximetry data were converted into Mel-spectrograms and analyzed using a Convolutional Neural Network, generating a confusion matrix. Additionally, we assessed the utility of the screening tool in patients admitted to the SU between January and October 2024. PSG was conducted for patients meeting the following criteria: STOP-BANG score ≥3, witnessed snoring or apnea, and a Modified Mallampati Score ≥3.
Results: Out of 1,806 PSG records, 252 cases with arrhythmias were excluded, leaving 1,554 records for analysis. OSA was classified as normal/mild in 616 cases and moderate/severe in 938 cases. The DLA results for oximetry yielded a ROC AUC score of 0.7814 and an F1 score of 0.79. In the SU cohort, 211 patients were evaluated. After excluding 34 cases with arrhythmias and 67 instances of data loss, 110 patients remained. Among these, 49.5% had a STOP-BANG score ≥3, 40.4% were suspected of having OSA based on oximetry data, and 60.6% based on ECG data. Among the five patients who underwent final PSG testing, oximetry demonstrated an accuracy of 80%, while ECG achieved 100%.
Conclusion: Our findings suggest that DLA using oximetry showed higher accuracy in retrospective PSG data compared to ECG. However, in the SU setting, oximetry faced challenges due to variations in sampling rates across devices. In contrast, ECG data demonstrated more consistent sampling rates, providing a clinical advantage. Further studies are warranted to validate and optimize both approaches for widespread application.
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0705

SAMPLING OF ARTERIAL BLOOD GAS ANALYSIS BEFORE PSG FOR EVALUATION FOR HYPOVENTILATION: WHEN IS THE BEST TIME?

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Introduction: Carbon dioxide (CO2) levels change during sleep in patients with obesity hypoventilation syndrome (OHS), obstructive sleep apnea with coexistent OHS, and respiratory failure. Transcutaneous carbon dioxide monitoring (TCM) during polysomnography (PSG) provides both continuous and non-invasive estimation of the CO2. TCM can be helpful in early recognition of hypoventilation. Untreated hypoventilation is associated with high morbidity and mortality. Recognizing hypoventilation and initiating appropriate treatment interventions can help lower this burden of morbidity and mortality. Despite TCM's potential benefits, it's not always included during PSG and not used at all sleep centers. Arterial blood gas (ABG) sampling before PSG can be helpful in determining the accuracy of the CO2 measurement using TCM at sleep onset during PSG. There is no current consensus on when ABG sampling should be performed before PSG. We are obtaining ABG sampling within 48 hours before the PSG at our center and will evaluate the accuracy of pTCO2 measurement with PaCO2 from ABG with the timing of the ABG sampling.
Methods: Starting in early March 2024, as a quality improvement effort, we added ABG sampling within 48 hours and included TCM during the PSG for patients who presented at an community-based academic sleep center for clinical evaluation for hypoventilation. We are collecting demographic variables including age, gender, body mass index range and cardiovascular and pulmonary comorbidities. We plan to evaluate the association between 1) the PaCO2 and 2) bicarbonate from the ABG with the 3) sleep onset and peak TCO2.
Results: To date, 30 patients seeking clinical evaluation for hypoventilation who completed ABG sampling within 48 hours before PSG and TCM during the PSG. 67% of the patients are female. Mean age of 51 ± 15.4 years and a BMI of 40.79 ± 10.73kg/m2. We will plan to continue this quality improvement effort until March 2025. Results to be shared.
Conclusion: ABG sampling within 48 hours before PSG and TCM during the PSG is feasible and might help with early recognition of hypoventilation.
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0706

TESTOSTERONE THERAPY AND THE RISK OF OBSTRUCTIVE AND CENTRAL SLEEP APNEA IN TRANSMASCULINE PATIENTS: A POPULATION-BASED COHORT STUDY

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Introduction: Testosterone can impact factors such as neck circumference, fat distribution, and airway characteristics, potentially elevating the risk of obstructive sleep apnea (OSA). It may also affect respiratory control, raising the apneic threshold and contributing to central sleep apnea (CSA). While studies in cisgender men have produced inconclusive findings regarding the relationship between testosterone and sleep apnea (SA), research in premenopausal women with hyperandrogenic conditions indicates a higher SA prevalence. This study aims to investigate the association between testosterone therapy and the diagnosis of OSA and CSA in transmasculine individuals.
Methods: Data were sourced from TriNetX, a database with de-identified health records of over 120 million U.S. patients across 84 healthcare organizations. Transmasculine individuals were identified using ICD-10 codes for gender identity disorders and testosterone therapy, excluding those with a prior SA diagnosis. The index date was defined as three months post-testosterone initiation to account for physiological changes. Cisgender male and female cohorts were matched using propensity scores for BMI, smoking, and other SA risk factors. The primary outcome was SA incidence, identified through ICD-10 G47.3x codes. Kaplan–Meier analysis was used to estimate the probabilities of SA, with log-rank test group comparisons. Hazard ratios (HR) and 95% confidence intervals (CI) were calculated using the Cox proportional hazards model, with significance set at $p < 0.05$.
Results: Among 22,745 transmasculine patients, the SA risk was significantly higher compared to matched cohorts of cisgender women (HR: 3.01, CI: 2.70–3.36, $p < 0.0001$) and men (HR: 1.64, CI: 1.49–1.81, $p < 0.0001$). The risk of OSA was elevated, with HRs of 3.25 (CI: 2.88–3.67, $p < 0.0001$) and 1.74 (CI: 1.57–1.95, $p < 0.0001$) compared to cisgender women and men, respectively. Moreover, there was an 18-fold increased risk of CSA compared to cisgender women (HR: 18.44, CI: 4.24–80.12, $p < 0.0001$).
Conclusion: Transmasculine individuals receiving testosterone therapy are at significantly higher risk of developing both OSA and CSA compared to cisgender individuals. These findings underscore the need for heightened clinical vigilance for SA in this population. Future studies should explore the underlying mechanisms and assess the impact of testosterone dose, duration, and patient-specific factors on SA risk.
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0707

BRIDGING SPECIALTIES: AN INTEGRATED SLEEP MEDICINE-CARDIOLOGY REFERRAL PROGRAM FOR SLEEP APNEA

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Introduction: OSA is associated with cardiovascular disease and contributes to morbidity and mortality. Much of the population with cardiovascular disease who are at risk for OSA remains undiagnosed. To increase the identification of patients with OSA in this population, we implemented OSA screening and HST testing in cardiology practices. We describe the results of a cooperative effort between seven Cardiology practices and Sleep Medicine within the Northwell Health system.
Methods: We conducted a retrospective analysis of 446 cardiology practice patients deemed to be at risk for OSA by screening questionnaire or clinical assessment who underwent WatchPAT

HST between 1/1/23 to 12/31/23. Patients were referred for sleep medicine consultation if HST showed AHI ≥5/hr.
Results: Of the patients with valid HST data (n=432), 8% had heart failure, 79% of which were found to have OSA (41% AHI≥15). 5.3% had a history of MI, 70% of which had OSA (53% AHI≥15). 26% had atrial fibrillation, 71% of which had OSA (36% AHI≥15). 4% had a history of CVA, 65% of which had OSA (41% AHI≥15). 71% of patients (n=432) had AHI≥5/hr (n=306). Of those with AHI≥5/hr, 47% had mild (n=145), 29% moderate (n=89), and 24% severe OSA (n=72). 74% of patients with AHI≥5/hr (n=226) initiated care with sleep medicine physicians. 41% of patients chose CPAP for initial treatment (n=124), 23% were mild (n=29), 33% were moderate (n=41), and 44% were severe OSA patients (n=54). 70% of patients who chose CPAP initiated CPAP (n=87), 24% were mild (n=21), 28% were moderate (n=24), and 48% were severe OSA patients (n=42). Of the patients who initiated CPAP, 45% (n=39) were adherent to therapy (usage ≥4hr/night for 70% of nights) during the initial 90-day compliance period, 26% were mild (n=10), 26% were moderate (n=10), and 49% were severe OSA patients (n=19).
Conclusion: In this retrospective study, a notably high proportion (71%) of screened Cardiology patients were diagnosed with OSA via HST. 53% of those diagnosed had moderate to severe OSA. CPAP adherence rates among patients referred to sleep medicine were suboptimal. Further intervention is needed to improve adherence to therapy in this at-risk population.
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0708

PHYSICAL ACTIVITY, DIETARY QUALITY, AND WEIGHT MANAGEMENT BEHAVIORS IN PATIENTS WITH UNTREATED OBSTRUCTIVE SLEEP APNEA

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Introduction: Obstructive sleep apnea (OSA) increases the risk of cardiovascular (CV) disease. However, many patients remain untreated due to intolerance of OSA therapies. A healthy lifestyle is foundational to CV health and may mitigate CV risk in these patients. Herein, we examine physical activity, dietary quality (DQ), and weight management behaviors in patients with untreated OSA.
Methods: Patients with untreated OSA (n=28) were recruited from an academic sleep surgery clinic. Healthy Eating Index scores (HEIs) were obtained via Mini-EAT questionnaires (unhealthy DQ = score < 61; intermediate = score 61-69; healthy = score >69). Physical activity level was determined via Nordic Physical Activity Questionnaire-short survey (suboptimal = < 150 minutes/week based on the U.S. Department of Health and Human Services' Physical Activity Guidelines). Patients were also surveyed about weight management behaviors. OSA treatment history and apnea-hypopnea index (AHI) were determined from chart review. Welch's t-tests and chi-square tests were applied in analyses.
Results: On average, participants were middle-aged (52.6 ± 12.7 years), had overweight (BMI, 27.2 ± 4.8 kg/m2), moderate-severe OSA (AHI, 24.0 ± 21.8), and unhealthy DQ (HEI 60.3 ± 6.6). Sixteen participants had previously tried and/or were intolerant of continuous positive airway pressure (CPAP, n=10), oral appliance therapy (OAT, n=2), or both (n=4). Physical activity level in the overall cohort was low, with 18 participants (64.3%) engaging in < 150 minutes of weekly exercise, including 7 reporting < 30 minutes of weekly exercise. Of 18 patients with a BMI ≥ 25 kg/m2, 10 (55.6%) were attempting to lose weight, of whom 5 had attempted dietary modifications.
Conclusion: The majority of patients with untreated OSA presenting to sleep surgery clinic had not tolerated or had been inadequately treated with medical OSA therapy. Despite the association between untreated OSA and elevated CV risk, these patients demonstrated suboptimal physical activity levels and DQ. Targeted support for lifestyle interventions to improve physical activity and DQ may be warranted in this clinical population to curb CV risk.
Support (if any):

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0709

COMPARISON OF TRACKING OSA FROM PAP MACHINE DATA VS CARDIOPULMONARY COUPLING BASED ASSESSMENT OBTAINED FROM NIGHTLY RING MONITORING

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Introduction: Management of OSA by Remote-Patient-Monitoring (RPM) methods has been gaining momentum, mainly utilizing the data obtained from PAP devices providing a metric represent an Apnea-Hypopnea-Index (pAHI). The REST-Tracker, a ring-based RPM platform, provides FDA-cleared methodology by SleepImage rendering AHI metrics ('ahi_3%' and 'ahi_4%') vai cardiopulmonary-coupling analysis. This study evaluates the REST Tracker AHI metrics to the ResMed PAP pAHI metric from patients utilizing both systems.
Methods: Data from 70 patients on PAP with at least 30 nights of simultaneous data from both REST-Tracker and PAP device. Nights with < 20% difference in usage time between devices were included, resulting in 7,835 nights of data for statistical analysis. Metrics included 'ahi_3%' and 'ahi_4%' (REST Tracker / SleepImage) and 'pap_ahi' (ResMed-AirView). Statistical analyses, including T-test and Bland-Altman plots, were used to assess agreement between the methods.
Results: The average AHI values and standard deviations were as follows: 'ahi_3%' had a mean of 10.67 (±8.45), 'ahi_4%' had a mean of 5.38 (±5.69), and 'pap_ahi' had a mean of 4.21 (±6.73). Average usage times were 7.26 (±1.43) hours for the REST Tracker and 7.60 (±1.40) hours for the PAP device, demonstrating similar nightly usage. T-tests revealed significant differences between the REST Tracker metrics and PAP AHI values, with t-statistics of 52.99 ($p < 0.001$) for 'ahi_3%' vs 'pap_ahi' and 11.72 ($p < 0.001$) for 'ahi_4%' vs 'pap_ahi'. Bland-Altman analysis showed mean differences of 6.47 and 1.17 for 'ahi_3%' and 'ahi_4%' vs 'pap_ahi', respectively, with wide 95% limits of agreement, indicating variability and non-equivalence.
Conclusion: Our findings demonstrate that PAP AHI measurements are not equivalent to REST Tracker / SleepImage metrics, as demonstrated by Bland-Altman analysis and significant t-test results. The ResMed AHI was less sensitive than the REST Tracker's ring-based (SleepImage) platform. Additional limitations of PAP-based RPM approaches include no data when the PAP device is not in use, further limiting the value of this approach. As an alternative to the current trend of utilizing PAP-based metrics for RPM, implementing FDA-cleared

wearables with better sensitivity of OSA characterization should be embraced as these approaches will raise the standard of care.
Support (if any):

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0710

THE DIFFERENTIAL IMPACT OF RESPIRATORY EVENT SCORING RULES ON HEALTHCARE DISPARITIES IN SLEEP MEDICINE

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Introduction: The relationship between sleep regularity and health outcomes in obstructive sleep apnea (OSA) is gaining recognition; however, its connection to continuous positive airway pressure (CPAP) treatment remains underexplored. This study hypothesized that CPAP treatment enhances sleep regularity, which may subsequently improve cognitive function and reduce 24-hour ambulatory blood pressure (BP) variability.
Methods: Patients with moderate-to-severe OSA from two centers were randomized (1:1) to 12 weeks of CPAP or inactive control. The primary endpoint was 7-day sleep onset, offset, and midsleep time measured by actiwatch. Secondary endpoints included mean reaction time from the Psychomotor Vigilance Task (PVT), correct trials from the Digit Symbol Substitution Test (DSST), and 24-hour BP. Variability in outcomes was assessed using standard deviation. CPAP effects were analyzed by intention-to-treat and per-protocol methods, including participants who adhered to the protocol.
Results: Of 67 participants, 52 were randomized to CPAP (n=26) or control (n=26). In the CPAP group, 75.2% averaged ≥4 hours of nightly use. CPAP did not significantly affect sleep onset (median=00:06), offset (median=-00:17), midsleep time (median=-00:16), PVT mean reaction time (median=5 msec), or DSST correct trials (median=0) (all P>0.05). However, CPAP reduced variability in awake systolic (median=-1 mmHg) and mean BP (median=-1 mmHg), as well as asleep diastolic (median=-2.6 mmHg) and mean BP (median=-2.5 mmHg) (all P< 0.05).
Conclusion: Short-term CPAP treatment did not improve sleep regularity but significantly reduced 24-hour ambulatory blood pressure variability, with no notable effects on cognitive function.
Support (if any): National Science and Technology Council, Taiwan (NSTC 113-2314-B-002 -284 -MY3; 111-2314-B-002-293); Ministry of Education (MOE) in Taiwan (NTU-107L900502, 108L900502, 109L900502);Taiwan University Hospital (NTHU 109-42, 111-S0298, 111-X0033,113-S0286); MediaTek Inc. (201802034 RIPD)

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0711

EFFECTS OF CPAP ON SLEEP REGULARITY, ATTENTION, AND 24-HOUR AMBULATORY BLOOD PRESSURE VARIABILITY: A RANDOMIZED CONTROLLED TRIAL

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Introduction: The relationship between sleep regularity and health outcomes in obstructive sleep apnea (OSA) is gaining recognition; however, its connection to continuous positive airway pressure (CPAP) treatment remains underexplored. This study hypothesized that CPAP treatment enhances sleep regularity, which may subsequently improve cognitive function and reduce 24-hour ambulatory blood pressure (BP) variability.
Methods: Patients with moderate-to-severe OSA from two centers were randomized (1:1) to 12 weeks of CPAP or inactive control. The primary endpoint was 7-day sleep onset, offset, and midsleep time measured by actiwatch. Secondary endpoints included mean reaction time from the Psychomotor Vigilance Task (PVT), correct trials from the Digit Symbol Substitution Test (DSST), and 24-hour BP. Variability in outcomes was assessed using standard deviation. CPAP effects were analyzed by intention-to-treat and per-protocol methods, including participants who adhered to the protocol.
Results: Of 67 participants, 52 were randomized to CPAP (n=26) or control (n=26). In the CPAP group, 75.2% averaged ≥4 hours of nightly use. CPAP did not significantly affect sleep onset (median=00:06), offset (median=-00:17), midsleep time (median=-00:16), PVT mean reaction time (median=5 msec), or DSST correct trials (median=0) (all P>0.05). However, CPAP reduced variability in awake systolic (median=-1 mmHg) and mean BP (median=-1 mmHg), as well as asleep diastolic (median=-2.6 mmHg) and mean BP (median=-2.5 mmHg) (all P< 0.05).
Conclusion: Short-term CPAP treatment did not improve sleep regularity but significantly reduced 24-hour ambulatory blood pressure variability, with no notable effects on cognitive function.
Support (if any): National Science and Technology Council, Taiwan (NSTC 113-2314-B-002 -284 -MY3; 111-2314-B-002-293); Ministry of Education (MOE) in Taiwan (NTU-107L900502, 108L900502, 109L900502);Taiwan University Hospital (NTHU 109-42, 111-S0298, 111-X0033,113-S0286); MediaTek Inc. (201802034 RIPD)

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0712

AUSTRALIA'S SLEEP REVOLUTION: TECHNOLOGY-ENABLED, PHYSIOLOGY-INFORMED, PERSONALIZED CARE FOR OSA, INSOMNIA & COMISA

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Introduction: The causes of common sleep disorders including obstructive sleep apnea (OSA), insomnia and their combination (COMISA) vary between patients. Yet, conventional diagnostic and treatment approaches do not fully capture or account for disease heterogeneity. Instead, treatment typically follows a one-size-fits-all, trial-and-error approach, often with suboptimal outcomes. This study aimed to use novel technology and methods to

better define underlying individual pathophysiology of common sleep disorders and use this information to tailor therapy with existing and emerging treatments.
Methods: 32 people with chronic sleep disorders enrolled in an 8-week intensive treatment program that was filmed for a television series titled "Australia's Sleep Revolution with Dr Michael Mosley". Participants completed polysomnography before and after treatment, plus multiple questionnaires including the Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS) and Flinders Fatigue Scale (FFS). A range of monitoring technology was also used such as an under-mattress sensor and oximetry to track nightly sleep parameters including apnea/hypopnea index (AHI), core body temperature capsules to estimate daily circadian timing and actigraphy. OSA endotypes were estimated to guide therapy in people with OSA. Data were reviewed bi-weekly during multi-disciplinary team meetings with scientists and clinicians to identify the optimal individualized treatment approach and modify as required. Options for insomnia and circadian misalignment included cognitive behavioural therapy (CBTi), melatonin, and light therapy. Treatments for OSA included oral appliances, supine avoidance therapy, emerging pharmacotherapy and continuous positive airway pressure (CPAP) as a last resort. Primary outcomes were ISI for insomnia/COMISA and AHI for OSA/COMISA.
Results: 28 participants (50% female) aged 51 [35, 60] years (median [IQR]) completed the trial (n=10 OSA, n=9 insomnia, n=9 COMISA). OSA endotype-informed targeted therapy reduced AHI from 28 [15,57] to 13 [10,23] events/h, p=0.01 in people with OSA/COMISA, most without CPAP. ISI reduced from 20 [19,23] to 9 [4,13], p< 0.01 in people with insomnia/COMISA. Participants also felt better post-treatment (e.g., ESS reduced by >30% and FFS by >70% in people with OSA and insomnia, respectively).
Conclusion: These findings highlight the potential to transform sleep disorders care to improve outcomes for patients using a novel multi-disciplinary, technology-enabled, physiology-informed, individualized approach.
Support (if any): Artemis Media

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0713

CHALLENGING THE 90-DAY CPAP ADHERENCE STANDARD: INSIGHTS INTO DISPARITIES AND HEALTHCARE INEQUITIES

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Introduction: The continuous positive airway pressure (CPAP) policy of Centers for Medicare & Medicaid Services (CMS) requires adherence over 90-days for continued coverage. This may result in premature treatment discontinuation, potentially exacerbating disparities and introducing healthcare inequities. We evaluated one-year CPAP adherence within an integrated healthcare system without rigid adherence criteria to assess longer-term adherence potential of initially non-adherent patients.
Methods: We evaluated all adult patients with OSA newly prescribed CPAP between 2020 and 2023 within Kaiser Permanente Southern California. We classified patients into Early Adherent (meeting CMS criteria within 90 days), Late Adherent (not meeting CMS criteria until between days 91-360) and Never Adherent (never meeting CMS criteria up to day 360) and compared demographic and sleep characteristics between groups.
Results: Out of a total of 132,492 patients, 49.0% were Early Adherent, 8.3% were Late Adherent, and 42.7% were Never Adherent. Compared to Early adherent, Late and Never Adherent, patients were progressively more likely to be female (31.5% vs 34.7% vs 37.9%; p< 0.0001), non-white (8.1% vs 9.2% vs 11.8% Black, 31.0 vs 33.3% vs 38.8% Hispanic, 8.7% vs 9.9% vs 9.3% Asian p< 0.0001), reside in lower income neighborhoods (4.2% vs 4.8% vs 5.9% living in <$45,000 income neighborhoods; p=0.0002), and have less severe OSA (AHI 35.4±25.0 vs 33.9±25.6 vs 29.4±24.0; p< 0.0001). Among the Late Adherents, the most common month to reach CMS adherence criteria was in month 4 (44% of all Late Adherent patients). When analyses were restricted to patients ≥ 65 years of age, results were similar. Mean time to achieve adherence was day 165.8±69.1 and was longer for Hispanics, Blacks, and other race/ethnicities versus White (171.6±71.7, 173.6±72.2, 166.6±67.9 vs 159.3±66.2; p< 0.0001).
Conclusion: Extending payer adherence interval to at least 120 days (4 months) may improve CPAP treatment access, reducing inequities and disparities in OSA treatment.
Support (if any): American Academy of Sleep Medicine Foundation 205-SR-19

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0714

FULLY TELEHEALTH VS. FULLY FACE-TO-FACE MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA: A COMPARATIVE STUDY OF CPAP COMPLIANCE

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Introduction: Obstructive sleep apnea (OSA) is effectively treated with continuous positive airway pressure (CPAP), but access remains a challenge. The COVID-19 pandemic accelerated telehealth, offering a convenient alternative to in-person visits for OSA evaluation and treatment initiation. This study compares patients managed entirely via video telehealth to those managed entirely in person. We hypothesize that virtual are as effective as in-person evaluations in managing most OSA patients.
Methods: The study is approved by the Mayo Clinic IRB. We retrospectively studied adult patients diagnosed with OSA requiring CPAP initiation between June 2020–2023. Data collected included baseline demographics, home sleep apnea testing (HSAT) results, polysomnography (PSG) results, Epworth Sleepiness Scale (ESS) scores, OSA severity, compliance results, other relevant comorbidities (i.e. cardiovascular diseases). Visit type categorized as "in-person" for patients who had both initial and follow-up appointments in-person, while "telehealth" group included patients who had both appointments virtually.
Results: Of 59 patients, 33 had telehealth (56%). The groups had similar medians in age (66 vs 62), sex (73% vs 67% male), and BMI (30 vs 32). There was no significant difference in median ESS scores (8 vs 7, p=0.7). However, the severity of OSA (moderate to severe) was higher in the in-person group (73% vs 45%, p=0.03). When baseline sleep study data was investigated, there

were no differences in AHI and average SpO2 values measured by HSAT or PSG between the two groups (p>0.05 for all). CPAP compliance was significantly higher in the telehealth group compared to in-person (78% vs 40%, OR: 5.5, 95% CI: 1.7-17.1, p=0.003). Virtual visit type was the only independent predictor of compliance (p=0.006), after adjusting for age, BMI, comorbidities and OSA severity in multivariate analysis. However, there was no difference in average daily CPAP usage (6:39 vs 7:18, p=0.5) and percentage of days with usage >4 hours (91% vs 95, p=0.5). Median AHI after treatment improved in both groups, with no significant difference between groups (1.7 vs 2.4, p=0.8).
Conclusion: Telehealth offers a successful alternative to in-person visits for OSA evaluation, with similar outcomes and significantly better compliance, enhancing OSA management.
Support (if any):

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0715

A PROSPECTIVE, MULTICENTER, REAL-WORLD STUDY ON THE LONG-TERM EFFECTIVENESS OF A CAD/CAM 3D-PRINTED ORAL APPLIANCE TO TREAT OSA: AN UPDATE

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Introduction: Oral appliance therapy (OAT) for treating obstructive sleep apnea (OSA) is one of the cornerstones of OSA management and requires multidisciplinary care management. When complete, the study will provide data on the use of the Panthera D-SAD, a CAD/CAM, 3D printed biocompatible nylon oral appliance. The primary endpoint of at least a ≥50% reduction in baseline apnea-hypopnea index (AHI) will be evaluated at five years, with interim sleep data at 3-6 months. The study fulfills French reimbursement requirements.
Methods: OAT naïve individuals with an AHI of 15-30 or those with severe OSA (AHI > 30) who decline CPAP and meet all other criteria will be included. Sites will follow the standard of care in France. Fifteen centers will enroll 217 participants via consecutive sampling. Participants will be medically and dentally evaluated. Evaluation time points are three to six months (sleep testing/medical), annual check-in, and five years (both). Secondary endpoints include side effects, oxygenation metrics, quality of life, self-reported adherence, and subjective symptoms. Ethics approval obtained.
Results: Enrollment is complete (N=257). Baseline demographics n=239 (mean/SD): Age 50.7 (12.8), BMI 26.6 (4.7), M 51%, AHI 22.7 (9.0), ODI 17.0 (11.4), lowest SpO2 84.6% (6.8), ESS >10, 42.4% (n=198). Change from baseline sleep respiratory variables at 3-6 Mos (n=179): a mean decrease in AHI of 10.5 (8.1) and an AHI reduction ≥ 50% in 60.3%. Additionally, 87.8% of moderate and 83.4% of severe transitioned to a lower AHI classification. ODI decreased to 9.7 (8.4). Subjective usage was sustained >4 hrs./night at six months in 94.8% of participants and 91.9% at one year (n=76), averaging 6.4 nights per week, demonstrating sustained adherence. Treatment satisfaction was 85.8% at three months. The mean ESS decreased from 9.1 (5.3) to 7.4 (4.8). The ≥50% AHI reduction was not influenced by BMI categories or gender, (p= 0.813 and 0.694, respectively).
Conclusion: These data demonstrate a reduction in total mean AHI with a substantial transition migration to a less severe AHI category. High OAT acceptance and adherence were found. In this sample, the percentage of patients whose AHI decreased by at least 50% does not differ between the subgroups.
Support (if any): Panthera Dental Inc.

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0716

CARDIOVASCULAR RISK REDUCTION WITH GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONISTS IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA AND OBESITY: A REAL-WORLD STUDY

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Introduction: Obstructive sleep apnea (OSA) is a well-established risk factor for cardiovascular disease. Glucagon-like peptide-1 receptor agonists (GLP-1RAs) have demonstrated promising potential in reducing cardiovascular risk and alleviating the severity of OSA. However, a significant knowledge gap remains regarding the impact of GLP-1RAs on cardiovascular events in OSA patients. This study utilizes large-scale global electronic healthcare record data to evaluate the associations of GLP-1RAs with improved cardiovascular outcomes.
Methods: We conducted a propensity score-matched retrospective cohort study using aggregate data from the TriNetX Global Network, which includes over 160 million patients from more than 120 healthcare organizations worldwide. The study population comprised patients with a BMI over 30 who were diagnosed with OSA between January 2010 and November 2021. Patients with a diagnosis of heart failure, pulmonary hypertension, or myocardial infarction were excluded. Two cohorts were created: one consisting of patients prescribed GLP-1RAs (semaglutide, liraglutide, or dulaglutide) within one year before their OSA diagnosis, and the other comprising OSA patients who were never prescribed any GLP-1RAs. Propensity score matching was performed using TriNetX software, which relies on the greedy nearest neighbor methodology. Cox proportional hazards analyses were conducted over a three-year follow-up period. The primary outcome was heart failure. Secondary outcomes included pulmonary hypertension and acute myocardial infarction (AMI).
Results: We included 16,992 patients in the GLP-1RA cohort and 727,130 patients in the non-GLP-1RA cohort. Propensity score matching resulted in 16,881 patients remaining in each cohort, which were well-matched in demographics (age 54.8 vs. 55.7, White: 62.3% vs. 61.9%, Female: 51.3% vs. 53.1%), comorbidities, medications, BMI (40.7 vs. 40.8), and HbA1c (7.6 vs. 7.5). In the GLP-1RA cohort, most patients received liraglutide

(50.2%), followed by dulaglutide (36.1%), and semaglutide (20.1%). After 3 years of follow-up, the GLP-1RA cohort had a significantly lower risk of newly developed heart failure (1,206 vs. 1,579 cases; HR: 0.73, 95% CI: 0.67-0.78), pulmonary hypertension (329 vs. 499 cases; HR: 0.63, 95% CI: 0.55-0.73), and AMI (324 vs. 482 cases; HR: 0.65, 95% CI: 0.56-0.74).
Conclusion: GLP-1RA use was associated with reduced risks of heart failure, pulmonary hypertension, and AMI in obese OSA patients. Prospective studies are needed for validation.
Support (if any):

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0717

DUAL-SIDED HYPOGLOSSAL NERVE STIMULATION FOR THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA: RESULTS FROM THE DREAM TRIAL

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Introduction: The Dual-sided hypoglossal neRvE stimulAtion for the treatMent of obstructive sleep apnea (DREAM) trial is a prospective, multicenter study evaluating safety and efficacy of bilateral hypoglossal nerve stimulation (HNSBL) in obstructive sleep apnea (OSA) patients with moderate and severe OSA.
Methods: A prospective non-randomized study of moderate-to-severe OSA (AHI4% 15.1-64.9 hr), body mass index ≤32 kg/m2, and lack of complete concentric palatal collapse during drug-induced sleep endoscopy who failed or refused positive airway pressure therapy evaluated two co-primary efficacy endpoints at at 12 months: proportion of patients with AHI4 (4% SaO2 drop for hypopnea) reduction of > 50% and < 20 hr and proportion of patients achieving a ≥25% reduction in 4% oxygen desaturation index (ODI4). Secondary study endpoints included changes in polysomnographic and subjective quality-of-life metrics.
Results: A total of 115 patients were included in the analysis. Majority of the patients were middle-aged (56.8±7.3 years) men(70.4%). Eighty-eight patients completed a 12-month polysomnography study at fixed HNS settings per protocol. 63.5% (73/115) and 71.3% (82/115) of patients met the AHI4 (p=0.002) and ODI4 endpoints (p< 0.001), respectively. In the per protocol set mean AHI4 was reduced from 28±11.5 to 9.5±9.4 events/h (p< 0.001), and supine AHI4 was reduced from 48.9±19.6 to 22.7±19.9 events/h (p< 0.001). All secondary endpoints changed significantly (p< 0.001). There were eight (7.0%) device/procedure-related serious adverse events.
Conclusion: Bilateral HNS yielded statistically significant changes in quality-of-life variables and OSA disease severity with significant improvement in supine AHI.
Support (if any): The study was sponsored by Nyxoah, Inc.

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0718

EFFECTS OF PROXIMAL TARGETED HYPOGLOSSAL NERVE STIMULATION ON APNEA-HYPOPNEA INDEX IN MODERATE TO SEVERE OSA: OSPREY RANDOMIZED CONTROLLED TRIAL

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Introduction: Clinically significant improvement of the total Apnea-hypopnea index (AHI) in the OSPREY randomized, controlled trial (RCT) of proximal hypoglossal nerve stimulation (pHGNS) was demonstrated for patients receiving active treatment compared to control at 7 months for moderate to severe obstructive sleep apnea (OSA). The AHI responses with respect to type of event, sleep stage and position during longitudinal follow-up in the preceding THN3 RCT were clinically significant and durable. Herein we report details of AHI for the OSPREY RCT.
Methods: OSPREY RCT participants (N=104 [Treatment=67,Control=37], no sleep endoscopy screening, AHI 15-65/hr, Body Mass Index ≤35 kg/m2) were evaluated through month 7. AHI details were compared by median values and stochastic probability of superiority (A) with bootstrapped 95% confidence intervals (95%CIs). A-values were bounded by 0 and 1, with A=1 indicating 100% likelihood of superiority and A=0.5 indicating equal likelihood (null outcome). Per convention, non-parametric effect size was characterized as large and medium for A≥0.71 and A≥0.64, respectively.
Results: No significant changes were observed in the Control group. AHI was decreased by pHGNS for Treatment: T=[34.3/hr to 11.6/hr, A=0.83 (95%CI:0.71-0.89)]. Similarly, Obstructive Apnea Index T=[5.2/hr to 0.6/hr, A=0.76 (95%CI:0.64-0.84)] as well as Hypopnea Index T=[23.9/hr to 9.4/hr, A=0.88 (95%CI:0.76-0.94)] were improved with pHGNS. Like improvements were observed for REM AHI T=[31.8/hr to 16.1/hr, A=0.65 (95%CI:0.52-0.75)] as well as non-REM AHI T=[34.3/hr to 10.6/hr, A=0.83 (95%CI:0.71-0.89)]. Finally, pHGNS improved Supine AHI T=[60.4/hr to 40.0/hr, A=0.63 (95%CI:0.49-0.75)] in addition to non-Supine AHI: T=[19.2/hr to 9.5/hr, A=0.65 (95%CI:0.52-0.74)].
Conclusion: In the OSPREY RCT of moderate to severe OSA, pHGNS produced clinically and statistically significant reductions with medium to large effect sizes in obstructive apneas, hypopneas, and total AHI, irrespective of REM or supine position. These outcomes validate the report of long-term results from the THN3 RCT.
Support (if any): LivaNova PLC

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0719

POTENTIAL OVER-TITRATION IN HYPOGLOSSAL NERVE STIMULATION (HNS) THERAPY: IMPLICATIONS FOR PROTOCOL REFINEMENT AND PATIENT OUTCOMES

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Introduction: Hypoglossal nerve stimulation (HNS) is a promising treatment for obstructive sleep apnea (OSA); however, flaws in manufacturer-recommended "fine-tuning" protocols may lead to over-titration, applying unnecessarily high stimulation voltages. This study evaluates patients whose optimal voltage fell below manufacturer-recommended starting levels, termed the "potential over-titration group." By comparing clinical outcomes, such as apnea-hypopnea index (AHI) and patient characteristics, we aim to emphasize the need for refined titration protocols to improve treatment effectiveness and patient comfort.
Methods: Participants who underwent HNS therapy activation at the UCI Sleep Center from December 2020 to August 2023 were included in this cohort study. At the activation visit, participants were instructed to increase the voltage to a comfortable level before undergoing titration. While the manufacturer's protocol suggests initiating titration at incoming amplitude –0.2 V, our protocol begins at the functional threshold. The "potential over-titration group" was defined as participants whose best voltage was lower than the manufacturer's recommended starting voltage. Variables were compared using t-tests and chi-square tests.
Results: Among 123 participants, 40 (32.5%) had a best amplitude below the manufacturer-recommended starting voltage, indicating potential over-titration if the protocol had been strictly followed. Compared to others, the "potential over-titration group" demonstrated: lower periodic limb movement of sleep ($p = 0.03$); lower prevalence of anxiety disorder ($p = 0.03$); lower mean total AHI (13.11 vs. 20.50, $p = 0.012$) and non-REM AHI (12.90 vs. 19.80, $p = 0.028$); lower best voltage (1.82V vs. 2.35V, $p = 0.0005$); lower AHI during device-off portions (7.66 vs. 21.28, $p = 0.0002$).
Conclusion: Patients in the "potential over-titration group" achieved favorable outcomes at voltages lower than manufacturer-recommended starting levels, underscoring the need for individualized titration protocols. Over-titration may not only reduce patient comfort but could also impact short-term outcomes, possibly contributing to tongue training effects observed during early post-activation. These findings highlight the importance of refining HNS titration protocols to optimize treatment efficacy and tailor strategies to the diverse characteristics of OSA patient populations.
Support (if any):

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0720

EFFECT OF HYPOGLOSSAL NERVE STIMULATION ON HYPOXIC BURDEN: ANALYSIS OF THE STAR TRIAL

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Introduction: Hypoglossal nerve stimulation (HGNS) is an implantable device for treating Obstructive Sleep Apnea (OSA) by electrically stimulating the hypoglossal nerve to move the tongue and relieve airway obstruction. The STAR trial showed a significant reduction in the apnea-hypopnea index (AHI) at 12 months. This study evaluates: 1) HGNS's effect on hypoxic burden (HB) at 12 months, 2) the percentage of individuals transitioning from high HB (≥60 %min/h, linked to increased cardiovascular risk) to low HB (i.e. < 60 %min/h), and 3) the impact of active HGNS versus withdrawal after 12 months in a subset of participants.
Methods: A secondary analysis of the STAR Trial (NCT01161420) measured HB from SpO2 signals during sleep studies at baseline, 12 months (including 1-week withdrawal), and 18 months of HGNS therapy.
Results: The median HB was 63 [48–95] %min/h (N=108; 84% male; mean (SD) age 55 (10) years; AHI 30 [25–40] events/h). After 12 months, the median HB reduction was 77% [36%–90%]. Among those with high baseline HB (≥60 %min/h; N=62; age 56 (10) years), 79% achieved low HB (79% [50%-90%] reduction from baseline).In individuals with a low HB at baseline (< 60 %min/h; N=46; age= 53 (11) years), the median HB changed from 45 [36 - 53] to 11 [3.1 - 34] %min/h. Finally, therapy-maintenance subgroup (N=19) had an HB of 69 [52 - 92], 12 [5.2 - 20], 15 [3.3 - 26], and 15 [4.8 - 26] %min/h at baseline, 12-month, 12-month+1-week, and 18-month, respectively. Therapy-withdrawal subgroup (N=18) had an HB of 55 [38 - 78], 11 [7.0 - 15], 35 [22 - 66], and 15 [13 - 27] %min/h at baseline, 12-month, 12-month+1 week, and 18-month, respectively. The 1-week change in HB from 12-month was 43 [95% CI: 6.6 - 77] %min/h higher in the therapy withdrawal versus therapy maintenance subgroup ($p=0.027$) but failed to reach baseline values.
Conclusion: HGNS reduces HB after 12 months in OSA patients, with 79% of those at high baseline HB achieving low HB. Therapy effects persisted at 18 months, while a 1-week withdrawal did not fully restore HB to baseline.
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0721

IMPLEMENTING A PSYCHOLOGICAL EVALUATION AS PART OF HNS IMPLANTATION PROTOCOL: RESULTS OF A QUALITY IMPROVEMENT INITIATIVE

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Introduction: Hypoglossal nerve stimulation (HNS) is a treatment option for patients with obstructive sleep apnea who cannot tolerate positive airway pressure (PAP). Although previous clinical trials of HNS have shown high adherence rates, rates may be significantly lower in some clinical settings. A psychological evaluation was added to the HNS screening protocol at one center, to evaluate for possible psychiatric contraindications to HNS (e.g., insomnia, serious mental illness, cognitive

impairments) and understanding of pre/post-HNS implantation procedures. This quality improvement project investigated changes in HNS adherence rates following implementation of the HNS psychological evaluation.
Methods: Data from 39 patients seeking HNS evaluation at a large Department of Veterans Affairs (VA) Sleep Medicine Clinic from August 2016 to September 2024 were analyzed; 15 patients were seen prior to implementation of the psychological evaluation (pre-psych) and 24 patients completed the evaluation (post-psych). Adherence was defined as an average of ≥4 hours of nightly usage and at least one clinic follow-up within 12 months after HNS activation.
Results: Of the 5 post-psych patients who underwent HNS surgery, 3 out of 4 eligible patients were adherent to HNS therapy (1 patient is immediately post-operative and was excluded from analysis) as compared to 2 out of 15 patients in the pre-psych evaluation group. The remainder of the post-psych patient outcomes are as follows: 2 await surgery, 5 were deemed ineligible to proceed with HNS due to Drug Induced Sleep Endoscopy findings, 8 chose conservative management (e.g. trialing PAP again), 3 were deemed ineligible for psychiatric/cognitive comorbidities, and 1 was lost to follow-up). Interestingly, 5 patients in the pre-psych group have expressed interest in explanting the device compared to 0 patients in the post-psych group.
Conclusion: Implementation of a psychological evaluation as part of the HNS screening process appears to be well received and screened out potential poor candidates for HNS. None of the post-psychological evaluation patients have requested HNS explant and adherence data appear favorable. While this data is promising, more information is needed from a larger sample size to systematically assess the outcomes of inclusion of the psychological evaluation in the pre-HNS evaluation process.
Support (if any):

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0722

AUTOMATIC ACTIVATION OF TRANSVENOUS PHRENIC NERVE STIMULATION FOR CENTRAL SLEEP APNEA RESULTS IN HIGH NIGHTLY USAGE

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Introduction: Adherence with mask-based therapies remains a significant challenge for optimal treatment of patients with sleep disordered breathing. Transvenous phrenic nerve stimulation (TPNS) to treat central sleep apnea offers a novel, automated approach to enhance nightly adherence by initiating therapy based on patient-specific programmed conditions such as sleep schedule, activity, and body position. Therapy automatically pauses when the patient sits up or changes position, facilitating re-initiation of sleep. This research aimed to determine the degree of adherence achieved with TPNS's automated activation approach.
Methods: Device data from 128 remedē® System Pivotal Trial participants were analyzed to calculate hours of therapy activation. Daily use from device data within the 14 days prior to scheduled visits were used to calculate median daily hours of therapy per patient, and subsequently the overall median daily use for all patients. Therapy duration was defined as the sum of time of delivered therapy when all conditions to activate therapy were met between the first time therapy came on to the last time off during the night, excluding time when activity or body position did not meet the programmed criteria for therapy activation.
Results: The median [Q1-Q3] nightly therapy duration at 6, 12, 18, and 24 months was 5.9 [4.9-6.6], 5.7 [5.0-6.8], 6.0 [5.3-6.8], and 5.9 [4.9-6.5] hours, respectively. Using a definition for adequate therapy as the percentage of patients with usage ≥4 hours/night for at least 70% of nights, 86%, 82%, 83%, and 90% of patients met the criteria at these visits. Only two patients (< 2%) who had therapy activated discontinued treatment prior to 6 months due to stimulation intolerance. Patients with median delivered therapy ≥4 hours/night reported more quality of life improvement than patients with < 4 hours of therapy.
Conclusion: The automatic activation of TPNS therapy resulted in a higher duration of nightly usage and higher rate of adequate delivered therapy than generally are reported for mask-based therapies. This high usage may yield a greater overall reduction in central sleep apnea burden over the whole night compared to therapies that require the patient to initiate the therapy.
Support (if any): ZOLL Respicardia, Inc.

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0723

HYPOPNEA CLASSIFICATION IMPACT ON TRANSVENOUS PHRENIC NERVE STIMULATION THERAPY PATIENT SELECTION AND EFFICACY

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Introduction: Despite AASM scoring guidelines encouraging classifying hypopneas as central or obstructive, classification is underutilized in practice. However, without that effort patients may receive an incorrect primary diagnosis and suboptimal treatment. The remedē® System Pivotal Trial studied transvenous phrenic nerve stimulation (TPNS) to treat adult patients with moderate to severe central sleep apnea (CSA). Entry criteria required apnea hypopnea index (AHI)≥20 with the central apnea index (CAI) greater than the obstructive apnea index and obstructive apneas< 20% of AHI but did not consider hypopnea differentiation. This analysis re-examined sleep studies from the trial to assess how hypopnea classification might lead to better patient selection for this therapy.
Methods: Hypopneas were classified as central versus obstructive by a sleep core laboratory following a modified version of AASM recommended criteria. The AHI composition was assessed at baseline and after 6 months of therapy.
Results: At baseline, 91% (138/151) of patients had ≥50% of events classified as central when accounting for hypopnea classification. If all hypopneas were assumed to be obstructive, only 63% (95/151) would have had ≥50% central events. Additionally, 95% (144/151) of patients had central AHI ≥15/hour, compared to 73% (110/151) with a central apnea index (CAI) ≥15/hour. The likelihood of achieving a ≥50% AHI reduction increased with the percentage of baseline events that were central: responder rates were 37.5% for patients with < 50% central events at baseline, incrementally increasing to 76.5% for those with ≥90% central events. At 6 months, the residual AHI predominantly consisted of obstructive events. Central events decreased by 89% with treatment, from a baseline median of 32/hour [1st and 3rd

quartiles: 22, 50]. Obstructive apneas rose by 2/hour and obstructive hypopneas increased by 2/hour from a baseline median of 5 obstructive events/hour [2, 12].
Conclusion: Distinguishing central from obstructive hypopneas is required to accurately determine if a patient has central sleep apnea/Cheyne Stokes respiration, and is crucial for epidemiologic studies, appropriate therapy selection, and managing patient expectations about treatment outcomes. This analysis suggests that accurate hypopnea classification may prevent disqualification of patients who could benefit from TPNS therapy, which effectively treats central sleep apnea syndrome.
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0724

PREVALENCE AND PROGRESSION OF SLEEP DISORDERED BREATHING IN PATIENTS WITH MYOTONIC DYSTROPHY A RETROSPECTIVE ANALYSIS

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Introduction: Patients with Myotonic Dystrophy (DM) may have progression of their sleep disordered breathing (SDB) which requires advancement of therapy. We examined our patients with Myotonic Dystrophy who had two or more studies to evaluate the treatment requirements over time.
Methods: 17 patients with DM having more than one sleep study were identified in the UNC Sleep Laboratory from 2003-2024. Data including sleep architecture parameters and respiratory indices: AHI, lowest desaturation, presence of hypercapnia, and/or hypoxemia, titration pressure of bilevel PAP/CPAP, supplemental oxygen requirement, periodic limb movements (PLMS), arousal index (AI), Epworth Sleepiness Scale scores, along with co-morbid medical conditions and current prescribed medications were collected. Student t test for continuous variable, and Fisher exact test for categorical variables were used to determine significance ($p < 0.05$).
Results: Fifty-six studies from 17 patients with DM were identified. Among the 17 patients 4 were children and 13 were adults. Most patients had 2-3 studies, but one had 7 and another had 8 repeated studies over 14 years. Sleep apnea was found in 16/17 (94%), 13/13 adults with AHI > 5 (mean AHI = 15.1), and 3/4 children with AHI > 1.5 (mean AHI = 7.1). Hypercapnia was found in 9/17 patients and hypoxemia was found in 6/17 with 5 requiring supplemental oxygen. Bilevel was required in 4/13 adult patients to treat hypoventilation. No significant change in therapy type was noted across the therapeutic studies. Only one patient progressed from CPAP to Bilevel and only one patient progressed from not requiring oxygen to requiring oxygen.
Conclusion: In our cohort, we found that many patients with DM have a high prevalence of sleep apnea and hypoventilation. We also noted that some patients may require a change in pressure over time, most did not require a change in therapy from constant pressure to bilevel PAP or the addition of oxygen. However, given that some patients in our cohort did require a change in therapies, clinicians should remain astute to changes in the possibility that these patients may need repeated evaluations.
Support (if any):

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0725

NUESTRO SUEÑO: PROVIDERS' PERCEIVED DISPARITIES FOR SLEEP TREATMENT IN SPANISH-SPEAKING COMMUNITIES

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Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder, affecting approximately 34% of Hispanic/Latino men and 18% of Hispanic/Latino women. Despite the proven effectiveness of Positive Airway Pressure (PAP) therapy, treatment disparities persist, particularly among Spanish-speaking patients. These disparities are often linked to language barriers, socioeconomic challenges, and limited healthcare access. This study aimed to explore healthcare providers' perspectives on challenges encountered when treating Latinx patients with OSA. The goal was to identify barriers and suggest potential solutions to improve care and patient outcomes.
Methods: Focus group discussions (FGDs) were conducted with sleep medicine providers from University of Utah Sleep Wake Center and local sleep centers. Participants discussed experiences and strategies for treating Hispanic/Latinx patients with OSA. FGDs were conducted via Zoom, recorded, and transcribed verbatim. Data analysis followed an applied thematic analysis in two stages: a deductive coding phase for broad themes and an inductive phase to identify emerging themes. Final coding was reviewed for consistency.
Results: Providers (N = 21), participated in the study, including physicians (pulmonary, psychiatry, neurology), advanced practice nurses, psychologists, physician assistants, clinic managers, and sleep technicians. Providers identified key barriers, including language-related issues such as time-consuming translations and insufficient Spanish-language educational materials. Socioeconomic challenges, such as work schedules and lack of insurance were also noted as significant barriers to care. Solutions proposed included improving the affordability of CPAP equipment, enhancing translation services, and employing creative educational techniques like visual aids and sound effects. Three major themes emerged (1) Language-related barriers: difficulties with translation and inadequate educational materials in Spanish; (2) Patient-related barriers: socioeconomic challenges and limited access to care; and (3) Potential solutions: improving affordability, enhancing translation services, and creative educational tools. Providers reported varying success with interventions, such as offering low-cost CPAP equipment and adjusting appointment schedules to accommodate language barriers.
Conclusion: This study highlights key barriers faced by healthcare providers when treating Latinx patients with OSA. These insights, gathered and organized from provider feedback, reveal the complexity of these challenges and emphasize the need for targeted interventions to address disparities and improve outcomes for Latinx patients with OSA.
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0726

PAP PRESCRIPTION AND UTILIZATION IN AN INTERNAL MEDICINE WARD: A SINGLE CENTER EXPERIENCE

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Introduction: Obstructive sleep apnea (OSA) is prevalent among hospitalized patients and adversely impacts comorbidities and length of stay. In-hospital adherence may predict home PAP adherence. PAP therapy use during hospitalization has not been clearly established. We aim to assess inpatient PAP therapy prescription rates and use, and factors that influence them among hospitalized patients with OSA.
Methods: This retrospective study reviewed electronic records of all patients discharged from a Medicine ward during one month at the VA Caribbean Healthcare System. Records of patients with OSA were reviewed. Data collected included demographics, comorbidities, Epworth Sleepiness Scale (ESS), body mass index (BMI), home PAP adherence, PAP therapy prescriptions within 24 hours of admission and the proportion of patients prescribed PAP therapy that used it. Statistical analysis identified significant associations.
Results: Thirty five percent (n=120) of patients discharged (n=340) had a diagnosis of OSA. Of these 25.8% (n=31) were PAP-adherent at home. Of patients with OSA 44.2% (n=53) received PAP therapy within 24 hours of admission, 55.8% (n=67) did not. Factors associated with PAP prescriptions include home adherence (39.6% vs. 14.9%; p=0.002) and history of heart failure (50.9% vs. 20.9% p=0.001). Adherence among those prescribed PAP therapy was 73.6% (n=39). There was no significant difference in prescription rates or PAP use associated with AHI, obesity, insomnia, hypoventilation, BMI, ESS, hypertension, depression, anxiety, PTSD, substance use, cognitive disorders, chronic pain. Patients who did not use prescribed PAP therapy had a higher rate of home PAP compliance than in-hospital users (64.3% vs. 30.8%; p=0.028).
Conclusion: There was low timely PAP prescription rates among inpatients. Home PAP adherence predicted the in-hospital prescriptions. Non-adherent patients may be at greater risk of being untreated. A greater use of PAP during hospital admission might represent a window of opportunity to improve PAP treatment adherence. Factors associated with lower in-hospital adherence in home-adherent patients should be studied. Equipment issues (availability, differences between hospital and home devices and settings) may explain these differences. Education could enhance inpatient PAP use and increase awareness of the importance of treating OSA in patients with comorbidities besides CHF.
Support (if any):

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0727

RURAL RESIDENCE IS ASSOCIATED WITH CPAP REFUSAL AMONG HOSPITALIZED PATIENTS WITH KNOWN OR AT RISK OF OSA

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Introduction: Obstructive sleep apnea (OSA) is a common disorder that is underrecognized and associated with comorbid conditions and societal impact. Health systems have directed efforts to inpatient assessment (OSA screening) to identify patients at risk and early treatment initiation to avoid unexpected outcomes including medical emergency team activation (META) (code blue, code stroke, rapid response, and reintubation). However, acceptance of positive airway pressure (PAP) therapy remains low for both patients with known OSA and those at risk. In our North Carolina regional academic medical center, we explored key social determinants of health (SDOH) that may lead to refusal of PAP therapy.
Methods: Hospitalized adult patients with known OSA or those who previously underwent screening with DOISNORE50 and identified as High-Risk for OSA, were prospectively enrolled in an OSA safety protocol consisting of patient wristband identifiers, electronic medical record alerts, and recommendations for inpatient sleep consultation and automatic PAP ventilation. PAP usage, demographics, SDOH, and outcomes were collected from patient charts.
Results: 22,107 patients screened High-Risk for OSA and were offered PAP therapy, of which 9,353 declined (42%). For those who declined PAP, there was an increase in length of stay (9.25 days versus 6.78 days, $p < 0.001$), total META (adjusted odds ratio (aOR) 1.16 (95% CI 1.08 – 1.26, $p < 0.001$)), and rapid response (aOR 1.49 (95% CI 1.37 – 1.64, $p < 0.001$)) compared to those who wore PAP. Among a variety of SDOH that were studied (including gender, race, and income), the probability of refusal was highest among those over 65 years old (aOR 1.4 (95% CI 10.03 – 1.26, $p = 0.01$)) and those from rural communities determined by zip code (OR 1.92, 95% CI (1.12 – 3.32), $p < 0.001$). Inpatient sleep consultation was associated with greater acceptance of PAP among all groups (OR 2.04 (95% CI 1.71 – 2.44), $p < 0.001$) including patients from rural communities.
Conclusion: Strategic use of inpatient sleep consultation among vulnerable older adults and those living in rural communities may favorably affect adherence to inpatient PAP recommendations. Further understanding of the perceptions and reality of PAP usage in these subpopulations is needed.
Support (if any):

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0728

PREDICTING SLEEP STATE FROM CONTINUOUS POSITIVE AIRWAY PRESSURE FLOW IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: The first-line treatment for Obstructive sleep apnea (OSA) is continuous positive airway pressure (CPAP). CPAP adherence is assessed by hours of mask usage per night. To understand whether patients using CPAP are sleeping while wearing their mask (and thus may benefit from therapy), we aimed to develop a tool that predicts sleep from CPAP flow signal.

Methods: We developed a machine learning algorithm to predict sleep states from CPAP flow data. It uses topological data analysis, dynamic warping, and respiratory rate variability to identify features predicting sleep states (two-state: Wake/Sleep; three-state: Wake, NREM, REM). Models include 125 flow features from above analyses, CPAP level, age, sex, and body mass index (BMI). We applied this algorithm to polysomnography records from 100 randomly selected OSA patients undergoing CPAP titration at Yale Sleep Center (2018–2023). Inclusion criteria were age ≥18 years and >70% recording time with valid CPAP flow signal. Sleep stages were scored by AASM-certified technologists. Participants were equally distributed into development (n=70) and validation (n=30) samples stratifying by age, sex, BMI, and residual apnea-hypopnea index (AHI). Model's sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were determined.
Results: The dataset (n=100) included 48 women, exhibited a mean age of 58.7±14.5 years, and a BMI of 35.0±10.6 kg/m². Seventy six percent of participants were White, 12% African American, and 12% were other/undisclosed. There were no significant differences in age, sex, BMI and residual AHI between samples. In the validation sample (n=30), 77% and 23% of the 22,267 epochs were sleep and wake respectively. The two-state model accuracy was 84%. This model detected sleep with 91% sensitivity, 60% specificity, 89% PPV, and 67% NPV. Using this model improves the chance of detecting wake from 23% (baseline) to 67% and sleep from 77% (baseline) to 89%. Three-state model accuracy was 73%.
Conclusion: Sleep and wake can be effectively predicted by a machine learning model using CPAP flow and demographics. Such information may complement data from CPAP devices currently used to assess CPAP effectiveness. Model differentiating between NREM, REM and Wake states, requires further refinement.
Support (if any): K23HL159259.

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0729

ODDS RATIO PRODUCT (ORP) FROM THE DIAGNOSTIC PSG AND INTERNAL LOCUS OF CONTROL AS PREDICTORS OF 6-MONTH CPAP ADHERENCE

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Introduction: Low adherence to CPAP is a well-documented problem and reduces the effectiveness of the treatment. This study aimed to investigate objective markers, such as ORP at diagnostic, combined with baseline subjective measures to predict adherence. ORP is a well-validated measure of sleep depth from 0 (deep sleep) to 2.5 (full wakefulness). Predicted adherence could be used to identify those who may need additional support for use of their prescribed treatment.
Methods: In a sample of 67 individuals referred for a Type 2 diagnostic study (Mage= 44.9 ±13.16, 39 females), 41 were prescribed CPAP (Mage= 45.80±13.40; MAHI=29.98±23.87) and had 6-month adherence reports. At the time of the diagnostic study, participants also completed questionnaires on sleep (Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS)), beliefs on health (Health Value, Multidimensional Health Locus of Control (MHLC)), and social support for the use of CPAP. Adherence was determined by the percentage of days with use greater than 4 hours (MAdherence=52.0%±35.63). AHI, TST90, mean SPO2, ORPwake (mean ORP during wake periods), ORPNREM (mean ORP during NREM), ORP-9 (mean ORP 9 seconds post-arousal), percentage of TRT with ORP< 0.5 and >2.25, health value, CPAP support, ISI, ESS, and the 3 subscales of the MHLC were entered in an MLR model with backward elimination to predict adherence.
Results: The final model in the MLR was significant (F(4,41)=4.55, p=.005, R2=.331), and the significant predictors included AHI (b=.533, t=2.40, p=.022), TST90 (b=-.515, t=-2.33, p=.025), ORPNREM (b=.282, t=2.02, p=.050), and MHLC-Internal (b=.501, t=3.39, p=.002). Thus, greater use of CPAP was associated with a higher AHI, lower TST90, higher ORPNREM, and more internal locus of control.
Conclusion: These results replicate the utility of AHI, desaturations, and sleep depth during NREM during the diagnostic in predicting long-term adherence. These results suggest that individuals with worse sleep due to respiratory events at diagnostic will be more likely to adhere, potentially due to the subjective improvement to their sleep with CPAP. However, these results extended previous literature by finding that individuals with worse objective sleep at diagnostic, but also a greater sense of control over their own health, would be most likely to adhere.
Support (if any):

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0730

IS SLEEP-DISORDERED BREATHING A RISK FACTOR FOR HOSPITALIZATIONS RELATED TO CARDIOMETABOLIC CONDITIONS?

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Introduction: Previous research has established that sleep-disordered breathing (SDB) is associated with cardiometabolic conditions but there is a paucity of real-world data examining the consequences of these comorbidities on health care resource utilization (HCRU) such as hospitalizations. The purpose of this study was to investigate the relationship between SDB diagnosis and hospitalization rates related to diabetes mellitus (DM) and/or atherosclerotic disease (AD) using a large claims dataset.
Methods: This study used a retrospective cohort design from a large medical claims database between 2018-2022. The presence of SDB, DM, and AD were identified using International Classification of Diseases (ICD-10) and relevant Current Procedural Terminology (CPT) codes. Hospitalizations related to DM and AD were identified primarily using Place of Service (POS) code 21. Data from year 1 (2018) was used to identify those diagnosed with SDB (n=193,671) and to conduct propensity-score matching to select matched comparison patients without SDB. The SDB group was compared to: 1) an unadjusted comparison group (n=248,848) excluding DM and AD in the propensity-score matching and 2) an adjusted comparison group (n=260,298), which included DM and AD in the propensity score matching. The observation period for hospitalizations was the subsequent 4-year period (2019-2022) for both models.
Results: In both models, odds ratios (OR) revealed a significant association between SDB diagnosis and hospitalizations related to DM (OR: 1.23-1.71), AD (OR: 1.08-1.17), and either

condition (OR: 1.17-1.45). In the adjusted model, post-hoc analysis revealed sex differences in the relationship between SDB and hospitalizations with females showing a pattern of significantly elevated risk across all hospitalization outcomes (OR: 1.25-1.44) whereas males were found to have a significant relationship between SDB diagnosis and future DM hospitalization only (OR: 1.10).
Conclusion: These findings provide real-world evidence that comorbid SDB increases the risk for hospitalizations related to cardiometabolic conditions. Sex is a potential moderator of this relationship and should be further explored.
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0731
POSITIVE AIRWAY PRESSURE (PAP) THERAPY ADHERENCE AND CARDIOVASCULAR-RELATED HEALTHCARE UTILIZATION (CVRHU) IN 1 YEAR

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Introduction: Obstructive sleep apnea (OSA) is associated with cardiovascular conditions when left untreated. While PAP therapy is the first-line treatment for OSA, real-world evidence on its impact in cardiovascular-related events is limited. This study assessed the relationship between long-term PAP adherence and CVRHU in a national OSA cohort.
Methods: This retrospective study analyzed insurance claims linked with objective PAP usage data from patients diagnosed with OSA who initiated PAP between 2015-2021. Two-year PAP adherence was defined as adherent, intermediate, or non-adherent based on US Medicare criteria. CVRHU was defined as emergency room (ER) visits, hospitalizations, or either ("serious cardiovascular-related event"), with primary diagnoses of stroke, heart failure, coronary artery disease, arrhythmia, cardiomyopathy, or hypertension. Covariates included demographics, obesity, comorbidities, healthy behaviors, and prior healthcare use. Inverse probability of treatment weighting was used to evaluate associations between adherence and CVRHU.
Results: The sample (n=377,830) was 42% female, mean age 51.7±11.9 years. Over two years, 75% of patients were at least intermediately adherent to PAP (25% non-adherent). Adherent patients were significantly less likely to have a serious cardiovascular-related event compared to non-adherent (4.09% vs 5.22%, P< 0.001), representing a 22% lower risk of having an event (RR: 0.78, 95% CI: 0.75-0.81). Intermediate adherence outcomes fell between adherent and non-adherent groups, with lower rates of cardiovascular-related ER visits (3.34% vs 3.70%, P< 0.001), hospitalizations (1.90% vs 2.09%, P< 0.001), and serious cardiovascular-related events (4.77% vs 5.22%, P< 0.001) compared to non-adherent. Total healthcare costs per patient were significantly lower for adherent patients compared to non-adherent (year 1: $9,748 vs $10,861, P=0.014; year 2: $9,102 vs $9,847, P< 0.001). Associated costs aligned with the frequency of events, with adherent patients incurring significantly lower costs compared to intermediate and non-adherent patients in the first year and further reductions in year 2 (year 1: adherent: $182 vs intermediate: $230 vs non-adherent: $257, P< 0.001; year 2: adherent: $166 vs intermediate: $237 vs non-adherent: $267, P< 0.001).
Conclusion: This real-world study demonstrates the relationship between PAP adherence and reduced CVRHU in patients with OSA. These findings underscore the importance of strategies to enhance PAP adherence to improve long-term cardiovascular outcomes.
Support (if any): ResMed

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0732
CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) USE IN WOMEN: ASSOCIATIONS WITH PRE-TREATMENT STIGMA

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Introduction: Women with obstructive sleep apnea (OSA) use CPAP therapy less time per night compared to men, but the underlying reasons are unclear. Social factors, including stigma and concerns about body image, may contribute to this disparity. This study aims to explore how stigma, perceptions of body image, and their relationship with women's age influence nightly CPAP use.
Methods: In this prospective study of 89 women (mean age 51+/-14) clinically diagnosed with OSA (mean AHI 22.6+/-17.9) and newly initiated on CPAP, we assessed perceptions of stigma and body image prior to CPAP initiation and after 90 days of therapy. Stigma was assessed using the 8-item Stigma Scale for Chronic Illness (SSCI-8), where higher scores indicate greater stigma. Body image was measured with the 30-item Body Esteem Scale (BES), with lower scores reflecting poorer body image. Nightly CPAP use was obtained from the device and averaged over the initial 90-days. Unadjusted associations were explored through correlational analyses. Linear regression models evaluated the adjusted associations between predictors and CPAP use.
Results: The average nightly CPAP usage at 90-days was 4.1 hours (SD = 2.1 hours). The mean stigma score was 14.8 (SD = 6.7, range: 8–34), while the mean Body Esteem Scale (BES) score was 86.7 (SD=19.1, range: 48–160). Age was negatively associated with stigma (r =-0.280, p = 0.008). Body Esteem Scale (BES) scores were not significantly associated with stigma or age (all p > 0.05) and were therefore excluded from the models. CPAP use was independently associated with both age (r=0.213, p= 0.022) and stigma (log-transformed) (r =-0.222, p = 0.017). In women below age 50, stigma had a stronger effect on CPAP use (r= -.349).
Conclusion: Our findings indicate a complex role of younger age and stigma as predictors of CPAP use among women. Additional research is necessary to gain a deeper understanding of how stigma particularly in younger women influences decisions to use CPAP.
Support (if any):

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0733
INSOMNIA SEVERITY PREDICTS INCREASED PAP SIDE EFFECTS AND USE IN WOMEN VETERANS WITH NEWLY DIAGNOSED APNEA

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Introduction: Despite positive airway pressure (PAP) being the gold-standard treatment for sleep disordered breathing (SDB), treatment adherence remains a challenge for providers and patients. Women with SDB are understudied, and understanding the difficulties associated with PAP use in this population is crucial to promoting treatment adherence. We aimed to assess the role of demographics and insomnia symptoms in PAP side effects and PAP use for women veterans.
Methods: We analyzed data from a randomized controlled trial of an Acceptance and Commitment Therapy-based intervention to promote PAP adherence vs. a sleep education control condition for women veterans newly diagnosed with SDB (NCT03377452). Data included demographics (age; body mass index, BMI; race/ethnicity), baseline assessment Insomnia Severity Index (ISI), PAP use data (days used, hours used at 30-, 60- and 90-days post-PAP initiation), and the PAP side effects subscale of the Calgary Sleep Apnea Quality of Life Index (SAQLI). Analyses included Pearson correlations and t-tests.
Results: Of the 90 participants (Mean age = 53.2±12.8), 83 (92.2%) attempted to use PAP and completed the questionnaires. The most common PAP side effects included: upper respiratory symptoms (stuffed/congested nose = 60.2%, excessive dryness of nose/throat = 55.4%, soreness = 39.8%), mask-related issues (discomfort = 56.6%, air leak =47.0%) and insomnia-like symptoms (waking frequently = 36.6%, difficulty returning to sleep = 31.3%). There was no relationship between age, BMI, or race/ethnicity and number of PAP-related side effects, nor was there a correlation between number of PAP side effects and PAP use variables. Elevated ISI prior to initiating PAP was associated with greater number of PAP side effects, $F(1, 81)=5.29$, $p=0.02$. Worse ISI was associated with fewer days of PAP use at 90 days post-PAP initiation, $F(1, 88)=4.55$, $p=0.04$.
Conclusion: Insomnia symptom severity prior to initiating PAP treatment for SDB is a significant contributing factor to increased endorsement of PAP-related side effects. Pre-existing insomnia symptoms prior to PAP initiation may play a role in fewer days of PAP use in the long term. Future research should explore the impact of insomnia treatment in PAP side effects and use in women.
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0734
IMPACT OF PAP THERAPY IN COMORBID COPD AND OBSTRUCTIVE SLEEP APNEA OVERLAP SYNDROME: AN UPDATE

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Introduction: Cognitive impairment in older Veterans is an independent predictor of subsequent mortality and disability. Pilot data indicate that patients with OSA-COPD Overlap Syndrome (OVS) have reduced sleep quality and disease-specific quality of life (QoL). However, there are no prior systematic studies evaluating treatment paradigms in patients with OVS. Our ongoing clinical trial is investigating whether positive airway pressure (PAP) therapy alleviates sleep disturbances, sleepiness, and improves cognitive function and QoL in older adults with OVS.
Methods: The design is a prospective parallel group randomized controlled trial in Veterans 60 years and older, with moderate-to-severe OSA with concomitant COPD (OVS). Participants on the conservative care (CC) arm are required to follow good sleep habits and sleep hygiene, and on the PAP arm, additionally, are required to be adherent to PAP therapy with CPAP or Bilevel PAP, following attended PAP titration study. Sleep questionnaires were administered to evaluate sleepiness, sleep quality, and general and disease specific QoL. A battery of neurocognitive tests to evaluate cognitive function, including Trail Making Test Part A and B, Paced Auditory Serial Addition Test, Stroop Task, Digit Coding, Hopkins Verbal Learning Test-R, Weschler Abbreviated Scale Intelligence II, Weschler Memory Scale IV, and Psychomotor Vigilance Test, respectively, and Six-Minute Walk Test(6MWT) were performed. All tests were administered at baseline visit, 3 months and 6 months.
Results: We have enrolled 300 participants with OSA (AHI≥20/hr) and moderate-severe COPD, randomized 72 participants (49 PAP vs. 23 CC). PAP/CC: 45/22 males, 4/1 females; age: 70.2±6.1/69.9±8.3 years, BMI: 29.3±6.4/28.8±5.4 kg/m2, AHI: 43.0±18.2/49.0±26.9 hr, spirometry FEV1: 58.3±15.0/68.9±10.1% predicted ($p< 0.05$), arterial blood gas (n=49) PaCO2:41.1±3.7/41.6±10.2 mmHg, Epworth sleepiness scale score: 7.6±4.4/9.1±4.5, Six-Minute Walk Test, Total Distance Walked: 386.5±105.0/388.0±94.5 meters, FOSQ Total Score:17.0±3.5/17.2±2.5, SGRQ Total Score:35.9±19.4/40.5±19.3. No baseline group differences in cognitive tests. Post-therapy group data will be available at the end of the trial.
Conclusion: Baseline characteristics were similar between the groups except for FEV1. We expect the results from our study will determine the effects of treating a novel target (OVS) to maximize daytime function and QoL, while providing a framework for treatment of cognitive impairment in older Veterans with chronic diseases.
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0735

NEIGHBORHOOD DISADVANTAGE IS ASSOCIATED WITH LOWER CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) ADHERENCE

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Introduction: Adherence with continuous positive airway pressure (CPAP) to treat obstructive sleep apnea (OSA) remains a challenge. Factors at the neighborhood level, including socioeconomic disadvantage, restricted healthcare access, and reduced social support, may significantly contribute to lower rates of consistent CPAP usage. We assessed whether the area deprivation index (ADI), which measures neighborhood-level socioeconomic disadvantage—with higher scores indicating greater disadvantage—was associated with CPAP adherence.

Methods: We reviewed consecutive OSA patients newly initiated on CPAP therapy at four University of Pittsburgh Medical Center sleep clinics from January 1 to December 31, 2023. Information on age, sex, race, and whether patients met Medicare adherence criteria at 90 days was extracted from the electronic health record. Patient address was mapped to census tract and ADI was obtained from public databases. For analytical purposes, we use quintiles of ADI.

Results: A total of 790 patients newly initiated on CPAP (mean age 53 ± 15 years, 45% female, 74% White, 18% Black, 4% Asian, 1% Hispanic, 3% Other, and mean ADI 66.1±18.7) were included in this analysis. With increasing quintiles of disadvantage, non-adherence to CPAP varied from 21.5% to 36.4%, 30.8%, 37.4%, and 32.9% (p=0.017). Nonadherence was significantly lower in the least deprived quintile compared to the other four quintiles (p=0.012). These differences persisted after adjusting for age, sex, and race. The odds of non-adherence at 90-days were 2.1 (95% CI: 1.3-3.4), 1.6 (0.9-2.6), 1.9 (1.1-3.1), and 1.6 (0.9-2.7) fold greater for those in quintiles 2-5 compared to quintile 1, respectively.

Conclusion: Our findings suggest that a higher ADI score is a significant predictor of CPAP non-adherence. Current criteria for long-term CPAP coverage are dependent on adherence. Patients who live in higher-risk neighborhoods are being disproportionately denied care, which in terms exacerbates healthcare disparities among OSA patients.

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0736

INTERPERSONAL RELATIONSHIP QUALITY IMPROVEMENT AFTER PAP THERAPY IN PATIENTS WITH OSA

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Introduction: Untreated sleep apnea can strain interpersonal relationships due to fatigue, irritability, and stress caused by sleep disruption. Conversely, supportive relationships may play an important role in successful positive airway pressure (PAP) therapy initiation and management. While PAP therapy is highly effective in alleviating apneic events and reducing daytime sleepiness, its impact on relationship quality is not well documented. This study sought to evaluate self-reported relationship quality before and after initiating PAP therapy among patients with sleep apnea.

Methods: This cross-sectional study included patients currently on PAP therapy who retrospectively assessed their interpersonal (friends, family, coworkers, etc.) and intimate (spouse or bed partner) relationship quality using an online questionnaire. Relationship quality was self-reported using an 11-point Likert scale, capturing two timepoints: before and after PAP therapy initiation. Higher scores indicated better relationship quality. A paired t-test was used to compare the difference in mean scores at the two timepoints.

Results: Twenty-two patients (36.4% female, mean age 53.3 years) were included in the analysis). A third of patients had been on PAP therapy for more than 10 years. Interpersonal relationship quality scores improved significantly, from a mean of 66.3% before PAP therapy, to 76.0% after PAP therapy initiation. This equated to a mean difference of 9.81 points (95% CI 4.20 -15.23, p = 0.0015). Intimate relationships mean score increased from 70.2% before PAP to 79.7% after PAP therapy, for a mean difference of 7.59 points (95% CI -0.85, 16.03, p =0.075), though this change did not reach statistical significance.

Conclusion: The results suggest potential benefits of PAP therapy on interpersonal relationship dynamics, and the improvement in relationship quality after sleep apnea treatment highlights the importance of sleep health as a crucial component for overall relationship well-being. Larger studies are needed to further explore the impact of long-term PAP compliance on interpersonal and intimate relationship quality.

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0737

WITHDRAWN

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0738

IDENTIFYING BARRIERS TO CPAP INITIATION AMONG PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: CPAP is the first-line treatment for obstructive sleep apnea (OSA). The process of initiating CPAP in clinical practice is complicated and patients may get lost navigating between clinic, sleep lab and durable medical equipment provider. We sought to identify predictors for patients who received a CPAP prescription but did not initiate treatment to develop interventions to improve care of these high-risk patients.

Methods: We reviewed medical records of patients diagnosed with OSA and prescribed CPAP by a sleep clinician at four academic sleep clinics within the University of Pittsburgh Medical Center health system between January 1 and July 31, 2024. Non-initiation was defined as not receiving a CPAP machine within 90 days of date of prescription.

Results: We have collected data on 209 patients (53.1 ± 15.5 years, 49% women, 72.6% White) thus far. Initiation rates were similar between men and women (45.3% vs. 49.5%). In contrast, the proportion of patients initiated on CPAP within 90 days did

vary substantially by age group (42.0% in age < 40 yrs, 52.3% in age 40-64 yrs, 42.3% in age > 65 yrs), insurance type (Medicare (42.2%), commercial (50.9%), Medicaid (56.5%)), and by race (48.7% in White vs. 42.0% in Black patients), although differences did not meet statistical significance. The largest difference was observed between people who had previously been prescribed CPAP versus CPAP-naïve patients. CPAP initiation rates were 34.8% in prior users vs. 50.9% in CPAP-naïve (p=0.053).
Conclusion: Patients at both younger and older ages, particularly those of Black race and those covered by Medicare, are less likely to successfully initiate CPAP therapy, suggesting difficulties navigating the complex system for CPAP care. Additionally, the finding that prior CPAP users are less likely to initiate CPAP raises concerns that patient goals are not adequately incorporated into the clinician decision-making process when prescribing CPAP.
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0739

PAP THERAPY ASSOCIATED WITH PERCEIVED IMPROVEMENTS IN SYMPTOMS AND QUALITY OF LIFE IN OSA

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Introduction: Positive airway pressure (PAP) therapy can provide immediate and lasting clinical benefits in obstructive sleep apnea (OSA). Nevertheless, therapy adherence can be challenging for some users. Identifying benefits related to quality of life and symptom relief may further motivate users to persist with therapy.
Methods: Users of a smartphone app to track PAP therapy usage (myAir, ResMed) completed a one-time survey about their therapy experience and behaviors. Questions on perceived changes in quality of life (energy level, relationships, general activity, and clear-headedness) and OSA-related symptoms following therapy initiation were assessed using a 5-point scale reflecting worsening, no change, or improvement in the outcome of interest. Descriptive statistics and ordinal logistic regressions were used to assess the relationship between perceived improvement in outcomes and age, gender, and time on therapy. These regressions controlled for demographic and baseline clinical confounders.
Results: Data from 10,906 PAP users were included in the analysis (median age: 59 years, 44.8% female, median PAP usage during the first 7 days: 6.5 hrs/day). On average, 91% of users perceived an improvement in at least one of the eleven symptom measures, and 76% perceived an improvement in at least one of the four quality of life (QOL) measures. Users primarily reported perceived improvements in snoring (87%), fatigue (75%), energy level (72%), insomnia (68%), activity level (66%), clear-headedness (59%), and relationships (42%). While users reported perceived improvement in symptoms and QOL measures within the first 90 days, the odds of improvement increased progressively with extended therapy use for QOL measures, accidents, insomnia, moodiness, and snoring (12 (vs. 3) months, all p< 0.05). Differences in symptoms and QOL by age and gender were also observed (p< 0.05).
Conclusion: PAP therapy is associated with perceived improvements in QOL outcomes and symptoms, with significant improvements observed within 90 days. Continued PAP usage may further enhance outcomes through one year. Differences in perceived improvements by age and gender suggest an opportunity to better personalize messaging and strategies for PAP therapy initiation and long-term adherence.
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0740

LOOP GAIN PREDICTS RESIDUAL SLEEP APNEA EVENTS AMONG PEOPLE USING POSITIVE AIRWAY PRESSURE

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Introduction: Residual sleep apnea occurs in ~20% of patients (defined by a residual apnea-hypopnea index, (rAHI) ≥10 events/hour) using positive airway pressure (PAP) therapy. High loop gain (LG) contributes to obstructive sleep apnea (OSA) by a waxing and waning neural input to the dilator muscles of the upper airway resulting in episodic airway obstruction. We hypothesized that high LG is associated with increased risk of high rAHI among people using PAP.
Methods: We analyzed data from two completed randomized controlled trials of PAP therapy (APPLES and RICCADSA). The APPLES study evaluated the effects of fixed PAP therapy on neurocognition in adults with OSA. The RICCADSA study assessed the effects of autotitrating PAP on cardiovascular outcomes in adults with coronary artery disease and OSA. Our primary outcome was rAHI ≥10 events/hour evaluated by polysomnography on PAP at 2 months (APPLES) or by PAP device downloads at 3 months (RICCADSA). We measured LG from baseline polysomnography using a validated method (Terrill et al., 2015). We performed logistic regression in the discovery sample (APPLES) and then the validation sample (RICCADSA) with LG as the exposure (highest vs. other quartiles). We then adjusted for baseline AHI, age, sex, body mass index (BMI), and pharyngeal collapsibility.
Results: Seventeen percent of the discovery (APPLES) sample (n=448) and 14% of the validation (RICCADSA) sample (n=185) exhibited rAHI ≥10 events/hour while on PAP. In unadjusted analysis, high LG was associated with an increased risk of ≥10 residual events/hour in both discovery and validation samples: odds ratio (OR) 3.1 [1.9, 5.2] and 3.2 [1.3, 7.4] respectively. This risk remained significantly increased after adjustment for baseline AHI, age, sex, BMI and pharyngeal collapsibility in APPLES (2.2 [1.2, 3.8]) and RICCADSA (3.5 [1.4, 8.7]). A sensitivity analysis that adjusted for central events at baseline did not meaningfully alter the results.
Conclusion: High LG on baseline polysomnogram is associated with an increased risk of residual sleep apnea while on PAP therapy (rAHI ≥ 10 events/hour). Identifying patients with this characteristic at start of PAP therapy may help select those who may benefit from adjunctive therapies (e.g., acetazolamide or oxygen) if residual sleep apnea occurs.
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0741

POTENTIAL IMPACT OF A RESPIRONICS CPAP SENSING ALGORITHM DEFECT ON ABANDONMENT OF CPAP THERAPY

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Introduction: A defect exists in some Respironics AutoPAP, BIPAP and ASV machines, with detection of "vibratory snores" that are not occurring. Pressures increase, even without apneas or hypopneas. This sensing error can cause volatile pressures, with mask leaks, patient discomfort, and impaired sleep quality. Respironics acknowledges this defect but states that it does not harm patients. However, no data exist as to its actual frequency and impact. Given that up to half of patients abandon positive airway pressure therapy, we modeled the potential contribution of this defect to PAP abandonment.
Methods: Model inputs include the proportion of patients who abandoned PAP therapy and the proportion of abandonments related to the vibratory snore defect. We based the number of U.S. Respironics machines on the number in the 2021 recall, approximately 5,000,000. Some patients who abandon AutoPAP keep their machines while others lose them because insurance stops paying for them. We modeled that 30% of machines counted in the recall were not in use, in addition to machines taken away due to insurance. Because of uncertainties in the input values, sensitivity analyses were conducted.
Results: In our base case, we estimated that 40% of patients abandoned AutoPAP and that the defect may have contributed to 2% of abandonments. Under the most conservative scenario (20% abandonment, 0.5% of patients impacted by defect), 5,000 patients were affected. Under the worst-case scenario (50% abandonment, 5% of patients impacted by defect), the defect may have contributed to 175,000 patients abandoning AutoPAP.
Conclusion: This model has two limitations. First, precise input data are not available. We have addressed this with sensitivity analyses using a wide range of estimates. Second, data were insufficient to model time factors, such as machine aging and replacement, patients becoming less likely to abandon AutoPAP after sustained use and, perhaps, older machines becoming more likely to develop the defect. However, even the most conservative model suggests that this defect may cause many patients to give up on AutoPAP – highlighting the need for empirical research on the frequency of the defect and its association with abandoning therapy.
Support (if any): None

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0742

RECORDING DURATION OF HOME SLEEP TEST PREDICTS ADHERENCE TO CPAP THERAPY

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Introduction: Continuous positive airway pressure (CPAP) is the first-line therapy for obstructive sleep apnea (OSA), but CPAP adherence is challenging to many patients. As OSA is often diagnosed using self-directed home sleep test (HST), we hypothesized that the timings of HST recording can reflect the patient's behavioral patterns and predict CPAP adherence.
Methods: We retrospectively collected data from our sleep clinic, which was the sole provider of HST within an academic tertiary-care center. Each patient took one night of HST using commercial devices with printed and verbal instructions to start HST recording when they "are ready to go to sleep" and stop recording when they "wake up". Our clinic also instructed patients to start recording before 12 AM, and continue recording if they wake up during the night and plan to resume sleep. Among 712 patients who took HST within the last two years, were diagnosed with severe OSA and prescribed with CPAP, CPAP usage within one year after HST and other clinical data were available and studied for 360 patients.
Results: HST recording duration, start time and end time were 8.15 (7.27-8.78) hours [median (25-75 percentile)], 10:28 PM (9:39-11:18 PM) and 6:30 AM (5:52-7:17 AM), respectively. Longer HST recording duration was strongly correlated with both earlier start time (Spearman's correlation coefficient r = -0.48; P < 3E-22) and later end time (r = 0.38; P < 2E-13). The daily CPAP usage time averaged on days when it was used was 6.22 (4.72-7.43) hours. Higher CPAP usage time was significantly correlated with longer HST recording duration (r = 0.21; P < 5E-5), and correlated with earlier recording start time (r = -0.13; P = 0.016), but not correlated with the recording end time (r = 0.01; P = 0.9). Patient's age [52 (42-63) years], gender [58% male], body mass index [35.6 (31.0-42.4) kg/m2], apnea-hypopnea index [33.9 (24.9-52.4)] were all uncorrelated with either HSAT recording duration or CPAP usage time (P > 0.05).
Conclusion: HST recording duration and start time are readily available clinical data that can be harnessed to predict CPAP adherence at the time of OSA diagnosis, which may improve clinical outcomes.
Support (if any): None

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0743

EFFECTIVENESS OF INITIATING NASAL MASK COMPARED TO FACE MASK DURING A TITRATION STUDY

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Introduction: Continuous Positive Airway Pressure (CPAP) titration studies at our institution typically favor initiation of full-face mask during the study, which subsequently lead to full face mask usage at home. However, existing literature suggests that nasal interfaces are associated with greater CPAP compliance, lower required pressures, and improved sleep efficiency compared to full face interface. This review of institutional practice is to determine if initial mask interface choice during the titration study affects CPAP compliance.
Methods: A single center, retrospective review was conducted, assessing the Epworth Sleepiness Scale, mask type used, baseline apnea hypopnea index (AHI), sleep efficiency, total sleep time, nocturnal hypoxic burden, compliance, and rates of mask crossover among patients who underwent CPAP titration studies from December 2023 to March 2024. A comparative analysis was performed between CPAP studies initiated with nasal masks and those initiated with full face masks.
Results: Forty-nine CPAP studies (20 nasal mask and 29 full face mask) were included in the analysis. Twenty-nine patients

were male and median age was 60. Patients initiated with full-face masks had higher baseline AHI (19.55 +/-21.52 to 13.90 events/hour +/-22.04), slightly higher CPAP pressure (10cmH2O +/-2.855 to 9.5cmH2O +/-2.758), and greater compliance (83% +/-23.807 to 72% +/-34.819) compared those initiated with nasal interface. Mask crossover rates were high among those initiated with nasal masks compared to full face masks (33.3% compared to 6.25%, p-value= 0.08).
Conclusion: The findings suggest that patients with high AHI may be more likely to undergo titration studies with full face masks. Full face masks started during the titration study demonstrated better compliance and lower rates of mask crossover, potentially indicating greater comfort and contrasting with existing literature favoring nasal interfaces. The primary limitation of the study is its small sample size.
Support (if any):

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0744

THE RELATIONSHIP OF THERAPEUTIC POSITIVE AIRWAY PRESSURE AND UPPER AIRWAY COLLAPSIBILITY

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Introduction: Drug-Induced Sleep Endoscopy with Positive Airway Pressure (DISE-PAP) provides a quantitative evaluation of upper airway collapsibility, known as the pharyngeal opening pressure (PhOP). Limited research has examined the relationship between PhOP and required level of CPAP. This study aimed to investigate the relationship between required CPAP and PhOP.
Methods: This single-institution retrospective study evaluated patients who underwent DISE-PAP in the supine position from 2022-2024. Adults ≥18 years of age with OSA (AHI ≥ 5), >2 hours/day average PAP use, and well-controlled OSA on PAP (≥50% AHI reduction, residual AHI < 10) were included. Primary outcome was the relationship between median CPAP level (mCPAP), CPAP level at 95% of the time (t95CPAP) obtained from auto-PAP downloads, and PhOP. Secondary outcome sought to determine the relationship between mCPAP, t95CPAP, and PhOP with AHI and BMI. Data analysis included descriptive statistics and linear regression tests.
Results: 86 patients were included in the study (age 50.7±15.5, BMI 29.5±4.3, AHI 36±24, 69.7% male, 58.1% white, 10.5% Black, 19.7% Hispanic, 39.5% on oronasal mask). The mean PhOP was 7.1±3.0 cmH2O, mCPAP 8.6±2.5 cmH2O, and t95CPAP 10.4±2.7 cmH2O. There was a positive correlation between PhOP and mCPAP (R-square=0.063, p=0.01). PhOP was approximately 1.5 and 3.3cm H2O lower than mCPAP and t95CPAP, respectively. As mCPAP and t95CPAP increased by 1, PhOP increased by.308 and.305 cmH2O. BMI was positively correlated with mCPAP (R-square= 0.132, p=0.0006). PhOP and mCPAP were mildly correlated with AHI (R-square=0.0638, p=0.0247; R-square=0.178, p=0.0001). For each 10-point increase in AHI, there was a.33 and.44 increase in PhOP and mtCPAP.
Conclusion: This study found a positive correlation between mCPAP, t95CPAP and PhOP with PhOP approximately 1.5cm H2O lower than mCPAP and 3.3 cmH2O below t95CPAP. The discordance between PhOP and therapeutic CPAP measures could be due to a variety of reasons, i.e., inability to perform DISE during REM sleep or prescribed oronasal masks leading to higher pressure requirements compared to nasal mask during DISE-PAP. These findings build on our current understanding of upper airway collapsibility as measured during DISE-PAP. Future studies aim to improve patient selection and surgical outcomes in OSA.
Support (if any):

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0745

IS BRAIN AGE MALLEABLE TO SLEEP APNEA THERAPY? AN EXPLORATORY POSITIVE AIRWAY PRESSURE TITRATION AND MACHINE LEARNING-BASED BRAIN AGE STUDY

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Introduction: Machine learning (ML) techniques offer powerful tools for analyzing complex physiologic data. One such tool is the ML-based Brain Age Index (BAI) which quantifies the difference between a person's ML-determined brain age (BA) using EEG signals collected during sleep versus their chronological age (CA). Prior research has associated BAI with various disease states. However, the effects of therapeutic interventions on BAI have yet to be explored.
Methods: A deep neural network model was trained on a dataset of 54,000 polysomnography (PSG) studies to predict patients' BA. Additionally, a real-world dataset of 4,738 split-night PSG studies was collected, where patients underwent the first half of the study without positive airway pressure (PAP) therapy and transitioned to PAP therapy midway through the night. To evaluate the effect of PAP therapy on the BAI, ordinary least squares (OLS) regression was performed while controlling for sleep-related metrics, including the percentage of time spent in wake, N1, N2, N3, and REM.
Results: The OLS analysis found a significant association with a lower BAI after transitioning to PAP therapy (P-value = 0.001, OLS coefficient = -0.648). The mean BAI was -1.62 (-1.842, -1.398) and -1.584 (-1.806, -1.362) for the pre-PAP and PAP portions respectively. The dataset showed the following mean percentages of time spent in Wake, N1, N2, N3, and REM for the pre-PAP / PAP portions of the night: 38.1% (37.6%, 38.5%) / 25.7% (25.2%, 26.1%), 7.8% (7.6%, 8.1%) / 5.6% (5.5%, 5.8%), 73.2% (72.8%, 73.7%) / 60.7% (60.2%, 61.1%), 11.3% (10.9%, 11.6%) / 10.1% (9.9%, 10.4%), and 7.7% (7.4%, 7.9%) / 23.6% (23.2%, 24.0%).
Conclusion: The OLS analysis, controlling for sleep-related metrics, demonstrated improvements in BAI with initiation of PAP therapy. This suggests BAI is "malleable" and responsive to therapies that improve sleep and thus highlights its value as a potential biomarker of brain health. Overall, the study encourages further research into biomarkers for studying the neurocognitive benefits associated with Obstructive Sleep Apnea treatment.
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0746

VALUES EXPRESSED BY WOMEN VETERANS INITIATING TREATMENT FOR SLEEP APNEA

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Introduction: Women with sleep apnea report poorer sleep and have lower positive airway pressure (PAP) adherence rates than men. Within the Veterans Health Administration, there is a movement toward a Whole Health approach to care, shifting the focus from "what's the matter with the patient" to "what matters to the patient." We asked women veterans initiating sleep apnea treatment to describe their personal values and the impact of sleep apnea on these values.

Methods: Within a larger randomized controlled trial (NCT03377452), 44 women veterans (mean age = 53.7 years; 65.9% White, 34.1% married, 47.7% employed) diagnosed with sleep apnea were randomly assigned to a behavioral treatment for sleep apnea called "Acceptance and the Behavioral Changes to Treat Sleep Apnea" (ABC-SA; compared to an education control condition). In the first ABC-SA session, participants were asked to "list three of the things you most care about in your life" (i.e., values) and "the ways having sleep apnea impacts what you care about most" (i.e., impacts). Value and impact responses were coded into five categories with 100% agreement among three raters after independent coding and adjudication: work/education, relationships, personal care/health, leisure, and pets. Values were further coded into 14 subcategories based on the Valued Living Questionnaire.

Results: The frequencies of value and impact categories were: relationships (value n = 40; impact n = 25), personal care/health (value n = 39; impact n = 43), work/education (value n = 22; impact n = 11), leisure (value n = 13; impact n = 12), and pets (value n = 7; impact n = 2). The most frequently endorsed value subcategories were physical health (n = 32), family (other than marriage/parenting; n = 30), and friends/social life (n = 20).

Conclusion: Health and relationships are highly important to women veterans with sleep apnea. Research has focused on the health benefits of PAP, but fewer studies have explored interpersonal factors. The perceived impacts of PAP on relationships may serve as a barrier and/or motivator of PAP use.

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0747

RESPONSIVENESS OF AN INDIVIDUALIZED MEASURE OF QUALITY OF LIFE TREATMENT RESPONSE IN SLEEP APNEA

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Introduction: Patients with obstructive sleep apnea (OSA) experience significant quality of life (QOL) burden. The Symptoms of Nocturnal Obstruction & Related Events (SNORE-25) is a 25-item validated, OSA-specific QOL instrument and offers an Importance Subscale, where patients select the five most bothersome items. Recognizing that burden changes with treatment, different item combinations for the Importance Subscale are possible at different times. To test responsiveness and compare during treatment, we hypothesized that changes in the Importance Subscale score would be greater when using the baseline combination, compared to using the baseline combination and the updated different combination at follow-up. We also hypothesized that the former change would correlate more strongly than the latter with a global QOL Change score.

Methods: This retrospective cohort from 2010-2020 included patients with OSA (apnea-hypopnea index (AHI)≥5) from a tertiary sleep surgery clinic, who underwent sleep surgery. The SNORE-25 instrument was completed prior to consultation (baseline) and first non-postoperative visit (follow-up) (range 0-5, higher worse, minimal clinically important difference 1.1). Changes in the Importance Subscale scores were calculated in two ways: 1) using the same combination of top five-items from baseline, and 2) using the combination of top five-items selected at each time point (baseline and follow-up), which could differ. Correlation analysis was performed between change in Importance Subscale scores and Global QOL Change score (range -7-+7).

Results: The cohort (N=269) was middle-age (mean+/-standard deviation 43+/-13 years) and majority male (71%) with severe OSA (AHI 35+/-32 events/hour). Mean baseline Importance Subscale score was 3.6+/-1.0 (moderate-severe burden). At follow-up (mean 94+/-71 days), the change in Importance Subscale score using the same baseline combination (-1.6+/-1.3) was greater than using the combination selected at each time point (-1.1+/-1.2) (difference 0.4+/-0.6, 95%CI -0.5-(-)0.3, $p < 0.001$). The correlations of change in Importance Subscale scores and Global QOL change were moderately positive, significant, and similar between Importance Subscale scores (Pearson r 0.52 vs 0.51 respectively, 95%CI 0.4-0.6, $p < 0.001$).

Conclusion: The SNORE-25 Importance Subscale is useful in measuring patient specific individualized QOL burden and improvement with treatment, and it is responsive to treatment, especially when using the same combination of importance items at baseline and follow-up.

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0748

IMPACTS OF HGNS ON HYPOXIC BURDEN

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Introduction: Hypoxic burden (HB) is a novel metric used to characterize the physiological impact of obstructive sleep apnea (OSA). Prior studies have shown HB to strongly correlate with cardiovascular (CV) risk. While the hypoglossal nerve stimulator (HGNS) has been shown to effectively reduce AHI, its impact on HB remains underexplored. This study examines the effect of HGNS on subjective and objective outcomes in OSA, including HB.
Methods: We conducted a retrospective review of 72 patients who underwent HGNS and completed home sleep apnea testing (HSAT) before and after surgery at our institution. Data collected included demographics, pre- and postoperative AHI, body mass index (BMI), oxygen desaturation index (ODI), and Epworth sleepiness score (ESS). HB was calculated using the SpO2 signal from sleep studies at baseline and post-optimization of HGNS therapy (The Siesta Group, Vienna Austria). Treatment success was evaluated using the Sher20 criteria, and the paired Wilcoxon test and Wilcoxon Rank Sum Test were used to assess outcomes.
Results: The mean age and BMI of the patients were 64.5 years and 28.7 kg/m², with 76.1% being male. The Sher20 success rate was 52.8%. Statistically significant reductions were seen in AHI (33.1 to 17.8, $p < 0.001$), ESS (11.4 to 7.7, $p < 0.001$), HB (102.5 to 62.9, $p < 0.001$), and ODI (29.5 to 14.8, $p < 0.001$) after HGNS. Significant differences were observed in ODI and HB changes between Sher20 responders and non-responders, while ESS changes were not significantly different.
Conclusion: HGNS resulted in significant improvements in both objective and subjective outcomes of OSA, including HB. These findings suggest that HGNS may be useful in alleviating physiological impacts associated with OSA.
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0749

POSITIVE CHANGES IN PATIENT REPORTED OUTCOMES IN MID-TERM AND LONG-TERM PATIENTS TREATED WITH HYPOGLOSSAL NERVE STIMULATION THERAPY

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Introduction: While hypoglossal nerve stimulation (HNS) is an effective therapeutic option for obstructive sleep apnea(OSA), improvement in mid-term and long-term patient reported outcomes (PROs) and influence of adherence remains understudied. We hypothesize that mid- and long-term PROs improve in dose dependent fashion with increased adherence, measured by validated questionnaires: Epworth Sleepiness Scale(ESS), Insomnia Severity Index (ISI), Patient Health Questionnaire-9(PHQ-9).
Methods: Consecutive HNS implanted patients (2015-2021) with available follow up data N=72 at Cleveland Clinic are included. Adherence was measured by weekly hours of usage at 3-months and 1 and 2 years. Paired t-tests evaluated PRO changes, and Spearman correlations assessed relationships between adherence and PRO changes. Mixed effects models examined the effect of adherence on PRO changes, adjusted for age, gender, and body mass index (BMI). Statistical significance was set at $p< 0.05$.
Results: Mean age 62.7±9.3 years, 32.4% female, 91.4% white. Usage averaged 42.0±15.0, 37.5±15.2, 33.8±15.1 hr/week at 3-months, 1 & 2 yrs respectively. Significant (all p-values < 0.05) improvements in scores were noted at each time points: ESS –3.4±4.4, -3.3±4.6, -2.3±3.9; ISI –4.8±6.2, -4.0±6.0, -4.3±7.5; PHQ-9 –3.3±4.4, -3.7±5.5, -3.6±5.4 respectively. At 1-yr higher weekly usage significantly correlated with reduction in ESS (Spearman's rho = -0.32, p = 0.031). In adjusted model, every 10 hours incremental weekly usage led to significant improvements in ESS [beta = -0.37 (-0.7, -0.03), p = 0.033] and ISI [beta = -1.00 (-1.58, -0.42), $p < 0.001$] but not PHQ-9 [beta = -0.32 (-0.69, 0.05, p=0.094]. Secondary analysis showed higher pre-implant ESS was associated with greater ISI [beta = -2.04 (-3.32, -0.76), $p < 0.001$] and PHQ-9 [beta = -1.22 (-2.16, -0.27), $p < 0.001$] improvements.
Conclusion: Self-reported PROs show mid- and long-term improvement in sleepiness, insomnia severity and depression scores post HNS treatment. Our findings suggest that with every 10 hours/week of usage, there is a dose dependent improvement in sleepiness (ESS) and insomnia (ISI), although increased adherence does not influence improvement in depression score. This improvement might be related to improvement in baseline sleepiness. Based on our findings we plan to conduct further research in a larger cohort to provide in-depth understanding of such correlations.
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0750

EFFICACY OF HYPOGLOSSAL NERVE STIMULATION IN POSITIONAL AND NON-POSITIONAL OBSTRUCTIVE SLEEP APNEA

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Introduction: Hypoglossal nerve stimulation (HGNS) is an emerging treatment for obstructive sleep apnea (OSA). This study evaluates the effectiveness of HGNS in positional and non-positional OSA patients by evaluating improvements in the Apnea-Hypopnea Index (AHI), Epworth Sleepiness Scale (ESS) scores, AHI reduction to mild OSA (AHI ≤ 15) and surgical success rate defined by Sher's criteria (≥ 50% reduction to AHI < 20).
Methods: This single-center retrospective study was conducted on 59 patients with moderate-to-severe OSA who underwent HGNS implantation between December 2021 and July 2024. Pre-implantation and best post-implantation AHI and ESS scores were analyzed utilizing in-lab and home sleep testing data. Patients were categorized into positional (supine AHI ≥ 50% reduction to ≤ 5 in non-supine) and non-positional OSA cohorts and outcomes were compared.

Results: The cohort had a median age of 66 years (range: 40–82), predominantly white (93.2%) and male (83.1%). The Wilcoxon signed-rank test showed significant reductions in AHI and ESS scores after HGNS in both positional and non-positional OSA patients. Overall, median AHI decreased from 27.4 to 6.8 ($p< 0.001$), and ESS improved from 7.0 to 4.0 ($p< 0.001$). In positional OSA, median AHI decreased from 21.5 to 6.15 ($p< 0.001$), and ESS improved from 7.5 to 4.5 ($p< 0.03$). In non-positional OSA, AHI decreased from 34.5 to 6.8 ($p< 0.001$), and ESS improved from 7 to 4 ($p< 0.03$). Surgical success (≥50% reduction, AHI < 20) was achieved in 81.25% of positional and 69.77% of non-positional patients; AHI < 15 was reached by 87.5% of positional and 65.12% of non-positional patients. The Fisher's Exact Test found no significant difference in surgical success ($p=0.51$) or AHI reduction to ≤15 ($p=0.11$) between groups.
Conclusion: HGNS significantly reduces AHI and improves ESS scores in both positional and non-positional OSA patients, with no statistically significant differences in success rates based on Sher's criteria and reduction of AHI ≤ 15. These results suggest that HGNS is effective regardless of OSA positional phenotype.
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0751

SLEEP AND BREATHING: POSITIVE AIRWAY PRESSURE AND HYPOGLOSSAL NERVE STIMULATION, A COMPARATIVE ANALYSIS

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Introduction: Obstructive sleep apnea (OSA) results in neurocognitive, behavioral, cardiovascular, and metabolic morbidities. Recently, hypoglossal nerve stimulation (HNS) emerged as second line therapy; subsequent to failed PAP use. A cohort comparative analysis for PAP and HNS remains to be seen. The following research suggests with consistent usage of HNS, physiological parameters and subjective benefit mirror PAP therapy and improve non-compliance.
Methods: The study group included 34 patients, under the care of Mercy Health Bon Secours St. Francis Sleep Center in Greenville, South Carolina. There were 20 males and 14 females. Average age of 63; median age of 66. Each patient was previously non-compliant with PAP therapy, as per insurance payor guidelines for implantation of HNS. Information were collected in reference to PAP and HNS compliance via respective cloud platforms. Epworth Sleepiness Score (ESS) questionnaires, blood pressure (BP), pulse rate were facilitated at each office visit and documented from nocturnal polysomnography (NPSG). NPSGs were recorded and scored using guidelines as described by the AASM scoring manual; with 4% oxygen desaturations for hypopneas. Apnea hypopnea index (AHI) was defined be the number of apneas and hypopneas per hour of total sleep time. AHI ≤ 5 is normal, AHI 5-15 is mild, AHI 15-30 is moderate, AHI > 30 is severe. ESS was used for subjective daytime sleepiness - which scores ≥ 10 are consistent with excessive daytime sleepiness. Compliance was defined as usage ≥ 4 hours per night for ≥ 70% of the nights. Pulse readings were acquired via peripheral oximetry during office visits and during NPSG. BP was acquired via sphygmomanometer during office visits.
Results: HNS revealed increased compliance versus PAP, decreased daytime sleepiness, reduced mean arterial pressure, and reduced pulse rate. In addition, median AHI reduction was 95%, while average reduction was 91%. AHI p-value was 2.62801E-13, ESS p-value was 1.04244E-05, MAP p-value was 0.06395, and pulse rate p-value was 0.2576.
Conclusion: The Subjective benefit, improvement in physiological markers, and increased compliance in this study cohort reveal that HNS is a viable option for treatment of OSA in PAP intolerant patients. This is comparable to results with consistent use of PAP therapy.
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0752

REAL WORLD (PILOT) HYPOGLOSSAL NERVE STIMULATOR EXPERIENCE IN A VETERAN POPULATION

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Introduction: The hypoglossal nerve stimulator (HNS) is an obstructive sleep apnea treatment for patients who have demonstrated difficulty adhering to CPAP therapy. In a cohort study, it has been shown to decrease apnea-hypopnea index (AHI) by 68%, improve quality of life, and decrease sleep time spent with the oxygen saturation less than 90%. Many decades of CPAP data have shown that non-adherence rates high, at an estimated 34%. Moderate to severe obstructive sleep apnea has been associated with increased cardiovascular morbidity and mortality. Home sleep apnea tests provide a convenient, cost-effective method to evaluate for real world treatment efficacy. This pilot study aims to examine the real-world effectiveness of the HNS to improve AHI in moderate-severe OSA in a veteran population.
Methods: Participants were selected from a database containing all of the patients who have received a HNS to date at the Lt. Col. Luke Weathers, Jr. VA Medical Center in Memphis, TN. Inclusion criteria were activation of the HNS 6 months prior and demonstrated current use of their device. Patients who agreed to enroll in the study were mailed a home sleep apnea test (HSAT) to use with their HNS turned on. A timeline consisting of device implantation, device activation, and HSAT completion was created. Measured outcomes included change in AHI and change in Epworth sleepiness scale score (ESS), pre and post HNS implantation and activation.
Results: This pilot study consisted of 8 patients who met the inclusion criteria and agreed to participate. There were 17 patients who received a HNS, but various factors including non-response, nonadherence, and non-use due to adverse events limited the size of this study. Mean AHI decreased from 39.2 events/hour to 18.8 events per hour and mean ESS scores decreased from 13.7 to 10.1 after HNS therapy.
Conclusion: The HNS is an effective therapy to decrease AHI in CPAP intolerant patients in a veteran population. However, some patients continue to struggle with adherence and this therapy does carry some risk for adverse events. Future plans for this study include exploring how to increase adherence for HNS therapy.
Support (if any):

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0753

PREDICTIVE FACTORS FOR ONE-YEAR OUTCOMES OF HYPOGLOSSAL NERVE STIMULATION THERAPY IN OBSTRUCTIVE SLEEP APNEA PATIENTS

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Introduction: Hypoglossal nerve stimulation (HNS) therapy is an alternative treatment for patients with obstructive sleep apnea (OSA) who cannot tolerate continuous positive airway pressure (CPAP). Identifying predictive factors for long term therapy response is essential to optimize patient selection and outcomes.
Methods: A retrospective analysis was conducted on 65 OSA patients undergoing HNS therapy, categorized into responders (n=33) and non-responders (n=32) based on treatment outcomes at one year. Responders were defined as patients who achieved a post-treatment AHI reduction of at least 50% from baseline and a post-treatment AHI below 20. Baseline characteristics, underlying diseases, sleep parameters (PSG), drug-induced sleep endoscopy (DISE) findings, and subjective measures (Epworth Sleepiness Scale, Insomnia Severity Index) were compared. Regression analysis was performed to identify predictors of one-year response.
Results: There were no significant differences between responders and non-responders in age (p=0.237), sex (p=0.401), race (p=0.667), or BMI (p=0.132). Responders showed significantly shorter baseline sleep latency (13.3±13.6 vs. 37.0±34.7; p=0.023). During the titration study, responders exhibited significantly lower AHI values, including total AHI (10.4±9.6 vs. 25.9±18.8; p< 0.001), AHI during supine sleep (24.5±40.4 vs. 44.3±31.4; p=0.047), and AHI during REM sleep (13.8±16.1 vs. 24.6±19.5; p=0.023). Additionally, sum of DISE scores were predictive, with responders showing significantly lower scores (4.5±1.4 vs. 5.2±1.1; p=0.041). Stepwise regression analysis identified older age, lower baseline central AHI, and lower sum of DISE scores as significant predictors of response at one year.
Conclusion: Predictive factors for successful one-year outcomes of HNS therapy in OSA patients include older age, lower baseline central AHI, and favorable DISE findings. Lower AHI values observed during the titration study further distinguish responders, particularly in supine and REM sleep. These findings can guide pre-treatment assessments to identify optimal candidates for HNS therapy.
Support (if any):

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0754

COMPARATIVE ANALYSIS OF PERIODIC LIMB MOVEMENTS OF SLEEP ON LONG-TERM ADHERENCE AND OUTCOMES OF HYPOGLOSSAL NERVE STIMULATION THERAPY

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Introduction: Periodic limb movement of sleep (PLMS) has been suggested as a potential factor influencing adherence and therapeutic outcomes in sleep-disordered breathing treatments. This study evaluates the impact of PLMS on one-year adherence and home sleep test (HST) results among patients undergoing hypoglossal nerve stimulation (HNS) therapy.
Methods: A retrospective analysis was conducted on 123 OSA patients treated with HNS therapy at UC Irvine Sleep Disorders Center, divided into two groups based on titration study PLM index (PLMI): PLMI < 15 (n=59) and PLMI ≥15 (n=64). Baseline characteristics, adherence data, and one-year outcomes, including subjective measures (ESS, benefit) and HST results (AHI, ODI), were compared between groups. Adherence was assessed using the average usage time over the past three months and the number of usage days within the past three months. Statistical analyses were performed using R software.
Results: The prevalence of PLMS during the HNS titration study was high at 52% (64 out of total 123 subjects). Between PLMS and non-PLMS groups, no significant differences were observed in adherence metrics, including average usage time over the past three months (256.9±188.9 vs. 270.5±184.5 minutes; p=0.712) or number of usage days (50.1±37.9 vs. 51.7±38.4; p=0.828). One-year HST results, including total AHI (21.2±18.4 vs. 19.2±17.9; p=0.648), supine AHI (24.1±20.5 vs. 20.0±18.6; p=0.398), and ODI (19.6±17.2 vs. 17.7±16.7; p=0.654), were comparable. Baseline characteristics, such as age (64.0±9.6 vs. 68.6±8.4; p=0.005), showed significant differences, but these did not correlate with long-term outcomes.
Conclusion: While presence of PLMS during the titration study were not directly associated with significant differences in one-year outcomes of HNS therapy, patients with PLMS may have received additional treatment targeting limb movements, which could have influenced their outcomes. These findings highlight the need for further research to determine the impact of concurrent treatment strategies and clarify the role of PLMS in long-term therapy success.
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0755

EFFICACY OF DISE TITRATION STUDIES ON SUBJECTS WITH HYPOGLOSSAL NERVE STIMULATION

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Introduction: Drug induced sleep endoscopy (DISE) titrations have been used as a tool to further assess different treatment options for subjects with OSA, and PAP intolerance. Suboptimal hypoglossal nerve stimulator (HNS) responders may be assessed with DISE to guide further treatment options.
Methods: We reviewed the last 7 DISE titration studies performed at a local VA hospital. We obtained baseline demographic characteristics, pre and post implantation sleep studies, and pre and post DISE data. The second data collected was performed following the intervention recommended. Inspire configuration and settings were adjusted during DISE to optimize treatment response and assess the need for further interventions.
Results: The average age of the 7 selected subjects was 65.5 years, their BMI was 31.2 and 6 of them were male and 1 female. They had an average baseline AHI of 59 and all but one subject had severe anteroposterior collapse at the velopharynx level. One subject was treated with Mandibular Advancement Device combined with Inspire and 2 were treated with ESP and Inspire. After initiation of therapy recommended by DISE titration,

AHI was reduced by 46% to 26 events/hour (p= 0.0021) in subjects expected to have improvement as predicted by DISE titration. One subject had concentric collapse at the velopharynx level and was placed on Inspire and PAP therapy combination while she would be working on weight loss with future planned reassessment of the airway.
Conclusion: DISE may be helpful to predict future response to therapeutic interventions in subjects with poor HNS response. It may also help select subjects who may not be expected to respond to therapy. Further data analysis of a larger cohort of subjects is needed.
Support (if any):

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0756
LONG-TERM ADHERENCE OF HYPOGLOSSAL NERVE STIMULATION FOR OSA

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Introduction: Obstructive Sleep Apnea (OSA) is a serious medical condition that can lead to poor health outcomes. Treatment for OSA with positive airway pressure (PAP) is efficacious, but effectiveness is limited by poor treatment adherence. Long-term adherence studies suggest that treatment utilization decreases with time. Alternative treatments, like Hypoglossal Nerve Stimulation (HNS), are effective at treating OSA and have shown high adherence in several studies, but long-term use has yet to be reported. This observational study examined adherence to HNS over 1.5 years using objective data on utilization.
Methods: We examined treatment utilization data obtained from the manufacturer's patient management platform (SleepSync, Inspire). 4273 patients had at least 18 months of usage data with a Bluetooth remote controller (available since 2022). A subset of these patients also had demographic information. Usage was calculated as hours (mean±std) from first start button press to time of therapy off, subtracting any nighttime pauses, and normalized by nights of no use counted as zero hours of therapy. Tukey analysis was performed to compare means.
Results: Mean usage was significantly higher in the first year post-activation (6.1±1.7 hours) compared to the first half of the second year (5.7±2.0 hours) (95% CI=[0.4,0.5]). However, comparing mean usage 12-15 months post-activation (5.8±2.0 hours) to 15-18 months (5.7±2.1 hours) was not significantly different (95% CI=[-0.04,0.2]). There was no significant difference between patients with pre-implant AHI< 20 and >=20 over the year and a half (95% CI=[-0.2,0.1]). However, for post-activation AHI< 20 or >=20, usage was significantly lower in individuals with a higher residual AHI post-activation (95% CI=[-0.6,-0.1]).
Conclusion: These are the first reported observational, long-term adherence data for HNS. The data suggest a clear leveling off of adherence at about 12-15 months, suggesting a stable usage over longer periods. Average use was higher than is seen in PAP users despite the fact that patients who meet criteria for HNS are required to fail PAP therapy. Pre-treatment AHI did not affect usage, but treatment usage was lower for those with higher residual AHI after treatment.
Support (if any): Employees of Inspire Medical Systems contributed to the data analysis.

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0757
FREQUENCY OF STIMULATION PROGRAMMING SETTINGS UTILIZED IN PATIENTS WHO RECEIVED HYPOGLOSSAL NERVE STIMULATION FOR TREATMENT OF OBSTRUCTIVE SLEEP APNEA

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Introduction: Hypoglossal Nerve Stimulation (HGNS) using an implantable cranial nerve XII neurostimulation system is a safe and effective therapy for CPAP-intolerant patients with obstructive sleep apnea (OSA). Data has been previously published about stability of amplitude (V) programming over time. There are alternative stimulation settings that can be programmed to impact efficacy and adherence. Very little published data exists about the percentage of patients who require alternative programming to optimize patient outcomes.
Methods: Patient programming data from SleepSync (a web-based platform that tracks adherence, settings, and patient outcomes) was analyzed to understand final programming settings. Stimulation settings (electrode, pulse width (PW) and rate) were analyzed to compare initial and final settings. The recommended programming settings are Electrode A, PW of 90 µS and rate of 33 Hz. A comparison was made between initial and final settings.
Results: 46,726 patients were analyzed. Results are reported as: setting (n#, %). Initial Electrode settings: A (45,306; 96.96%), B (647; 1.38%), C (450; 0.96%), D (222; 0.48%), and E (60; 0.13%). Final electrode settings: A (40,923; 85.64%), B (3,079; 6.44%), C (2076; 4.34%), D (819; 1.71%), and E (774; 1.62%). Initial PW settings: 90 µS (46, 117; 98.70%, 60 µS (408; 0.87%), 120 µS (161; 0.34%), 150 µS (30; 0.06%), 210 µS (6; 0.01%), and 180 µS (4; 0.01%). Final PW settings: 90 µS (38,820; 81.24%), 60 µS (6,453; 13.5%), 120 µS (2078; 4.35%), 150 µS (362; 0.76%), 180 µS (36; 0.08%), and 210 µS (35; 0.07%). Initial Rate settings: 33 Hz (46,280, 99.05%), 40 Hz (305, 0.65%), 30 Hz (124, 0.27%) and 25 Hz (12, 0.03%), and 20 Hz (5, 0.01%). Final Rate settings were: 33 Hz (41,508; 86.87%), 40 Hz (5,324; 11.14%), 30 Hz (707, 1.48%), 25 Hz (133, 0.28%), 20 Hz (112, 0.23%).
Conclusion: Default settings for Electrode, PW and rate were still utilized in greater than 80% of patients for final settings. This suggests most patients are still programmed to recommended settings. However, there are some patients who require alternative settings to ensure optimal outcomes. Providers should be aware of how these settings can affect patient outcomes.
Support (if any): Inspire Medical Systems, Inc.

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0758
PROMIS-GH SCALE IN OBSTRUCTIVE SLEEP APNEA PATIENTS TREATED WITH HYPOGLOSSAL NERVE STIMULATION

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Introduction: Hypoglossal nerve stimulation (HNS) is a treatment for moderate-to-severe obstructive sleep apnea (OSA) in

patients who cannot tolerate positive airway pressure therapy. The Patient-Reported Outcomes Measurement Information System Global Health (PROMIS-GH) scale assesses physical, mental, and social health. Widely studied in neurological and sleep disorders, including OSA, it has not been examined in patients with HNS therapy. This study evaluated self-reported changes in PROMIS-GH following HNS therapy.

Methods: This retrospective study included patients who underwent HNS activation and follow-up at Cleveland Clinic (2015-2024). PROMIS-GH was assessed through its two components: global physical health (GPH) and global mental health (GMH). PROMIS-GH score changes were assessed pre-implantation and at 3-months, 1-year and 2-years post-activation. The association between PROMIS-GH score changes and therapy adherence, measured by average weekly hours and total hours of usage, was analyzed through multivariable mixed effects linear regression, adjusted for age, gender, BMI, and post-activation time points (3-months, 1-year, 2-years). The association between PROMIS-GH score changes and pre-implantation and Epworth Sleepiness Scale (ESS) score changes was examined using multivariable mixed effects linear regression.

Results: Out of N=65 patients, 67.7% were male with mean age 63.8±8.7 years and BMI 28.4±3.0 kg/m2. The GPH score significantly improved at 3-months post-activation (mean change 1.7±5.0, p=0.017), while the GMH score did not improve at any time point. When examining the impact of HNS adherence on changes in PROMIS-GH scale using total hours usage, longer total device use was associated with greater improvement in GMH (per 100-hour beta estimate=0.11, 95%CI=0.02-0.2, p=0.020) and GPH scores (per 100-hour beta estimate = 0.12, 95%CI=0.04-0.21, p=0.004). A higher pre-implantation ESS score was associated with more improvement in GPH score (per 5-point beta estimate=1.41, 95%CI=0.46-2.36, p=0.004), but improvement did not correlate with ESS changes.

Conclusion: HNS therapy led to improvement in perceived physical health short term, potentially influenced by the degree of baseline sleepiness experienced by patients. Greater device adherence was associated with better improvements in both physical and mental health. Mid-term and long-term improvements were not significant. Larger prospective studies are required to validate these findings.

Support (if any):

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0759

A NOVEL APPROACH TO PREDICT ORAL APPLIANCE THERAPY RESPONSE FOR OBSTRUCTIVE SLEEP APNEA (OSA) USING COMBINATIONS OF OSA ENDOTYPES AND HYPOXIC BURDEN

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Introduction: Obstructive sleep apnea (OSA) is caused by impaired pharyngeal anatomy and one or more non-anatomical contributors including low respiratory arousal threshold, high loop gain and/or ineffective pharyngeal dilator muscle activation. These endotypic traits can be estimated using polysomnography (PSG) and have the potential to help guide targeted treatment decisions. OSA is typically first-line treated with continuous positive airway pressure (CPAP) although it is often poorly tolerated. Alternate treatments such as oral appliance therapy (OAT) have variable and currently unpredictable efficacy. Here, we investigated a new approach using OSA endotypes and hypoxic burden to predict OAT outcomes.

Methods: People with OSA (apnea-hypopnea index (AHI): >10 events/h) were recruited (ACTRN12618001995268) and fitted with a novel oral appliance (O2Vent Optima™). Participants had a standard in-laboratory PSG to quantify baseline OSA severity prior to OAT. A detailed physiology PSG with a nasal mask and pneumotachograph to quantify OSA endotypes and hypoxic burden followed at least one week later. A treatment efficacy PSG was performed after approximately 4 weeks of OAT at optimal level of titration. Generalized Procrustes analysis was used to combine the results from principal component analyses applied to the multiple imputed data set. The resulting principal components scores were then used as regressors in a modified Poisson regression to model OSA resolution.

Results: Ninety-three participants (22 female, aged 55 [42, 65] years, AHI: 30 [17, 49] events/h, median [IQR]) completed baseline and treatment efficacy PSG visits. Responders to OAT (AHI < 10 events/h) had a less collapsible upper airway (Vpassive), better pharyngeal muscle compensation, lower loop gain and a lower arousal threshold at baseline versus non-responders (all p-value < 0.05). Principal component regression revealed the following combination of characteristics: a) high arousal threshold and low Vpassive, b) high loop gain and low Vpassive values and c) very high hypoxic burden reduces the probability of OSA resolution by 44% (p-value=0.002), 33% (p-value=0.005), and 57% (p-value=0.001) respectively.

Conclusion: These novel findings highlight the potential importance of different combinations of OSA endotypes and hypoxic burden to help predict OAT response.

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0760

QUANTITATIVE ANALYSIS OF HYPOGLOSSAL NERVE STIMULATOR SENSORY WAVEFORMS AND CLINICAL OUTCOMES

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Introduction: Hypoglossal nerve stimulation (HGNS) treats obstructive sleep apnea (OSA) by causing tongue protrusion during inhalation and preventing upper airway collapse. Synchronization of stimulus delivery with breathing relies on a sensory waveform collected by an electrode placed in the anterior chest wall. We hypothesize that morphological characteristics of sensory waveforms are predictive of therapy response and may ultimately impact clinical outcomes. We designed and implemented a waveform signal analysis tool to assess the association between waveform characteristics and response to HGNS therapy.

Methods: A retrospective cohort study was conducted on adults who underwent HGNS implant by two surgeons between August 2019 and August 2024. Demographics, sleep studies (diagnostic and postoperative), and drug-induced sleep endoscopy results (VOTE scores) were collected from the medical record. Response to HGNS therapy was defined by modified Sher criteria: > 50% reduction in apnea-hypopnea index (AHI) from baseline and post-treatment AHI ≤ 15 events/hour. Raw waveform data were recorded using a computer tablet (Inspire™ Programmer). Data

preprocessing, waveform signal analysis, and statistics were performed using custom MATLAB script (Natick, MA, USA).
Results: This study included 50 total patients with OSA (mean AHI = 42.0 ± 15.7 events/h); 22 responders and 28 non-responders. Age (mean = 64.0 years), sex (36.8% female), race (86% white), and VOTE scores were similar between groups. Body mass index (BMI) was lower for responders compared to non-responders (mean = 28.2 kg/m2 vs. 30.5 kg/m2; P < 0.05). Linear and logistic regression analyses, adjusted for BMI, revealed six waveform characteristics that individually predicted percent change in AHI (ΔAHI) (P < 0.05) or therapy response (P < 0.05). All characteristics were related to slope and/or morphology during the inhalation (stimulation) phase. Slope variance and maximum slope during inhalation predicted both ΔAHI (P < 0.05 and P < 0.05) and the voltage setting required to produce functional tongue protrusion (P < 0.01 and P < 0.05).
Conclusion: Quantifiable sensory waveform characteristics are independently associated with postoperative reduction in AHI. We determined that waveform characteristics related to slope and morphology during the inspiratory phase predict HGNS therapy response, suggesting these characteristics may be optimized to improve future clinical outcomes.
Support (if any):

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0761

DETAILED THREE-YEAR EFFECTS OF PROXIMAL TARGETED HYPOGLOSSAL NERVE STIMULATION ON APNEA-HYPOPNEA INDEX IN MODERATE TO SEVERE OBSTRUCTIVE SLEEP APNEA

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Introduction: Proximal hypoglossal nerve stimulation (pHGNS) has been shown in the THN3 randomized, controlled trial to produce durable three-year improvements in quality of life, oxygenation, and sleep-disordered breathing (Apnea-Hypopnea Index, AHI) in moderate to severe obstructive sleep apnea (OSA). Detailed AHI responses (apneas vs. hypopneas, supine vs. non-supine, REM vs. non-REM) have not previously been reported.
Methods: THN3 patients (no sleep endoscopy screening, AHI 20-65/hr, Body Mass Index ≤35 kg/m2) who completed 3 years annual follow up were studied (N=98), as prespecified by protocol. The non-parametric probability of superiority (A) with bootstrapped confidence intervals was used to compare median values and effect sizes at Follow-up to Baseline. Effect size was measured by A, the probability that a value in a sample (herein follow-up) was superior to a reference (herein at Baseline) with values bound by 0 and 1. A=1 would have indicated 100% likelihood of superiority while A=0.5 would have indicated equal likelihood (null result). Large effect sizes were characterized by A≥0.71 with a 95% confidence interval (95%CI) lower bound of >0.5.
Results: AHI fell from 36.2/hr at Baseline to 18.9/hr at 3 years [A=0.79 (95%CI:0.70-0.87)], due to reductions in apnea index from 8.3/hr to 2.4/hr [A=0.76 (95%CI:0.67-0.85)] and hypopnea index from 27.4/hr to 14.3/hr [A=0.76 (95%CI:0.68-0.85)]. Supine AHI decreased from 59.1/hr to 48.4/hr [A=0.71 (95%CI:0.62-0.81)], while Non-supine AHI improved from 26.0 /hr to 14.5/hr [A=0.71 (95%CI:0.63-0.81)]. Finally, REM AHI improved from 40.3/hr to 22.2/hr [A=0.77 (95%CI:0.68-0.85)] while non-REM AHI improved from 34.6/hr to 17.3/hr [A=0.77 (95%CI:0.68-0.85)]. These paired findings were comparable to unpaired responses for all outcomes from all available 3 year follow up data.
Conclusion: In moderate to severe OSA, pHGNS produces large, durable, clinically and statistically significant improvements in apneas, hypopneas and total AHI across all body positions and sleep stages. Sleep apnea severity was reduced in non-supine compared to supine sleep at Baseline and Follow up, suggesting that positional therapy can enhance pHGNS therapeutic responses, irrespective of sleep stage.
Support (if any): LivaNova PLC

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0762

HYPOGLOSSAL NERVE STIMULATION AND ITS EFFECT ON N3 SLEEP

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Introduction: Inspire™ is a novel therapy to treat moderate to severe obstructive sleep apnea. By electrically stimulating the hypoglossal nerve, the tongue is prevented from obstructing the upper airway during sleep. However, the effects of hypoglossal nerve stimulation on the amount of time spent in different stages of sleep, especially N3 sleep, is unknown. Thus, we asked: does hypoglossal nerve stimulation (HNS) affect the amount of time spent in N3 sleep?
Methods: We did a retrospective chart review. We sampled 15 patients who underwent a HNS in-lab titration study as well as a sample of 15 patients who underwent CPAP titration and compared the percentage of time spent in N3 sleep within each group. Descriptive data included mean average, variance, and standard deviation. Analytic evaluation involved a one-tail t-test (two independent samples) with a critical alpha 0.05.
Results: The average age for the HNS group and CPAP group was 71.5 vs 59, respectively (p=0.10). Baseline AHI between HNS group was 37.25 (+/-4.94 SEM) and for the CPAP group 38.71 (+/-6.36 SEM), which was not significantly different (p=0.44). While the CPAP group spent 15.29% ± 2.42% (Mean ± SEM) in N3 sleep, a significant reduction in the amount of time spent in N3 sleep was observed in the HNS group 6.08% ±1.88% (Mean

± SEM) (p=0.003). No statistical difference was noted on REM sleep (16.28% vs 18.63% p=0.26).
Conclusion: These results suggest that patients with OSA who underwent treatment with hypoglossal nerve stimulation during an in-lab titration study had significantly less N3 sleep compared to those utilizing continuous positive airway pressure (CPAP) therapy in an in-lab titration study. A notable strength of this study was the direct comparison between HNS versus CPAP. However, the small sample size of this investigation may be considered a limitation. Whether the suppression of N3 sleep is a long-term effect or merely a short-term observation is still undetermined. Continued research is ongoing to fully understand hypoglossal nerve stimulation in treating obstructive sleep apnea.
Support (if any):

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0763

PREDICTORS OF DAYTIME NEUROMUSCULAR ELECTRICAL STIMULATION ADHERENCE AND INTENSITY AMONG US VETERANS WITH MILD OSA

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Introduction: Transoral neuromuscular electrical stimulation (NMES; eXciteOSA device) is approved for mild obstructive sleep apnea (OSA). Patients use low-frequency daytime stimulation to strengthen oral musculature. The factors influencing adherence to daytime NMES remain unclear. In this study, we aimed to examine predictors of eXciteOSA adherence and intensity in a cohort of US veterans.
Methods: A retrospective study of consecutive veterans prescribed eXciteOSA for mild OSA at the Miami VA over a 24-month period was performed. Patients were instructed to 1) complete daily 20 min sessions for the initial 42 days and 2) increase stimulation to a therapeutic intensity. Analysis inclusion criteria were completion of diagnostic polygraphy (PG), questionnaires (e.g., Epworth sleepiness scale [ESS], Insomnia Severity Index [ISI]), and using eXciteOSA at least one night. Adherence data (sessions completed, stimulation intensity) were obtained from the device manufacturer. Medications and comorbidities (i.e., post-traumatic stress disorder [PTSD], depression) were collected from medical record review. Logistic regression models were constructed predicting 1) use on at least 5 days per week and 2) reaching therapeutic stimulation levels. Independent covariates examined were sociodemographics (age, gender, race), sleep symptoms (ESS, ISI), mental health comorbidities, and the respiratory event index (REI).
Results: The study included 113 veterans (21% female, 32% Black, 43% PAP-intolerant) with a mean age of 47 ± 13 yrs and REI of 9 ± 3 events per hour. The mean baseline ESS was 12 ± 7 while the mean ISI was 18 ± 7. Over the study period, the mean adherence for sessions completed was 63 ± 25 % and 19 veterans (17%) discontinued therapy. More than half (52%) of the cohort completed 5 sessions weekly while only 14% completed at least 6 sessions weekly and 0% completed all 42 treatment sessions. In adjusted analyses, a diagnosis of PTSD was associated with lower odds of regular adherence (OR 0.38, 95% CI 0.17-0.87), while Black race was associated with lower odds of achieving therapeutic stimulation intensity (OR 0.39, 95% CI 0.16-0.97).
Conclusion: Black veterans and those with PTSD had lower odds of adhering to therapeutic NMES treatment parameters. These findings could inform personalized therapies for veterans with mild OSA.
Support (if any): None

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0764

STIMULATION ARTIFACT' ON CHIN EMG DURING IN-LAB TITRATION POLYSOMNOGRAPHY IN HYPOGLOSSAL NERVE STIMULATION FOR OSA

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Introduction: Hypoglossal nerve stimulation (HGNS), marketed as Inspire, is an established treatment for obstructive sleep apnea (OSA) in patients intolerant to continuous positive airway pressure (CPAP). While it has gained clinical acceptance since FDA approval in 2013, gaps remain in optimizing its functionality and titration. Polysomnographic recordings post-Inspire implantation often show "stimulation artifacts" on the chin electromyogram (EMG), reflecting hypoglossal nerve activation. However, these artifacts have not been systematically studied in relation to respiratory cycles or clinical outcomes.
Methods: This retrospective chart review included 40 adult patients (≥18 years) who underwent Inspire-HGNS titration at The University of Kansas Health System (October 2023–October 2024). Demographic data (age, sex, BMI, Epworth) and polysomnographic metrics (stimulation artifacts, synchronization frequency, apnea-hypopnea index, sleep stage, body position) were analyzed. AHI response was defined as ≥50% reduction and AHI < 15 events/hour. Synchronization frequency was the number of stimulation artifacts on chin EMG divided by the number of respiratory cycles, with qualitative ratings of synchronization as Good (>80%), Moderate (50–80%), or Poor (< 50%). Random epoch sampling was used to ensure unbiased data selection. Statistical analyses include t-tests, chi-square, and regression using Stata 17, with significance set at $p < 0.05$.
Results: Of 40 patients, 26 were responders, 11 non-responders, and 3 excluded due to absent REM sleep. Responders had higher sleep efficiency (70.9 vs 63.3), lower baseline AHI (33.3 vs 44.5), lower Epworth (8.5 vs 7.5) and higher percentage time spent in N2 (67.2 vs 56.8) and REM (17.9 vs 11.2) sleep. No statistically significant difference in synchronization frequency based on response or association with sleep stages. Higher synchronization frequencies noted with prone sleep. Responders had higher synchronization ratings ("Good" 80.8% vs. 19.2%, $p < 0.001$), and correlated positively with N3 or prone sleep.
Conclusion: This study demonstrated significant differences in synchronization ratings on titration between responders and non-responders, with better synchronization associated with greater AHI reduction. No association was noted with synchronization frequency, likely reflecting the confounding nature of apneic events which affecting this metric. Qualitative rating of synchronization could play an important role in predicting response to therapy and assessing clinical follow-up or treatment adjustment.
Support (if any):

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0765

CHANGES IN SLEEP SURGERY TRENDS SINCE THE ADVENT OF HYPOGLOSSAL NERVE STIMULATION THERAPY

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Introduction: Hypoglossal nerve stimulation (HGNS) therapy has revolutionized the surgical management of obstructive sleep apnea (OSA). This study examines the impact of HGNS on surgical trends and disparities across demographic and socioeconomic groups.
Methods: A retrospective analysis of the National Inpatient Sample (2004–2021) and Nationwide Ambulatory Surgery Sample (2016–2021) was conducted. Trends were compared between pre-HGNS (2004–2013) and post-HGNS (2014–2021) for inpatient data, and between 2016–2018 and 2019–2021 for outpatient data. Multivariable logistic regression identified demographic, socioeconomic, and procedural factors associated with changes in care.
Results: Post-2014, inpatient OSA diagnoses rose by 3% ($p < 0.001$). Surgical patients were 1.74 times more likely to be age 65+ (95% CI 1.68–1.80), 1.31 times more likely to be obese (95% CI 1.28–1.33), and 1.40 times more likely to be White (95% CI 1.37–1.43). Traditional surgeries, such as septoplasty (OR 0.29, 95% CI 0.28–0.30) and palatal surgery (OR 0.37, 95% CI 0.36–0.39), declined, while lingual tonsillectomy (OR 2.64, 95% CI 2.38–2.94) and tracheostomy (OR 0.71, 95% CI 0.68–0.74) increased. Outpatient HGNS use rose from 2.5% (2016–2018) to 10% (2019–2021), with a 3.44-fold higher likelihood of receiving HGNS in 2019–2021 (95% CI 3.27–3.62). Overall, White patients received HGNS at higher rates than non-White patients (OR 2.30, 95% CI 1.98–2.68), whereas non-White patients more frequently received traditional surgeries and were more often low-income (OR 0.66, 95% CI 0.65–0.67).
Conclusion: The rise of HGNS has driven a shift in OSA surgeries, reducing traditional procedures and increasing rates of HGNS and tracheostomy (the latter possibly reflecting a growing burden of severe comorbidities in the OSA patient population). This signals a move toward targeted, less invasive therapies and reflects a growing preference among providers and patients for such therapies. However, persistent racial and socioeconomic disparities in HGNS use underscore the need for more equitable access to advanced therapies. Future research should focus on exploring barriers to HGNS access and evaluating its long-term outcomes to guide clinical practice.

Support (if any):

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0766

SIGNIFICANT AND SUSTAINED IMPROVEMENTS IN SYMPTOMS OF NOCTURNAL OBSTRUCTION AND RELATED EVENTS (SNORE-25) INSTRUMENT SCORES AFTER SLEEP SURGERY

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Introduction: The burdens of obstructive sleep apnea (OSA) and benefits of its treatment span an array of quality of life (QOL) domains. Validated instruments, such as the Symptoms of Nocturnal Obstruction and Related Events (SNORE-25) Instrument, attempt to capture the impacts broadly; however, this breadth can dilute the intense impacts of certain aspects. The SNORE-25 addresses this limitation by incorporating an Importance Subscale that patient select the five most important items. This provides an individualized score specific to patient's burden and quantifies the individualized impact of OSA and its treatment. This study tests the association between staged sleep surgery and change in SNORE-25 Total and Importance Subscale scores.
Methods: This retrospective cohort from 2010-2020 included patients with OSA (apnea-hypopnea index(AHI) ≥ 5) from a tertiary sleep surgery clinic, who underwent at least two sleep surgery procedures. The SNORE-25 instrument was completed prior to consultation (preoperative) and subsequent postoperative visits. Total and Importance Subscale scores range from 0-5 (higher is worse), and the minimal clinically importance difference of 0.5 (Total) and 1.1 (Importance Subscale) was used. A paired t-test analysis was performed.
Results: The cohort (N=64) of patients who completed at least two surgery stages and had complete data (out of 364) was middle-age (mean+/-standard deviation 41+/-13 years) and majority male (73%) with severe OSA (AHI 35+/-31 events/hour). Mean baseline SNORE-25 Total score was 1.9+/-1.0 (mild burden) and Importance Subscale score was 3.8+/-1.1 (severe burden). At first non-postoperative visit (77+/-60 days postoperative), the mean change in SNORE-25 Total score was -1.1+/-0.9 (95% confidence (CI) -1.3-(-)0.8, $p< 0.001$, clinically important) and Importance Subscale score was -2.0+/-1.5 (95%CI -2.4-(-)1.6, $p< 0.001$, clinically important). At long-term follow-up (n=17, 219+/-85 days postoperative), the mean change in SNORE-25 Total score was -0.9+/-0.9 (95%CI -1.5-(-)0.4, $p=0.002$) and Importance Subscale score was -1.9+/-1.1 (95%CI -2.5-(-)1.2, $p< 0.001$).
Conclusion: Patients with OSA who underwent staged sleep surgery were associated with significant improvements in SNORE-25 and, moreover, Importance Subscale scores. Additionally, these improvements were clinically meaningful and sustained in follow-up. This suggests that patients with OSA experience meaningful and sustained improvements in QOL after sleep surgery, and especially on burdens important to them.
Support (if any): None.

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0767

A ROLE FOR DRUG-INDUCED SLEEP ENDOSCOPY (DISE) IN PREDICTING OUTCOMES OF UVULOPALATOPHARYNGOPLASTY (UPPP)

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Introduction: Drug-induced sleep endoscopy (DISE) is a dynamic tool used to evaluate airway collapse patterns in obstructive sleep apnea (OSA). When performed prior to uvulopalatopharyngoplasty (UPPP), DISE may guide surgical planning, but its role in predicting postoperative outcomes remains uncertain. Prior studies have found that DISE reveals significant outcomes in UPPP success in Chinese populations. This study assesses the ability of DISE to predict the effectiveness of UPPP and its potential to optimize surgical decision-making in an American population.
Methods: Patients with OSA undergoing UPPP were evaluated using DISE preoperatively to assess patterns of upper airway collapse. DISE findings were categorized by collapse site (e.g., velum, pharyngeal walls, tongue base, epiglottis).

Apnea-Hypopnea Index (AHI) and Epworth Sleepiness Scale (ESS) were recorded pre- and postoperatively. Surgery outcomes were evaluated at follow-up using polysomnography, with success defined as a postoperative AHI < 20 events/hour and >50% reduction in AHI. Pre- and postoperative AHI and ESS were compared, and correlations with DISE findings were analyzed.
Results: Among 24 patients evaluated, no significant differences in DISE parameters (e.g., velum, pharyngeal walls, tongue base, epiglottis) were observed between patients meeting Sher's criteria for surgical success and those who did not ($p > 0.05$ for all comparisons). In this cohort, complete circumferential collapse at the velum was observed with similar frequency between responders and non-responders, showing no significant correlation with surgical success ($p > 0.05$). Additionally, obstructions at the tongue base and epiglottis did not demonstrate a predictive relationship with outcomes, with partial or complete collapse at these sites occurring across both groups without significant differences ($p > 0.05$ for all comparisons). The primary predictors of successful UPPP outcomes were subjective sleepiness, as measured by preoperative ESS ($p = 0.008$).
Conclusion: The findings suggest that DISE lacks predictive value for determining surgical success in UPPP, with no significant correlation between DISE parameters and postoperative outcomes. Instead, subjective measures like preoperative ESS were stronger predictors of success. These results highlight the need for further research into optimizing DISE's utility, potentially by integrating it with other clinical and objective parameters to enhance surgical planning and improve patient outcomes.
Support (if any):

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0768

USING AN INTELLIGENT ANTI-SNORING PILLOW FOR POSITIONAL THERAPY IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: Obstructive sleep apnea (OSA), a prevalent and serious disorder, degrades sleep quality, memory, and performance, and heightens the risk of heart attacks, strokes, and hypertension. Continuous positive airway pressure (CPAP) therapy is effective but not always preferred by 30-80% of patients. Over half of Asian individuals with OSA exhibit Positional Obstructive Sleep Apnea (POSA), characterized by exacerbated airway obstruction in the supine position. Positional therapy can help by promoting side sleeping, reducing airway collapse, and improving oxygenation. Our study has two main objectives: developing an intelligent anti-snoring pillow for POSA patients and validating its effectiveness of reducing respiratory interruptions.
Methods: Outfitted with sensors, our intelligent anti-snoring pillow adjusts its side height upon detecting a supine position, promoting side sleeping and mitigating symptoms of sleep apnea. Participants eligible for positional therapy tested the pillow, including individuals with prior CPAP usage. Sleep quality and the severity of the apnea-hypopnea index (AHI) were evaluated under three conditions: before treatment, while using the pillow, and during CPAP use.
Results: The results showed that the pillow increased side sleeping by 2.73 times, reduced AHI by 57%, and decreased snoring by 31%. CPAP maintained its status as the benchmark treatment for improving AHI and oxygen saturation levels. Nevertheless, the pillow outperformed in terms of sleep efficiency and minimizing sleep disturbances.
Conclusion: The study indicates that the intelligent anti-snoring pillow may offer an effective alternative therapy for patients with mild to moderate OSA, effectively lowering the AHI and hypoxemia, and notably enhancing sleep quality.
Support (if any): This work was supported by grant from the Chen Hsin General Hospital [CHGH110-(N)18].

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0769

THE IMPACT OF REM-EXACERBATED OBSTRUCTIVE SLEEP APNEA ON OUTCOMES IN HYPOGLOSSAL NERVE STIMULATION THERAPY

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Introduction: Hypoglossal nerve stimulation (HGNS) is an effective treatment for obstructive sleep apnea (OSA) in patients intolerant to continuous positive airway pressure (CPAP). Limited data exists on HGNS outcomes in patients with REM-exacerbated OSA (REM-OSA), defined by a REM-to-NREM apnea-hypopnea index (AHI) >2. This study investigates postoperative outcomes in patients with REM-OSA treated with HGNS.
Methods: This single-institution retrospective study evaluated patients who underwent HGNS placement from 2016-2023. Inclusion criteria were adults ≥18 years old, preoperative AHI ≥15, and ≥30 minutes of REM sleep on preoperative polysomnogram and full-night efficacy home sleep study with a WatchPAT device. The primary outcome compared response rates between REM-OSA and non-REM OSA (NREM-OSA), defined as a ≥50% reduction in AHI and post-implant AHI< 15. Secondary outcomes included post-operative changes in REM and NREM AHI and Epworth Sleepiness Scores (ESS). Data analysis included t-test and linear regression.
Results: Of 245 patients, 40 met inclusion criteria, with 5 classified as REM-OSA. Postoperative REM sleep data were unavailable for one patient. Among the remaining four, 2 (50.0%) responded to HGNS compared to 9 of 25 (36.0%) NREM-OSA patients ($p=0.62$). Mean REM/NREM AHI ratios were 1.30±1.02 in responders and 0.81±0.73 in non-responders ($p=0.15$). Median change in REM AHI was –13.80 [-25.6 to 7.8], and in NREM AHI was -17.3 [-29.2 to 2.8] (spearman correlation rho: 0.83, $p=0.052$). Mean pre-implant ESS was 9.10±4.93 in NREM-OSA and 8.40±5.03 in REM-OSA ($p=0.77$). Mean post-implant ESS was 6.08±4.17 in NREM-OSA and 6.50±3.87 in REM-OSA ($p=0.85$). Analyzing ESS relative to preoperative REM/NREM ratio as a continuous variable, the beta score was 0.63 (95% CI [–1.3, 2.6], $p=0.51$) for pre-implant ESS and 0.63 (95% CI [-1.2, 2.4], $p=0.48$) for post-implant ESS. In subgroup analysis, males showed greater NREM AHI reduction (-11.91±23.94) than REM AHI (-6.92±23.42), with a significant mean difference of -4.99±6.47 ($p=0.01$).

Conclusion: No significant difference in HGNS response rates was observed when analyzing REM/NREM AHI as a continuous variable, suggesting that REM-exacerbated OSA may not be of concern when evaluating patients for surgery. These findings provide insights into the effectiveness of HGNS, but interpretation is limited by small sample size and lack of post-operative full-night polysomnography.
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0770
EFFICACY OF SPLIT-NIGHT TITRATION STUDIES

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Introduction: Split-night polysomnography is valued for its ability to provide both diagnosis and therapy during the same study. However, in practice, it is often limited by a lack of time afforded to the titration component of the study. Data has shown that Auto-CPAP (continuous positive airway pressure) modalities can be as efficacious as full-night titration polysomnography in identifying optimal therapeutic pressures. In this paradigm, the utility of a resource-intensive split-night titration study is called into question.
Methods: We conducted a retrospective review of all individuals > 18 years of age with diagnosis of obstructive sleep apnea (OSA) who underwent split-night polysomnography at a tertiary sleep center over a 3-year period. Exclusion criteria included other types of sleep-disordered breathing and use of nocturnal supplemental oxygen. Individuals were evaluated to determine efficacy of split-night titration by two measures: Whether a titration pressure was reached yielding an apnea hypopnea index (AHI) < 5 and whether supine REM (rapid eye movement) was seen at such a pressure. Total titration time and time to optimal pressures (if found) were also noted.
Results: For the purpose of this abstract, we are presenting preliminary data on 2 outcomes in 25 patients. Demographic data showed 14 males and 11 females with mean age of 51. Eighteen patients achieved an optimal pressure with AHI < 5 events/hour with 61% of these (11) also demonstrating supine REM sleep at optimal pressure. When optimal pressure was achieved, mean titration time was only 2.4 hours. Of the 7 individuals who did not achieve an optimal pressure, 5 were males, a mean of 5.2 hours was spent in the titration phase, and supine REM was present in 6 studies.
Conclusion: While preliminary data from this study shows that split-night polysomnography can be reasonably successful in achieving therapeutic titration pressures, it remains unclear if this is a cost-effective approach. Further analysis is ongoing to characterize the individual phenotype that would best benefit from split-night polysomnography versus home sleep testing with empiric Auto-PAP as a first step in establishing ideal therapeutic pressures.
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0771
A BUCCAL MUCOSAL REFLECTANCE OXIMETER ACCURATELY MEASURES ARTERIAL OXYHEMOGLOBIN SATURATION AND PULSE RATE

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Introduction: Pulse oximeter (SpO2) devices suitable for multi-night monitoring of arterial oxyhemoglobin saturation (SaO2) are not readily available despite a need to monitor SaO2 decreases in patients with sleep apnea and pulmonary diseases during sleep. The objective of the current study was to assess the SpO2 and pulse rate accuracy of a buccal mucosal oximeter embedded into a custom-fitted overlay of the upper teeth by comparison to a gold standard (CO-oximeter SaO2 and ECG heart rate).
Methods: Accuracy of the buccal mucosal oximeter was assessed in healthy participants (n=12) under non-motion conditions. Participants were made progressively hypoxic by decreasing the fraction of inspired oxygen in a stepwise manner to achieve a range of SaO2 from approximately 97-70%. SpO2 and pulse rate values from the buccal mucosal oximeter were compared with CO-oximeter values of SaO2 and ECG heart rate, respectively.
Results: SaO2 values were evenly distributed over the range of 97-67%. Analysis of 325 CO-oximeter SaO2/buccal mucosal oximeter SpO2 data pairs yielded the following: r = 0.95; bias = 0.72; and accuracy root-mean-square (ARMS) = 2.94%. Analysis of 346 ECG heart rate/buccal mucosal oximeter pulse rate data pairs yielded the following: r = 0.99, bias = 0.30; and ARMS = 2.08%.
Conclusion: The results of the study indicate that the buccal mucosal oximeter accurately measures SpO2 and pulse rate, as shown by good agreement with a gold standard, over a wide range of arterial hypoxemia. Such clinically acceptable accuracy indicates that this novel reflectance oximeter may prove useful in management of patients with sleep-induced hypoxemia by providing multi-night monitoring of SaO2. Additionally, the intraoral placement of the oximeter may be particularly convenient due to its temperature regulation, protection from ambient light, and relative lack of mucosal melanin.
Support (if any): This study was funded by ProSomnus Sleep Technologies.

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0772
THE IMPACT OF GLP-1 AND GLP-1/GIP RECEPTOR AGONISTS ON HYPOGLOSSAL NERVE STIMULATOR TREATMENT IN SLEEP APNEA PATIENTS

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Introduction: Obstructive sleep apnea (OSA), the most common sleep-related breathing disorder, has various treatment options. Recently, GLP-1 and GLP-1/GIP receptor agonists have been approved to treat obesity and found to successfully improve associated OSA. Our study aims to evaluate the impact of incretins on patients with OSA and whether these anti-obesity medications are effective as standalone treatments or require hypoglossal nerve stimulation (HNS) to optimize OSA management.
Methods: A comparative outcomes analysis was conducted using the TriNetX platform, which leverages electronic medical records from 104 healthcare organizations. Two adult (18–90 years old)

cohorts were defined for the January 1, 2022 to June 1, 2024 time period: Cohort 1 (n=194,583) included patients with an OSA diagnosis, BMI between 27–40 kg/m2, and no history of taking anti-obesity incretins (semaglutide, liraglutide, and tirzepatide), while Cohort 2 (n=17,674) had the above criteria and a history of incretins. Propensity-score matching was applied to balance the cohorts for demographic and clinical characteristics, resulting in matched groups of 17,674 patients each. Key outcomes assessed included new incidence of drug-induced sleep endoscopy (DISE, CPT 42975) and HNS (CPT 64582). Patients with prior instances of these outcomes were excluded from the analysis.
Results: After matching, cohorts 1 and 2 were comparable in age (mean age 58.9±12.2 and 58.8±12.1 years), gender distribution (49.5% vs. 49.5% female), type 2 diabetes mellitus prevalence (48.8% vs. 48.8%), and overweight and obesity diagnosis (44.8% vs. 48.8%), respectively. BMI was matched across three categories: 25–30, 30–35, and 35–40, with final standardized differences less than 0.1. Patients were followed for a mean duration of 480.9±313.8 days in cohort 1 and 436.1±244.2 days in cohort 2. Patients taking incretins underwent DISE significantly more (0.585%) than the control (0.425%; OR: 1.38, 95% CI: [1.02, 1.86], p=0.034). Implantation of HNS occurred at a similar rate in the incretin group (0.295%) as in the control cohort (0.255%; OR: 1.16, 95% CI: [0.776, 1.726], p=0.472).
Conclusion: The results suggest incretin medications may not be sufficient as a sole treatment for OSA. In this study, patients treated with incretins underwent further treatment with upper airway stimulation at rates similar to those not on incretins.
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0773

DOES GLUCAGON LIKE PEPTIDE-1 AGONIST, EXENDIN-4 AFFECT CONTROL OF BREATHING IN OBESITY HYPOVENTILATION

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Introduction: Obesity hypoventilation syndrome (OHS), the most severe form of sleep disordered breathing (SDB), affects over 6 million individuals in the US. OHS is manifested by daytime hypercapnia due to a defect in the hypercapnic ventilatory response (HCVR). Glucagon-like peptide receptor-1 (GLPR-1) agonists liraglutide and tirzepatide induce weight loss and treat SDB in obese patients, but it is unknown if their therapeutic effect on SDB is entirely due to weight loss or there is an independent effect on HCVR. This study investigates the GLP-1 agonist, exendin-4 (ex-4) augments the HCVR in C57BL/6J male mice with diet induced obesity (DIO).
Methods: C57BL6 male mice with DIO (n=8) were treated in an acute (1 day) and a chronic (1 week of treatment) crossover experimental protocols. First, they received a vehicle (saline) or a subcutaneous injection of exendin-4 (2.5 ug/kg) in the acute protocol. In the chronic protocol, mice received an intraperitoneal dose (10 ug/kg) of ex-4 or saline. Daily food intake and body weight was measured for 1 week. Mice were allowed a two-week washout period before the crossover experiments. Hypercapnic ventilatory experiments (HCVR) were performed after the acute and chronic doses.
Results: Our current results showcase that exendin-4 does not have any significant respiratory effects and did not increase the HCVR compared to mice receiving saline. Mice receiving ex-4 had a decrease in food intake and an initial loss of weight but regained it during the week. Mice treated with ex-4 had an average body weight of 47.15g ± 0.4 and with saline of 48.65g ±0.2. The weekly average food intake for ex-4 mice was 3g ± 0.4 and 3.6g ± 0.3 for the saline group.
Conclusion: Exendin-4 does not have an independent effect on baseline ventilation and HCVR in DIO mice. Other GLPR1 agonists, such as liraglutide and tirzepatide need to be tested.
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0774

GLUCAGON-LIKE PEPTIDE 1 RECEPTOR AGONISTS FOR OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: Glucagon-like peptide-1 (GLP-1) receptor agonists have gained recent popularity in its usage for weight loss in people with diabetes and obesity. There is also emerging evidence of its usage for treating obstructive sleep apnea (OSA) which can be caused by or worsened by obesity. However, there is limited synthesized evidence for the usage of GLP-a receptor agonists for people with OSA.
Methods: We performed a PRISMA compliant systematic review and meta-analysis of the effects of GLP-1 receptor agonists in people with OSA. MEDLINE, EMBASE, Cochrane Library, and PsycINFO were searched up to June 30th, 2024. Randomized controlled trials (RCT) investigating the usage of any GLP-1 receptor agonists in people with OSA that reported OSA symptom outcomes as measured by the apnea-hypopnea index (AHI) were included. Standardized mean difference (SMD) measured effect size. Q and I2 tests measured heterogeneity. Cochrane Risk of Bias Tool 2 assessed risk of bias.
Results: Six studies were included which consisted of 1023 participants with moderate to severe OSA. 516 participants received GLP-1 receptor agonist treatment for their OSA with 507 in the control group (receiving either placebo or continuous positive airway pressure (CPAP)). GLP-1 receptor agonist therapy for OSA when compared to placebo groups had an medium effect size of SMD = - 0.601 (95% CI: - 0.969 to - 0.233, p = 0.001). When compared to CPAP treatment, there was no significant difference in AHI differences post-treatment (p = 0.297).
Conclusion: This systematic review and meta-analysis synthesizes the current evidence which supports the potential usage of GLP-1 receptor agonists for the treatment of OSA. This pharmaceutical treatment option would increase the treatment options available for people with OSA. However, the literature is limited by the few RCTs available, small sample sizes, and lack of long-term follow-up data. Further studies are needed in this area.
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0775

OSA OUTCOMES IN PARTICIPANTS BY BASELINE BMI CLASSIFICATION FROM SURMOUNT-OSA TRIALS: A POST-HOC ANALYSIS

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Introduction: In SURMOUNT-OSA, tirzepatide reduced apnoea-hypopnoea-index (AHI), sleep-apnea-specific-hypoxic-burden (SASHB), and body weight (BW). Here we evaluated weight-reduction (WR) and measures of OSA by baseline body mass index (BMI) category.
Methods: SURMOUNT-OSA (NCT05412004) evaluated tirzepatide-versus-placebo for 52 weeks in participants with moderate-to-severe obstructive sleep apnoea (OSA) with obesity. Study 1 (N=234) and 2 (N=233) included participants not using, or using positive-airway-pressure (PAP) therapy, respectively. These post-hoc analyses analyzed WR and measures of OSA by baseline BMI categories (< 35, ≥35 and < 40, and ≥40kg/m2) using on-treatment data. Mixed-model-repeated-measures were applied for continuous variables, and logistic regression for binary outcomes.
Results: Study 1 included 77, 74, and 83 participants; and Study 2 had 66, 88, and 79 participants in the baseline BMI categories < 35, ≥35 and < 40, and ≥40 kg/m2, respectively. Baseline demographics, AHI, and Epworth sleepiness scale (ESS) were generally similar across subgroups, with higher BMI categories tending to have more female participants, be slightly younger, and have higher AHI and ESS. In Study 1, at Week 52, the placebo-corrected decrease associated with tirzepatide across BMI categories was 19.0-26.4 events/hour or 46.7-54.4% for AHI, 53.5-67.5% for SASHB, and 16.0-17.8% for BW. The odds ratio for a ≥50% reduction in AHI associated with tirzepatide compared to placebo was 6.92-11.91; and it was 3.10-18.84 for AHI< 5, or AHI 5-14 with ESS≤10. In Study 2, at Week 52, the placebo-corrected decrease associated with tirzepatide across BMI categories was 21.8-27.8 events/hour or 47.1-62.4% for AHI, 58.4-73.4% for SASHB, and 17.3-18.6% for BW. The odds ratio for a ≥50% reduction in AHI associated with tirzepatide compared to placebo was 6.94-11.06; and it was 6.35-9.97 for AHI< 5, or AHI 5-14 with ESS≤10. All results were statistically significant versus placebo (p< 0.01), except for the odds ratio for AHI< 5, or AHI 5-14 with ESS≤10 in Study 1 with baseline BMI≥40 kg/m2 subgroup. There was no consistent trend in WR or OSA measures between baseline BMI categories across both studies.
Conclusion: These post-hoc analyses suggested that OSA measures associated with tirzepatide treatment were generally improved compared to placebo, regardless of baseline BMI.
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0776

PARTICIPANTS WITH IMPROVEMENT IN OSA SEVERITY FOLLOWING TREATMENT: A POST HOC ANALYSIS OF SURMOUNT-OSA STUDIES

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Introduction: In the SURMOUNT-OSA studies, tirzepatide reduced apnea-hypopnea index [AHI] values in participants living with moderate-to-severe OSA and obesity. The proportion of participants with improved obstructive sleep apnea (OSA) severity after tirzepatide treatment in these studies was investigated.
Methods: SURMOUNT-OSA involved Study 1, (participants not using positive airway pressure (PAP)), and Study 2, (participants using PAP). The efficacy analysis set included all randomized participants who received ≥ 1 dose of study intervention, excluding data after treatment discontinuation. Participants were categorised at baseline and week 52 by OSA severity, using apnea-hypopnea index [AHI] level: severe (AHI ≥30); moderate (AHI ≥15 and < 30); mild (AHI ≥5 and < 15) and no OSA (AHI < 5). Categorical shifts in OSA severity from baseline to week 52 were evaluated and classified as improvement (a shift to an improved OSA severity category), worsening (a shift in the opposite direction), or no change (remaining in the same severity category).
Results: In Study 1, 22 participants (26.8%) in the placebo group improved their AHI category, 57 (69.5%) showed no change, and 3 (3.7%) worsened, compared to those treated with tirzepatide wherein 65 (67.7%; between treatment p <.001) improved, 30 (31.3%; p <.001) showed no change, and 1 (1.0%; p = 0.336) worsened. In Study 2, 21 participants (25.3%) in the placebo group improved, 53 (63.9%) showed no change, and 9 (10.8%) worsened, compared to those treated with tirzepatide wherein 83 (79.0%; p <.001) improved, 19 (18.0%, p <.001) showed no change, and 3 (2.9%, p = 0.035) worsened. In study 1 and 2, 20.2% and 31.9% of tirzepatide-treated participants, respectively, improved to the no OSA present category. Of those, a larger proportion of participants shifted from moderate to no OSA in study 1, while a larger proportion of participants went from severe to no OSA in study 2.
Conclusion: In these post hoc analyses, tirzepatide treatment was associated with significant improvements in the severity of OSA from baseline to week 52 compared to placebo in adults with moderate-to-severe OSA and obesity. The majority of tirzepatide-treated participants shifted to an improved OSA category with 20-32% achieving no OSA present.
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0777

MEASURES OF SLEEPINESS BASED ON BASELINE CHARACTERIZATION IN PARTICIPANTS: SURMOUNT-OSA POST-HOC ANALYSIS

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Introduction: Daytime sleepiness, a common symptom of obstructive sleep apnea (OSA), can be measured via multiple patient-reported outcome questionnaires. It is hypothesized that tirzepatide may reduce daytime sleepiness, as it showed significant improvements in the apnea hypopnea index in the SURMOUNT-OSA trials.
Methods: Two phase 3 studies evaluated the efficacy of the maximum tolerated dose of tirzepatide (TZP, 10 or 15 mg) versus placebo in participants with moderate-to-severe OSA and obesity. Study 1 participants were not on positive airway pressure (PAP) therapy at baseline while Study 2 participants were on PAP therapy. Post-hoc analyses grouped participants based on

baseline PGIS Sleepiness responses: "not at all/slightly sleepy" (Non-sleepy) or "moderately/very sleepy" (Sleepy). Changes from baseline to Week 52 of sleep-related measures (Epworth Sleepiness Scale [ESS], PROMIS Short Form Sleep-related Impairment [PROMIS-SRI], Functional Outcomes of Sleep Questionnaire [FOSQ]) were compared between TZP and placebo by subgroups, based on mixed model repeated measure methods using on-treatment data. Lower ESS and PROMIS-SRI scores and higher FOSQ scores indicate improvement. Patient Global Impression of Change [PGIC] Sleepiness responses were also calculated. Significant P-values are reported using "*" to denote values < 0.05.

Results: In Study 1 (N=194), there were placebo-adjusted changes from baseline to Week 52 with TZP treatment on the ESS (Non-sleepy: -1.33, Sleepy: -2.18), PROMIS-SRI (Non-sleepy: -1.6, Sleepy: -7.1*), and FOSQ Vigilance domain (Non-sleepy: 0.09, Sleepy: 0.28). Over half of participants treated with TZP reported that they were less sleepy (Non-sleepy: 55.0%; Sleepy: 60.9%). Study 2 participants (N=193) experienced placebo-adjusted improvements from baseline to Week 52 on the ESS (Non-sleepy: -1.02, Sleepy: -0.57), PROMIS-SRI (Non-sleepy: -4.3*, Sleepy: -5.6*), and FOSQ Vigilance domain (Non-sleepy: 0.15, Sleepy: 0.03). On the PGIC Sleepiness item, 46.6% of Non-Sleepy participants and 62.5% of Sleepy participants reported that they were less sleepy at Week 52, in participants treated with TZP.

Conclusion: This post-hoc analysis found that TZP-treated participants who were "moderately/very sleepy" at baseline generally showed greater improvement on ESS, PROMIS-SRI, and FOSQ Vigilance domain than those "not at all/slightly sleepy", especially participants not on PAP therapy. Over half of all TZP-treated participants reported improvements in overall sleepiness, despite sleepiness at baseline.

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0778

ASSOCIATION BETWEEN TIRZEPATIDE AND SNORING BASED ON PARTICIPANTS' BASELINE CHARACTERIZATION FROM SURMOUNT-OSA

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Introduction: Snoring is a common symptom of obstructive sleep apnea (OSA). Tirzepatide has previously shown improvements in the apnea hypoxia index, and it is hypothesized tirzepatide treatment may be associated with improvements in snoring in participants with obesity and moderate-to-severe OSA.

Methods: Two phase 3 studies enrolled adults with moderate-to-severe OSA and obesity to evaluate the efficacy of tirzepatide at the maximum tolerated dose (10 or 15 mg) versus placebo. Study 1 (N=194) included adults who were not on positive airway pressure (PAP) therapy, while Study 2 (N=193) enrolled adults on PAP therapy. Participants completed Patient Global Impression of Status (PGIS) and Change (PGIC) assessments at baseline and Week 52, which measured overall sleep changes, including snoring, since starting the study drug. Post-hoc analyses categorized participants into subgroups based on PGIS baseline assessment of their snoring. The Baseline Non-snoring group was "not at all/slightly affected" by snoring, while the Baseline Snoring group was "moderately/very affected" by snoring.

Results: In participants not on PAP therapy (N: Snoring=91; Non-Snoring=103), a total of 68% (N=34) of participants treated with TZP in the Baseline Non-snoring group rated their sleep as "a little less affected" or "much less affected" by snoring, compared to 26.4% (N=14) of participants receiving placebo. For participants in the Baseline Snoring group, 62.8% (N=27) of participants treated with TZP noted the same improvement, compared to 20.9% (N=10) for placebo. In participants on PAP therapy (N: Snoring=106; Non-Snoring=87), PGIC results were similar, with 51.1% (N=24) of Baseline Non-Snoring participants treated with TZP rating their sleep as "a little less affected" or "much less affected" by snoring compared to 25.0% (N=10) of participants receiving placebo. For those in the Baseline Snoring group, 60.7% (N=31) of participants treated with TZP and 23.6% (N=13) of participants receiving placebo rated their sleep as "a little less affected" or "much less affected" by snoring.

Conclusion: In these post hoc analyses, the majority of participants treated with TZP demonstrated improvements in snoring regardless of baseline severity or PAP treatment. Notably, over 60% of participants that reported being moderately or very affected by snoring at baseline showed improvements with TZP.

Support (if any):

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0779

SLEEP QUALITY BASED ON BASELINE CHARACTERIZATION IN SURMOUNT-OSA: POST-HOC ANALYSES

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Introduction: Obstructive sleep apnea (OSA) can impair sleep quality. Tirzepatide has shown improvements in the apnea hypoxia index and is hypothesized to improve sleep quality in participants with moderate-to-severe OSA and obesity.

Methods: Two phase 3 studies evaluated the maximum tolerated dose of tirzepatide (TZP, 10 or 15 mg) versus placebo in participants with moderate-to-severe OSA and obesity. Study 1 included participants not on positive airway pressure (PAP) therapy, while participants in Study 2 were on PAP therapy. Post-hoc analyses grouped participants based on baseline PGIS Sleep Quality responses: "very poor/poor" (Poor SQ, N=138) or "fair/good/very good" (Good SQ, N=263). Changes in PROMIS SD scores from baseline to Week 52 were compared between TZP and placebo by subgroups based on mixed model repeated measure methods using on-treatment data. Patient Global Impression of Change (PGIC) Sleep Quality responses were also compared. Significant P-values are reported using "*" to denote values < 0.05.

Results: In Study 1 (N=194), placebo-adjusted changes from baseline with TZP treatment on the PROMIS-SD were -5.8* (Poor SQ) and -1.2 (Good SQ). Of participants treated with TZP with Poor SQ, 60.0% (N=12) reported their sleep quality as "A little better" or "much better," compared to 20.0% (N=6) for those receiving placebo. For participants with Good SQ at baseline who were treated with TZP, 75.7% (N=56) reported improved sleep quality, compared to 29.8% (N=22) for those receiving placebo. In Study 2 (N=193), PROMIS-SD placebo-adjusted

changes from baseline with TZP treatment were -3.9 (Poor SQ) and -4.7* (Good SQ). Among participants with Poor SQ who were treated with TZP, 55.8% (N=24) reported improved sleep quality, compared to 20% (N=9) for those receiving placebo. Similarly, 56.4% (N=35) of participants with Good SQ at baseline treated with TZP reported better sleep quality, compared to 28.3% (N=15) for those receiving placebo.
Conclusion: Participants treated with TZP, not on PAP therapy, and with Poor SQ at baseline experienced greater improvements in PROMIS-SD compared to those with Good SQ. For those on PAP therapy, changes in PROMIS SD were similar across subgroups. Most participants reported improved sleep quality in both studies, regardless of baseline sleep quality.
Support (if any):

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0780

ASSOCIATION BETWEEN TIRZEPATIDE AND FATIGUE AND FUNCTIONING BASED ON BASELINE CHARACTERIZATION: SURMOUNT-OSA TRIALS

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Introduction: Fatigue, a symptom of obstructive sleep apnea (OSA), is measurable through patient-reported outcome questionnaires. Tirzepatide improved the apnea hypopnea index in SURMOUNT-OSA trials and is hypothesized to improve fatigue and functioning in individuals with moderate-to-severe OSA and obesity.
Methods: Two Phase 3 studies evaluated the maximum tolerated dose of tirzepatide (TZP, 10 or 15 mg) vs placebo in participants with obesity and moderate-to-severe OSA. Study 1 participants were not on PAP therapy, while Study 2 participants were on PAP therapy. Post-hoc analyses categorized participants based on baseline PGIS responses: "no/mild fatigue" (Non-Fatigued) or "moderate/severe fatigue" (Fatigued). Improvements in fatigue and/or functioning were assessed by PGIC Fatigue, FOSQ-10, FOSQ (Activity domain) and SF-36v2 (General Health and Vitality domains). Higher scores indicate improvement. Treatment associations were measured as the differences in change from baseline between TZP and placebo at Week 52, computed with mixed model repeated measure methods using on-treatment data. Significant P-values are reported using "*" to denote values < 0.05.
Results: In Study 1 (N=194), treatment associations at Week 52 were observed in FOSQ-10 (Non-Fatigued: 0.3, Fatigued: 0.9), FOSQ Activity (Non-Fatigued: 0.05, Fatigued: 0.33*), SF-36v2 General Health (Non-Fatigued: 1.4, Fatigued: 6.2*) and SF-36v2 Vitality (Non-Fatigued: 1.0, Fatigued: 8.5*). Of participants treated with TZP, 71.7% (N=43) Non-Fatigued and 69.7% (N=23) Fatigued participants rated their fatigue as "A little better" or "much better." Participants treated with placebo were less likely to report the same improvements (Non-Fatigued: 22.6%, N=12; Fatigued: 20.9%, N=10). In Study 2 (N=193), treatment associations were experienced on the FOSQ-10 (Non-Fatigued: 0.7, Fatigued: 0.3), FOSQ Activity (Non-Fatigued: 0.13, Fatigued: 0.15), SF-36v2 General Health (Non-Fatigued: 6.5*, Fatigued: 9.7*) and SF-36v2 Vitality (Non-Fatigued 5.7*, Fatigued: 6.0*). More participants treated with TZP reported improvements in fatigue (Non-Fatigued: 51.0%, N=26, Fatigued: 59.6%, N=28) compared to those receiving placebo (Non-Fatigued: 25.9%, N=14; Fatigued: 21.9%, N=9).
Conclusion: In this post hoc analysis, TZP-treated participants, not on PAP therapy, and with "moderate/severe" fatigue at baseline generally showed greater improvements in fatigue/functioning. Those on PAP therapy with "moderate/severe" fatigue at baseline improved only on the SF-36v2 General Health and FOSQ Activity domains. All participants treated with TZP improved compared to placebo.
Support (if any):

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0781

IMPACT OF GLUCAGON- LIKE PEPTIDE- 1 ANALOGS ON THROMBOEMBOLIC OUTCOMES IN OBSTRUCTIVE SLEEP APNEA PATIENTS

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Introduction: Obstructive sleep apnea (OSA) is associated with an elevated thromboembolic risk due to comorbidities, reduced mobility, chronic inflammation, and a hypercoagulable state. Glucagon-like peptide-1 (GLP-1) analogs, including glucagon-like peptide-1 receptor agonists (GLP-1 RAs) and glucose-dependent insulinotropic polypeptide (GIP)/GLP-1 co-agonists, have shown potential in reducing thrombotic effects. However, the impact of GLP-1 analogs on thromboembolic risk in OSA patients remains unclear.
Methods: We conducted a retrospective cohort study using the TriNetX Analytics Network international database. Adults (≥18 years) diagnosed with both OSA and type 2 diabetes mellitus (T2DM) between January 2018 and September 2023 were included. Patients prescribed GLP-1 analogs were compared with those receiving dipeptidyl peptidase-4 inhibitors (DPP-4i). The index date was set as the date of OSA diagnosis, with both groups initiating therapy within one year before this date. Primary outcomes included arterial thromboembolic events (ATE), specifically myocardial infarction (MI) and ischemic stroke, and venous thromboembolic events (VTE), specifically pulmonary embolism (PE) and deep vein thrombosis (DVT). Secondary outcomes comprised individual ATE and VTE components. Safety outcomes were defined as serious gastrointestinal adverse events, including gastroparesis, biliary disease, pancreatitis, and bowel obstruction. Propensity score matching (1:1) was performed to adjust for demographics, body mass index (BMI), hemoglobin A1c (HbA1c), comorbidities, use of positive pressure ventilation and related medication use. A standardized mean difference < 0.1 indicated balance between cohorts. Outcomes were assessed using a Cox proportional hazards model, with $p < 0.05$ considered statistically significant.
Results: The study included 82,035 OSA patients with T2DM. After matching, each group contained 24,505 patients with similar covariate distributions. The GLP-1 group demonstrated a reduced risk for ATE (Hazard Ratio [HR]: 0.88, 95% CI: 0.80-0.97; p=0.012), VTE (HR: 0.80, 95% CI: 0.67-0.94; p=0.009), MI (HR: 0.85, 95% CI: 0.74-0.98; p=0.024), DVT (HR: 0.73,

95% CI: 0.58-0.93; p=0.012), and PE (HR: 0.76, 95% CI: 0.61-0.95; p=0.017) compared to the DDP-4i group. No significant differences were observed in ischemic stroke or serious gastrointestinal adverse events.
Conclusion: GLP-1 analogs may offer thromboembolic protection in OSA patients with comorbid T2DM.
Support (if any):

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0782

USE OF WAKE-PROMOTING AGENTS IN THE MANAGEMENT OF RESIDUAL HYPERSOMNOLENCE IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA (OSA) ON OPTIMAL CPAP THERAPY

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Introduction: Excessive daytime sleepiness (EDS) can be a significant symptom of obstructive sleep apnea (OSA) that impacts quality of life and has morbidity and mortality implications. EDS is defined as unintentional sleepiness or an inability to stay awake during the day, leading to adverse effects on mood, cognition, and daily functioning. Continuous positive airway pressure (CPAP) therapy is standard of treatment for OSA; however, 9-22% of patients continue to experience residual excessive sleepiness (RES) despite adherence. This study evaluated OSA patients with hypersomnolence seen at the University of Connecticut Health Pulmonary/Sleep Medicine Clinic, focusing on the use of wake-promoting agents (WPA) and CNS stimulant medications in managing RES in eligible subset of patients after confirmed CPAP compliance and ruling out other coexisting sleep disorders.
Methods: This descriptive retrospective chart review included adult patients (≥18 years) seen at the Pulmonary/Sleep Medicine Clinic from January 2021 to July 2024. Patients diagnosed with OSA, treated with PAP therapy, and reporting hypersomnolence were examined. PAP therapy adherence was defined as "adherent" (≥70% of nights for >4 hours), "effective" (Apnea-Hypopnea Index [AHI] < 5), and "adequate" (both adherent and effective). Data were collected using EPIC SlicerDicer and analyzed with Microsoft Excel and SPSS. Fisher's exact tests explored differences between patients with and without hypersomnolence, adjusting for multiple comparisons with the Hommel method.
Results: Of 4247 OSA office visits over 3.5 years, 549 patients reported hypersomnolence. Patients with hypersomnolence were 1.6 times more likely to be 35-45 years old (p=0.002), 1.3 times more likely female (p=0.02), 1.4 times more likely divorced or separated (p=0.05), and 1.3-1.7 times more likely to lack insurance information (p< 0.04). These patients were 2.0 times more likely to be prescribed WPAs (p=0.03) but showed no difference in CNS stimulant use (p=0.65). Further analysis of Epworth Sleepiness Scale scores and CPAP adherence is ongoing.
Conclusion: Preliminary data analysis suggest patients with RES in OSA are more likely to be female, aged 35-45, divorced/separated, lack insurance information, and be prescribed WPAs. Ongoing analysis aims to clarify pharmacologic treatment effects and identify high-risk profiles to improve RES recognition and management in OSA patients, with results expected soon.
Support (if any):

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0783

DEMOGRAPHIC AND BASELINE DISEASE CHARACTERISTICS OF SYNAIRGY: A PHASE 3 TRIAL OF AROXYBUTYNIN AND ATOMOXETINE (AD109) IN OBSTRUCTIVE SLEEP APNEA

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Introduction: AD109 is a combination of a novel antimuscarinic, aroxybutynin (aroxy; R-enantiomer of oxybutynin), and the selective norepinephrine reuptake inhibitor atomoxetine (ato). We report the sample characteristics of the fully enrolled SynAIRgy trial, a Phase 3 study to examine the efficacy, safety, and tolerability of AD109 (aroxy 2.5mg/ato 75 mg) in OSA.
Methods: SynAIRgy (NCT05813275) is a randomized, double blind, placebo-controlled, 6-month parallel-arm clinical trial in adults with OSA who do not accept or adhere to positive airway pressure therapy. Participants were enrolled over the full range of OSA severity as measured by apnea-hypopnea index with 4% desaturation (AHI4) >5 with no upper limit. Participants must have had a Patient Reported Outcomes Measurement Information System (PROMIS) -Fatigue raw score ≥17, and a body mass index (BMI) between 18.5–40 kg/m2 for men, or 18.5–42 kg/m2 for women. The primary efficacy endpoint is the proportion of participants with ≥50% reduction in AHI4 at six months. Secondary efficacy endpoints include change from baseline in PROMIS-Fatigue, PROMIS-Sleep Impairment (a measure of functional impairment during daytime), and Epworth Sleepiness Scale (ESS).
Results: SynAIRgy enrolled 646 participants that were randomized to AD109 or placebo. At baseline, the mean (SD) age was 57.1 (11.0) years, and mean (SD) BMI was 32.3 (5.0) kg/m2 with a balanced proportion of female (n=317, 49.1%) and male (329, 50.9 %) participants. The study enrolled a population representative of the diverse demographic composition of the United States with 67.2% being White, 20.4% Black/African American, 7.4% Asian, 1.1% American Indian/Alaskan Native, and 0.6% Native Hawaiian/Other Pacific Islander. The mean (SD) AHI4 at baseline was 22 (11) with 34.4%, 42.4%, and 23.2% of participants having mild (AHI4 5–< 15) moderate (AHI4 15–< 30), or severe (AHI4 ≥30) OSA, respectively. Mean (SD) PROMIS-Fatigue T-score was 59.1 (7.0), mean (SD) PROMIS-Sleep Impairment T-score score was 58.5 (7.5), and mean (SD) ESS was 10.1 (4.7).
Conclusion: The baseline demographic characteristics of participants enrolled in SynAIRgy are representative of the general population of adults living with OSA, and the baseline AHI4 scores and symptom profiles reflect those of a typical sleep clinic referral OSA population.
Support (if any): Apnimed Inc.

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0784

EFFECTS OF SOLRIAMFETOL ON NEUROPSYCHOLOGICAL OUTCOMES IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA IN THE REAL-WORLD SURWEY STUDY

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Introduction: Patients with excessive daytime sleepiness (EDS) associated with obstructive sleep apnea (OSA) show deficits in cognitive domains including alertness, attention, executive function and decision-making. Solriamfetol (Sunosi®) is a dopamine-norepinephrine reuptake inhibitor with agonistic properties at the trace amine-associated receptor 1 and serotonin 1A receptor approved for treatment of EDS associated with narcolepsy or OSA. Solriamfetol demonstrated improvements in cognitive performance in patients with EDS in OSA in a phase 4 randomized study. Here, we report a post-hoc analysis of neuropsychological outcomes in patients with EDS in OSA treated with solriamfetol in a real-world setting.
Methods: SURWEY was a retrospective, observational study using data from physicians who prescribed solriamfetol for EDS in OSA. Neuropsychological assessments were performed in a subgroup of patients prior to and 3 months after solriamfetol initiation. Tests included: Test of Attentional Performance (TAP) subtest alertness, the Regensburger Word Fluency Test, the Wechsler Memory Scale subtest visual reproduction, Wechsler Adult Intelligence Scale (WAIS-IV) subtest coding and British Columbia Cognitive Complaints Inventory (BC-CCI). Data were analyzed with repeated measures ANOVA. The relationship between changes in EDS and cognition were assessed via regression.
Results: Before solriamfetol initiation, participants (N=46) showed impaired alertness on the TAP (mean±SD 268.2±21.8 ms with warning signal, 270.2±21.9 ms without), impaired cognitive function on the BC-CCI (8.6±2.2), and reduced psychomotor and visual processing speed on the WAIS-IV coding subtest (7.1±1.5). After 3 months of treatment with solriamfetol, TAP scores improved by a mean of 11.4% (237.7±21.4 ms with warning signal; 239.5±21.3 ms without, $p< 0.01$ for both). BC-CCI scores improved by a mean of 40.8% (5.1±3.1, $p< 0.01$). WAIS-IV coding scores improved by 30.6% (9.3±1.8, $p< 0.01$). Word fluency and memory were not impaired at baseline, or after solriamfetol initiation. Epworth Sleepiness Scale scores improved with solriamfetol treatment by 4.7±2.7 ($p< 0.01$). There was no association between the improvements in cognitive function and change in EDS ($|r|=0.16$, $p=0.3$).
Conclusion: These real-world results show that solriamfetol not only reduces EDS in patients with OSA, but also has the potential to partially reduce OSA-associated cognitive impairment. This effect was not associated with changes in EDS.
Support (if any): Support: Axsome Therapeutics and Pharmanovia.

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0785

REAL-WORLD EVALUATION OF AGENT LONGEVITY AND SATISFACTION IN THE TREATMENT OF RESIDUAL SLEEPINESS IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: Residual excessive daytime sleepiness (RES) despite effective positive airway pressure (PAP) therapy for obstructive sleep apnea (OSA) is a clinical problem impacting quality of life and daily function. Wake-promoting agents (WPAs) such as modafinil, armodafinil, and solriamfetol have demonstrated efficacy in reducing RES in randomized controlled trials (RCTs); however, their effectiveness in typical sleep clinic populations remains underexplored. This study aimed to evaluate the efficacy, safety, and tolerability of these WPAs in real-world clinical settings.
Methods: This retrospective study analyzed electronic health records of 69 randomly selected, consenting patients with OSA who are on PAP therapy and a WPA at Mayo Clinic from 9/19/2019 to 9/19/2024. Researchers reviewed charts for treatment indication, duration, adverse effects, and response (categorized as "complete," "partial," or "poor"). Therapy longevity was assessed using initiation, refill, and discontinuation data. Outcomes were analyzed with paired t-tests, chi-square tests, and regression models.
Results: Of 69 patients, 45 were excluded because: WPA use before observation period (24), off-label WPA use (13), WPA use before CPAP (3), or other (5). Off-label reasons included neurologic-condition-related fatigue (6), depression augmentation (5), and autoimmune-condition-related fatigue (2). 24 patients were on WPAs for RES with PAP-treated OSA, including 3 with mixed indications, and were included in analyses. The median age was 65 (IQR 11). BMI at OSA diagnosis was 33.6 (IQR 6.4). Most subjects were male (75%). Initial Epworth Sleepiness Scale scores (ESS) were 12.3±1.1. ESS at the first WPA prescription were 15.4±0.9 ($p=0.04$). Most patients (83.3%) started on modafinil. Of the 4 patients who started on armodafinil or solriamfetol, chart review showed a previous trial of modafinil without benefit. After optimizing the initial WPA dosage, ESS improved by 3.3±1.4 points ($p=0.04$) to 12.1 ±1.2. Side effects limited WPA use in 20.8% of patients. Median first WPA duration was 141 days (IQR 53-280) with no significant difference between these WPAs ($p=0.81$).
Conclusion: Although WPAs have narrowly defined approved indications, they are often prescribed off-label for comorbidities. Unlike straightforward use in RCTs, real-life use is more complicated. Patients prescribed WPAs for the targeted approved indication show statistically significant benefits, although adverse effects limited their use for some.
Support (if any):

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0786

REAL-WORLD USE OF SOLRIAMFETOL FOR EXCESSIVE DAYTIME SLEEPINESS IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA IN THE US

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Introduction: Excessive daytime sleepiness (EDS) is a vital and often overlooked patient-centered outcome in obstructive sleep apnea (OSA) and is associated with worsened health and economic outcomes. Solriamfetol (Sunosi®), a wake-promoting agent (WPA) approved in the United States (US), is the first and only dopamine and norepinephrine reuptake inhibitor indicated for EDS in OSA. The purpose of this study was to examine real-world use of solriamfetol and related clinical outcomes

(before and after initiation), using claims data from a large US population.
Methods: Adult patients newly initiating solriamfetol in the MarketScan® Commercial and Medicare Databases (7/1/2019-9/30/2022) were identified (first solriamfetol claim = index). Inclusion criteria included 1) continuous enrollment for 6 months pre- and post- index, and 2) ≥1 OSA diagnosis and ≥1 claim for positive airway pressure therapy. Exclusion criteria included pre-index diagnoses for central sleep apnea, narcolepsy, substance use disorder, or pregnancy. OSA-related comorbidities and symptoms (identified via diagnoses) were evaluated before and after index. Adherence to solriamfetol was defined using the proportion of days covered (PDC) during the 6-month post-index period. Pre-post differences in 22 OSA-related comorbidities and 19 OSA-related symptoms were evaluated using McNemar's tests for categorical variables and paired t-tests for continuous variables.
Results: Among 665 patients initiating solriamfetol (mean age 50.7 years; 54.3% male), 74% exclusively used solriamfetol during the 6 months post-index while 54.9% had prior use of other WPAs or stimulants. Mean PDC for solriamfetol was 0.9, with 79.2% of patients achieving a PDC ≥0.8. A significant reduction from the pre- to post-index period was observed in many OSA-related symptoms including fatigue/tiredness (16.5% vs.11.6%), hypersomnia (57.3% vs. 48.3%), insomnia (18.8% vs. 15.8%), sleep disturbance (12.5% vs. 8.7%), and gastroesophageal reflux (17.7% vs. 14.0%) (all $p < 0.05$). Numerical decreases were found for several OSA-related comorbidities (i.e. asthma, cardiovascular disease, type 2 diabetes, hypercholesterolemia, hypertension, obesity, psychiatric conditions).
Conclusion: In this real-world analysis, solriamfetol adherence was high over the 6-month post-index period. Significant reductions in OSA-related symptoms were observed following initiation, suggesting that solriamfetol may improve clinical outcomes in the management of EDS in patients with OSA.
Support (if any): Axsome Therapeutics, Inc.

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0787
THE TREATMENT PREFERENCES FOR COMORBID OBESITY AND OBSTRUCTIVE SLEEP APNEA (PRO-CON OSA) SURVEY

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Introduction: About 10% of U.S. adults have comorbid obesity and obstructive sleep apnea (COBOSA). Traditionally, COBOSA has been managed with lifestyle changes (diet/exercise) and continuous positive airway pressure (CPAP). Recently, tirzepatide (a once-weekly injection) results in ~20% weight loss over one year and improves sleep apnea severity by ~55%. This is comparable to the effectiveness of CPAP in practice. To inform treatment choice, we assessed patient and provider attitudes towards the use of CPAP and tirzepatide for COBOSA.
Methods: An online survey was developed to assess acceptability of CPAP and tirzepatide for newly diagnosed COBOSA. The survey was pilot tested and refined based on cognitive interviews. In November 2024 the survey was distributed to 17 UCSD sleep medicine providers and all ~6,500 patients age 21+ seen at a UCSD sleep clinic in the preceding two years. Following a brief overview of COBOSA and treatments, providers answered questions from the perspective of writing prescriptions, while non-providers responded as potential users. Responses were anonymous and uncompensated. We compared responses using Fisher's exact test.
Results: Seventeen providers (100%) and 365 patients (~5.5%) responded; 42% were women, 29% non-white, and 9% Hispanic. Among patients, 53% had COBOSA, 73% reported ≥3 prior weight loss attempts, 23% current/past use of tirzepatide and/or semaglutide, and 78% current/past use of CPAP. Over 75% of patients and providers reported CPAP and tirzepatide somewhat/very acceptable. Patients reported similar acceptability for both therapies, whereas providers were more accepting of CPAP than patients (e.g., "very acceptable" 88% vs. 59%, P=0.04). Patients leaned toward tirzepatide should evidence demonstrate equal effectiveness (48% vs. 35%), while providers tended to favor CPAP (53% vs. 26%, P=0.16). Both groups supported combination therapy, though patients were less enthusiastic than providers (61% vs 88%, P=0.06).
Conclusion: While both CPAP and tirzepatide appear as acceptable COBOSA treatments, preferences diverge between patients and providers. Research to compare the relative effectiveness of CPAP and/or tirzepatide for COBOSA, and to better understand reasons underlying differential preferences is warranted.
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0788
IMPROVING OBSTRUCTIVE SLEEP APNEA MANAGEMENT: THE ROLE OF WEARABLE DEVICES AND HEALTH COACHING

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Introduction: Obstructive sleep apnea (OSA) is the most prominent sleep-related breathing disease. Although Positive Airway Pressure (PAP) is generally effective for treating OSA, limited usage remains problematic due to several factors (e.g., mask discomfort). Health and wellness coaching (HWC) has emerged as a novel intervention aimed at enhancing PAP usage and can be coupled with a Connected Wearable (CW) to objectively monitor sleep quality. This study aimed to assess the effect of HWC with a CW on PAP usage and oxygen saturation (OS) in participants with OSA.
Methods: This prospective 6-week clinical trial recruited newly diagnosed adults with mild-to-severe OSA. All participants were prescribed PAP and provided a CW device to monitor OS.

Participants conducted a week-long run-in period using the CW only then combined PAP + CW + HWC throughout a 6-week period. HWC was provided by a board-certified health coach at 1 session per week. OS parameters included evaluating time under 90% oxygen saturation (T90) and Oxygen Desaturation Index 4% (ODI4). PAP usage and OS parameter data were analyzed using a paired samples t-test comparing run-in baseline scores to those collected at 6 weeks of HWC. Data is represented as mean (standard deviation), and significance was set at $p < 0.05$.

Results: Thirty participants completed the study, with a mean age of 49.1±13 years, body mass index of 36.1±7.2 kg/m2, and the majority (n = 23, 76.7%) being female. From week 1, PAP use was significantly improved from an average of 5.1 (1.8) hours per night to, week 6, an average of 6 (1.6) hours per night ($p=0.017$) over each 7-day period ($p < 0.001$). Significant improvements were observed between baseline and after week 6 in T90% score (mean difference [MD]=- 4.5%, $p=0.013$) and ODI4 (MD=-6.2 desaturations/hour, $p=0.002$), and mean oxygen saturation (MD=0.6%, $p=0.02$).

Conclusion: The findings demonstrate improvements from baseline in PAP usage and OS post-HWC intervention. The results suggest that HWC and CW could improve PAP usage hours per night. Further research is required to evaluate long-term PAP usage and sleep behaviors following HWC, particularly with the inclusion of a control condition.

Support (if any): Apnimed Inc.

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0789

A NOVEL MODEL TO OPTIMALLY TARGET WEIGHT LOSS INTERVENTIONS TO TREAT OSA

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Introduction: Obstructive sleep apnea (OSA) pathophysiology is heterogeneous. Current front-line treatments are often poorly tolerated or don't fully resolve the underlying repetitive upper airway collapse. As obesity is a major risk factor, weight loss strategies can be an effective alternative or adjunct therapy for OSA. However, the degree to which weight loss strategies reduce OSA severity varies markedly between individuals. Given that weight loss interventions can be burdensome, methods are needed to determine which patients are likely to respond versus those better suited to alternate OSA treatment.

Methods: 149 people with OSA (mean [SD] age, 49 [10] years) from five trials (one pharmacological, four non-pharmacological) were included in this study. Participants were included in the analysis if they had a BMI reduction of >5% at post-treatment follow-up. Model input variables included routine metrics from baseline in-laboratory polysomnography reports such as sleep efficiency, and age, BMI, breathing, and oxygen-saturation parameters. XGBoost and distributed neural network (DNN) models were used to predict whether individuals had a >50% reduction in AHI or a 'partial response' (a reduction in OSA category; < 5, < 15, < 30, 30+ events/h) at post-treatment follow-up. Models were trained on ~80% of the data and validated on the remaining 20%.

Results: Performance of the XGBoost and DNN classifier models in the validation subset had reasonable accuracy (69% and 66%, respectively). Models were accurate at predicting a partial resolution in OSA (83%), with particularly strong negative predictive power (92%, positive predictive value=76%).

Conclusion: Using only data from routine clinical sleep studies, the models developed in this study were able to effectively predict whether individuals with OSA who achieved some weight loss via weight loss interventions would have a corresponding change in OSA severity. Prediction was particularly robust at identifying those not likely to not respond favourably. While prospective validation is required, this novel approach has the potential to be a useful clinical decision support tool for targeted weight loss treatment for overweight and obese individuals with OSA.

Support (if any): DJE: NHMRC (1196261) and on behalf of the OSA treatable traits group R.R. Grunstein, B.J. Yee, C.M. Hoyos, N.S. Marshall, F.J. Lowrie

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0790

POSITIONAL OBSTRUCTIVE SLEEP APNOEA: WHEN AND WHY THE NECK-BASED VIBROTACTILE DEVICE FAILS

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Introduction: The efficacy of positional therapy with a neck vibrotactile device for positional obstructive sleep apnoea (POSA) has been demonstrated, but its inefficacy in changing body position has not been equally explored. The primary aim of this study was to evaluate the failure rate of the neck vibrotactile positional therapy in POSA. Secondary aims were: to investigate the reliability of a single night sleep study for labelling a supine sleeper, any differences on supine time between the laboratory and the home environment, the impact of the device on snoring and the compliance.

Methods: A retrospective observational study reviewed patients with a diagnosis of POSA according to Cartwright and who had received monitoring and/or treatment with a Night ShiftTM (NS) Sleep Positioner neck device for 4 nights in Monitor or Therapy mode or both. The diagnosis of POSA was made on respiratory polygraphy or polysomnography and a minimum supine sleep time of 15% was required. A supine sleeper was defined if supine sleep time at home was > 5% at least in 2 nights of neck vibrotactile device in Monitor mode. Failure was defined as continuous vibration time 5 minutes and a supine time > 5% in at least 2 nights.

Results: Ninety two adult patients were enrolled. The failure rate, restricted to 74 patients who had received the neck vibrotactile device in Therapy mode for 2 nights, was 14.8%, with a compliance rate of 96%. Non-supine sleepers at home were 13/74 (17.5%). A significant reduction of supine sleep time at home was observed in comparison with the diagnostic sleep study (23.9% vs 51%, $p < 0.001$). Snoring rate was significantly reduced while using the vibrotactile device in Therapy mode versus Monitor mode.

Conclusion: Considering the failure rate of the device in changing body position, and the rate of patients that at home spontaneously do not sleep in supine position, around 32% of positional therapy prescribed might be inappropriate. An adequate trial with the neck vibrotactile device, in diagnostic and therapeutic modality, might disclose these cases. Main reasons for inefficacy are: sedatives, chronic sleep deprivation, motor limitations and cognitive impairment.

Support (if any):

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0791

OXYGEN THERAPY FOR CHILDREN WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: Oxygen supplementation is effective treatment for obstructive sleep apnea (OSA) in adults and infants, but there is a paucity of data on its use in older children. The aim of this study is to evaluate the effectiveness of oxygen therapy in children >1 year old with OSA and factors that influence the response to oxygen.
Methods: We conducted a retrospective review of patients 1-20 years old with OSA who underwent diagnostic sleep study and oxygen titration study at CCHMC between January 1, 2005 and October 1, 2024. Patients were determined to be "responders" if they had a ≥ 50% reduction in obstructive apnea hypopnea index (oAHI) on oxygen supplementation. Patients with tracheostomy and/or ventilator dependence were excluded. Chi-squared test was used to compare categorical variables and Mann Whitney test was used to compare continuous variables.
Results: 143 patients (86 males, 57 females) met criteria for analysis; 104/143 (72.7%) were responders (R) and 39 (27.3%) were non-responders (NR). There was a non-statistically significant trend toward younger age in responders (3.85±4.5yo [R] vs. 4.56±5.5yo [NR]; P=0.16). Although more non-whites were non-responders (15 (14.4%) [R] vs. 15 (38.5%) [NR], P=.0046), it should be noted that 104/143 (79%) of the study population was white. Central apnea index (CAI) on diagnostic study was higher in responders than non-responders. (5.01±12.32 [R] vs. 1.86±3.35 [NR], P=0.001). There was no difference between responders and non-responders based on severity of initial oAHI (14.09±20.09 [R] vs. 16.40±19.72 [NR], P=0.361), BMI, presence of upper airway obstruction, prior upper airway surgery, pulmonary disease, neurological/neuromuscular disease, premature birth, Down Syndrome or other genetic disorders.
Conclusion: Most children and adolescents with OSA were oxygen responders. Interestingly, oxygen responders had higher CAI suggesting increasing frequency of central events may predict oxygen therapy response in patients with OSA. We speculate that high loop gain and ventilatory instability may underlie the mechanism by which higher central events are more likely to respond to oxygen therapy. Further trials are needed to investigate this relationship and to assess the long-term outcomes of oxygen therapy in the pediatric population.
Support (if any):

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0792

RAPID DOSE TITRATION MODEL: REDUCING TREATMENT TIME IN ORAL APPLIANCE THERAPY FOR OSA

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Introduction: Patient treatment times have successfully been reduced and clinical workflow improved by using telemedicine, pre-collected patient information, and online scheduling. AI design and robotic manufacturing have further streamlined oral appliance therapy treatments for obstructive sleep apnea. One remaining opportunity is finding the therapeutic dose of mandibular advancement in a timely fashion. This often takes 4-8 weeks which elongates the total treatment time. This protocol demonstrates how a rapid titration technique can establish the appropriate dose in just a few days and significantly reduce treatment time.
Methods: 20 consecutive patients (12 mild, 5 moderate, and 3 severe) with an average AHI of 13.75 were treated using the rapid titration protocol, with a novel HST ring and Precision Oral Appliance Therapy. Patients were first seen for intraoral records appointment. Digital scans of both arches, a maximum intercuspal position and a construction bite were taken and sent to the medical device manufacturer for device construction. Two weeks later, the patient was fitted with their appliance, and given post operative guidance, the ring, and explicit written instructions on advancing 1 mm each day for 5 days. They returned in one week with the ring for a physical data upload and determination of the appropriate dose/advancement and were referred back to their sleep MD for the follow up efficiency test.
Results: 90% were successfully treated to an AHI below 10 and 50% improvement. The average total treatment time was 27 days from the records appointment to a confirmed therapeutic dose position. No patients experienced any unusual temporomandibular joint discomfort, tooth pain, or other untoward side effects that would compromise this protocol from being implemented.
Conclusion: The combination of a rapid titration protocol using the Belun Tech HST ring and the ProSomnus EVO precision oral appliance provided a significant condensation of the time to treatment. It was well supported by the explicit instructions, device and test simplicity, and excellent patient communication.
Support (if any): No support was provided for this study.

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0793

A DIGITAL PROTOCOL TO IDENTIFY AND ELIMINATE CONSTRUCTION BITE ERRORS

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Introduction: The fabrication of a precision oral appliance to treat OSA requires accurately recording the prescribed starting mandibular advancement dose using a construction bite. A horizontal bite gauge is commonly used to measure and set the vertical and horizontal position of the lower jaw. Construction bite midline can be skewed to one side or the other due to provider error or inaccurate patient movement. This may result in unilateral joint or muscle pain. The purpose of this paper is to present a digital protocol to verify the midline position of the construction bite.
Methods: Upper and lower arch digital scans were taken on ten patients to create 3-D digital models of the arches. A 3mm bite fork and horizontal bite gauge was used to measure and set the construction bite position. Digital scans of the MIP and construction bite were taken. Using the multi-occlusion function in the scan software the provider can verify the midline in MIP. When switching between these two scan images the provider can visualize the movement of the lower jaw as well as visualize the midline position. If there is a midline shift the provider can correct and repeat the process to mitigate errors.
Results: Of the ten patients scanned, seven were found to have midline construction bite discrepancies. These discrepancies were

identified immediately using the protocol and the scan software. In all cases the provider was able to take a new construction bite. The scan image of this second bite was used to manufacture the medical device.
Conclusion: This proposed digital protocol resulted in an immediate view of the midline position, and lower jaw movement in the construction bite when compared to the MIP bite. This protocol will result in less errors when taking the construction bite. This allows a more precise fabrication of the oral appliance improving patient comfort and decreasing the TMD side effects from a midline discrepancy
Support (if any): No Support

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0794

A NEW METHOD FOR QUICKLY IDENTIFYING DENTAL SIDE EFFECTS IN USERS OF THE INTRAORAL MANDIBULAR ADVANCEMENT APPLIANCE USING AN INTRAORAL SCANNER

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Introduction: Long-term use of mandibular advancement device (MAD) for treating obstructive sleep apnea syndrome (OSAS) can cause changes in dental occlusion. Traditional methods for monitoring these changes, such as intraoral photographs, plaster models, and radiographs, can be time-consuming, involve ionizing radiation, and lack sensitivity for detecting early tooth movement. Consequently, there is a need for more efficient and precise technologies to monitor dental occlusion.
Methods: We included 41 custom-made thermoformed titratable MAD users who had their dental arches scanned before treatment (T0) and after 6 to 12 months (T1). Digital files from T0 and T1 were superimposed to evaluate tooth movement with a precision of 0.007 mm. We analyzed six teeth from each arch, which included central incisors, canines, and first molars at three specific points along their long axis. For the incisors, these points were the incisal, middle, and cervical. For the canines and first molars, the points were incisal or occlusal, middle, and cervical. Comparisons were made for the upper arch, lower arch, and both arches occluded. This protocol allowed us to detect early positional changes in the teeth.
Results: The average mandibular advancement was 7 mm. Digital comparisons showed that tooth 16 was the only one without movement greater than 0.007 mm. Tooth 41 exhibited significant movement at all measured points ($p < 0.001$). Occlusion analysis revealed that teeth 13, 23, 31, 41, and 43 experienced significant movement across all marked points ($p < 0.001$). By the sixth month, over 50% of MAD users presented measurable occlusal changes. The use of digital intraoral scanners allowed the detection of movements smaller than a tenth of a millimeter, providing earlier and more precise identification of tooth positional changes compared to conventional methods.
Conclusion: Intraoral scanners proved to be an accurate and practical tool for detecting early dental occlusion changes in MAD users. Our methodology, capable of identifying movements as small as 0.007 mm, enables early intervention and enhances patient awareness regarding treatment progress. This approach offers a significant advantage over traditional monitoring methods in diagnosing and managing MAD-related occlusal side effects.
Support (if any):

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0795

NOVEL ORAL APPLIANCE THERAPY WITH POSITIVE EXPIRATORY PRESSURE VALVE SUCCESSFULLY TREATED PATIENTS WITH SEVERE OBSTRUCTIVE SLEEP APNEA (OSA)

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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. The 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 included 17 patients with severe OSA (AHI>30/hr.). Average age: 54.6±5.8 years; mean BMI: 32.6±4.3; 70% were men. Severe patients who were CPAP intolerant or preferred OA were approached for study participation and informed consented was obtained. The enrolled patients were evaluated, custom fitted with the EPAP enhanced novel OA and followed by the sleep dentists. Anterior adjustments of the of the OA was clinically guided and optimized, highest resistance EPAP valves (7 cmH2O) were utilized. T Primary Efficacy Measure: Change in AHI between baseline vs. EPAP enhanced OA. Secondary Efficacy Measures: Treatment success (percentage 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 41.4±11.23/hr. to 12.1±2.45/hr. ($p< 0.005$), average 71% reduction in AHI. The lowest oxygen saturation (SpO2 nadir) during sleep increased from 81.8±6.2% to 89.4±1.2% ($p< 0.005$). Treatment success rate was 86%.
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.
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0796

AIO BREATHE FOR OSA: MATCHING AIRFLOW TO OXYGEN DEMAND WITH CONNECTED-ARC-OF-MOTION, AI-PREDICTIVE ORAL DEVICE GEOMETRY AND ON-DEMAND-AIRFLOW DELIVERY

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Introduction: AIOMEGA's FDA-cleared (K233754) AIO BREATHE™ is a unique Total Antero-Vertical Mandibular-Lingual Repositioning Device (TAVMLRD™) from patented inventions by the first author. Its flanges display unique geometry that result in CONNECTED-ARC-OF-MOTION™ that provides REVIVE ON-DEMAND-AIRFLOW™, a method of calibrating incremental reduction in airflow resistance by increasing the SMCA (Smallest Cross-sectional Area) of the collapsible part of the airway during sleep or wake.
Methods: Subjects with suspected OSA underwent pretreatment and post-treatment clinical examination with ESS, Ghuge Fatigue Scale. Pre-RX and post-RX Home Sleep Studies were performed. AI-Predictive device flange geometry specified production of AIO BREATHE for entire group and forecasted post-RX AHI/LSAT. Pre-AHI, Pre-LSAT, Post-AHI and Post-LSAT were tabulated, univariate and multi-variate regression analysis were performed.
Results: Goup included mild, moderate and severe OSA. N = 50. Mean pre-RX AHI was 20.07, AHI range was 9-38, 1 Std. dev was 11.01. Mean pre-LSAT was 84.60%, LSAT range was 78% - 91% with mean of 84.60%. Mean Post-RX AHI was 2.13, AHI range was 0 – 4.5 with 1 Std. Dev of 1.46. Mean Post RX-LSAT was 92.4%, LSAT range was 90% - 96%. Ability to predict Post-RX AHI with AI-driven algorithms was 98.5% with p-value of 0.065 and T-stat of 2.141. Lower 95th% -1.773 and upper 95th% 2.468. Ability to predict Post-RX LSAT with AI-driven Algorithms was 99% with p-value of 0.15, adjusted R square of 0.131. Lower 95th% -0.095 and upper 95th% 0.472.
Conclusion: AIO BREATHE effectively treated all severities of OSA (up to AHI 38 and LSAT 78%) in this group. All participants experienced improvement in clinical symptoms. HSAT proved effective therapy (AHI < 5, LSAT >90%) with AI-predictive modeling of AIO BREATHE geometry. Design geometry reduced therapeutic uncertainty, minimized side effects like TMJ or dental movement and built dentist/physician/patient trust. AIOMEGA's AI-predictive algorithms are device geometry-specific.
Support (if any): AIOMEGA LLC.

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0797

SEVERE OBSTRUCTIVE SLEEP APNEA TREATED WITH ORAL APPLIANCE THERAPY IN ELDERLY ADULTS: A COHORT STUDY

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Introduction: Emerging evidence suggests that positive airway pressure (PAP) treatment for moderate-to-severe obstructive sleep apnea (OSA) in elderly patients does not improve daytime sleepiness, or quality of life outcomes, despite improving apnea-hypopnea index (AHI). While oral appliance therapy (OAT) is known to be an effective treatment for mild-to-moderate OSA, its efficacy in treatment of elderly patients with severe OSA is unknown.
Methods: Retrospective chart review of patients ≥ 65 years old with diagnosis of OSA, treated with OAT, who underwent subsequent follow-up sleep testing and clinical assessments, including Epworth Sleepiness Scale (ESS), a measure of daytime sleepiness.
Results: We studied 66 elderly patients with OSA (31 women, 35 men), including 58 with mild-to-moderate OSA (AHI < 30) and 8 with severe OSA (AHI ≥ 30) treated with OAT. At baseline, patients with mild-to-moderate OSA had a median AHI of 11.6 compared to 41.3 in patients with severe OSA ($p < 0.0001$). There was no difference in ESS score between patients with mild-to-moderate OSA (median ESS = 8; IQR = 4-12) and severe OSA (median ESS = 6; IQR = 3-9). Following their OSA diagnosis, OAT was offered due to PAP intolerance (n = 32), patient preference (n = 28), or as an alternative treatment option (n = 4). After initiation of OAT, 42 patients with mild-to-moderate and 7 with severe OSA underwent follow-up assessment with home sleep testing (n = 32), oximetry (n = 15), or polysomnography (n = 2). At follow-up assessment, ESS was decreased in patients with mild-to-moderate OSA (median ESS = 5; IQR = 3-8) and severe OSA (median ESS = 5; IQR = 3-7), indicating reduction in daytime sleepiness in response to OAT in both groups. Moreover, 50% of patients with mild-to-moderate OSA and 50% of severe OSA patients saw ≥ 50% reduction in AHI.
Conclusion: Our study findings suggest that treatment with OAT in mild-to-moderate and severe OSA is tolerable and effective in elderly patients who do not have contraindication for this treatment. OAT should be considered as an alternative treatment specifically for elderly adults with severe OSA not tolerating or improving with PAP therapy.
Support (if any):

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0798

ASSESSMENT OF ORAL APPLIANCE THERAPY EFFICACY IN STROKE PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: Sleep apnea impacts 50-70% of patients following stroke. Treatment of obstructive sleep apnea (OSA) in patients with stroke using continuous positive airway pressure (CPAP) has been recommended in recent American Heart Association/American Stroke Association guidelines. However, stroke patients poorly tolerate CPAP and often remain untreated. There is a paucity of data regarding alternative treatments such as oral appliance therapy (OAT) in stroke patients. We hypothesized that oral appliance therapy would be an efficacious option in the treatment of OSA in stroke patients, defined as a ≥50% reduction in apnea-hypopnea index (AHI) or oxygen desaturation index (ODI) or reduction in total AHI or ODI to < 10/h.
Methods: We performed a retrospective review of patients with OSA treated with OAT at our institution and had a history of stroke prior to receiving the oral appliance. Chart abstraction included demographic data, stroke type, sleep apnea diagnostic data, and efficacy data. Efficacy data included repeat sleep studies, overnight oximetry, patient reported outcomes, and subjective benefit, as available.
Results: 23 patients (52% female, mean age 63) were identified with a history of stroke prior to use of OAT for OSA. Baseline parameters (mean, SD) included BMI (30.8, 4.2), AHI (15.0, 10.6), and Epworth Sleepiness Scale (ESS) (9.3, 5.4). Post-treatment parameters included (mean, SD) BMI (30.1, 4.2), AHI

(12.4, 12.0), and ESS (6.5, 4.0). 12 patients had both baseline and follow-up sleep studies performed which met criteria for AHI efficacy of OAT in 7 of 12 (58%). Wilcoxon signed rank exact test demonstrated improvement in median AHI of 9.3 (0.40-17.6, p< 0.05) among these 12 patients. 2 of 3 (67%) patients with overnight oximetry follow-up met criteria for ODI efficacy of OAT. Of 8 patients with only subjective follow-up, 6 (75%) reported subjective improvement and 2 (25%) did not tolerate the device.

Conclusion: This study demonstrated that oral appliance therapy is efficacious in reducing the AHI by at least 50% or to a value below 10 in a majority of patients. Oral appliance therapy may be a viable alternative to CPAP in selected OSA patients with a history of stroke.

Support (if any): No support

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0799

THE EFFICACY OF ORAL APPLIANCE THERAPY IN MANAGING POSITIONAL OBSTRUCTIVE SLEEP APNEA

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Introduction: Positional obstructive sleep apnea (POSA) is characterized by a significant increase in airway obstruction and breathing disturbances when a patient sleeps in the supine position compared to sleeping on their side. While mandibular advancement devices (MADs) are effective in managing obstructive sleep apnea (OSA), their efficacy in treating POSA remains uncertain. This study evaluates the effectiveness of MADs in improving clinical and polysomnographic outcomes for patients with POSA.

Methods: Clinical notes and sleep studies (in-lab polysomnography or home sleep apnea test) were reviewed from patients who received a MAD for OSA treatment between 2019 and 2023. Patients who met the diagnostic criteria for POSA (supine AHI at least double the lateral AHI) were analyzed. Sleep parameters, including the Epworth Sleepiness Scale (ESS), Apnea-Hypopnea Index (AHI), and minimum oxygen saturation (SpO2), were compared between baseline and follow-up visits after MAD titration and optimization.

Results: Of 167 patients, 49.7% (n=83) had POSA. The POSA cohort had a median baseline ESS of 8 (range 0-20, n=69), AHI of 13.3 events/hour (range 5.7-62.2, n=67), supine AHI of 19.2 events/hour (range: 8-109.8, n=67), lateral AHI of 5.3 events/hour (range 0-44; n=67), minimum SpO2 of 82% (range 0.7-90, n=67), sleep efficiency of 73.4% (range 37.2-78.9, n=6), and arousal index of 13.2 events/hour (range 6.8-36, n=6). After MAD intervention, the cohort demonstrated a median ESS of 6 (range 0-20), AHI of 8.7 events/hour (range 0.5-88.9), supine AHI of 11.4 events/hour (range 0-85.9), lateral AHI of 4.1 events/hour (range 0-100.8), minimum SpO2 of 82% (range 64-91), sleep efficiency of 81.5% (range 65.4-95.8), and arousal index of 22.7 events/hour (range 2.8-41.9). Patients experienced significant reductions in median overall AHI (p< 0.001) and supine AHI (p< 0.001) and improvement in sleep efficiency (p< 0.001). Similar outcomes were observed in the non-POSA cohort (n=84, 50.3%), including significant reductions in median overall AHI (p< 0.05) and lateral AHI (p< 0.001).

Conclusion: Mandibular advancement devices (MADs) effectively improved clinical and polysomnographic outcomes in patients with POSA. Similar benefits in AHI reduction were observed in non-POSA patients, supporting MADs as a viable treatment for both groups.

Support (if any): American Academy of Dental Sleep Medicine

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0800

NOCTURNAL SLEEP STAGE STABILITY FEATURES IN UNEXPLAINED HYPERSOMNOLENCE

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Introduction: Unexplained hypersomnolence is a common condition, nosologically categorized as hypersomnolence disorder (HD) and idiopathic hypersomnia (IH) by the DSM-5-TR and ICSD-3-TR, respectively. HD and IH are predominantly distinguished by required PSG/MSLT diagnostic criteria for IH. Among persons seeking clinical care, IH constitutes the subset of HD patients that meet objective PSG/MSLT criteria for IH. Sleep stage stability (SSS) methodology is a fine-grained approach to identify abnormalities in sleep architecture dynamics that may be relevant to unexplained hypersomnolence. This study evaluated SSS features in adult HD patients relative to healthy sleeper controls (HSC), and explored differences in SSS features between HD who displayed objective criteria for IH (HD/IH+) and those who did not (HD/IH-).
Methods: Sixty unmedicated HD clinical patients (average age = 28.6 ± 8.6 years; percentage female = 78.3%) were compared against 29 HSC. All participants underwent ad libitum nocturnal PSG and daytime MSLT. SSS features included number of stage bouts, median stage bout duration, number of transitions between stages, and survival analysis of stage bouts. Primary analyses used regression and cox proportional hazards models to compare HD vs HSC. ANCOVA and log-rank tests assessed differences between HSC, HD/IH+ (n=14), and HD/IH- (n=46) across SSS, with subsequent pairwise comparisons performed for outcomes with significant group effects. All analyses accounted for age, sex, body mass index, and depressive symptom severity.
Results: HD consistently displayed enhanced SSS relative to HSC, including significantly longer N2 and REM bouts, fewer transitions from N3 to Wake or N1, and increased survival of N2 and REM bouts. Many phenotypic similarities were observed between HD/IH+ and HD/IH-, though HD/IH+ displayed significantly greater PSG sleep duration and efficiency along with fewer N3 bouts and increased survival of N2 bouts.
Conclusion: Our findings demonstrate enhanced SSS features in adult, unmedicated clinical patients with unexplained hypersomnolence. Follow-up studies are necessary to determine the role of enhanced SSS as a valid, reliable and specific signature of HD and IH. These results may also inform future nosological frameworks that consider unexplained hypersomnolence along a continuum of alterations of sleep architecture and dynamics.
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0801

POLYSOMNOGRAPHIC CHARACTERISTICS DIFFERENTIATING THE CENTRAL DISORDERS OF HYPERSOMNOLENCE

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Introduction: Central Disorders of Hypersomnolence (CDH) are classified primarily by polysomnography-multiple sleep latency test (PSG-MSLT). Lack of biomarkers and variable MSLT results in disorders other than narcolepsy type 1 (NT1) contribute to under- and mis-diagnosis. Limited studies explore PSG characteristics that may differentiate CDH subtypes using large datasets.
Methods: This retrospective cohort included 1,330 patients who underwent PSG-MSLT for hypersomnolence (January 2003-August 2024) at Cleveland Clinic. Cases were classified as NT1, narcolepsy type 2 (NT2), idiopathic hypersomnia (IH) and undifferentiated hypersomnia (UH; not meeting CDH criteria) based on physician clinical diagnosis. 557 patients with disorders associated with hypersomnia (i.e. OSA) were excluded. Demographic and PSG characteristics were compared with ANOVA, Kruskal-Wallis, and Pearson chi-square tests.
Results: Of 773 patients (33.7±14.0 yr, 79.4% female), 72(9.3%) had NT1,121(15.7%) NT2, 296(38.3%) IH, and 284(36.7%) UH. While groups did not differ in age or gender, more Caucasians had IH and UH than NT1(78.6, 80.8 vs. 62.5%, p=0.001). Epworth Sleepiness Scale scores were lower in UH than CDH groups (12.6±5.0 vs NT1-15.9±5.6,NT2-16.1±5.1,IH-14.2±5.2, p< 0.001). Self-reported sleep time was longer for UH than NT2 without other group differences (UH-9.1±2.1,NT2-8.4±1.7,NT1-8.6±2.1,IH-8.8±1.9 hours, p=0.003). PSG sleep onset REM periods (SOREMPs) were more common in NT1 and NT2 than IH and UH (NT1-27.8%,NT2-9.1%,IH-1.01%,UH-1.06%, p< 0.001). NT1 and NT2 had shorter REM latency than IH and UH(NT1-73.5[7.0,123.0],NT2-74.0[53.0,112.0],IH-103.0[71.0,161.5],UH-105.0[74.5,183.0] min, p< 0.001). NT1 and UH showed more wakefulness after sleep onset than NT2 and IH (NT1-43.5[26.0,97.0],UH-47.5[25.5, 85.0],NT2-32.5[17.3,61.5],IH-30.5[17.5, 62.5] min, p< 0.001). Sleep latency was shorter in CDH than UH (NT1-10.8[4.5,26.0],NT2-14.0[6.0,24.5],IH-17.5[7.8,30.5],UH-24.5[12.5,39.0] min, p< 0.001), and sleep efficiency higher in NT2 and IH than UH (NT2-87.4±7.3,IH-86.3±8.8,UH-82.0±10.0, p< 0.001). NT1 had greater, though non-significant, arousal index, stage shifts, and N1 percentage, along with lower sleep efficiency than NT2 and IH. No significant differences were observed between NT2 and IH in sleep latency, sleep efficiency, arousal index, WASO, stage shifts, or stage percentages.
Conclusion: We found significant differences in PSG variables between CDH that confirm and extend prior observations. Minimal differences between NT2 and IH support a common pathophysiology. Recognizing the larger group of UH with distinct PSG features from CDH is important in clinical practice.
Support (if any):

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0802

POLYSOMNOGRAPHIC NON-RAPID EYE MOVEMENT SLEEP BIOMARKERS TO STRATIFY CENTRAL DISORDERS OF HYPERSOMNOLENCE

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Introduction: Central disorders of hypersomnolence (CDH) including narcolepsy and idiopathic hypersomnia are chronic and debilitating conditions characterized by profound daytime sleepiness. However, they are heterogeneous and diagnostic delays of 5 to 10 years are common, exacerbating disease burden. The multiple sleep latency test (MSLT) is commonly used for diagnosis but has poor validity and reliability. There is a critical need for objective biomarkers from standard overnight polysomnograms (PSG) to stratify patients and enhance diagnostic accuracy.
Methods: As part of an ongoing study, we are harmonizing PSGs from CDH cases across multiple cohorts. Here we report results from the initial cohort (Mignot Nature Communications) of 469 CDH cases (including 259 with narcolepsy type 1 (NT1)) and 342 controls. After automated staging, artifact detection and filtering using Luna, we derived macro- and micro-architecture EEG metrics including stage duration/transition, spectral power, spindle and slow oscillation occurrence, morphology and coupling, as well as indices of ultradian dynamics and evaluated group-level differences.
Results: Comparing the two groups (NT1 and other hypersomnolence (OH)) to controls, both exhibited increased sleep time ($p < 0.01$ for all results reported), whereas only NT1 showed increased WASO and sleep fragmentation. Both groups showed reduced REM latency. After excluding individuals with sleep onset REM (< 15 minutes), only OH cases showed reduced REM latency. Quantifying the relative timing of each stage within the sleep period, both groups showed "earlier" N1 but N2/N3 sleep was earlier in NT1 and later in OH. Considering NREM EEG metrics, slow/delta power (and slow oscillation (SO) rate and amplitude) was increased in both groups. Spindles showed qualitatively distinct associations: slow spindles had reduced density in OH and fast spindles were reduced in NT1. In contrast, both NT1 and OH had altered SO/spindle coupling vs. controls.
Conclusion: We observed both shared and unique – or even qualitatively different – PSG alterations in NT1 and OH patients. These group-level effects can inform unbiased clustering of CDH patients and ultimately provide diagnostic alternatives to the MSLT, to predict disease progression, and treatment responsiveness.
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0803

A NOVEL PHENOTYPE OF HYPERSOMNIA IDENTIFIED BY GAMMA BAND SPECTRAL SLOPE DURING MSLT

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Introduction: Hypersomnia is diagnosed using the multiple sleep latency test (MSLT), and sleep latency is determined by visual scoring of electroencephalography (EEG) signals. Recent studies established the gamma-band (30-45 Hz) spectral slope as a novel EEG marker that changes significantly across wakefulness and sleep stages, yet cannot be appreciated in visual scoring. Spectral slope reflects neuronal excitation-inhibition balance; thus, studying how the spectral slope changes during MSLT may provide new insights into the pathophysiology of hypersomnia.
Methods: We retrospectively analyzed 30 MSLTs consecutively conducted in our clinic in one year. For each 30-second epoch, EEG power spectral density was computed using Welch's method, and spectral slope was computed from linear fitting of logarithm of power to logarithm of frequency over 30-45 Hz range. To minimize the effects of artifacts in individual electrodes, the lowest of four spectral slope values for F3-A2, C3-A2, F4-A1, C4-A1 channels was taken for each epoch. Spectral slope was computed for both MSLT and the preceding overnight EEG.
Results: During overnight EEG, most patients (26/30) showed a decrease in 30-45 Hz spectral slope of at least 1.0 unit from awake to stage N2, and MSLT was analyzed only for those patients. During MSLT, the majority of patients (14/26) showed decreases in spectral slope around when sleep occurred, such that sleep latency could be equivalently derived from when the spectral slope decreased. However, 5 patients showed no significant decrease in spectral slope during sleep stages N1 and N2. In the remaining 7 patients, spectral slope was as low as at the level expected for stage N2 sleep at or very shortly after the start of each MSLT nap, even when the patient was still awake based on visual scoring of EEG. Mean sleep latency derived from when the spectral slope decreased during MSLT (less than 2.0 min) was much shorter than that derived from standard visual scoring (range: 3.0-7.6 min).
Conclusion: Among hypersomnia patients, there is a distinctive subgroup in which the EEG's gamma-band spectral slope decreases to the level expected for sleep long before the sleep onset during MSLT. This phenotype of hypersomnia might represent excessive neuronal inhibition during daytime.
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0804

MULTIMODAL DETECTION OF NARCOLEPSY TYPE 1 USING GENETIC AND NOCTURNAL POLYSOMNOGRAPHY DATA

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Introduction: Efficient screening methods with high specificity which can be applied to large sample sizes are needed to improve significantly underdiagnosed people with narcolepsy type 1 (NT1). To address this unmet need, we combined polygenetic risk scores (PRS), HLA typing, and nocturnal polysomnography (PSG) data. These methods are developed and validated using a dataset significantly larger than those used in previous studies, ensuring their reliability and generalizability.
Methods: People with diagnosed narcolepsy were studied across 7 different global locations, involving multiple collaborators (coauthors limited by guidelines). We developed a custom U-Sleep model for variable-resolution sleep staging using electroencephalography, electrooculography, and electromyography data from 19,381 PSG recordings from the National Sleep Research Resource and the Stanford Sleep Clinic. Sleep staging was performed across epochs from 0.25 to 3600 seconds, leveraging novel multiscale transition matrix (MTM) features to capture NT1-specific transitions and overlapping sleep stages. Next, a Gaussian processes classifier was trained on features from 21,846 PSGs across 14 cohorts (NT1: n=327; controls: n=21519) and tested on 634 separate PSGs (NT1: n=317; controls: n=317). An

ensemble model combined multiple time resolutions, weighted by prediction accuracy. Classifier performance was evaluated using 5-fold cross-validation. We developed a multi-information model integrating new PRS scores with HLA DQB1*06:02 typing, where HLA- and PRS+ conditions map to control and NT1 prediction, respectively, with PSG used when neither applies.
Results: Adding PRS to HLA increased the specificity from 81.9% to 100.0%, with a sensitivity of 25.9%, enabling potential screening of NT1 using genetics alone. When combining PSG with HLA, our approach yielded 99.4% specificity and 94.6% sensitivity, surpassing State-of-the-Art (SOTA). Adding PRS further rescued HLA+ cases missed based off PSG, and increased sensitivity to 95.9% while maintaining 99.4% specificity. MTM features meaningfully boosted classification performance (approximately 1% gain) compared to SOTA features, which themselves significantly outperformed standard clinical PSG measures. Ensemble models showed that combining multiple resolutions improved performance, notably specificity. Additionally, post-hoc analyses show that genetic information noticeably improved model robustness.
Conclusion: These findings suggest that the proposed multimodal model is a robust framework for NT1 classification, providing more specific and sensitive screening methods.
Support (if any): Funded by Takeda Development Center Americas, Inc.

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0805

THE CLINICAL AND HUMANISTIC BURDEN OF NARCOLEPSY: MATCHED ANALYSIS OF US NATIONAL HEALTH AND WELLNESS SURVEY DATA

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Introduction: Narcolepsy is a chronic neurological disorder that causes debilitating daytime sleepiness among other symptoms. This study compared clinical and humanistic outcomes between those with and without narcolepsy to characterize the extent of disease burden.
Methods: This study was a retrospective, cross-sectional analysis of 2021/2023 US National Health and Wellness Survey data. The narcolepsy cohort included those who reported a physician diagnosis of narcolepsy. Propensity-score matching (1:3) adjusted for demographic/health characteristics between those with and without narcolepsy (controls). Chi-square tests and t-tests compared comorbidities, symptoms of depression and anxiety, and health-related quality of life (HRQoL) between groups.
Results: Before matching, respondents with narcolepsy (n=335; female=56%; mean age, 45.5 years; White=68%) and without narcolepsy (n=141,072; female=55%; mean age, 47.8 years; White=72%) were included. Additionally, the narcolepsy cohort had higher mean [SD] body mass index (30.1 [8.4] vs 27.6 [7.1], p<.001) and were more likely to have obesity (44% vs 28%, p<.001) and be current smokers (25% vs 17%, p<.001) than those without narcolepsy. After matching, the narcolepsy cohort reported more frequent physician-diagnosed psychiatric comorbidities vs controls, including depression (58% vs 32%, p<.001), anxiety (54% vs 33%, p<.001), and ADHD (20% vs 6%, p<.001). The narcolepsy cohort had higher reporting of moderate-to-severe depression symptoms via Patient Health Questionnaire-9 (52% vs 33%, p<.001) and moderate-to-severe anxiety via Generalized Anxiety Disorder Questionnaire-7 (41% vs 26%, p<.001). On the Brief Resilience Scale, more respondents with narcolepsy reported low resiliency scale score vs controls (43% vs 28%, p<.001). Compared with controls, the narcolepsy cohort scored lower on HRQoL measures, including mean [SD] mental health composite (32.8 [11.3] vs 40.6 [12.6], p<.001) and physical health composite (35.7 [11.4] vs 42.9 [11.6], p<.001) scores of the RAND 36-Item Health Survey. The narcolepsy cohort reported greater impairment of daily activities vs controls (51% vs 34%, p<.001).
Conclusion: Narcolepsy is associated with broad clinical and humanistic burden. Those with narcolepsy had more frequent psychiatric comorbidities, more severe depression and anxiety symptoms, less self-reported resiliency, and lower HRQoL. Future strategies should focus on comprehensive management that prioritizes mental health, while investigating new treatments that may improve HRQoL for narcolepsy patients.
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0806

THE ECONOMIC BURDEN OF NARCOLEPSY: MATCHED ANALYSIS OF US NATIONAL HEALTH AND WELLNESS SURVEY DATA

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Introduction: Narcolepsy is a chronic neurological disorder that typically begins in childhood or young adulthood. This study compared economic outcomes between those with and without narcolepsy to characterize personal and societal financial burden associated with this rare condition.
Methods: This study was a retrospective, cross-sectional analysis of 2021/2023 US National Health and Wellness Survey data. The narcolepsy cohort had a self-reported physician diagnosis of narcolepsy. Propensity-score matching (1:3) adjusted for demographic/health characteristics between those with and without narcolepsy (controls). Chi-square tests and t-tests compared economic outcomes between groups (eg, healthcare resource use, work impairment, medical and indirect costs).
Results: Before matching, respondents with narcolepsy (n=335; female=56%; mean age, 45.5y; White=68%) and without narcolepsy (n=141,072; female=55%; mean age, 47.8y; White=72%) were included. The narcolepsy cohort had lower socioeconomic status vs those without: less likely to receive college degree (45% vs 52%, p<.05), less likely to be employed full-time (36% vs 46%, p<.001), more likely to receive disability (10% vs 3%, p<.001), more likely to have <$25,000 annual household income (22% vs 12%, p<.001), and more likely to report food insecurity (39% vs 18%, p<.001). After matching, the narcolepsy cohort reported significantly more outpatient visits vs controls (11.6 vs 6.2 average visits during prior 6 months, p<.001), including more visits to neurologists, psychiatrists, and pulmonologists (all p<.001). The narcolepsy cohort reported significantly higher hospitalizations (≥1 visits; 27% vs 16%, p<.001) and emergency department visits (≥1 visits; 31% vs 22%, p<.01) during prior 6 months vs controls. Those with narcolepsy had an additional $14,492 per-person-per-year in medical expenses (average annual medical costs: $37,815 vs $23,323, p<.001). Of those employed, the

narcolepsy cohort reported significantly higher levels of work-related impairment vs controls, including absenteeism (21% vs 12%, p<.001) and presenteeism (44% vs 29%, p<.001). The narcolepsy cohort had an additional $12,853 per-person-per-year in lost wages to employers (average annual indirect costs: $30,075 vs $17,222, p<.001).
Conclusion: Narcolepsy is associated with reduced socioeconomic outcomes. Those with narcolepsy had greater annual medical and indirect costs than controls. Research should assess how psychosocial supports and treatments may improve healthcare utilization and overall financial burden among those living with narcolepsy.
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0807
CENTRAL DISORDERS OF HYPERSOMNOLENCE IN MAJOR DEPRESSIVE DISORDER

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Introduction: Central disorders of hypersomnia (CDH), characterized by excessive daytime sleepiness, frequently overlap with major depressive disorder (MDD), complicating diagnosis and treatment. Understanding the prevalence of CDH in MDD is crucial for enhancing diagnostic accuracy and optimizing treatment strategies. This systematic review and meta-analysis aimed to estimate the pooled prevalence of CDH in MDD patients and explore variations based on demographic, geographic, and methodological factors.
Methods: A comprehensive search of PubMed, Embase, Cochrane Library, PsycINFO, and CINAHL was conducted to identify observational studies reporting CDH prevalence in MDD patients. Eligible studies were assessed for quality using the Newcastle-Ottawa Scale. Data were extracted systematically, and a random-effects model was employed to calculate pooled prevalence and explore heterogeneity. Subgroup analyses were conducted by age, gender, diagnostic criteria, geographic region, and study type. Publication bias was evaluated using funnel plots and Egger's test, with trim-and-fill adjustments applied.
Results: Twelve studies met inclusion criteria, comprising a total of 71,633 MDD patients. The pooled prevalence of CDH was 20.23% (95% CI: 7.31%–44.93%), increasing to 30.17% (95% CI: 18.24%–42.09%) after accounting for publication bias. Subgroup analyses revealed the highest prevalence among adolescents (34.2%, 95% CI: 24.1%–44.3%), followed by adults (23.5%, 95% CI: 15.0%–32.0%), and older adults (10.3%, 95% CI: 4.5%–16.1%). Gender-based analyses indicated slightly higher prevalence among males (31.8%, 95% CI: 19.2%–47.8%) compared to females (30.5%, 95% CI: 15.9%–50.6%), although overlapping confidence intervals suggest these differences are not statistically significant. Geographic variations showed the highest rates in Asia (24.7%, 95% CI: 16.4%–33.0%) and Europe (21.8%, 95% CI: 13.1%–30.5%). Diagnostic criteria analysis revealed slightly higher prevalence in studies using DSM-V (22.7%, 95% CI: 14.1%–31.3%) compared to DSM-IV (19.5%, 95% CI: 12.0%–27.0%). Funnel plots indicated potential publication bias, and sensitivity analyses confirmed the robustness of the findings.
Conclusion: CDH is highly prevalent in MDD patients, with significant variations across demographic and methodological subgroups. These findings underscore the importance of routine sleep assessments in MDD management and highlight the need for integrated diagnostic and treatment approaches. Future research should focus on elucidating causal relationships and addressing gaps in underrepresented populations to improve care for patients with comorbid CDH and MDD.
Support (if any):

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0808
DESCRIBING THE HEALTHCARE PROVIDERS OF PATIENTS WITH NARCOLEPSY OR IDIOPATHIC HYPERSOMNIA IN US CLINICAL PRACTICE

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Introduction: Narcolepsy and idiopathic hypersomnia (IH) are rare central disorders of hypersomnolence associated with diagnostic delays, comorbidities, and disease burden. Understanding how healthcare providers (HCPs) diagnose and treat these patients could help inform effective diagnostic and management strategies. We described the HCP specialties who managed people with narcolepsy or IH in the real-world clinical practice in the US.
Methods: The study identified a cohort of individuals with a diagnosis of narcolepsy or IH from Optum's Market Clarity integrated claims and electronic healthcare record database from January 01, 2014 to December 31, 2021, and the HCPs who managed them over a 12-month observation period. HCP encounters, dispensings of narcolepsy-specific medications (oxybates or Wakix), and sleep evaluations were described by HCP specialty. Evaluations included any polysomnography, multiple sleep latency test, or orexin-A/hypocretin-1; and human leukocyte antigen or lumbar puncture testing on claims with narcolepsy/IH diagnoses. A sample of 1,000 HCPs from narcolepsy/IH-related claims were further characterized by linked data of their patient encounters over a year to examine diagnoses, medications, and other evaluations.
Results: Overall, 68,328 individuals qualified for the study (10,054,075 encounters with 506,236 HCPs over 12-month observation period). 378,994 of the medical claims included any diagnoses of narcolepsy/IH, and 70,473 were for narcolepsy/IH as primary diagnoses. 12.1% of overall HCP encounters were with internal medicine, and 11.5% were with primary care. Sleep specialists, neurologists, and pulmonologists accounted for 0.2%, 2.2%, and 1.5%, respectively. Patients on narcolepsy/IH medical claims accounted for a median of 2% of all patients with medical claims among sleep specialists (increased to 5% for 75th percentile and to 10% for 90th percentile). Prescribers of narcolepsy medication followed a similar pattern with overall higher proportions of narcolepsy/IH patients (median of 3%; 75th percentile of 6%). Over 80% of sleep specialists did not prescribe any narcolepsy-specific medications.
Conclusion: In this large real-world US population, people with a diagnosis of narcolepsy or IH constitute a very small component of the overall HCP patient clinical cohort, even among sleep specialists. Specialists who manage a larger number of patients with narcolepsy/IH more commonly prescribe narcolepsy-specific medication.
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0809

EFFECT OF NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA ON RELATIONSHIPS: A SOCIAL MEDIA ANALYSIS

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Introduction: Central disorders of hypersomnolence, such as narcolepsy and idiopathic hypersomnia (IH), contribute to quality-of-life challenges, including entering or maintaining relationships. A social listening analysis was conducted to characterize the emotions and effects of narcolepsy and IH on romantic/social partners.

Methods: This social listening analysis used natural language processing and other statistical techniques to analyze 447,347 posts and comments shared (August 2011 to September 2024) from 2 subreddits (r/Narcolepsy and r/idiopathichypersomnia) and the PWN4PWN Facebook group. The process used an Attributes of Daily Living (ADL) model to identify sleeping paragraphs and a span recognition model to filter paragraphs with spans labeled "relationship."

Results: A total of 227,276 paragraphs that discussed sleeping were identified by the ADL model; of these, 8,871 (3.9%) also mentioned a partner. Across all conversations that mentioned both sleeping and a partner, the most common topics identified were sleep medication usage, narcolepsy journey, Xyrem/Xywav, falling asleep, medical diagnosis journey, and vivid dreaming. Of the most common sleep-related clinical topics identified, nighttime sleep disruptions were more likely to co-occur with the mention of a partner (OR [95% CI]; bad dreams, 2.8 [1.6-4.8]; night terrors, 2.2 [1.7-2.9]; rapid eye movement behavior disorder, 2.0 [1.3-3.0]; nightmares, 1.8 [1.5-2.1]; vivid dreams 1.4 [1.1-1.7]). The primary emotions expressed in paragraphs mentioning both sleep and a partner were fear (28.2%), anger (23.2%), and happiness (22.8%). In conversations that mentioned both sleep and a partner, the most associated sleep-related clinical topic and emotion (standardized pointwise mutual information squared [PMI2]) were sleep paralysis and fear (3.0). In paragraphs that discussed sleep and a partner, naps were associated with multiple emotions including frustration (2.6), love (2.5), anger (2.2), annoyance (1.7), and worry (1.6); sleepiness was associated with anger (1.9) and frustration (1.9); nightmares and night terrors were associated with fear (1.9 and 1.8, respectively).

Conclusion: These data suggest that nighttime sleep symptoms, including parasomnias, may be a source of concern within relationships of people with narcolepsy or IH. Sleepiness and bed sharing with a partner with narcolepsy or IH may cause relationship tension given the strong association with emotions with a negative connotation, such as anger and frustration.

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0810

MODELLING KEY DRIVERS OF INCREASED COSTS AND MORTALITY IN NARCOLEPSY

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Introduction: While increased costs and mortality in people with narcolepsy are well-established, the underlying drivers of these outcomes remain underexplored. This study aimed to identify and quantify the probable causes of elevated direct costs, indirect costs, and mortality in people with narcolepsy versus controls.

Methods: We reviewed patient-reported consequences of narcolepsy, focusing on those impacting healthcare resource use, productivity, and mortality. Costs, mortality, and prevalence of each impact in the US general population were obtained from nationally representative data. Systematic and targeted literature reviews identified odds ratios for each impact in people with narcolepsy versus controls, selecting values from the most representative and rigorous studies. Few studies provided separate odds ratios for narcolepsy type 1 and type 2 compared with controls, and those that did generally reported no significant differences between the types. A model was developed to deterministically calculate average age-adjusted costs and mortality for an individual with narcolepsy compared with a control. Treatment-related costs were excluded.

Results: The annual incremental cost of narcolepsy was $18,735 (2024 US Dollars) per person. The largest contributor was productivity loss ($8,645/year), followed by healthcare costs associated with non-vehicular accidental injuries ($2,480/year), cardiovascular disease and events ($2,310/year), depression and anxiety ($2,110/year), headaches/migraines ($1,620/year), suicidal thinking and behavior ($1,050/year), and motor vehicle accidents ($520/year). Fatal cardiovascular events, non-vehicular accidental injuries, motor vehicle accidents, and suicide resulted in a 40% greater risk of mortality for people with narcolepsy compared with controls (average lifetime hazard ratio 1.4).

Conclusion: This study is the first to quantify increased costs and excess mortality in people with narcolepsy based on their probable causes. Our model results align with annual costs and mortality hazard ratios reported in previous database studies, while providing deeper insight into the specific contributors to narcolepsy's economic burden. Identifying the most costly and fatal aspects of narcolepsy is a critical step towards assessing the value of treatments that reduce these impacts. Understanding the cost of illness and mortality also helps inform policymakers about the severity and unmet needs of this underappreciated yet devastating disease.

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0811

CHARACTERIZING PATIENT-REPORTED COGNITIVE SYMPTOMS AND THEIR IMPACT ON DAILY LIFE IN NARCOLEPSY TYPE 1

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Introduction: Narcolepsy type 1 (NT1) is a chronic, rare neurological disorder with a significant impact on daily life. It is characterized by a pentad of symptoms including excessive daytime sleepiness (EDS), cataplexy, disrupted nighttime sleep, hypnagogic and hypnopompic hallucinations, and sleep paralysis. Cognitive symptoms associated with narcolepsy are understudied in NT1 but have substantial impacts on daily life. This study investigated the nature of cognitive symptoms experienced by adults with NT1 and the impact on daily life using semi-structured interviews.
Methods: In-depth, qualitative interviews were conducted with adults diagnosed with NT1 in the USA. Participants were recruited through 1) a patient advocacy organization (via social media and the organization's website); 2) a professional market research organization; and 3) participant referrals. Individual interviews were conducted by telephone, followed a semi-structured guide and lasted ~90 minutes. The qualitative analysis was informed by an adapted grounded theory approach. Analyses identified key conceptual themes related to cognitive symptoms associated with NT1 in adults and their consequences for daily life.
Results: Of the 46 participants, 45 (98%) reported cognitive symptoms, with the most common being trouble remembering (89%, n=41) and difficulty with focus/sustained attention (87%, n=40). Most participants characterized cognitive symptoms as severe or moderate (79%, n=33/42) and reported symptoms occurring daily (73%, n=30/41). Of participants who rated the current impact of cognitive symptoms on their functioning/daily life, two-thirds (67%, n=22/33) reported that cognitive symptoms had a severe or moderate impact. Notably, 12/45 (27%) participants reported no improvement and 29/45 (64%) reported incomplete resolution of cognitive symptoms following drug treatments for NT1 symptoms, including EDS; 4/45 (9%) participants did not provide a response.
Conclusion: This investigation showed that cognitive symptoms among adults with NT1 are frequent, severe, and interfere with daily life activities. As such, the current pentad of narcolepsy symptoms represents an incomplete clinical picture. These findings suggest that cognitive symptoms should be considered a core feature of the disease. In many participants, cognitive symptoms persisted despite treatment. These data highlight a clear unmet need to assess cognitive function in people with NT1 and identify treatments that address NT1-associated cognitive symptoms.
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0812

USE OF THE PSYCHOMOTOR VIGILANCE TEST IN CLINICAL TRIALS OF CNS-ACTIVE DRUGS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: People with central disorders of hypersomnolence (CDH) experience difficulties with sustained attention and associated difficulties in daily living. The Psychomotor Vigilance Test (PVT) is used widely to measure impairment in attention arising from disruption to sleep in healthy adults and in individuals with sleep/wake disorders. The PVT is therefore useful and relevant as an outcome for clinical trials of medicines designed to treat disorders in which there is a disruption to attentional processes, such as CDH. Interpretation of PVT clinical trial data for new medicines would be improved by the presence of a framework that aggregates the nature and magnitude of performance changes on the PVT in response to drugs that either depress or activate the central nervous system (CNS). We reviewed studies using PVT to assess the effects of CNS-active compounds on sustained attention in clinical trials, focusing on its utility in determining treatment efficacy and safety.
Methods: A systematic review and meta-analysis of 77 clinical trials that included the PVT as an outcome measure was conducted. These trials were conducted on healthy adults with and without sleep disruption, and in adults with diagnosed sleep disorders. Data were extracted from studies conducted after 2000, including placebo-controlled and experimental trials with CNS-active drugs.
Results: Among the 77 trials investigated, 84% (n=65) used PVT reaction time (RT) and 74% (n=57) used PVT lapses in attention (RT >500 ms) as the main outcome measures. Adults with sleep disorders showed significant impairment in both outcome measures compared with healthy adults. Sedative drugs increased lapses, while CNS-activating drugs improved both RT and lapses. Benchmark interventions, including modafinil and sleep deprivation, produced clinically meaningful changes in reaction time (≥38.4 ms) and lapses (≥3).
Conclusion: The PVT has been used widely to assess the effects of CNS-active compounds on sustained attention. Its ability to measure response speed and lapses in attention makes it valuable for evaluating drug effects on sustained attention, especially in CDH populations. The PVT's predictive validity and broad use across pharmaceutical, academic, and military trials underscores its importance in drug development and safety monitoring.
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0813

CLINICAL AND POLYSOMNOGRAPHIC CHARACTERISTICS OF PATIENTS WITH IDIOPATHIC HYPERSOMNIA AND MAJOR DEPRESSIVE DISORDER

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Introduction: Idiopathic hypersomnia (IH) presents with debilitating daytime sleepiness. The pathophysiology of IH is poorly understood and there is lack of data concerning thoroughly documented comorbidities such as major depressive disorder (MDD), coupled with polysomnography (PSG) and multiple sleep latency test (MSLT) findings. We aimed to characterize clinical and PSG/MSLT characteristics of IH patients with and without MDD, seen within the Lehigh Valley Health Network.
Methods: We performed a chart review of all IH cases seen between 2000 and 2022, extracting presenting clinical features, comorbidities, PSG and MSLT findings. Descriptive statistics were generated for the entire sample and bivariate analyses were conducted to highlight differences between patients with MDD compared to those without.

Results: We included 142 patients diagnosed with IH, based on the International Classification of Sleep Disorders-3 criteria. Age at onset was 25.33±7.93 years and 119 (83.80%) were female. Average Epworth Sleepiness Scale (ESS) was 16.77±2.92. The most common presenting symptoms were sleep inertia [68(47.89%)], non-refreshing naps [48 (33.8%)], disrupted sleep [36(25.35%)]. MDD was the most frequent mood disorder [77(54.23%)]. Compared to patients without MDD, MDD patients had older age at onset (27.10±8.32 versus 23.23±6.94 years; p=0.003), lower ESS (15 versus 19; p< 0.0001), reported more frequently distrupted sleep [28(36.36%) versus 8(12.31%); 0.001], less non-refreshing naps [16(20.78%) versus 32(49.23%); p< 0.001] and less sleep inertia [30(38.96%) versus 38(58.46%); p=0.02]. Review of overnight PSG data among the whole cohort showed a median sleep efficiency of 90% (IQR:86%-95%), sleep latency of 13.50 minutes (IQR:6-33), REM latency of 122.5 minutes (IQR:79.50-183.50). On MSLT, average sleep latency was 5.21±2.08 minutes. Only 23 (16.20%) patients had sleep onset REM periods (SOREMP) on MSLT. Fewer patients with MDD [7 (9.09%)] had SOREMPs compared to patients without MDD [(16 (24.62%)] (p=0.0124). MDD patients had longer sleep latency [15.50 (7-36.50) versus 9.50 (4-22.50) minutes; p=0.002].
Conclusion: Our study highlights significant clinical and polysomnographic differences in IH patients with and without MDD. These findings underscore the importance of recognizing MDD as a comorbidity in IH, as it may influence clinical presentation and diagnostic features. Further research may elucidate underlying mechanisms and optimize management strategies for this subset of patients.
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0814

POSTURAL ORTHOSTATIC TACHYCARDIA SYNDROME, HYPERMOBILITY, AND HYPERSOMNIA: CHARACTERIZING AN EMERGING PHENOTYPE

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Introduction: Hypermobility syndromes (including Ehlers-Danlos [EhD]) and postural orthostatic tachycardia syndrome (POTS) have each been associated with sleep disorders, as well as each other. We aimed to characterize the association of these diagnoses with hypersomnia as well as an overlap phenotype in which all three are present using a large, national electronic health record (EHR) database.
Methods: We queried the TriNetX U.S. Collaborative Network, an EHR and claims-derived database of >120 million patients from 69 healthcare organizations in the US. We searched for patients with diagnoses of either EhD (ICD-10-CM Q79.6) or hypermobility syndrome (M35.7) as well as POTS (G90.A) and hypersomnia (G47.1). We then utilized a commonplace index event (encounter for immunization, Z23) between 10/2015 – 10/2024 in patients with and without EhD/hypermobility and POTS to examine the risk of being diagnosed subsequently with hypersomnia, repeating this analysis after incorporating demographics into a 1:1 propensity matched model.
Results: There were 146,306 patients with a diagnosis of EhD/hypermobility, 75,366 with POTS, and 717,206 with hypersomnia within the dataset. Hypersomnia was associated with both EhD/hypermobility (4.9% prevalence vs 0.6% in non-EhD/hypermobility patients, X2 = 45,697, p< 0.001) and POTS (6.0% vs 0.6%, X2 = 36,719, p< 0.001), and there were 1,584 patients with all three diagnoses. This overlap population is 92% female and 86% Caucasian, with a mean age of 33 (SD 11, range 7–85). Using a commonplace index event (overall N = 15,219,962) and after propensity matching, EhD/hypermobility represented a significant risk for subsequent hypersomnia (RR 4.2, CI 3.8–4.7) and POTS (RR 63.4, CI 48.3–83.1), while POTS represented a significant risk for subsequent hypersomnia diagnosis (RR 3.7, CI 3.2–4.3) and EhD/hypermobility (RR 55.4, CI 42.4–72.4); all p< 0.001. The presence of EhD/hypermobility and POTS combined was associated with hypersomnia after matching (RR 6.5, CI 4.8–9.0, p< 0.001).
Conclusion: Our findings showed significant overlap between EhD/hypermobility and POTS diagnoses and hypersomnia, with the combination of both being more strongly associated with a future diagnosis of hypersomnia than either alone. This supports the hypothesis of a common disease entity, the characterization of which demands further study.
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0815

THE DIAGNOSTIC AND THERAPEUTIC VALUE OF TIME IN BED EXTENSION IN INSUFFICIENT SLEEP SYNDROME

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Introduction: Insufficient sleep syndrome (ISS) represents an emerging health concern but remains poorly defined as a diagnostic entity. In the present study, we aimed to clarify the longitudinal course of ISS and to identify prognostic factors by comparing remitting and non-remitting patients.
Methods: Fifty-five patients with ISS underwent a comprehensive clinical evaluation at baseline and during a follow-up visit. This evaluation included sleep symptoms, sleep logs, medications, and comorbidities. Additionally, actigraphy, video-polysomnography, and a multiple sleep latency test were conducted at baseline.
Results: During the follow-up visit, 69% of patients still met the criteria for a clinical diagnosis of ISS, experiencing symptoms such as daytime sleepiness, disrupted nighttime sleep, unrefreshing sleep, and sleep attacks. Comparing sleep patterns of remitters and non-remitters based on sleep diaries, we observed that remission is associated with not only an increase in total sleep time but also a more regular sleep schedule. This regularity includes a reduction in napping and a lesser difference in sleep timings between weekdays and weekends. However, comparing baseline clinical and instrumental data between remitters and non-remitters revealed no significant differences, hindering the use of these features as prognostic factors.
Conclusion: Given the low remission rate with standard treatment, we propose the following: (1) Criterion E (extension of total sleep time results in resolution of the symptoms of sleepiness) should be considered supportive rather than necessary; and (2) specific cognitive-behavioral therapy protocols targeting the cognitive factors underlying sleep-depriving behaviors are required, as single routine behavioral interventions are insufficient.
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0816

IMPACT OF AGE AT NARCOLEPSY ONSET ON SLEEP-ONSET REM PERIODS IN THE MULTIPLE SLEEP LATENCY TEST

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Introduction: This study aimed to investigate the effect of age at onset on the clinical characteristics and multiple sleep latency test (MSLT) findings in patients with narcolepsy.
Methods: We recruited 135 patients with narcolepsy who underwent MSLT and fulfilled the diagnostic criteria for narcolepsy type 1 (NT1) or type 2 (NT2). The age at onset of narcolepsy was defined as the age at which either excessive daytime sleepiness or cataplexy first occurred. We compared the clinical, PSG, and MSLT findings between the early- and late-onset groups. Correlation and multiple linear regression analyses were used to determine the effect of age at onset as a continuous variable. We also performed survival analyses to confirm the effect of age at onset on MSLT parameters. Statistical significance was defined as a two-tailed P-value of < 0.05.
Results: The mean age at onset was 18.3 ± 8.8 years and 79 (58.5%) patients were female. Seventy (51.9%) patients were diagnosed with NT1 and 65 (48.1%) were diagnosed with NT2. Patients with early onset had a higher rate of sleep-onset rapid eye movement periods (SOREMPs) than those with late onset in the first nap of the MSLT (81.9% vs. 63.3%, P = 0.031). However, the clinical symptoms of narcolepsy did not differ between the two age groups. In multiple linear regression analysis, age at onset was significantly associated with MSLT REM sleep latency (β = 0.057, 95% confidence interval [CI] 0.011-0.103, P = 0.015) after adjusting for covariates. Survival analysis confirmed that the early onset of narcolepsy (hazard ratio 2.340, 95% CI 1.396-3.920, P = 0.001) was associated with a higher probability of SOREMPs in the first nap trial of MSLT.
Conclusion: Younger age at the onset of narcolepsy was associated with shorter REM sleep latency and higher SOREMP probability on the MSLT. Furthermore, the effect of age at narcolepsy onset on the incidence of SOREMPs was most pronounced during the first nap of MSLT. Our results suggest that early onset of narcolepsy may be associated with great disease severity, specifically related to REM sleep dysregulation.
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0817

INCREASED SLEEP PROPENSITY WITHOUT A COMPLAINT OF EXCESSIVE DAYTIME SLEEPINESS IS PROTECTIVE OF INCIDENT HYPERTENSION

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Introduction: Pathological sleepiness has been associated with significant medical morbidity in clinical samples. We have previously shown that physiological sleepiness (i.e., objective short sleep latencies) in otherwise healthy individuals is not associated with cardiovascular risks. The aim of this study was to examine whether physiological sleepiness in individuals without a complaint of excessive daytime sleepiness (EDS) is protective of incident hypertension.
Methods: From a random, general population sample of 1741 adults of the Penn State Cohort, 1395 were followed-up after 7.5 years and 659 (55% women, aged 49.72± 13.08) have neither hypertension nor complaint for EDS at baseline. All subjects underwent 8-hour polysomnography. Based on previous studies, physiological sleepiness was defined as a sleep latency (SL) ≤ 7 minutes. Hypertension was determined by a self-report of receiving treatment for high blood pressure. EDS was defined as the absence of a report of moderate-to-severe daytime sleepiness/drowsiness and/or irresistible sleep attacks. Binary logistic regression was performed while controlling for age, BMI, sex, race, smoking, alcohol use, caffeine use, diabetes, depression, total sleep time, wake time after sleep onset, OSA, follow-up duration and sampling weight.
Results: The incidence of hypertension was significantly lower in subjects with short SL (i.e., ≤ 7 minutes; 8.8%) as compared to those with intermediate SL (i.e., 8-30 minutes; 17.3%) and long SL (i.e., ≥ 30 minutes; 19.1%), respectively (both $p< 0.05$). There was a negative association between short sleep latency and incident hypertension after controlling for age, BMI, sex, race, smoking, alcohol use, caffeine use, diabetes, depression, total sleep time, wake time after sleep onset, OSA, follow-up duration and sampling weight. (OR=0.45; 95%CI=0.24-0.86; p=0.02).
Conclusion: This study confirms and expands our previous findings that physiologically sleepy individuals without a complaint of excessive daytime sleepiness are protected of hypertension risk. It appears that asymptomatic increased sleep propensity is not perceived as stressful or interfering with subjects' daily function and possibly is associated with lower activity of the stress system (i.e., sympathetic system and HPA axis). Additional studies are needed to explore further the psychological and physiological profile of these individuals.
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0818

DISCREPANCY BETWEEN CLINICAL PHENOTYPING AND ICSD-3 CRITERIA CONTRIBUTES TO MISDIAGNOSIS IN CENTRAL DISORDERS OF HYPERSOMNOLENCE

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Introduction: Central Disorders of Hypersomnolence (CDH) are classified primarily by polysomnography-multiple sleep latency test (PSG-MSLT). Lack of biomarkers, variable MSLT results in disorders other than narcolepsy type 1 (NT1) and inaccessibility of 24-hr PSG and actigraphy in most U.S. sleep centers contribute to misdiagnoses. We compared CDH diagnoses by sleep expert clinical phenotyping and ICSD-3 criteria to estimate the magnitude of potential misdiagnosis in a U.S. quaternary care sleep center.
Methods: This retrospective study included patients evaluated for hypersomnolence at Cleveland Clinic (January 2003

- August 2024). Patient with a clinical diagnosis of NT1, NT2, and IH based on sleep physician clinical history were included. ICSD-3 diagnoses were based on PSG/MSLT SOREMPs and MSLT mean sleep latency (MSL): narcolepsy: MSL< 8 min + >2SOREMPs; IH: MSL< 8 min + < 2SOREMPs. Those not meeting ICSD-3 criteria were considered undiagnosed. ICSD-3 diagnoses were analyzed between clinical groups using ANOVA, Kruskal-Wallis, and Pearson chi-square tests, followed by pairwise comparisons.

Results: Of 489 patients (33.6±13.6 yrs, 78.7% female), 72(14.7%) had NT1, 121(24.7%) NT2, and 296(60.5%) IH. More NT1 and NT2 patients had >2 SOREMPs than IH (NT1-81.9%, NT2-71.1%, IH-12.4%, p< 0.001). MSL was longer in IH than narcolepsy (IH-8.1±4., NT1-4.9±3.8, NT2-5.4±3.2 min, p< 0.001). Percentage agreement between ICSD-3 and clinical diagnoses was 100% for NT1, but lower for NT2 and IH (NT2-61.2%,IH-58.1%, p< 0.001). Among clinical NT1, 26.4% did not meet PSG-MSLT criteria. Among clinical NT2, 38.9% had different ICSD-3 diagnoses: 24% reclassified as IH and 14.9% were undiagnosed. Among clinical IH, 41.9% had different ICSD-3 diagnosis: 0.6% reclassified as NT2 and 41.2% were undiagnosed. Overall, 28.6% of CDH patients diagnosed based on clinical criteria were not diagnosed as CDH by ICSD-3 criteria due to lack of sleep laboratory findings.

Conclusion: This study showed diagnostic discrepancies between clinical phenotyping and ICSD-3 criteria for NT2 and IH, while NT1 diagnoses aligned. Over a quarter of clinically diagnosed patients remained undiagnosed by ICSD-3 criteria. These findings illustrate limitations of current diagnostic criteria and the need for to improve diagnostic accuracy in the evaluation of CDH.

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0819

INSIGHTS FROM PHYSICIAN NOTES INTO MANAGEMENT OF PATIENTS WITH NARCOLEPSY TYPE 2 AND IDIOPATHIC HYPERSOMNIA (IH)

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Introduction: Narcolepsy and idiopathic hypersomnia (IH) are associated with diagnostic delays, comorbidities, and disease burden. Understanding how healthcare providers diagnose and treat patients could inform more timely and effective strategies for diagnosis and patient management. This study utilized physician-recorded electronic health record (EHR) clinical notes linked to claims data to understand patient management, symptoms and concerns, clinical features, and diagnostic journey of patients with narcolepsy type 2 (NT2) or IH in a large real-world US population.

Methods: Medical notes (n=400) for 70 patients sampled from a large cohort (n=51,548 patients) diagnosed with NT2 or IH were qualitatively reviewed utilizing Optum's Market Clarity integrated claims and EHR database based on data from January 01, 2014, to December 31, 2021. A grounded theory qualitative methodology has been applied to develop a schema of clinical terms and concepts and to summarize the frequencies of clinical terms. Classification categories included symptoms, diagnosis, testing and procedures, treatments, comorbidities, non-pharmacological management, and social/family/work factors. Patient narratives were described. Results were contextualized in the larger population.

Results: Patients median age was 39 years and 81% were female. Narcolepsy/IH-specific symptoms were documented for 70% of patients (excessive daytime sleepiness: 59%, disturbed nighttime sleep: 37%); 84% reported narcolepsy/IH-related symptoms (most commonly depression: 51% and anxiety: 46%), and 94% reported symptoms of any kind. Diagnostic/sleep evaluations were reported for 49% of patients, most commonly the multiple sleep latency test (36%) or polysomnography (30%). Treatments were recorded for 83% of patients; 77% with any narcolepsy-specific treatment (modafinil [31%], amphetamine-dextroamphetamine [26%], armodafinil [24%], methylphenidate HCI [20%], and oxybates [11%]); 53% with non-pharmacological measures, including exercise (30%), sleep hygiene (24%), weight management (23%), caffeine use (23%), and dietary management (21%). Social/family/work factors were rarely documented (overall: 16%, work productivity loss: 11%, and social support ≤4%), but documented more often for patients with treatment changes (overall: 26%; work productivity loss: 19%).

Conclusion: Physician notes of patients with NT2/IH inconsistently reported symptoms, diagnostic evaluations and treatments. Social/family/work factors were rarely reported. These findings are indicative of under-recognition of the full NT2/IH patient burden and highlight the need for improved patient management.

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0820

CORRELATION BETWEEN EPWORTH SLEEPINESS SCALE SCORES AND MEAN SLEEP LATENCIES: A MULTIPLE PATHOLOGY CROSS-SECTIONAL ANALYSIS

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Introduction: The correlation between the Epworth Sleepiness Scale (ESS) and mean sleep latency (MSL) on a Multiple Sleep Latency Test (MSLT) has been the subject of extensive research in sleep medicine. Higher ESS scores are often associated with shorter sleep latencies on MSLT. However, this finding has not been consistent in all clinical contexts. We performed a cross-sectional analysis of MSLT studies, testing this correlation while taking into consideration different final sleep diagnoses.

Methods: MSLTs performed at Memorial Hermann Sleep Disorders Center at Texas Medical Center between November 2020 and November 2024 were reviewed. Exclusion criteria included insufficient polysomnographic data quality or unavailable final report. Demographic and polysomnographic data were collected to include the MSLT findings and documentation of the final diagnosis. A correlation between the ESS scores and the MSLs was made with linear regression analysis (using a 95% confidence interval), first as an entire group followed by only those studies that met the criteria for narcolepsy (type 1 or 2).

Results: 33 studies were identified, and 22 studies were included for analysis. The average age was 25.7 years (SD +/- 11.4), comprising 23% males and 77% females. The average ESS score was 15.4 (SD +/- 4.9) and the average sleep time on the overnight PSG was 422 minutes (SD +/- 61.4). The prevalence of narcolepsy was 23%. The R2 value when comparing the ESS and MSL for the entire group was only 2%. When performing the same analysis on the studies that were diagnostic of narcolepsy, the R2 was 82% (p-value 0.03) demonstrating a strong correlation. The average ESS in this subgroup was 17.2 (SD +/- 4.9).
Conclusion: When patients are referred for an MSLT, their ESS score is typically known. We found that patients diagnosed with narcolepsy had a higher correlation between their ESS score and the mean sleep latency on the MSLT compared to those who did not get a narcolepsy diagnosis. Thus, the ESS score is a strong predictor of a positive diagnosis of narcolepsy on an MSLT.
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0821
POSTURAL ORTHOSTATIC TACHYCARDIA SYNDROME IN IDIOPATHIC HYPERSOMNIA

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Introduction: Idiopathic hypersomnia (IH) is a chronic neurologic sleep disorder causing excessive daytime sleepiness despite normal or prolonged sleep durations, often impairing daily functioning. Autonomic symptoms are common in people with IH. Postural orthostatic tachycardia syndrome (POTS), a form of autonomic dysfunction, is marked by symptomatic increased heart rate upon standing. This study aimed to investigate whether IH with comorbid POTS represents a distinct subtype of IH based on symptoms, signs, and treatment responses.
Methods: This retrospective study analyzed clinical data from IH patients who had (POTS+) or had not (POTS-) been diagnosed with POTS. We compared clinical, demographic, and sleep features between POTS+ and POTS−, employing Chi-square, Fisher's exact test, or t-tests, as indicated.
Results: Among 173 patients with idiopathic hypersomnia (IH), 75% were female, with a mean age of 43.1±15.3 years. Of these, 22 (12.7%) also had POTS. POTS+ patients were younger (38.3±10.7 vs. 43.8±15.8 years, p=0.04); gender distribution did not differ. At baseline, POTS+ patients had similar Epworth scores (16.3±4.9 for POTS+ vs 14.9±4.9 for POTS-, p=0.49), Functional Outcomes of Sleep scores (FOSQ, 9.4±4.0 vs 11.97±4.0, p=0.053), average weekday sleep durations (9.6±2.56 vs. 9.03±2.25 hours, p=0.46), and proportion with difficulty waking in the morning and cognitive symptoms. PSG sleep efficiency (89.3%±6.17% vs. 85.4%±10.63%, p=0.06), total sleep time (450.6±75.9 vs 424.2±80.9, p=0.27), and MSLT mean sleep latency (5.28± 2.53 vs 4.98±2.74, p=0.67) did not differ by group. Comorbidities such as Ehlers-Danlos syndrome (22.7% vs 1.3%, p=0.0004), fibromyalgia (22.7% vs 5.3%, p=0.01), and headaches (77.27% vs. 42.3%, p=0.002) were more common in POTS+, without significant differences for Hashimoto's or mood disorders. The POTS+ group was more likely to have side effects from amphetamine-dextroamphetamine (58.3% vs 16.1%, p=0.004) and methylphenidate (41.7% vs 11.9% p=0.03) but not modafinil, armodafinil, solriamfetol or oxybates.
Conclusion: People with IH and comorbid POTS have similar IH symptom severity and PSG/MSLT findings to those with IH without POTS. However, those with POTS are more likely to also have comorbid Ehlers-Danlos, fibromyalgia, and headache. The presence of POTS may signal an increased risk of side effects with traditional psychostimulants used for treating IH.
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0822
AI-ENABLED NARCOLEPSY TYPE-1 SCREENING WITH PPG: A PROOF-OF-CONCEPT STUDY

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Introduction: While highly specific, the current diagnostic paradigm for type 1 narcolepsy (NT1), defined largely by sleep-onset REM period event (SOREMP) observations in PSGs and MSLTs, remains limited by its NT1 disorder sensitivity and procedural complexity. Machine learning methods have shown promise to accurately detect NT1 from PSG via comprehensive assessment of EEG biomarkers. Photoplethysmography (PPG), used for home sleep apnea testing, can determine sleep stages through machine learning without EEG. We explore whether such PPG-based sleep stages are robust enough to detect sleep architectural abnormalities specifically associated with NT1.
Methods: The dataset included a total of N=110 patients, N=35 positive NT1 patients and N=75 negative NT1 subjects. The negative NT1 patients were composed of N=61 confounding hypersomnolence disorders and N=14 negative controls. We evaluated four separate input data types, trained with stratified 10-fold cross-validation with supervised random forest machine learning (ML) models for NT1 detection. The following 4 input data types are features derived from ML models applied for automated sleep staging of EEG and PPG signals extracted respectively from overnight PSG: EEG-based sleep stage report indices (EEG-Stage), PPG-based sleep stage report indices (PPG-Stage), EEG-based hypnodensity derived features (EEG-Hypno), and PPG-based hypnodensity derived features (PPG-Hypno). To measure performance, we calculated the area under the receiver operating characteristic curve (ROC-AUC) for each model and performed a feature importance analysis for all models.
Results: ROC-AUC values were 0.889 and 0.843 for the EEG-Hypno and PPG-Hypno models, respectively. Furthermore, ROC-AUC values were 0.813 and 0.842 for the EEG-Stage and PPG-Stage models. Feature importance analyses for the EEG-Stage model revealed the highest-ranking features: sleep latency, total N3 time, N3 prevalence, total sleep time, and REM latency. Feature importance analysis for the PPG-Stage model revealed these highest-ranking important features comparatively: sleep latency, REM latency, total N3 time, and N3 prevalence.
Conclusion: ML methods automatically detected NT1 in PPG with comparable degrees of accuracy to EEG. The PPG sensor offers a simple and accessible modality in ecologically valid home settings. This method demonstrates potential extensions for screening of NT1 in HSATs, whereby patients with

NT1-associated sleep architectural characteristics may be flagged for further hypersomnolence disorders evaluation and testing.
Support (if any):

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0823

IMPACT OF NARCOLEPSY ON MORTALITY AMONG PATIENTS WITH CARDIOVASCULAR DISEASE. A PROPENSITY SCORE MATCHED ANALYSIS

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Introduction: Studies have shown patients with narcolepsy may be at increased risk of cardiovascular disease (CVD) and metabolic comorbidities, which in turn increase the risk of cardiovascular-related morbidity and mortality. However, there is limited data on the impact of narcolepsy on mortality among patients with cardiovascular disease.
Methods: We analyzed data from TrinetX database, a global federated health research network providing access to electronic medical across large healthcare organizations (HCOs). This report was run on the subset of 103 HCOs, a network called Research. We included all adult patients with a diagnosis of one of the following: ischemic heart disease, atherosclerotic heart disease, heart failure or cerebrovascular disease, and grouped them based on the presence or absence of narcolepsy. Groups were compared for comorbid conditions - diabetes mellitus, pulmonary hypertension, overweight and obesity, obstructive lung disease, sleep apnea, periodic limb movement disorders. A propensity score matching was done for age, sex and all of the comorbid conditions and then compared for mortality rates as an outcome variable.
Results: A total of 11,223,566 patients with CVD were included in this study, of which 15,281 patients had a diagnosis of narcolepsy. Patients with CVD and narcolepsy were significantly younger, more often female and had higher proportion of patients with all the comorbid conditions. After propensity score matching was done there were 14,789 patients in both groups for comparison. The adjusted mortality rate was significantly higher among patients with CVD and narcolepsy (15.16% vs 14.32%, P = 0.04).
Conclusion: Our study shows significant differences in co-morbidities in patients with CVD with and without narcolepsy, and with propensity matching, mortality is higher in the study patients with narcolepsy. Further analyses in this study will compare narcolepsy with and without cataplexy as well as the effects of medication use on mortality.
Support (if any): N/A

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0824

CHARACTERISTICS OF PATIENTS WITH A CO-MORBID NARCOLEPSY DIAGNOSIS ADMITTED TO U.S. HOSPITALS: 20-YEAR TREND

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Introduction: Patients with narcolepsy are at risk for adverse health consequences, which may make them more vulnerable to hospital admissions. Moreover, narcolepsy can complicate the management of patients with other primary illnesses. There is scarce information about the characteristics of adult patients with narcolepsy who are admitted to hospital. The objective of the study was to describe a nationwide trend of patient characteristics and healthcare utilization of hospitalized adult patients with a comorbid narcolepsy.
Methods: We analyzed the National Inpatient Sample over 20-year period between 2002 and 2021. Adults (> 18 years) with diagnosis of narcolepsy were identified based on the ICD 9th/10th revisions. High-risk mortality was defined as the All-Patient Refined Diagnosis-Related Group (APR-DRG) Risk of Mortality ("rating of 3-4 subclasses). Total charges were the main measurement of health care utilizations and were adjusted by applying for the Consumer Price Index (CPI) rate since 2012. Overall trend of 5-year period (year 2002-2006, 2007-2011, 2012-2016, 2017-2021) over 20-year period was calculated by ANOVA.
Results: A total of 49,610 hospital admissions were identified over 20-year period. Mean age was 57.6 (17.5) years old and female patients consisted of 61%. The most common race/ethnic group was White (71%) followed by Others (15%), and Black (10%). Hispanics (2.8%) and Asians (0.5%) were underrepresented. Over the period of 20-year period, there was a trend of increasing number of hospitalized patients with comorbid narcolepsy (n=9215, 11807, 11071, 14679, p< 0.0001). Mean age decreased over time (58.8 years, 57.7, 57.6, 56.8, p< 0.0001). The proportion of female (58.1%, 60.2, 61.7, 62.1, p< 0.0001) and White race (57.7%, 65.3, 76.2, 79.7, p< 0.0001) patients with narcolepsy increased over time whereas Other race decreased over time (32.3%, 22.6, 9.2, 5.0, p< 0.0001). The proportion of high-risk mortality patients with narcolepsy fluctuated but generally increased (22.2%, 30.7, 22.8, 33.9). Mean total charges showed uptrends from ($20,583, 30469, 40905, 53318, p< 0.0001).
Conclusion: There is a trend of decreasing age, more female representation and a higher complexity of patients with narcolepsy admitted to US hospital over the past two decades. There appears to be underrepresentation of Hispanics and Asian races, implying underdiagnosis of narcolepsy.
Support (if any):

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0825

OPTIMIZATION OF STANFORD CATAPLEXY QUESTIONNAIRE SCORING FOR NARCOLEPSY DETECTION

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Introduction: Narcolepsy Type 1 (NT1) is a chronic and disabling neurological disorder characterized by excessive daytime sleepiness and cataplexy—episodes of sudden loss of muscle tone triggered by emotions. Accurate diagnosis in large-scale studies remains challenging due to NT1's low prevalence (~30 per 100,000 adults) and reliance on resource-intensive clinical assessments. This study used XGBoost to increase specificity for a self-administered narcolepsy questionnaire developed at the Stanford Sleep Disorders Clinic, and that has been administrated to 180,000 participants in the UK Biobank.

Methods: We analyzed questionnaire responses from 1,358 adult participants (388 with narcolepsy cataplexy, 970 with other sleep disorders all recruited at the Stanford Sleep Clinic or by Stanford Staff), The questionnaire assessed demographics (age, sex), muscle weakness in specific body parts (jaw, knees, head, hands, speech), emotional triggers (laughter, anger, joking), and Epworth Sleepiness Scale (ESS) scores. An XGBoost classifier was trained and validated using 5-fold stratified cross-validation. To further reduce false positives and enhance specificity, a veto rule was applied during the validation phase: predictions of NT1 were vetoed when the DQB1*06:02 biomarker was negative, given its strong association with NT1.
Results: The study demonstrates high specificity (99.0%) and moderate sensitivity (82.5%) on the validation folds when excluding HLA biomarkers. Application of the HLA veto rule further improved specificity (99.7%) while maintaining the sensitivity (82.7%). At a prevalence of 30 per 100,000 adults, the Positive Predictive Value (PPV) improved from 2.4% to 7.6% before and after veto, respectively. Key features contributing to performance included laughing, head weakness, and joking as reported triggers for cataplexy and very high levels of ESS (≥17).
Conclusion: Our approach shows high specificity for a questionnaire screening tool on a validation set, which is critical for diagnosing narcolepsy given its low prevalence of approximately 0.03% in the general population. This approach provides a scalable and cost-effective screening tool for identifying NT1 cases in large-scale population samples. We anticipate that adding actigraphy and genome wide association polygenic risk score, available in 100,000 of these subjects in the UK biobank, will raise specificity to a level that will permit identification of the 30 cases within the 100,000 subjects.
Support (if any): ResMed Foundation

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0826

IMPAIRED ATTENTION IN PEDIATRIC NARCOLEPSY TYPE 1 USING PSYCHOMOTOR VIGILANCE TASK

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Introduction: Decreased attention is common in pediatric Narcolepsy Type 1 (NT1). However, objective data assessing attention dysfunction in this population are limited. The psychomotor vigilance task (PVT) has been used to measure attention in adults with central disorders of hypersomnolence but understudied in pediatric NT1. In this study, we compare PVT metrics between pediatric NT1 patients and healthy controls (HC) in the evening and morning with a between interval of nocturnal sleep measured by in-lab polysomnography (PSG). We hypothesized that attention dysfunction would be worse in NT1 vs HC in evening and morning and both sessions would be associated with self-reported sleepiness.
Methods: 28 pediatric NT1 participants (mean age 15.9) and 27 healthy controls (mean age 13.6) completed 3-minute PVT testing in the evening before PSG and upon awakening in the morning. Before each PVT, participants rated their sleepiness on 3-item visual analog scale. We compared PVT metrics between NT1 and HC, adjusting for age (including non-linear effects) and gender. Outcomes included mean 1/reaction time (RT), lapses (RT ≥ 500 ms), lapses355 (RT ≥ 355 ms), and slowest 10% 1/RT.
Results: NT1 participants showed reduced attention across various PVT metrics vs. HC. In the evening, mean 1/RT was significantly worse in NT1 participants (p =.008) but we found no significant group differences in lapses, lapses355, or slowest 10% 1/RT. In the morning, NT1 participants performed significantly worse than controls on mean 1/RT (p =.002), lapses355 (p <.001), and slowest 10% 1/RT (p =.004). Age but not gender significantly predicted all PVT measures (p <.01). Contrary to our hypothesis, none of the PVT measures were associated with self-reported sleepiness.
Conclusion: Pediatric NT1 participants exhibit objective and significantly impaired objective attention vs HC. Slower mean reactions times were evident in evening and morning but lapses and slowest reactions times were more evident in the morning. Given that self-reported sleepiness did not predict PVT outcomes, it is possible other narcolepsy features such as disrupted nighttime sleep play contributing roles. Overall, the PVT could be useful for assessing attention in children/adolescents with NT1 in clinical and school based settings.
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0827

EFFECTS OF ONCE-NIGHTLY SODIUM OXYBATE ON APNEA-HYPOPNEA INDEX: POST HOC ANALYSIS FROM THE REST-ON CLINICAL TRIAL

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Introduction: Sodium oxybate (SXB) is a central nervous system depressant used to treat narcolepsy and has the potential to cause respiratory depression. Registrational trials of SXB have generally excluded patients with respiratory depression, including those with an apnea hypopnea index (AHI) >15. This post hoc analysis of REST-ON evaluates the effect of once-nightly SXB (ON-SXB) compared to placebo on AHI in individuals with narcolepsy with either no sleep apnea or mild sleep apnea.
Methods: REST-ON (NCT02720744) was a phase 3, double-blind, placebo-controlled randomized clinical trial. Participants (age ≥16 years) with narcolepsy and AHI < 15 were randomized 1:1 to ON-SXB (week 1, 4.5 g; weeks 2–3, 6 g; weeks 4–8, 7.5 g; weeks 9–13, 9 g) or placebo. AHI was measured using polysomnography at baseline and weeks 3, 8, and 13, and analyzed post hoc. Adverse drug reactions (ADRs) were assessed at each visit.
Results: Respective mean (min, max) AHI values were similar for the ON-SXB (n=97) and placebo groups (n=93) at baseline (2.7 [0, 15] and 2.8 [0, 13]), week 3 (0.1 [0, 5] and 0.1 [0, 2]), and week 8 (0 [0, 0] and 0 [0, 0]). At week 13, mean (min, max) AHI values were 0 (0, 0) and 0.2 (0, 10) in the ON-SXB and placebo groups, respectively. Least squares mean (LSM) change from baseline in AHI with ON-SXB and placebo was –3.0 and –2.9, respectively, at week 3 (LSM difference [LSMD; 95% CI], –0.11 [–0.46 to 0.24]; P=0.522); –3.0 and –2.9, respectively, at week 8 (LSMD [95% CI], –0.11 [–0.46 to 0.23]; P=0.518); and –3.0 and –2.9, respectively, at week 13 (LSMD [95% CI], –0.12 [–0.46 to 0.23]; P=0.515). In the safety population, 1 (0.9%) and 1 (1.0%) participant in the ON SXB and placebo arms, respectively, experienced ADRs of sleep apnea, and 1 (0.9%) participant receiving ON-SXB reported snoring; all were mild or moderate in severity.

Conclusion: Treatment with ON-SXB was not associated with worsened AHI at any tested dose. ON-SXB was well-tolerated, as the reported respiratory-related ADRs were minimal, and mild or moderate in severity.
Support (if any): Avadel Pharmaceuticals

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0828

IMPACT OF AXS-12 ON SYMPTOM SEVERITY AND FUNCTIONAL IMPAIRMENT IN NARCOLEPSY: RESULTS FROM THE PHASE 3 SYMPHONY TRIAL

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Introduction: Narcolepsy is a chronic neurologic condition associated with severe symptom burden, impaired functioning and reduced quality of life. Patients commonly report comorbid mood disorders. AXS-12 (reboxetine) is a selective norepinephrine reuptake inhibitor and cortical dopamine modulator under investigation for the treatment of narcolepsy. In the Phase 3 SYMPHONY trial, AXS-12 met the primary endpoint, a statistically significant reduction in weekly cataplexy attacks from baseline to Week 5 versus placebo. Here, we report secondary endpoints assessing symptom severity, daily functioning, and mood.
Methods: SYMPHONY was a randomized, double-blind, placebo-controlled trial in patients with narcolepsy type 1 (NT1). Participants (15-75 years) were randomized 1:1 to AXS-12 or placebo for 5 weeks. Stable, concurrent modafinil/armodafinil use was allowed. Secondary endpoints included: the Clinical Global Impression of Severity (CGI-S) for narcolepsy, the Functional Outcomes of Sleep Questionnaire short version (FOSQ-10), and the EuroQol 5-Dimension 5-Level (EQ-5D-5L) questionnaire anxiety/depression domain.
Results: Ninety participants were enrolled. At baseline, mean (SD) CGI-S for narcolepsy score was 5.2 (1.0) in the AXS-12 arm and 4.9 (1.0) in the placebo arm. AXS-12 led to a significant reduction versus placebo in CGI-S for narcolepsy at Week 5 (LS mean difference [95% CI]=0.72 [0.29, 1.16]; p=0.001). At baseline, mean FOSQ-10 total score was 11.1 (3.1) in the AXS-12 arm and 11.6 (3.2) in the placebo arm. AXS-12 led to a statistically significant improvement from baseline to Week 5 in FOSQ-10 total scores compared to placebo (1.66 [0.51, 2.82], p=0.005). At baseline, 47.8% of participants in the AXS-12 arm and 45.5% in the placebo arm reported anxiety/depression (EQ-5D-5L). A numerically greater proportion of participants achieved improvements on this domain with AXS-12 (55.0%) versus placebo (31.6%) at Week 5 (p=0.146).
Conclusion: AXS-12 demonstrated significant reductions in clinical impressions of narcolepsy symptom severity. Functional impairment due to EDS was also significantly reduced, in-line with previously reported improvement in clinician-rated assessments. Anxiety and depression-related symptoms showed trends favoring AXS-12. Combined with prior findings on cataplexy and cognitive improvements, these results highlight the potential of AXS-12 as a therapeutic option addressing multiple symptoms of narcolepsy which affect QoL and functioning.
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0829

RESIDUAL SYMPTOM BURDEN IN PATIENTS WITH NARCOLEPSY SATISFIED WITH TREATMENT: SUBGROUP ANALYSIS FROM THE CRESCENDO SURVEY

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Introduction: People living with narcolepsy type 1 (narcolepsy with cataplexy [NT1]) often experience breakthrough symptoms, including excessive daytime sleepiness (EDS), cataplexy, and cognitive difficulties, even when taking multiple medications. The CRESCENDO survey examined the patient experience in patients with NT1, providing a detailed characterization of symptom burden. Here we report a subgroup analysis of respondents reporting overall satisfaction with their current pharmacologic treatment to quantify residual symptoms in this population.
Methods: The CRESCENDO survey was conducted from October-December 2023 in adults diagnosed with NT1 who were currently taking an FDA-approved medication for the condition. The survey included assessments of symptom burden and impact on quality of life and was developed and executed in partnership with the patient advocacy organization Narcolepsy Network. A third-party research firm conducted the survey and ensured patient privacy. This subgroup analysis included respondents indicating satisfaction with their current narcolepsy treatment on a categorical scale.
Results: Of 203 respondents, 60.6% were taking multiple classes of narcolepsy medication. A majority (63.1%) reported satisfaction with their current treatment(s), 20.2% were neutral, and 16.7% were dissatisfied. Common reasons for satisfaction included symptom improvement (70%) and ability to complete more activities (37%). Of those satisfied, 71.9% reported breakthrough cataplexy (10.9% experienced attacks once per day or more, and 22.8% experienced attacks multiple times per week). Additionally, 53.3% reported that cataplexy burdens their professional lives, 49.3% their social lives, and 38.7% their day-to-day lives. Other commonly reported breakthrough symptoms were EDS (89.1%), brain fog (73.4%), and difficulty concentrating (71.9%). Depression was reported by 67.2% of satisfied respondents (Patient Health Questionnaire-8; score ≥5). Cognitive complaints were reported by 64.8% of participants (British Columbia Cognitive Complaints Inventory, score ≥5).
Conclusion: Respondents who reported overall satisfaction with their current NT1 treatment regime continued to experience substantial and diverse symptoms. These findings reveal a disconnect between patient-reported treatment satisfaction and the degree of symptom resolution, which may reflect limitations of current therapies, underreporting of ongoing symptoms, or diminished patient expectations. Overall, the results of this study suggest the need for enhanced assessment of residual symptoms and novel approaches to treating narcolepsy.
Support (if any): Axsome Therapeutics, Inc.

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0830

EFFECTS OF THE OREXIN 2 RECEPTOR AGONIST ALKS 2680 ON QEEG IN PATIENTS WITH NARCOLEPSY AND IDIOPATHIC HYPERSOMNIA

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Introduction: ALKS 2680 is a highly potent, orally bioavailable, and selective orexin 2 receptor agonist being developed as a once-daily treatment for narcolepsy and idiopathic hypersomnia (IH). Quantitative electroencephalography (qEEG) was conducted as an exploratory measure in a phase 1b study to evaluate the central pharmacodynamic effects of ALKS 2680 in patients with narcolepsy type 1 (NT1), narcolepsy type 2 (NT2), and IH.

Methods: In a randomized, double-blind, placebo-controlled study, single doses of ALKS 2680 (1, 3 and 8 mg for NT1; 5, 12 and 25 mg for NT2 or IH) and placebo were evaluated in a four-way crossover design following two-week washout from prior medications. At baseline and on dosing days, the Maintenance of Wakefulness Test (MWT) and Karolinska Sleepiness Scale (KSS) were administered at five post-dose timepoints. During each MWT assessment, three EEG epochs were extracted for oscillatory and fractal spectral qEEG analysis corresponding to test initiation, sleep onset, and test termination. Effects on baseline-corrected qEEG spectra were analyzed using a mixed-models repeated measures approach.

Results: In the combined cohort of patients with NT1 (N=10), NT2 (N=9), or IH (N=8), ALKS 2680 decreased amplitude in bands associated with sleepiness at the central midline region: oscillatory delta (least squares mean difference (LSMD), high dose vs placebo: −0.05μV/Hz; standard error [SE], 0.01; p< 0.001) and oscillatory theta (LSMD high dose vs placebo: −0.09μV/Hz; SE 0.02; p< 0.001). ALKS 2680 also increased amplitude in bands associated with wakefulness/vigilance: oscillatory beta3 (LMSD high dose vs placebo: 0.05μV/Hz; SE, 0.01; p< 0.001) and fractal gamma (LMSD high dose vs placebo: 0.03μV/Hz; SE, 0.01; p=0.001). The effects of ALKS 2680 on spectral parameters were maintained for up to 10 hours at the high dose. Decreased low frequency amplitude and increased high frequency amplitude was associated with higher sleep latency on MWT (eg. central midline delta×MWT: r=−0.359, p=0.001) and lower scores on the KSS (eg. frontal right beta3×KSS: r=−0.366, p< 0.001).

Conclusion: ALKS 2680 demonstrated statistically significant wake-promoting effects on qEEG spectral parameters in patients with NT1, NT2, and IH. These effects were correlated with objective and subjective improvements in wakefulness/alertness by ALKS 2680 (ie, MWT and KSS).

Support (if any): Alkermes

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0831

EFFECTIVENESS AND SAFETY OF LOW-SODIUM OXYBATE IN PARTICIPANTS WITH NARCOLEPSY: RESULTS FROM THE DUET STUDY

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Introduction: Jazz DUET (Develop hypersomnia Understanding by Evaluating low-sodium oxybate Treatment) is a phase 4, prospective, multicenter, single-arm, multiple-cohort, open-label study (NCT05875974) assessing the effectiveness of low-sodium oxybate (LXB; Xywav®) treatment on daytime and nighttime symptoms in participants with narcolepsy (type 1 [NT1] or 2 [NT2]) or idiopathic hypersomnia. Data presented are from the narcolepsy cohort.

Methods: DUET included a screening period (with 2-week washout for current oxybate users), 8-day baseline (BL) period, 2- to 8-week LXB titration period, 2-week stable-dose period, 8-day end-of treatment (EOT) period, and 2-week safety follow-up. The primary endpoint was change in Epworth Sleepiness Scale (ESS) score from BL to EOT. Key secondary endpoints for the narcolepsy cohort included change in polysomnography parameters: total shifts from deeper to lighter sleep stages, stage N3 sleep duration (minutes), and number of awakenings. Additional endpoints included Patient Global Impression of Change (PGIc)–overall narcolepsy disease. Primary and key secondary endpoints were controlled for multiplicity with sequential testing; other P-values are considered nominal.

Results: Fifty-five narcolepsy participants enrolled and were dosed with LXB (NT1, n=26; NT2, n=29); 13 transferred to another cohort and 34 were completers (NT1, n=16; NT2, n=18). Enrolled participants were mostly female (72.7%) and White (80.0%); mean (SD) age was 33.4 (12.9) years (NT1=34.6 [12.6]; NT2=32.4 [13.2]). For completers, least-squares mean (LSM) (SE) changes in ESS score were −7.7 (0.9), P<.0001, overall; NT1=−6.5 (1.4), P<.0001; NT2=−8.8 (1.3), P<.0001. Compared with BL, sleep architecture at EOT showed fewer deeper to lighter sleep stage shifts (LSM [SE]: −13.1 [2.9], P<.0001, overall; NT1=−13.9 [4.3], P=0.0029; NT2=−12.3 [4.1], P=0.0050); increased stage N3 sleep (minutes) (45.0 [8.8], P<.0001, overall; NT1=49.8 [13.0], P=0.0006; NT2=40.8 [12.3], P=0.0023); and fewer awakenings (−3.2 [0.9], P=0.0015, overall; NT1=−4.1 [1.4], P=0.0056; NT2=−2.3 [1.3], P=0.0771). Most participants (93.3%, n=30; NT1, 86.7%, n=15; NT2, 100%, n=15) reported improvement (very much, much, minimally) in overall narcolepsy disease on PGIc. Treatment-emergent adverse events were consistent with the known safety profile of LXB.

Conclusion: Participants with NT1 and NT2 taking open-label LXB showed improvements in daytime sleepiness (decreased ESS scores) and reduced symptom burden (improved PGIc), which paralleled improvements in sleep architecture and disruption.

Support (if any): Jazz Pharmaceuticals

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0832

CLINICALLY MEANINGFUL IMPROVEMENT IN DAYTIME SLEEPINESS WITH ON-SXB IN PEOPLE WITH NARCOLEPSY AND SEVERE SLEEPINESS

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Introduction: Efficacy of once-nightly sodium oxybate (ON-SXB; LUMRYZ™) for narcolepsy was demonstrated in the phase 3 REST-ON trial (NCT02720744). Efficacy on daytime sleepiness in REST-ON participants with the most severe sleepiness at baseline was analyzed post hoc.
Methods: Participants (≥16 years; narcolepsy type 1 [NT1] or NT2) were randomized 1:1 to ON-SXB (week 1, 4.5 g; weeks 2-3, 6 g; weeks 4-8, 7.5 g; weeks 9-13, 9 g) or placebo. Sleep latency on the Maintenance of Wakefulness Test (MWT) and Epworth Sleepiness Scale (ESS) scores were calculated in tertiles of participants from the modified intent-to-treat (mITT) population (randomized participants with ≥1 efficacy measurement after receiving 6-g dose) with lowest mean sleep latency on the MWT (MWT tertile) or highest ESS scores (ESS tertile) at baseline. Data are median (Q1, Q3) observed values.
Results: In the mITT population (ON-SXB, n=97; placebo, n=93), mean age for MWT tertile participants (ON-SXB, n=33; placebo, n=30) was 30.5 years (65.1% female, 76.2% NT1, 60.3% taking concomitant alerting agents), and for ESS tertile participants (ON-SXB, n=33; placebo, n=41), it was 32.4 years (63.5% female, 90.5% NT1, 37.8% taking concomitant alerting agents). Respective sleep latency on the MWT (min) for ON-SXB and placebo groups of MWT tertile participants was 1.5 (1.0, 2.3) and 2.0 (1.3, 2.5) at baseline and 7.0 (2.5, 15.0) and 4.9 (1.8, 8.3) at week 13 (9 g), and for ESS tertile participants was 4.7 (2.8, 7.5) and 4.6 (2.1, 6.6) at baseline and 11.5 (6.9, 21.7) and 5.0 (2.0, 13.0) at week 13 (9 g). Respective ESS scores for ON-SXB and placebo groups of MWT tertile participants were 16.0 (14.0, 19.0) and 19.0 (16.0, 20.0) at baseline and 10.0 (6.0, 16.5) and 16.0 (13.0, 19.0) at week 13 (9 g), and of ESS tertile participants were 21.0 (19.0, 22.0) and 21.0 (19.0, 22.0) at baseline and 9.0 (6.0, 19.5) and 18.0 (14.0, 22.0) at week 13 (9 g).
Conclusion: The most severely sleepy REST-ON participants at baseline experienced clinically meaningful improvement in daytime sleepiness with ON-SXB treatment, as ESS scores were at or below the normal threshold at the end of the study.
Support (if any): Avadel Pharmaceuticals

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0833

LONG-TERM SAFETY AND TOLERABILITY OF ONCE-NIGHTLY SODIUM OXYBATE: A POST HOC ANALYSIS FROM RESTORE

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Introduction: Once-nightly sodium oxybate (ON-SXB; LUMRYZ™) is an extended-release formulation of sodium oxybate that eliminates the second, middle-of-the-night dose required by immediate-release twice-nightly oxybate (TN-OXB) formulations. RESTORE (NCT04451668) was an open-label/switch study evaluating the long-term safety/tolerability of ON-SXB in people with narcolepsy.
Methods: Participants ≥16 years of age with narcolepsy who had completed the phase 3 REST-ON trial, were on stable-dose TN-OXB (switch participants), or were oxybate-naïve were eligible for RESTORE. Switch participants' initial ON-SXB doses were equivalent/closest to their prior total nightly TN-OXB dose. After participants titrated their ON-SXB dose (±1.5 g/week; maximum, 9 g/night) with no tolerability issues for ≥3 months, participants entered the stable dosing period. Treatment-emergent adverse events (TEAEs) were recorded quarterly for switch participants in the safety population (all participants who received ≥1 dose of ON-SXB).
Results: A total of 130 switch participants were included in the safety population and received ON-SXB for a median (range) duration of 502.5 (8-1169) days during the >3-year study. Of these participants, 115 continued into the stable dosing period and were included in this analysis. Of the 115 who entered the stable dosing period, 73.9% (85/115) reported ≥1 TEAE. TEAEs reported by ≥3% of participants included COVID-19 (18.3%), nasopharyngitis (11.3%), nausea (10.4%), sinusitis (8.7%), fall (8.7%), headache (7.0%), enuresis (7.0%), cough (6.1%), upper respiratory tract infection (5.2%), urinary tract infection (5.2%), somnolence (4.3%), tremor (4.3%), vomiting (3.5%), dyspnea (3.5%), rash (3.5%), decreased appetite (3.5%), hypertension (3.5%), concussion (3.5%), and contusion (3.5%). Eight (7%) participants reported ≥1 serious TEAE (events, n=10); of these, 2 serious TEAEs were deemed related to ON-SXB (gastroesophageal reflux disease and cataplexy). Five participants (4.3%) experienced ≥1 TEAE that led to ON-SXB discontinuation (upper abdominal pain, fatigue, fall, dizziness, paresthesia, irritability, nightmare, and hypertension; n=1 [0.9%] each).
Conclusion: Reported AEs were consistent with the known AEs of oxybates. Only 4% of participants discontinued owing to a TEAE during the stable dosing period, underscoring the largely transient nature of AEs and the long-term tolerability of ON-SXB.
Support (if any): Avadel Pharmaceuticals

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0834

HYPNAGOGIC/HYPNOPOMPIC HALLUCINATION TYPES AMONG PARTICIPANTS WITH NARCOLEPSY TYPE 1 FROM THE PHASE 3 REST-ON TRIAL

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Introduction: Limited information is available to quantify hypnagogic/hypnopompic hallucination (HH) events people with narcolepsy (PWN) may experience. This post hoc analysis from the phase 3 REST-ON trial evaluated individual HH types.
Methods: REST-ON (NCT02720744) participants (age ≥16 years) with narcolepsy were randomized 1:1 to once-nightly sodium oxybate (ON-SXB) (week 1, 4.5 g; weeks 2-3, 6 g; weeks 4-8, 7.5 g; weeks 9-13, 9 g) or placebo. HH events were assessed in participants with narcolepsy type 1. Modified intent-to-treat (mITT) population (≥1 efficacy measurement after 6-g dose) data were analyzed. Nocturnal HH types were evaluated via 6 yes/no questions and recorded in daily diaries. Daytime HHs were not assessed.
Results: In the mITT population with HH at baseline (n=112 [ON-SXB, n=55; placebo n=57]), baseline mean [SD] number of HH events/day was 0.60 [0.35] and 0.66 [0.35] in the ON-SXB and placebo groups, respectively. Respective mean change from baseline (95% CI) in HH events/day to weeks 3, 8, and 13 was −0.16 (−0.21, −0.11), −0.28 (−0.37, −0.19), and −0.29 (−0.40, −0.18) with ON-SXB (all P< 0.001) and −0.14 (−0.20, −0.08), −0.18 (−0.26, −0.10), and −0.24 (−0.33, −0.14) with placebo (all P< 0.001). Participants chose from the following HH types: 1) feeling that shadows or objects are moving/distorting (total number of events with ON-SXB and placebo: 1693 and 2133), 2) feeling another presence in the room (1362 and 1839), 3) feeling that you are about to be attacked (655 and 1232), 4) feeling that you are flying through the air (543 and 1351), 5) feeling that you will soon fall into a hole (448 and 914), and 6) feeling caught in a fire (123 and 152). Of 12,455 HH events, 7762 (62%) were hypnagogic, and 4683 (38%) were hypnopompic.
Conclusion: There were low baseline HH rates in REST-ON, and a strong placebo effect was observed. However, these data provide insight into the HH types participants experienced. Relevant to clinician-patient discussions, approximately half the number of events where participants felt like they were about to be attacked, flying through the air, and falling in a hole were reported with ON-SXB vs placebo.
Support (if any): Avadel Pharmaceuticals

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0835

IMPROVEMENT OF INDIVIDUAL EXCESSIVE DAYTIME SLEEPINESS SYMPTOMS WITH ONCE-NIGHTLY SODIUM OXYBATE FOR NARCOLEPSY

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Introduction: The Epworth Sleepiness Scale (ESS) is a commonly used 8-item patient-reported outcome measure for excessive daytime sleepiness. While aggregate data are typically presented, individual domains vary in clinical significance. This post hoc analysis from the phase 3 REST-ON trial (NCT02720744) evaluated the efficacy of once-nightly sodium oxybate (ON-SXB; LUMRYZ™) on individual ESS domains.
Methods: Participants aged ≥16 years with narcolepsy were randomized 1:1 to ON-SXB (week 1, 4.5 g; weeks 2–3, 6 g; weeks 4–8, 7.5 g; weeks 9–13, 9 g) or placebo. ESS data from the modified intent-to-treat population (mITT; ≥1 efficacy measurement after receiving the 6-g dose) at weeks 3, 8, and 13 were analyzed.
Results: In the mITT population (ON-SXB, n=97; placebo, n=93), ON-SXB was associated with significant sleepiness improvements vs placebo for sitting and reading, watching TV, lying down to rest in the afternoon, and sitting quietly after lunch; all doses P< 0.01. ON-SXB was associated with significant sleepiness improvement vs placebo as a passenger in a car for an hour without a break (least squares mean difference [LSMD; 95% CI] in change from baseline: 6 g, –0.39 [–0.61 to –0.17]; 7.5 g, –0.59 [–0.85 to –0.32]; 9 g, –0.67 [–0.95 to –0.38]; all doses P< 0.001). Significant sleepiness improvements were observed with 7.5-g and 9-g ON-SXB when sitting inactive in public (LSMD vs placebo [95% CI]: 7.5 g, –0.34 [–0.61 to –0.07], P=0.014; 9 g, –0.44 [–0.71 to –0.18], P=0.001) and sitting and talking to someone (7.5 g, –0.29 [–0.47 to –0.11], P=0.002; 9 g, –0.24 [–0.44 to –0.04], P=0.018). Significant sleepiness improvement as a driver stopped in traffic was observed with 9-g ON-SXB (LSMD vs placebo [95% CI], –0.35 [–0.63 to –0.07]; P=0.015).
Conclusion: At all ON-SXB doses, participants had significant improvements vs placebo in sleepiness while completing routine activities. The greatest improvements in these activities were observed with the 9-g ON-SXB dose, including the domain for sleepiness as a driver stopped in traffic, a key safety concern. ON-SXB may be helpful in addressing safety challenges for people with narcolepsy.
Support (if any): Avadel Pharmaceuticals

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0836

CONSISTENT EFFICACY OF ONCE-NIGHTLY SODIUM OXYBATE ON DISRUPTED NIGHTTIME SLEEP IN PEOPLE WITH NARCOLEPSY

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Introduction: Once-nightly sodium oxybate (ON-SXB; LUMRYZ™) demonstrated efficacy in treating narcolepsy symptoms, including disrupted nighttime sleep (DNS), in the phase 3 REST-ON trial (NCT02720744). This post hoc analysis assessed ON-SXB efficacy on DNS across various participant subgroups.
Methods: Participants aged ≥16 years with narcolepsy type 1 (NT1) or 2 (NT2) were randomized 1:1 to ON-SXB (week 1, 4.5 g; weeks 2-3, 6 g; weeks 4-8, 7.5 g; weeks 9-13, 9 g) or placebo. Least squares mean differences (LSMDs) in changes from baseline for ON-SXB vs placebo for number of sleep stage shifts and nocturnal arousals as measured by polysomnography, as well as patient-reported sleep quality and refreshing nature of sleep, were compared among demographic (age, sex, race, body mass index [BMI] category), narcolepsy type (NT1/NT2), and concomitant alerting agent use subgroups from the modified intent-to-treat population (mITT;≥1 efficacy measurement after receiving the 6-g dose).

Results: In the mITT population (ON-SXB, n=97; placebo, n=93), LSMDs for ON-SXB vs placebo demonstrated significant improvements from baseline (P< 0.001) in number of sleep stage shifts at week 13 (9 g) across all participant subgroups, including age (< 35, ≥35 years), sex (female, male), race (white, non-white), BMI (low [< 25 kg/m2], high [≥25 kg/m2]), narcolepsy type (NT1, NT2), and alerting agent/no alerting agent use. LSMDs were significant in favor of ON-SXB 9 g vs placebo for change from baseline in number of nocturnal arousals (P< 0.05) in all subgroups, except age ≥35 years. At week 13, ON-SXB was associated with significant improvement from baseline (P< 0.05) in visual analogue scale (VAS) sleep quality compared with placebo across all subgroups, except non-white. All subgroups exhibited significant improvements (P≤0.01) in VAS refreshing nature of sleep with ON-SXB 9 g vs placebo, except NT2. Comparable trends were observed with the 6-g dose at week 3 and the 7.5-g dose at week 8.
Conclusion: While the trial was not powered to test for subgroup differences, these post hoc analyses demonstrate the robust, consistent efficacy of ON-SXB in treating DNS, including reducing nocturnal arousals and increasing refreshing nature of sleep, in patients with narcolepsy across various demographic and clinical characteristics.
Support (if any): Avadel Pharmaceuticals

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0837

EVALUATION OF CARDIAC SAFETY PROFILE OF ALKS 2680 IN HEALTHY SUBJECTS: CONCENTRATION-QTC RELATIONSHIP OF ALKS 2680

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Introduction: ALKS 2680 is a highly potent, orally bioavailable, and selective orexin 2 receptor agonist being developed as a once-daily treatment for narcolepsy and idiopathic hypersomnia. Cardiac safety is an important consideration for drugs in clinical development. This cardiodynamic evaluation assessed the effects of ALKS 2680 on the corrected QT (QTc) interval using the Fridericia method (QTcF), and other electrocardiogram (ECG) parameters (heart rate [HR] and cardiac conduction [PR and QRS intervals]).
Methods: Single-ascending dose (SAD) data from 42 ALKS 2680-treated healthy volunteers (6 subjects in each of 7 dose cohorts ranging from 1 to 50 mg powder-in-capsule [PIC] and nanosuspension [NS] formulations) and 14 placebo subjects, and multiple-ascending dose (MAD) data from 23 ALKS 2680-treated healthy volunteers (5-6 subjects in each of 4 dose cohorts ranging from 3 to 25 mg PIC formulation) and 8 placebo subjects, were analyzed. Twelve-lead ECGs were extracted from Holter recordings at baseline and prespecified post-dose time points in the SAD (Day 1) and MAD (Day 10) cohorts. The primary analysis was based on concentration-QTc (C-QTc) modeling of the relationship between change-from-baseline QTcF and ALKS 2680 plasma concentrations using a linear mixed-effects modeling approach to exclude an effect on the QTc interval ≥10 ms. Other endpoints included HR and PR and QRS intervals.
Results: For the SAD and MAD cohorts, the by-timepoint analysis showed that the mean change-from-baseline HR followed the pattern observed on placebo for all doses. In the C-QTc analysis based on the pooled SAD and MAD cohorts, the estimated slope of the concentration-QTc relationship was negative (−0.113 [90% CI: −0.179 to −0.047] ms per ng/mL). An effect on placebo-corrected change-from-baseline QTcF exceeding 10 ms can be excluded within the full observed ALKS 2680 plasma concentration range up to ~94.4 ng/mL. No clinically relevant effects were observed in the by-timepoint analysis on placebo-corrected change-from-baseline PR and QRS intervals.
Conclusion: The high precision QT analysis confirms a lack of any effects of ALKS 2680 (up to 50 mg) on QTc prolongation, heart rate, or cardiac conduction.
Support (if any): Alkermes, Inc.

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0838

THE OREXIN 2 RECEPTOR AGONIST ALKS 2680 IN PATIENTS WITH NARCOLEPSY OR IDIOPATHIC HYPERSOMNIA: A PHASE 1B STUDY

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Introduction: Targeting the orexin system may address symptoms across hypersomnolence disorders (narcolepsy type 1 [NT1], narcolepsy type 2 [NT2], idiopathic hypersomnia [IH]) with or without orexin deficiency. ALKS 2680 is a highly potent, orally bioavailable, and selective orexin 2 receptor agonist being developed as a once-daily treatment for narcolepsy and idiopathic hypersomnia.
Methods: Safety/tolerability and pharmacodynamics of ALKS 2680 were assessed in a randomized, double-blind, phase 1b study. Single doses of ALKS 2680 (1, 3, and 8mg for NT1; 5, 12, and 25mg for NT2 or IH) and matching placebo were administered in a 4-way randomized crossover design following 2-week washout from prior medications. Safety endpoints included treatment-emergent adverse events (TEAEs), vital signs, clinical laboratory assessments, and electrocardiograms (ECGs). Key pharmacodynamic assessment was mean sleep latency (MSL) on the Maintenance of Wakefulness Test (MWT).
Results: In patients with NT1 (N=10), NT2 (N=9), or IH (N=8), there were no serious adverse events and no patient discontinued due to a TEAE. All TEAEs were mild except 3 moderate events (NT1, nausea; NT2, pollakiuria; IH, pollakiuria), which occurred at the highest respective doses. Drug-related TEAEs occurring in >1 patient were insomnia, pollakiuria, salivary hypersecretion, decreased appetite, dizziness, and nausea in NT1 cohort, and insomnia, pollakiuria, and dizziness in NT2 and IH cohorts, respectively. For all cohorts, no clinically meaningful changes from baseline were identified in laboratory values, and no cardiovascular safety signals were identified in vital signs or ECGs. ALKS 2680 increased MWT MSL in a dose-dependent manner over 8h, as assessed by estimated least squares mean difference in change from baseline versus placebo (minutes) in patients with NT1 (1mg, 18.4; 3mg, 22.6; 8mg, 34.0; all p< 0.001), NT2 (5mg, 11.6; 12mg, 18.6; 25mg, 21.0; all p< 0.05), or IH (5mg, 8.1; 12mg, 11.1; 25mg, 17.7; all p< 0.05).

Conclusion: ALKS 2680 was generally well-tolerated and led to statistically significant, clinically meaningful improvements in MSL at all doses tested in patients with NT1, NT2, or IH, with MSL exceeding the average in healthy individuals at most doses. These results support the phase 2 clinical evaluation of ALKS 2680 in patients with NT1, NT2, and IH.
Support (if any): Alkermes, Inc.

Abstract citation ID: zsaf090.0839

0839

UNDERSTANDING PATH TO DIAGNOSIS, HCP RELATIONSHIPS, AND TREATMENT REGIMENS AMONG PEOPLE LIVING WITH NARCOLEPSY

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Introduction: Narcolepsy is a chronic, disabling hypersomnolence disorder requiring lifelong management. People with narcolepsy (PWN) often experience diagnostic delays and difficulties with quality care, including healthcare provider (HCP)- and treatment-related challenges. This survey assessed the path to diagnosis, HCP relationships, and treatment regimens among PWN from MyNarcolepsyTeam, a social network of >11,000 members.
Methods: MyNarcolepsyTeam members were invited to participate in a 36-question online survey fielded between April 10 and May 9, 2024. Eligible participants had a narcolepsy diagnosis, were age ≥21 years, and resided in the United States. Data were analyzed descriptively.
Results: Of 88 total respondents (female, 77%; age ≥50 years, 74%), 39% had narcolepsy type 1, 50% had narcolepsy type 2, and 11% were unsure. Most (81%) respondents saw ≥2 clinicians to receive a diagnosis; 36% visited ≥5 clinicians. 98% had undergone ≥1 sleep study, which was the most common diagnosis method (83%). Following diagnosis, 68% of respondents visited multiple HCPs to address narcolepsy symptoms. Of 82 respondents currently seeing an HCP, 56% were extremely/very satisfied with their clinician. Satisfaction was higher among respondents seeing sleep specialists vs non-sleep specialists (70% vs 38%). More respondents seeing sleep specialists vs non-sleep specialists reported discussions that address mental health (48% vs 31%) and long-term planning (38% vs 15%). Fifty percent of respondents currently seeing an HCP discussed the advantages and disadvantages of treatments with their HCP. Seventy-nine (90%) respondents were taking ≥1 medication to treat their symptoms; 67% took ≥2 medications. Current medications for narcolepsy most commonly included traditional stimulants (56%; [Adderall®, Ritalin®, etc.]) and antidepressants (38%). Nearly half of respondents (44%) found their treatment regimen extremely/very/somewhat challenging, of whom 83% were taking multiple medications. Reported treatment challenges included loss of efficacy, side effects, access barriers, and the complexity of medication regimens.
Conclusion: These findings highlight the challenges PWN face, emphasizing the need for expedited diagnosis and access to specialized healthcare. Despite greater satisfaction with care from sleep medicine specialists, there is a shortage in this field. This gap underscores the necessity for improved treatment regimens and enhanced discussions between PWN and HCPs to address mental health support and long-term planning.
Support (if any): Avadel Pharmaceuticals

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0840

OXYBATE AWARENESS, USAGE, AND EXPERIENCE AMONG PEOPLE WITH NARCOLEPSY: A MYNARCOLEPSYTEAM SURVEY ANALYSIS

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Introduction: Narcolepsy is characterized by excessive daytime sleepiness (EDS) and can occur with or without cataplexy. Oxybates are FDA-approved to treat EDS or cataplexy in people with narcolepsy. Immediate-release twice-nightly sodium oxybate (TN-SXB) and calcium, magnesium, potassium, and sodium oxybates (mixed-salt oxybates) are administered at bedtime and 2.5-4 hours later, whereas extended-release once-nightly SXB (ON-SXB; FT218) is administered once at bedtime. This study assessed oxybate awareness, usage, and experience among people with narcolepsy (PWN).
Methods: The MyNarcolepsyTeam survey was an anonymous, voluntary survey conducted from April 10 to May 9, 2024. Eligible participants were age ≥21 years, United States residents, and reported a narcolepsy diagnosis. The 36-item survey assessed respondents' demographics, symptom management, and relationships with healthcare providers (HCPs).
Results: Of 88 respondents, 77% were female, 75% were ≥50 years of age, and 39% and 50% had narcolepsy type (NT) 1 and NT2, respectively. Respondent brand awareness of oxybates was high (70%), with highest awareness for TN-SXB (55%), followed by mixed-salt oxybates (43%) and ON-SXB (23%). Of 82 respondents seeing an HCP, only 39% had discussed oxybates with their HCP. Current oxybate use was reported by 13% of respondents (15% of NT1 respondents; 7% of NT2 respondents), 82% of whom experienced symptom improvement within 2 weeks of starting oxybate treatment. Benefits of oxybate use included getting a better night's sleep (64%) and waking up refreshed (64%). Of 77 respondents not currently taking oxybates, 36% reported they did not know enough about oxybates. Of respondents who had previously taken an oxybate, 28% discontinued within 1 month of initiating treatment. The most commonly reported reason for discontinuing oxybate treatment was side effects (40% [age ≥60 years, 47%; age < 60 years, 27%]).
Conclusion: These results demonstrate that while respondents were moderately aware of oxybates, over one-third reported lacking enough information to consider starting oxybate treatment. Despite TN-SXB approval by the FDA in 2002, only 1:8 respondents were currently receiving oxybates. As narcolepsy medication regimens can be daunting, clinicians have the opportunity to counsel PWN about oxybate treatment options, including the potential for early symptom improvement and proactive side effect management to reduce discontinuation.
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0841

ARIPIPRAZOLE FOR TREATING POST-COVID-19 HYPERSOMNOLENCE IN ADOLESCENTS: A CASE SERIES

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Introduction: Post-COVID-19 conditions, also known as long COVID, encompass a range of symptoms, including fatigue, dyspnea, and cognitive dysfunction, that persist for at least two months following three months after the onset of COVID-19. The WHO estimates that approximately 10–20% of individuals infected with COVID-19 develop post-COVID-19 conditions. Among these patients, it has been reported that around 80% experience sleep disturbances, such as insomnia, hypersomnolence, or circadian rhythm disorders. These disruptions in sleep duration, whether reduced or prolonged, can adversely affect subjective health and quality of life. In adolescents, such disturbances may contribute to school absenteeism and impair social adaptation, emphasizing the need for effective management strategies. Aripiprazole (APZ), commonly prescribed for schizophrenia, has recently been shown to improve hypersomnolence symptoms when used at low doses. In this study, we report a case series of 10 adolescents with post-COVID-19 hypersomnolence. Administration of low-dose APZ effectively reduced sleep duration, providing insights into its potential utility as a therapeutic option for hypersomnolence associated with post-COVID-19 conditions.
Methods: Ten adolescent patients with post-COVID-19 hypersomnolence who visited our institution between 2019 and December 2024 were included if their sleep duration was prolonged compared to their pre-infection baseline. All participants displayed sleep patterns resembling those observed in delayed sleep phase syndrome (DSPS). After obtaining informed consent from the patients and their guardians, low-dose APZ (0.5–2.0 mg) was prescribed. Patients maintained sleep diaries documenting bedtime, wake-up time, and total sleep duration both before and after the initiation of APZ treatment. Sleep parameters were subsequently analyzed for changes in total sleep duration and wake-up times using statistical methods. Adverse effects were monitored throughout the treatment period. The Ethics Committee of Ibaraki Prefectural Medical Center of Psychiatry approved this study.
Results: Low-dose APZ effectively reduced total sleep duration and advanced wake-up times in adolescents with post-COVID-19 hypersomnolence, enabling some patients to return to their previous lifestyles. No significant adverse effects were reported.
Conclusion: Low-dose APZ effectively managed post-COVID-19 hypersomnolence in adolescents by reducing total sleep duration and advancing wake-up times. These findings suggest APZ as a promising therapeutic option for post-COVID-19 hypersomnolence, particularly in adolescents, warranting further investigation in larger studies.
Support (if any):

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0842

AMELIORATION OF SLEEP-RELATED EATING DISORDER AFTER SWITCHING FROM TWICE- TO ONCE-NIGHTLY OXYBATE

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Introduction: In a disproportionality analysis (Merino D, et al. J Clin Med. 2022;11:3890), sodium oxybate (SXB) treatment was associated with sleep-related eating disorder (SRED), a parasomnia characterized by somnambulism and compulsive eating. Immediate-release twice-nightly oxybate (TN-OXB) formulations (ie, SXB and calcium, magnesium, potassium, and sodium oxybates [mixed-salt oxybates]) are administered at bedtime and again 2.5-4 hours later. SRED coincides with the first dose of TN-OXB if patients remain awake. This retrospective, single-site analysis assessed the effect of switching from TN-OXB to extended-release once-nightly SXB (ON-SXB) on SRED among individuals with narcolepsy.
Methods: Retrospective chart review was conducted from a single clinical site. Data were collected from individuals with narcolepsy who experienced SRED while taking TN-OXB and were switched to ON-SXB from the time of switch to ON-SXB through currently available data. Patient demographics, medical history, oxybate treatment duration, dosage, and weight-related measures before and after the treatment switch were recorded. Data were described and analyzed descriptively.
Results: Of 8 individuals with narcolepsy who experienced SRED, the mean (SD) age was 21 (4.1) years, 6 (75%) were female, and 6 (75%) and 2 (25%) had narcolepsy type (NT) 1 and NT2, respectively. Before switching to ON-SXB, median (range) TN-OXB dose and mean (SD) treatment duration were 8.8 (4.8-10.5) g and 40.6 (21.1) months, respectively, with 3 individuals (37.5%) taking asymmetric doses. After switching to ON-SXB, median (range) ON-SXB dose was 9 (6-9) g. Sleep eating episodes were resolved in all individuals within 6 months of switching to ON-SXB. Five (63%) individuals experienced a reduction in BMI after switching to ON-SXB.
Conclusion: In this retrospective chart analysis, individuals with narcolepsy and SRED experienced positive clinical outcomes after switching from TN-OXB to ON-SXB. Individuals switching to an oxybate that did not require a middle-of-the-night dose had resolution of sleep eating, and nearly two-thirds experienced a reduction in BMI. SRED is an underappreciated challenge with TN-OXB dosing that may be ameliorated with a single, extended-release dose of SXB, as provided by ON-SXB.
Support (if any): Avadel Pharmaceuticals

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0843

ENCORE: TOPLINE RESULTS OF A PHASE 3 OPEN-LABEL EXTENSION AND RANDOMIZED-WITHDRAWAL TRIAL OF AXS-12 IN NARCOLEPSY

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Introduction: AXS-12 (reboxetine) is a highly selective norepinephrine reuptake inhibitor and cortical dopamine modulator under development for narcolepsy. In the Phase 3 SYMPHONY trial, AXS-12 significantly reduced weekly cataplexy attacks from baseline to Week 5 versus placebo in patients with narcolepsy. Here we report the Phase 3 ENCORE trial, assessing long-term efficacy and safety of AXS-12 in participants who completed SYMPHONY.
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, remaining participants were randomized 1:1 to continue twice-daily AXS-12 or switch to once-daily AXS-12 plus placebo for 1 week, then placebo twice-daily for 2 weeks. The primary endpoint was change in frequency of cataplexy attacks from randomization to DBRW Week 3. OLE efficacy outcomes included change in weekly frequency of cataplexy attacks, cataplexy response (≥50% reduction), and change in cataplexy-free days. Additional analyses are ongoing.
Results: ENCORE enrolled 68 participants; 42 completed the OLE and entered the DBRW (AXS-12, n=22; placebo, n=20). In SYMPHONY, baseline mean weekly frequency of cataplexy attacks was 31.5. At DBRW randomization, mean weekly frequency of cataplexy attacks was 4.2 (AXS-12) and 6.9 (placebo). Participants randomized to placebo experienced a mean increase of 10.29 weekly cataplexy attacks versus 1.32 for AXS-12, at end of DBRW (p=0.017). In the OLE, weekly frequency of cataplexy attacks decreased by 22.3 (71%) and 24.1 (77%) at 1 and 6 months, respectively. Cataplexy response was achieved by 72% and 82% at 1 and 6 months, respectively. Cataplexy-free days increased from 14.3% to 61% and 70% at 1 and 6 months, respectively. Common adverse events (AEs; ≥5%) during the OLE were nausea and tachycardia (both 5.9%); no new safety signals were detected. Discontinuations due to AEs occurred in 17.6% of participants in the OLE.
Conclusion: AXS-12 significantly reduced the frequency of cataplexy attacks during the DBRW. AXS-12 was well-tolerated and demonstrated maintenance of efficacy with long-term open-label use. These results align with SYMPHONY, supporting the positive therapeutic impact of AXS-12 for narcolepsy.
Support (if any): Axsome Therapeutics, Inc.

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0844

NARCOLEPSY TYPE 1 SYMPTOMS ACROSS PREGNANCY

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Introduction: Narcolepsy type 1 (NT1) is a chronic neurological disorder characterized by excessive daytime sleepiness, cataplexy, and disrupted nighttime sleep, often requiring lifelong treatment. Little is known about how pregnancy impacts NT1, so individuals with NT1 face difficult decisions about continuing or discontinuing treatments during pregnancy, particularly given the uncertain risks and benefits for themselves and their fetuses. This study aims to address this knowledge gap by investigating the trajectory of NT1 symptoms and associated experiences during pregnancy, with the goal of informing future guidelines and improving shared decision-making for individuals with NT1 and their clinicians.
Methods: This mixed-methods study was designed to capture both quantitative and qualitative data on NT1 symptom trajectories and patient experiences around pregnancy. Eligible participants were adults with NT1 who gave birth within the past two years. Data collection included an online survey assessing symptom severity, social support, and treatment decisions during preconception, pregnancy, delivery, and postpartum. The survey included validated tools, such as the Narcolepsy Severity Scale (NSS), and custom items tailored to pregnancy contexts. A subset of participants also participated in semi-structured interviews. Quantitative data was analyzed using paired t-tests and one-way ANOVA, while qualitative data was analyzed thematically to provide additional insight into participants' experiences and priorities.
Results: Preliminary data from 16 women (mean age 33.8 ± 4.36 years) with NT1 revealed significant variability in symptom trajectory and medication use around pregnancy. Half reported improvement in their NT1 symptoms during pregnancy, while about 1/3 described worse symptoms. The most bothersome symptoms during pregnancy were disrupted nighttime sleep (94%), attention/concentration difficulties (94%), and daytime sleepiness (88%). While most (56%) participants took medications for at least part of their pregnancy, discontinuation was common, particularly in the first trimester.
Conclusion: This study provides the beginning of a comprehensive overview of NT1 symptom evolution and medication management patterns during pregnancy. These findings plus additional research will help shape future prospective studies tracking NT1 symptoms during pregnancy and guide clinical recommendations and support.
Support (if any): This project was supported by Avadel Pharmaceuticals.

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0845

SAMELISANT (SUVN-G3031) ALLEVIATES EXCESSIVE DAYTIME SLEEPINESS IN NARCOLEPSY: RESULTS FROM A PHASE-2 STUDY

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Introduction: Narcolepsy is a chronic sleep disorder characterized by excessive daytime sleepiness (EDS), uncontrollable sleep attacks, cataplexy, hypnagogic hallucinations, and sleep paralysis. Current treatments for narcolepsy often come with significant limitations, such as side effects, limited efficacy, or the necessity of combining multiple therapies. Samelisant is a selective inverse agonist of histamine 3 receptors, showing promising potential as a novel treatment for this condition. In preclinical studies involving orexin knockout mice, Samelisant demonstrated wake-promoting effects and reduced cataplexy, underscoring its therapeutic potential. Samelisant safety/tolerability has been established in healthy subjects.
Methods: Samelisant was evaluated as monotherapy in a Phase 2 proof-of-concept study conducted in the USA and Canada to treat EDS in patients with narcolepsy (NCT04072380). The study

enrolled narcoleptic patients aged 18 to 65 years per ICSD-3 criteria, who had an Epworth Sleepiness Scale (ESS) score of ≥12 and a mean Maintenance of Wakefulness Test (MWT) time of < 12 minutes. A total of 190 patients were randomized into three treatment groups (placebo, Samelisant 2 mg, and Samelisant 4 mg) in a 1:1:1 ratio and received either placebo or Samelisant once daily for 14 days. The primary efficacy endpoint was the change in ESS score from Baseline to Day 14. Secondary and exploratory endpoints included changes in Clinical Global Impression – Severity, MWT and Patient Global Impression – Change scores from Baseline to Day 14. Safety was monitored throughout the study by the medical monitor and the data safety monitoring committee.

Results: Study evaluating Samelisant achieved primary efficacy endpoint demonstrating statistically significant ($p < 0.024$) and clinically meaningful reduction (-2.1 point) in ESS total score compared to placebo. Treatment with Samelisant resulted in significant improvement in EDS on scales assessed by both clinicians and patients. Samelisant was generally safe and well tolerated in narcolepsy patients and there were no serious events or death reported.

Conclusion: Samelisant holds promise as a monotherapy for treatment of EDS in narcolepsy, and a global Phase 3 study for the treatment of narcolepsy will be initiated in Q2 2025

Support (if any):

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0846

ACTIGRAPHY-BASED ASSESSMENT OF THE IMPACT OF TAK-861 ON DAYTIME NAPPING IN PEOPLE WITH NARCOLEPSY TYPE 1

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Introduction: Excessive daytime sleepiness (EDS) is a hallmark symptom of narcolepsy that profoundly impacts daily life. Naps are a clinically meaningful indicator of EDS, and wrist-worn accelerometers offer a convenient and accurate measurement method. We aimed to develop and validate an objective actigraphy-based algorithm for detecting daytime naps in people with narcolepsy type 1 (NT1).

Methods: The Multi-Ethnic Study of Atherosclerosis (MESA) dataset included manually annotated naps from 2,237 participants with wrist-worn actigraphy devices across seven days. Using MESA data, we developed an algorithm that predicted sleep-wake epochs from activity counts, grouped these predictions into naps (sleep periods lasting ≥5min between 9AM and 9PM), then applied decision rules (pruning and fusion) to optimize agreement with manually annotated naps. Following validation, our algorithm was applied in a phase 0 non-interventional study of 16 participants with NT1 and 16 healthy sex- and age-matched controls (NCT04445129), and a phase 2 interventional study of orexin receptor 2-selective agonist TAK-861 in 112 participants with NT1 (NCT05687903). Algorithm-derived measures included the proportion of nap-free days and total minutes of daytime sleep on days with ≥1 nap.

Results: In MESA, our nap detection algorithm yielded high sensitivity (86.5%) and F1 area (84.6%), and nominal correlations ($R=-0.16$, $p < 0.001$; $R=0.15$, $p < 0.001$; n=2,237) between napping and self-reported sleepiness measured via Epworth Sleepiness Scale (ESS), suggesting sleepiness is weakly associated with less nap-free days and more daytime sleep. In the non-interventional trial, participants with NT1 had 11.5 fewer nap-free days ($p < 0.001$; n=16) in a 4-week period and slept 37.5 more minutes during the day ($p < 0.001$; n=16) than controls. In the interventional trial, relative to baseline, TAK-861-treated participants with NT1 experienced a statistically significant increase in nap-free days in a 4-week period and slept less time per day across TAK-861 dose groups (0.5mg/0.5mg: n=23, 2mg/2mg: n=21, 2mg/5mg: n=23, 7mg: n=23; all $p < 0.001$). No significant effects were observed with placebo (n=22).

Conclusion: We developed a highly sensitive and specific actigraphy-based nap-detection algorithm which identified two important nap-related findings: increased napping in untreated participants with NT1, and substantially reduced daytime napping in TAK-861-treated participants with NT1.

Support (if any): Funded by Takeda Development Center Americas, Inc.

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0847

TREATMENT WITH AN OREXIN AGONIST REDUCES MICROSLEEPS AND IMPROVES WAKEFULNESS DURING MWT IN PEOPLE WITH NT1

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Introduction: The Maintenance of Wakefulness Test (MWT) is widely used in clinical trials to assess drug treatment effects on excessive daytime sleepiness (EDS). Sleep onset latency (SOL), the primary endpoint in MWT studies, measures the ability to stay awake until persistent sleep occurs; it does not provide insight into the quality of wakefulness prior to falling asleep. Here, we explored microsleeps, short periods of sleep (3-15 sec) prior to sleep onset during MWT as a biomarker for EDS following therapy using TAK-861, an oral orexin receptor 2-selective agonist developed for the treatment of narcolepsy type 1 (NT1) in a Phase 2 randomized, placebo-controlled trial (NCT05687903).

Methods: Participants with NT1 were randomized to receive TAK-861 (first dose at 8AM for all treatment arms; 0.5mg twice 3 hours apart; 2mg twice 3 hours apart; 2mg then 5mg 3 hours later; or 7mg once-daily) or placebo. The 4 MWT sessions consisted of a 40-minute wake trial at 10AM, 12PM, 2PM, and 4PM to assess fluctuations in sleepiness. MWTs were conducted at baseline and after 28 and 56 days after treatment, with microsleeps scored manually. Zero-inflated negative binomial mixed-effects models (with an offset term for SOL) and mixed-effects survival analysis were used to analyze microsleep rates and time-to-first microsleep, respectively. Pairwise contrasts with baseline within each treatment were performed, averaging over MWT sessions.

Results: MWT data were collected for 112 participants with NT1 (placebo: n=22, 0.5mg/0.5mg: n=23, 2mg/2mg: n=21, 2mg/5mg: n=23, 7mg: n=23). Microsleep rates (prior to falling asleep) decreased significantly by Week 4 and at Week 8 in all TAK-861 treatment groups relative to baseline (from 6 microsleeps per 10 min at baseline to < 2 per 10 min across all treatment groups). Additionally, all TAK-861 treatment groups experienced a prolonged time-to-first microsleep ($p < 0.005$ compared to baseline). Average microsleep duration (excluding participants with no

microsleep) showed no significant change in any arm. Placebo-treated participants showed minimal changes across sessions and visits.
Conclusion: TAK-861 significantly reduced microsleep rates and delayed the onset of the first microsleep, demonstrating its potential as an effective treatment for daytime sleepiness in participants with NT1.
Support (if any): Funded by Takeda Development Center Americas, Inc.

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0848
EVALUATION OF THE NOVEL OREXIN 2 RECEPTOR AGONIST ALKS 2680 ON MEASURES OF AROUSAL CIRCUIT ACTIVATION IN RODENTS

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Introduction: The orexin/hypocretin system acts as the master regulator of wakefulness by virtue of its connections to multiple downstream arousal neurotransmitter pathways. Thus, targeting the orexin system may provide novel treatment strategies for narcolepsy and related disorders. In this study, we characterized network engagement and functional activation induced in preclinical rodent models by ALKS 2680, a highly potent, orally bioavailable, and selective orexin 2 receptor agonist being developed as a once-daily treatment for narcolepsy and idiopathic hypersomnia.
Methods: Whole-cell patch-clamp techniques were used to measure changes in histamine neuron excitability following ALKS 2680 treatment in acute mouse brain slices conserving the tuberomammillary nucleus. Whole brain circuit activation mapping was quantified using cellular c-Fos activation following acute oral dosing in rats. Changes in cortical neurotransmission were measured using microdialysis in freely moving rats. Cortical activation and arousal states were quantified using electroencephalography (EEG) and electromyography (EMG) in rats.
Results: Bath application of ALKS 2680 onto acute brain slices resulted in a concentration-dependent depolarization of histamine neurons. The maximal change in membrane potential was similar to that produced by the synthetic orexin B peptide [Ala11,D-Leu15]-OX-B, however ALKS 2680 demonstrated greater potency. ALKS 2680 dose-dependently increased the number of c-Fos positive nuclei in OX2R expressing brain areas associated with arousal/wakefulness, cognition, and/or cataplexy. Notably, change in c-Fos activation was not observed in a brain area predominantly expressing orexin 1 receptors. Acute, oral administration of ALKS 2680 dose-dependently elevated extracellular prefrontal cortical acetylcholine and histamine concentrations. Finally, oral administration of ALKS 2680 resulted in a dose-dependent increase in an EEG profile consistent with wakefulness, including an increase in gamma power and suppression of slower frequency bands such as delta. In addition, sleep staging analysis revealed a significant increase in wakefulness relative to vehicle.
Conclusion: ALKS 2680 increased measures of cortical activation, engagement of vigilance circuitry, and consolidated wakefulness. These preclinical data support further investigation of ALKS 2680 for the treatment of narcolepsy and idiopathic hypersomnia, including cognition- and wakefulness-related symptoms.
Support (if any): Alkermes, Inc.

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0849
DIAGNOSIS JOURNEY, SYMPTOMS, AND BURDEN OF IDIOPATHIC HYPERSOMNIA: PATIENT PERSPECTIVES FROM QUALITATIVE INTERVIEWS

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Introduction: Idiopathic hypersomnia (IH) is a chronic neurological disorder characterized by excessive daytime sleepiness (EDS), among other symptoms. Studies assessing the burden of IH have largely relied on quantitative methods, providing limited insight into the patient experience. This study used qualitative interviews to understand aspects of this rare condition including diagnostic journey, symptoms, and disease burden.
Methods: Participants were recruited using purposive sampling. Trained qualitative researchers conducted each 60-minute individual interview. Interviewers used a concept elicitation approach with a semi-structured interview guide to elicit descriptions of patients' experiences. Interview transcripts were coded and analyzed using inductive and deductive approaches.
Results: Ten adults with IH were interviewed (mean age: 37 years). Most identified as female (80%) and employed (80%). All participants were White. At disease onset, initial symptoms included EDS (70%), fatigue (30%), and oversleeping (30%). In seeking a diagnosis, participants saw different healthcare professionals including sleep specialists, neurologists, psychiatrists, and primary care physicians. Half of the participants received an IH diagnosis >10 years after symptom onset. Prior to diagnosis, participants reported receiving other diagnoses, including depression, sleep apnea, and chronic fatigue syndrome. The most common symptoms participants with IH have experienced included cognitive impairments i.e. difficulties with thinking, memory, and concentration (100%), EDS (90%), and fatigue (90%). All or nearly all participants described that IH negatively impacted: work and school activities (e.g., trouble concentrating on tasks, forgetting information, falling asleep during meetings or conversations; 100%), mental health (e.g., depression, anxiety, embarrassment, lack of motivation; 100%), and instrumental activities of daily living (e.g., home maintenance, cooking/preparing meals, driving; 90%). Most participants also described negative impacts of IH on their relationships with family, friends, and romantic partners (e.g., reduced time spent with children, marital strain; 80%) and activities of daily living (e.g., eating, bathing, dressing/grooming, toileting; 70%).
Conclusion: This study provides patient-reported depictions of the often-challenging journey toward seeking an IH diagnosis, describes IH symptoms from patients' perspectives, and demonstrates the breadth of impact of IH on patients' lives. These results help to fill gaps in the literature by providing important insights into the IH patient experience.
Support (if any): Alkermes, Inc.

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0850
RISING PRESSURE TO UNDERSTAND THE RISKS OF HYPERTENSION IN CHILDREN WITH NARCOLEPSY TYPE 1

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Introduction: Most children/adolescents with Narcolepsy Type 1 (NT1) are treated with traditional stimulants based on U.S. claims data, yet the cardiovascular effects of these medications have not been investigated in this population. We compared vital signs in youth with NT1 before and after exposure to stimulants/wake promoting agents (WPAs) to test the hypotheses that these medications increase rates of elevated blood pressure (BP) and hypertension (HTN) and that body mass index (BMI) influences these outcomes.
Methods: In this retrospective study, we collected electronic medical data including vital signs and polysomnography/multiple sleep latency test (PSG/MSLT) results from 39 NT1 patients aged 7-18 at three points over 20-month period: baseline (drug-naïve/weaned), after initiating treatment, and after treatment optimization. We performed stepwise regression to determine predictors of baseline elevated BP/HTN. We used McNemar's test and generalized estimating equations to assess the effects of stimulant/WPA exposure on vital signs.
Results: The prevalence of elevated BP/HTN at baseline was 51% in our cohort and increased to 72% at the final visit when stimulants/WPA were optimized. BMI was not associated with elevated BP/HTN at baseline. Systolic and diastolic BP increased significantly with stimulant/WPA exposure (both $p < 0.05$), while heart rate (HR) showed a non-significant increase ($p = .08$). BMI was associated with increased systolic BP and HR across the three time points.
Conclusion: This study highlights potential cardiovascular risks associated with pediatric NT1, particularly in the context of treatment with stimulants/WPAs. We recommend close clinical monitoring of vital signs in clinical management of pediatric NT1 and advocate for prospective longitudinal research studies to better understand the cardiovascular risks of stimulants/WPAs in this population.
Support (if any): This study was funded by a grant from Wake Up Narcolepsy, PI: Maski.

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0851

EFFECTIVENESS AND SAFETY OF LOW-SODIUM OXYBATE IN IDIOPATHIC HYPERSOMNIA PARTICIPANTS: RESULTS FROM THE DUET STUDY

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Introduction: Introduction: Jazz DUET (Develop hypersomnia Understanding by Evaluating low-sodium oxybate Treatment) is a phase 4, prospective, multicenter, single-arm, multiple-cohort, open-label study (NCT05875974) evaluating the effectiveness of low-sodium oxybate (LXB, Xywav®) treatment on daytime and nighttime symptoms, including excessive daytime sleepiness (EDS) and polysomnography in participants with idiopathic hypersomnia (IH) or narcolepsy. Data presented are from the IH cohort.
Methods: DUET included screening (with 2-week washout for oxybate users), 8-day baseline (BL), 2- to 8-week LXB titration, 2-week stable-dose, 8-day end-of-treatment (EOT), and 2-week safety follow-up periods. The primary endpoint was change in Epworth Sleepiness Scale (ESS) score from BL to EOT. Secondary endpoints for the IH cohort included change in Idiopathic Hypersomnia Severity Scale (IHSS) total score, Patient Global Impression of Change (PGIc)−overall IH disease, PGIc−sleep inertia, and Patient Global Impression of Severity (PGIs)−sleep inertia. Exploratory endpoints included IHSS component scores (daytime functioning, sleep inertia). Primary and key secondary (IHSS total score) endpoints were controlled for multiplicity with sequential testing; all other P-values are considered nominal.
Results: Forty-six people with IH enrolled and were dosed with LXB; 40 were completers. Enrolled participants were mostly female (80.4%) and White (84.8%), with a mean (SD) age of 38.1 (11.8) years. For completers, BL mean (SD) ESS score and IHSS total score were 16.5 (2.7) and 32.9 (7.1), respectively; least-squares mean (LSM) (SE) changes from BL to EOT were −8.4 (0.7), P<.0001 and −15.5 (1.5), P<.0001. BL mean (SD) IHSS component scores for daytime functioning and sleep inertia were 17.7 (4.2) and 10.7 (3.1), respectively; LSM (SE) changes from BL to EOT were −8.8 (1.0), P<.0001 and −4.8 (0.4), P<.0001. At EOT, most participants reported improvement (very much, much, minimally) on PGIc−overall IH disease (94.6%) and PGIc−sleep inertia (81.1%). At BL, 25.0% of participants reported sleep inertia severity as very mild/mild/not present on PGIs–sleep inertia vs 59.0% at EOT. Treatment-emergent adverse events were consistent with the known safety profile of LXB.
Conclusion: People with IH taking open-label LXB showed improvements in EDS and sleep inertia (decreased ESS and IHSS component scores) and reported reduced multi-symptom burden (decreased IHSS total scores and improved PGIc/PGIs ratings).
Support (if any): Jazz Pharmaceuticals

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0852

SUBJECTIVE SLEEP QUALITY WITH LOW-SODIUM OXYBATE TREATMENT IN IDIOPATHIC HYPERSOMNIA: RESULTS FROM THE DUET STUDY

Richard Bogan[1], David Plante[2], Alyssa Cairns[3], Deborah Nichols[4], Teresa Steininger[4], Douglas Fuller[4], Sarah Akerman[4], Marisa Whalen[4], Nancy Foldvary-Schaefer[5]
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Introduction: Jazz DUET (Develop hypersomnia Understanding by Evaluating low-sodium oxybate Treatment) is a phase 4, prospective, multicenter, single-arm, multiple-cohort, open-label study (NCT05875974) evaluating the effectiveness of low-sodium oxybate (LXB, Xywav®) treatment on outcomes including sleep quality (using polysomnography [PSG] and self-reported questionnaires) in participants with idiopathic hypersomnia or narcolepsy. Data reported here are from the idiopathic hypersomnia cohort.
Methods: DUET included a screening period (with 2-week washout for current oxybate users), an 8-day baseline (BL) period, a 2- to 8-week LXB titration period, a 2-week stable-dose period (SDP), an 8-day end-of-treatment (EOT) period, and a 2-week safety follow-up. Participants underwent nocturnal PSG (ad libitum protocol) at BL and EOT. The Karolinska Sleepiness Scale

(KSS) was administered 90 minutes post-awakening from PSG to measure situational sleepiness (9-point scale; 1="extremely alert" to 9="extremely sleepy, can't keep awake"). Participants completed an electronic sleep diary (eDiary) daily during the BL and EOT periods, including questions regarding nightly sleep patterns, total sleep time (TST), 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"). Completion of ≥5 eDiary days during the 8-day assessment before PSG visits was required for analysis. eDiary and KSS data were analyzed in the completer set (enrolled participants who were dosed with LXB and completed SDP and PSG at EOT).

Results: Forty-six participants with idiopathic hypersomnia enrolled (completer set, n=40). Most were female (37/46; 80%) and White (39/46; 85%); mean (SD) age was 38.1 (11.8) years. Mean (SD) self-reported nocturnal TST at BL (n=36) and EOT (n=30) was 8.6 (2.0) and 8.4 (2.7) hours, respectively. The percent of participants rating their sleep quality as "very good"/"good" increased from 19.4% (BL) to 56.7% (EOT). The percent of participants with rested sleep ("very well"/"well"/"somewhat" rested) increased from 22.2% (BL) to 73.3% (EOT). Likewise, mean (SD) rating of self-reported sleepiness decreased from 5.7 (2.0) at BL to 3.5 (2.0) at EOT.

Conclusion: Following open-label LXB treatment, participants with idiopathic hypersomnia reported improvements in sleep quality and feeling more rested and less sleepy upon awakening.

Support (if any): Jazz Pharmaceuticals

Abstract citation ID: zsaf090.0853

0853

SLEEP ARCHITECTURE WITH LOW-SODIUM OXYBATE TREATMENT IN IDIOPATHIC HYPERSOMNIA: RESULTS FROM THE DUET STUDY

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Introduction: Jazz DUET (Develop hypersomnia Understanding by Evaluating low-sodium oxybate Treatment) is a phase 4, prospective, multicenter, single-arm, multiple-cohort, open-label study (NCT05875974) evaluating the effectiveness of low-sodium oxybate (LXB, Xywav®) treatment on outcomes including polysomnography (PSG)-based sleep architecture in participants with idiopathic hypersomnia or narcolepsy. This abstract will include results from the idiopathic hypersomnia cohort.

Methods: DUET included a screening period (2-week washout for current oxybate users), an 8-day baseline (BL) period, a 2- to 8-week LXB titration period, a 2-week stable-dose period (SDP), an 8-day end-of-treatment period (EOT), and a 2-week safety follow-up. Participants underwent nocturnal PSG using an ad libitum protocol at BL and EOT. PSGs were scheduled to allow a minimum of 10 hours in bed, unless the participant naturally awakened earlier; bedtime was determined by habitual bedtime. PSG recordings were centrally scored. Data were analyzed for participants in the idiopathic hypersomnia cohort completer set. P-values were uncontrolled for multiplicity and therefore considered nominal.

Results: Forty-six participants with idiopathic hypersomnia enrolled; 40 completed the study. Most were female (80%) and White (85%) with a mean±SD age of 38.1±11.8 years. Mean±SD total sleep time (TST) at BL and EOT was 467.5±111.9 and 413.4±97.9 minutes, respectively (LSM change [95% CI], –54.1 [–81.3, –26.9]; P=.0003). Mean±SD number of total shifts from deeper to lighter sleep stages at BL and EOT was 60.8±30.1 and 43.7±27.0, respectively (LSM [95% CI], –17.1 [–23.7, –10.5]; P<.0001). Mean±SD time spent in N1 at BL and EOT was 47.8±26.1 and 33.0±22.4 minutes (LSM [95% CI], –14.8 [–20.3, –9.3]; P<.0001), % of stage was 10.3% and 8.0% (P=.0017); in N2, 270.0±64.8 and 225.8±72.8 minutes (LSM [95% CI], –44.3 [–66.7, –21.9]; P=.0003), 58.5% and 54.2% (P=.0286); in N3, 51.9±35.3 and 92.5±53.5 minutes (LSM [95% CI], 40.6 [25.8, 55.4]; P<.0001), 11.2% and 22.8% (P<.0001); and in REM, 97.7±47.0 and 62.1±35.4 minutes (LSM [95% CI], –35.7 [–46.0, –25.3]; P<.0001), 20.0% and 15.0% (P<.0001).

Conclusion: Participants with idiopathic hypersomnia treated with open-label LXB demonstrated reduced TST on ad libitum polysomnography compared with baseline, increases in N3 sleep, and changes in sleep architecture.

Support (if any): Jazz Pharmaceuticals

Abstract citation ID: zsaf090.0854

0854

SAFETY AND TOLERABILITY OF ONCE-NIGHTLY SODIUM OXYBATE: A POST HOC ANALYSIS FROM THE LONG-TERM RESTORE STUDY

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Introduction: In the phase 3 REST-ON clinical trial, extended-release, once-nightly sodium oxybate (ON-SXB) demonstrated a safety profile consistent with the known oxybate safety profile, with adverse drug reactions (ADRs) primarily related to tolerability. The long-term safety and tolerability of ON-SXB were investigated in the open-label/switch study RESTORE (NCT04451668).

Methods: Participants in RESTORE were ≥16 years of age with narcolepsy type 1 or 2 who had completed the REST-ON trial (without starting another oxybate), were on immediate-release twice-nightly SXB (TN-SXB) for ≥1 month, or were oxybate naive. For participants who completed REST-ON but had not initiated TN-SXB or who were oxybate naive, ON-SXB was initiated at 4.5 g/night and increased weekly by 1.5 g/night as needed up to 9 g/night during a 1- to 2-month titration period. Participants then received ON-SXB until they could be transitioned to commercial therapy. This analysis included data from participants who completed REST-ON (without starting another oxybate) or who were oxybate naive and received ≥1 dose of ON-SXB (safety population). Safety data are reported as treatment-emergent adverse events (TEAEs; ie, any AE that occurs during treatment) and ADRs (ie, TEAEs considered drug-related).

Results: Of the 50 participants (mean age, 33 years; female, 60%; white, 80%; mean [range] ON-SXB treatment, 408.1 [8–1098] days) who were from REST-ON (n=15) or were oxybate naive (n=35), 76% (38/50) reported ≥1 TEAE; most were mild (n=18; 36%) or moderate (n=18; 36%) in severity. TEAEs occurring in ≥10% of participants included nausea (26%), COVID-19 (12%), somnolence (12%), dizziness (10%), vomiting (10%), sinusitis (10%), and tremor (10%). One (2%) participant reported ≥1 serious AE considered related to ON-SXB treatment (anxiety, delusional thoughts) that led to ON-SXB discontinuation. ADRs were reported by 56% (28/50) of participants. ADRs occurring in ≥10% of participants included nausea (24%), somnolence (12%), and dizziness (10%). Seven (14%) participants experienced ≥1 ADR that led to ON-SXB discontinuation; only nausea led to discontinuation in >1 participant (n=2).
Conclusion: These data from RESTORE demonstrate that REST-ON and oxybate-naive participants tolerated ON-SXB well, as TEAEs were primarily mild/moderate in severity. ADRs were aligned with the known safety profile of TN-SXB.
Support (if any): Avadel Pharmaceuticals

Abstract citation ID: zsaf090.0855

0855

SUCCESSFUL TRANSITION FROM TWICE-NIGHTLY OXYBATES TO ONCE-NIGHTLY SODIUM OXYBATE: A POST HOC ANALYSIS FROM RESTORE

Adrian Santamaria[1], John Harsh[2], Bruce Corser[3], J. Douglas Hudson[4], Sally Ibrahim[5], Paula Schweitzer[6], Brian Abaluck[7], Jennifer Gudeman[7]

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Introduction: Extended-release, once-nightly sodium oxybate (ON-SXB; LUMRYZ™) eliminates the middle-of-the-night dosing required with immediate-release, twice-nightly oxybates (TN-OXBs). RESTORE (NCT04451668) was an open label/switch study that assessed the safety and tolerability of ON-SXB in people with narcolepsy.
Methods: Participants with narcolepsy aged ≥16 years who had completed the phase 3 REST-ON trial, were on stable-dose TN-OXB (switch participants), or were oxybate-naïve were eligible. For switch participants, initial ON-SXB doses were equivalent or closest to their prior total nightly TN-OXB dose. Doses could be titrated at ±1.5g/week until stable dosing was achieved (minimum, 4.5g/night; maximum, 9g/night). Treatment-emergent adverse events (TEAEs) during the 8-week dose titration period were recorded weekly for switch participants in the safety population (ie, received ≥1 ON-SXB dose) who completed a nocturnal AE questionnaire.
Results: Safety data were collected for 99.2% (129/130) of switch participants. All TEAEs reported by ≥3% of switch participants occurred during weeks 1-3; no TEAEs ≥3% were reported during weeks 4-8. At week 1, TEAEs ≥3% included nausea (3.2%), vomiting (3.2%), decreased appetite (3.2%), and urinary retention (3.2%) with the 6-g dose, and headache (7.0%) and somnolence (4.7%) with 9g. At week 2, TEAEs ≥3% included nausea (3.2%), upper respiratory infection (3.2%), dizziness (3.2%), and hypertension (3.2%) with 6g. At week 3, TEAEs ≥3% included vomiting (3.2%), enuresis (3.2%), insomnia (3.2%), and somnambulism (3.2%) with 6g. No TEAEs ≥3% were reported with 4.5g during weeks 1-3, or with 7.5g or 9g during weeks 2-3. Most TEAEs were mild or moderate in severity. The only reported severe TEAE was dyskinesia (1.2%) with the 7.5-g dose. During the ≥3-year RESTORE study, only 5.4% of switch participants discontinued ON-SXB due to a TEAE.
Conclusion: For participants switching from stable-dose TN-OXB, ON-SXB was well tolerated during the 8-week titration period, with most TEAEs being of mild to moderate severity and consistent with the oxybate safety profile. By week 4, no TEAEs were reported by ≥3% of participants, suggesting resolution of many TEAEs during titration. Participants successfully switched to ON-SXB from their nearest or equivalent prior total nightly TN-OXB dose.
Support (if any): Avadel Pharmaceuticals

Abstract citation ID: zsaf090.0856

0856

REAL-WORLD PATIENT INSIGHTS ON LOW-SODIUM OXYBATE FOR IDIOPATHIC HYPERSOMNIA: INTERIM RESULTS FROM LYRICAL

Caroleen Drachenberg[1], Jennifer Cline[2], Jennifer D'Souza[2], Christina Graham[2], Emily Kim[2], Meaghan Lawrence[2], Meagan Farrell[2], Grecia Sanchez[2], Donald Stull[2], Marisa Whalen[1], Jessica Alexander[1], Laura Herpel[3]

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Introduction: Low-sodium oxybate (LXB; Xywav®) is approved by the US Food and Drug Administration to treat excessive daytime sleepiness or cataplexy in patients ≥7 years of age with narcolepsy and adults with idiopathic hypersomnia (IH). To better characterize the treatment experience, including symptoms and quality of life (QoL), a longitudinal mixed methods study (LYRICAL) explores real-world, patient-reported outcomes (PROs) among a US-based cohort of adults with narcolepsy or IH taking LXB.
Methods: This analysis focuses on interim enrollment data from participants with IH on LXB for ≥12 weeks (n=22). An ongoing online survey consisting of standardized PRO instruments and de novo questions is being administered at enrollment, weeks 12 and 24; qualitative interviews are being conducted in a subset of participants. Descriptive analyses were performed with Patient Global Impression of Change (PGIC) items, Epworth Sleepiness Scale (ESS), and Treatment Satisfaction Questionnaire for Medication version 9 (TSQM-9). Initial interview data (n=5) provided supporting evidence. No statistical testing was performed.
Results: At enrollment, the mean time on LXB for participants with IH was 61.4 weeks (standard deviation [SD]=37.5) with a mean nightly dosage of 6.9 grams (SD=2.3). Participants had a mean age of 30.2 years (SD=6.9), with the majority identifying as female (68.2%), White (45.5%) or Black/African American (36.4%); half (50.0%) were taking alerting agents. Nearly all participants (95.4%) reported improvements in IH symptoms compared to before LXB per overall PGIC. Symptom-specific PGIC items indicated improvements in nighttime sleep quality (72.7%), daytime sleepiness (86.4%), and sleep inertia (90.9%). ESS scores were in the mild range (mean=10.8; SD=4.7), with 50.0% reporting "normal" daytime sleepiness (≤10). Participants reported high global satisfaction (mean TSQM-9 score=69.8; SD=16.6); most participants (72.7%) reported being "Satisfied" to "Very satisfied" with symptom relief via LXB. Over 90.0% of participants reported improved QoL since starting LXB, per QoL-specific PGIC. During interviews, participants described

more complete symptom coverage with LXB compared to prior medications and improved day-to-day functioning.
Conclusion: The interim results of patient-reported data suggest improvements in multiple IH symptoms and quality of life compared to before starting LXB; and high global treatment satisfaction with LXB.
Support (if any): Jazz Pharmaceuticals.

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0857

REFRESH: PROSPECTIVE, OBSERVATIONAL STUDY DESIGN OF ONCE-NIGHTLY SODIUM OXYBATE FOR NARCOLEPSY IN CLINICAL PRACTICE

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Introduction: Once-nightly sodium oxybate (ON-SXB; LUMRYZ™) is approved to treat excessive daytime sleepiness and cataplexy in adult and pediatric patients ≥7 years of age with narcolepsy. The REFRESH study assesses the clinical effectiveness, patient satisfaction, and safety of ON-SXB for the treatment of narcolepsy in a real-world setting.
Methods: REFRESH is a multicenter observational study with a targeted enrollment of approximately 60 participants. Inclusion criteria include age ≥18 years and a confirmed diagnosis of narcolepsy type 1 or 2. Individuals who are oxybate naïve or switching from twice-nightly oxybate (TN-OXB) to ON-SXB may participate. Exclusion criteria include prior or current use of ON-SXB, presence of a clinical or mental health condition contraindicated by ON-SXB labeling, or any mental or physical condition deemed exclusionary by the study clinician. Participants complete a baseline assessment before ON-SXB treatment initiation. Clinical assessments are conducted over 4 monthly clinic visits; between visits, participants complete self-assessments. The study assesses changes in Epworth Sleepiness Scale score, Narcolepsy Severity Scale symptom scores, Sheehan Disability Scale, Patient and Clinician Global Impression of Change, and vital signs, including blood pressure. Prior to starting ON-SXB, participants switching from TN-OXB are retrospectively asked how often they missed doses, how missed doses affect their narcolepsy symptoms and function, and if the twice-nightly dosing regimen of TN-OXB was associated with safety concerns. Partners of switch participants can participate to understand how twice-nightly dosing affected them.
Results: Study enrollment began in July 2024.
Conclusion: Understanding the real-world experience of individuals treated with ON-SXB can improve the care of people with narcolepsy in the future. In addition, understanding how treatment with ON-SXB compares with those who previously received TN-OXB is critical to optimizing decision-making for people with narcolepsy and their clinicians.
Support (if any): Avadel Pharmaceuticals

Abstract citation ID: zsaf090.0858

0858

REAL-WORLD EXPERIENCE AND SATISFACTION WITH LOW-SODIUM OXYBATE IN NARCOLEPSY: INTERIM RESULTS FROM LYRICAL

Caroleen Drachenberg[1], Jennifer Cline[2], Jennifer D'Souza[2], Christina Graham[2], Emily Kim[2], Meaghan Lawrence[2], Meagan Farrell[2], Grecia Sanchez[2], Donald Stull[2], Marisa Whalen[1], Jessica Alexander[1], Laura Herpel[3]

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Introduction: Low-sodium oxybate (LXB; Xywav®) is approved by the US Food and Drug Administration to treat excessive daytime sleepiness (EDS) or cataplexy in patients ≥7 years of age with narcolepsy and adults with idiopathic hypersomnia. The longitudinal mixed methods study LYRICAL examines the real-world, treatment experience of US adults with narcolepsy or idiopathic hypersomnia taking LXB.
Methods: This analysis focuses on interim enrollment data from participants with narcolepsy on LXB for ≥12 weeks (n=33). An ongoing online survey consisting of standardized patient-reported outcome instruments and de novo questions is being administered at enrollment, weeks 12, and 24; interviews are being conducted among a subset of participants. Descriptive analyses were performed on Patient Global Impression of Change (PGIC) items, Epworth Sleepiness Scale (ESS), and Treatment Satisfaction Questionnaire for Medication version 9 (TSQM-9). Initial interview data (n=6) provided supporting evidence. No statistical testing was performed.
Results: At enrollment, the mean time on LXB for participants with narcolepsy was 98.2 weeks (standard deviation [SD]=64.8); mean total nightly dosage was 7.7 grams (SD=1.3); mean age was 32.7 years (SD=7.7). Participants were mostly female (93.9%), White (93.9%), and taking alerting agents (84.8%). All participants (100.0%) reported improvements on PGIC for overall narcolepsy symptoms after initiating LXB. Individual symptom-specific PGICs indicated similar improvements in nighttime sleep quality (93.8%), EDS (96.9%), and cataplexy (90.0%) since starting LXB. Mild levels of EDS were reported after initiating LXB (mean ESS score=11.2; SD=4.2). Participants reported high global satisfaction with LXB treatment (mean TSQM-9 score=72.7, SD=23.0); 75.7% of participants reported being "Satisfied" to "Very satisfied" with symptom relief provided by LXB and 60.6% were "Very" to "Extremely satisfied" with the amount of time needed to experience the effects of LXB. Over 90.0% of participants reported improved quality of life (QoL), per QoL-specific PGIC. Anecdotal interview data suggest high satisfaction with LXB, which may be attributed to reduced symptom burden and more comprehensive symptom coverage relative to prior medications.
Conclusion: Interim results of patient-reported data from the ongoing LYRICAL study suggest that participants with narcolepsy taking LXB experience symptom improvement, improved quality of life, and high global treatment satisfaction.
Support (if any): Jazz Pharmaceuticals.

Abstract citation ID: zsaf090.0859

0859

CORRELATION BETWEEN MAINTENANCE OF WAKEFULNESS TEST AND EPWORTH SLEEPINESS SCALE SCORES IN REST-ON

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Introduction: Low-to-moderate strength correlations between Maintenance of Wakefulness Test (MWT) and Epworth Sleepiness Scale (ESS) scores have been reported in clinical trials in narcolepsy. This post hoc analysis of REST-ON (NCT02720744), which demonstrated the efficacy of once-nightly sodium oxybate (ON-SXB; LUMRYZ™) for narcolepsy, assessed the correlation between mean sleep latency (MSL) on the MWT and ESS scores.
Methods: REST-ON participants (age ≥16 years) with narcolepsy were randomized 1:1 to ON-SXB (week 1, 4.5 g; weeks 2-3, 6 g; weeks 4-8, 7.5 g; weeks 9-13, 9 g) or placebo. Pearson correlation coefficients assessed the relationship between MSL (min) on the MWT and ESS score by treatment arm in the modified intent-to-treat (mITT) population (≥1 efficacy measurement after receiving the 6-g dose) at baseline (pretreatment) and weeks 3 (6 g), 8 (7.5 g), and 13 (9 g).
Results: In the mITT population (ON-SXB, n=97; placebo, n=93), respective baseline MSL (SD) on the MWT and baseline mean (SD) ESS score was 5.0 (3.1) and 16.6 (3.8) for ON-SXB and 4.7 (2.6) and 17.5 (4.1) for placebo. At baseline, no correlation was observed between MSL on the MWT and ESS score for either arm (ON-SXB, r=0.015; placebo, r=–0.023). At weeks 3, 8, and 13, respective MSL (SD) was 13.1 (8.8), 14.5 (9.8), and 15.5 (9.8) minutes and respective ESS scores were 13.3 (5.9), 11.6 (6.1), and 10.4 (6.2) for ON-SXB; for placebo, MSL (SD) was 7.8 (5.9), 7.8 (6.3), and 9.4 (7.9) minutes, with ESS scores of 16.6 (4.6), 15.4 (5.3), and 14.9 (5.5). Moderate strength correlations between MSL on the MWT and ESS scores were observed in the ON-SXB arm (r=–0.419, –0.305, –0.394 at weeks 3, 8, 13, respectively). Weak correlations were observed in the placebo group (r=–0.193, –0.271, –0.181 at weeks 3, 8, 13, respectively).
Conclusion: After initiating ON-SXB treatment, the correlation between MWT and ESS scores strengthened, suggesting that improved wakefulness enhances awareness of sleepiness levels in people with narcolepsy.
Support (if any): Avadel Pharmaceuticals

Abstract citation ID: zsaf090.0860

0860

SUBJECTIVE SLEEP QUALITY WITH LOW-SODIUM OXYBATE TREATMENT IN NARCOLEPSY: RESULTS FROM THE DUET STUDY

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Introduction: Jazz DUET (Develop hypersomnia Understanding by Evaluating low-sodium oxybate Treatment) is a phase 4, prospective, multicenter, single-arm, multiple-cohort, open-label study (NCT05875974) evaluating the effectiveness of low-sodium oxybate (LXB, Xywav®) treatment on outcomes including sleep quality (using polysomnography [PSG] and self-reported questionnaires) in participants with narcolepsy or idiopathic hypersomnia. Data reported here are from the narcolepsy cohort.
Methods: DUET included a screening period (with 2-week washout for current oxybate users), an 8-day baseline (BL) period, a 2- to 8-week LXB titration period, a 2-week stable-dose period (SDP), an 8-day end-of-treatment (EOT) period, and a 2-week safety follow-up. Participants underwent nocturnal PSG (ad libitum protocol) at BL and EOT. The Karolinska Sleepiness Scale (KSS) was administered 90 minutes post-awakening from PSG to measure situational sleepiness (9-point scale; 1="extremely alert" to 9="extremely sleepy, can't keep awake"). Participants completed an electronic sleep diary (eDiary) daily during the BL and EOT periods, including questions regarding nightly sleep patterns, total sleep time (TST), 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"). Completion of ≥5 eDiary days during the 8-day assessment before PSG visits was required for analysis. eDiary and KSS data were analyzed in the completer set (enrolled participants who were dosed with LXB and completed SDP and PSG at EOT).
Results: Fifty-five participants with narcolepsy (type 1, n=26; type 2, n=29) enrolled (completer set, n=34). Most were female (40/55; 73%) and White (44/55; 80%); mean (SD) age was 33.4 (12.9) years. Mean (SD) self-reported nocturnal TST at BL (n=32) and EOT (n=20) was 8.1 (1.6) and 8.3 (0.9) hours, respectively. The percent of participants rating their sleep quality as "very good"/"good" increased from 15.6% (BL) to 70.0% (EOT). The percent of participants with rested sleep ("very well"/"well"/"somewhat" rested) increased from 46.9% (BL) to 90.0% (EOT). Likewise, mean (SD) rating of self-reported sleepiness decreased from 5.1 (2.0) at BL to 3.8 (1.9) at EOT.
Conclusion: Following open-label LXB treatment, participants with narcolepsy reported improvements in sleep quality and feeling more rested and less sleepy upon awakening.
Support (if any): Jazz Pharmaceuticals

Abstract citation ID: zsaf090.0861

0861

A PHASE 2A, DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY OF ORX750 IN PATIENTS WITH NARCOLEPSY (TYPE 1 AND 2) AND IDIOPATHIC HYPERSOMNIA: STUDY DESIGN

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Introduction: Narcolepsy types 1 (NT1) and 2 (NT2), and idiopathic hypersomnia (IH) are rare, debilitating central disorders of hypersomnolence characterized by excessive daytime sleepiness (EDS). None of the currently available therapies target the orexin system, which is a core element of wake-promoting circuitries and specifically, of NT1 pathology. ORX750 is a novel, investigational oral orexin-2 receptor (OX2R) agonist that demonstrated strong wake-promoting effects in acutely sleep-deprived healthy volunteers (ongoing phase 1 study). An ongoing phase 2a study, ORX750-0201 will evaluate the safety, tolerability, efficacy, and PK of ORX750 in NT1, NT2, and IH patients.
Methods: This phase 2a study is a randomized, double-blind, placebo-controlled, cross-over basket study with separate cohorts for NT1, NT2, and IH. Initial dosing will be 1 mg (NT1) and 2 mg (NT2 and IH) with sequential dose escalation/de-escalation between cohorts. Within dosing cohorts, participants will be randomized to one of two blinded treatment sequences and receive ORX750 for 4 weeks and placebo for 2 weeks (6-week treatment duration total) in a crossover design. Efficacy endpoints will include the Maintenance of Wakefulness Test (MWT), Epworth Sleepiness Scale (ESS), and weekly cataplexy rate (NT1 only). Other exploratory assessments include measures of overall symptom improvement, sleep, cognition, attention, memory, and general health.
Results: This study plans to complete 78 participants (n=18 NT1; n=24 NT2; n=36 IH), with three dose cohorts per disorder. This 6-week crossover study has >87.5 % power within each dosing cohort to detect a 15 min change in mean sleep latency on the MWT relative to placebo (two-sided α=0.05). The study initiated with participating sites in the US, Canada, and EU. Data for all three disorders are expected in 2025.
Conclusion: This study will evaluate the safety, tolerability, efficacy, and PK of multiple doses of ORX750 for the first time in patients with NT1, NT2, and IH with results informing future clinical studies.
Support (if any): Centessa Pharmaceuticals

Abstract citation ID: zsaf090.0862

0862

SLEEP ARCHITECTURE WITH LOW-SODIUM OXYBATE TREATMENT IN NARCOLEPSY: RESULTS FROM THE DUET STUDY

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Introduction: Jazz DUET (Develop hypersomnia Understanding by Evaluating low-sodium oxybate Treatment) is a phase 4, prospective, multicenter, single-arm, multiple-cohort, open-label study (NCT05875974) evaluating effectiveness of low-sodium oxybate (LXB, Xywav®) treatment on outcomes including polysomnography (PSG)-based sleep architecture in participants with idiopathic hypersomnia or narcolepsy (type 1 [NT1] or 2 [NT2]).
Methods: DUET included a screening period (2-week washout for current oxybate users), 8-day baseline (BL) period, 2- to 8-week LXB titration period, 2-week stable-dose period (SDP), 8-day end-of-treatment period (EOT), and 2-week safety follow-up. Participants underwent nocturnal PSG (ad libitum protocol) at BL and EOT. PSGs were scheduled to allow a minimum of 10 hours in bed, unless the participant naturally awakened earlier; bedtime was determined by habitual bedtime. PSG recordings were centrally scored. Data were analyzed for participants in the narcolepsy cohort completer set. Total shifts from deeper to lighter sleep stages was defined as N1/N2/N3/REM to wake and N2/N3/REM to N1. Key secondary endpoints (total stage shifts, N3 duration) were controlled for multiplicity with sequential testing; other P-values are considered nominal.
Results: Fifty-five participants with narcolepsy enrolled (NT1, n=26; NT2, n=29); 34 completed the study (NT1, n=16; NT2, n=18). Most were female (73%) and White (80%) (mean±SD age, 33.4±12.9 years). Mean±SD total sleep time (TST) at BL/EOT was 453.2±80.1/452.4±70.0 minutes (LSM change [95% CI]: –0.78 [–23.7, 22.1]; P=.9451). Mean±SD number of total shifts from deeper to lighter sleep stages at BL/EOT was 54.6±28.0/41.6±25.6 (LSM [95% CI]: –13.1 [–19.0, –7.1]; P<.0001 [controlled for multiplicity]). Mean±SD time spent in N1 at BL/EOT was 45.3±28.4/37.2±25.2 minutes (LSM [95% CI]: –8.1 [–14.9, –1.4]; P=.0196), % of stage was 10.4%/8.2% (P=.0037); in N2 was 241.8±61.2/243.3±76.1 minutes (LSM [95% CI]: 1.5 [–23.6, 26.6]; P=.9040), 53.1%/53.2% (P=.9869); in N3 was 61.1±34.8/106.1±69.5 minutes (LSM [95% CI]: 45.0 [27.0, 63.0]; P<.0001 [controlled for multiplicity]), 13.7%/24.0% (P<.0001); and in REM was 105.0±42.7/65.8±33.1 minutes (LSM [95% CI]: –39.2 [–50.8, –27.5]; P<.0001), 22.8%/14.7% (P<.0001).
Conclusion: Participants with narcolepsy taking open-label LXB showed negligible change in TST and N2, increased N3, decreased N1 and REM, and fewer shifts from deeper to lighter stages of sleep.
Support (if any): Jazz Pharmaceuticals

Abstract citation ID: zsaf090.0863

0863

PHASE 1 CLINICAL DATA WITH OREXIN RECEPTOR 2 (OX2R) AGONIST, ORX750, IN ACUTELY SLEEP-DEPRIVED HEALTHY VOLUNTEERS

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Introduction: ORX750 is a novel, investigational oral orexin receptor 2 (OX2R) agonist in development for the treatment of narcolepsy and idiopathic hypersomnia. Strong wake-promoting effects were observed in preclinical studies, supporting clinical investigation of ORX750. A first-in-human phase 1 study is ongoing to evaluate the safety and wake-promoting effects of single and multiple oral doses of ORX750.
Methods: Safety, tolerability, and pharmacokinetics of ORX750 were evaluated at single-ascending doses (SAD) and multiple-ascending doses (MAD) in a randomized, placebo-controlled study in healthy volunteers. Following the SAD study, wake-promoting effects were evaluated in placebo-controlled Proof of Concept (POC) cohorts with a single dose, two-way crossover design in acutely sleep-deprived subjects utilizing the Maintenance of Wakefulness Test (MWT).
Results: As of the data cut-off date of October 31, 2024, five SAD (total N=45 active, N=15 placebo), three POC (N=8, N=8, N=10), and 2 MAD cohorts (N=16 active, N=4 placebo) have

completed. Observed least squares (LS) mean (95% confidence interval [CI]) sleep onset latencies (minutes) in the MWT were 17.6 (12.1, 23.2), 32.0 (22.2, 41.8), and 33.6 (27.1, 40.1) at 1.0 mg, 2.5 mg, and 3.5 mg once daily (QD), respectively. Average LS mean (95% CI) difference from placebo for mean sleep latency was 8.1 (0.3,15.9), p=0.04 for 1.0mg, 15.2 (4.7, 25.8), p=0.01 for 2.5 mg, and 20.2 (15.2, 25.2), p< 0.0001 for 3.5 mg. Across SAD and MAD cohorts, treatment emergent adverse events were transient and mild in severity. This abstract will be supplemented with data from additional cohorts at the time of presentation.
Conclusion: ORX750 showed a favorable safety profile and clinically meaningful and statistically significant improvements on wakefulness in acutely sleep-deprived healthy volunteers. ORX750 was well tolerated, and normative wakefulness (>30 mins on the MWT) was achieved at the doses ≥ 2.5mg. These results support continued evaluation of ORX750 for the potential treatment of narcolepsy (type 1 and type 2) and idiopathic hypersomnia.
Support (if any): Centessa Pharmaceuticals

Abstract citation ID: zsaf090.0864

0864

ASSESSING PATIENT PREFERENCE OF SOLRIAMFETOL FOLLOWING USAGE OF MODAFINIL/ARMODAFINIL: A SINGLE CENTER RETROSPECTIVE ANALYSIS

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Introduction: Wakefulness promoting agents (WPA) are a class of drugs typically used for patients suffering from excessive daytime sleepiness to improve alertness. The most commonly utilized WPAs are modafinil/armodafinil ("modafinils"), and solriamfetol (trade name: Sunosi). The modafinils are similar in nature: modafinil is a racemic mixture of R and S isomers, while armodafinil is the isolated R isomer. The modafinils inhibit dopamine reuptake, while solriamfetol inhibits both dopamine and norepinephrine reuptake. Considering the difference in mechanisms and pharmacokinetic properties, more data are needed to assess the real world preferences of patients who are offered Sunosi while established on a modafinil product.
Methods: A manual chart review from 1/1/2024 to 6/1/2024 was conducted at a comprehensive sleep center in Sugar Land, TX to screen for patients with a diagnosis of obstructive sleep apnea, narcolepsy type 1, narcolepsy type 2, or idiopathic hypersomnia and who were on a modafinil product prior to switching to solriamfetol. Screening was conducted by using EMR software reporting to search for "Sunosi" in the impression and plan section of patient notes. Presence of inclusion criteria was confirmed manually. Patients who did not continue any WPA or were taking both a modafinil and solriamfetol were excluded.
Results: Sixty-two patients tried solriamfetol after being prescribed a modafinil product. Of these, 44 (71%) patients preferred solriamfeol, while 18 (29%) switched back to a modafinil. Of those who switched back, 12 (67%) reported superior benefit with the modafinil product, which 6 (33%) reported adverse events (2 citing anxiety, 1 each citing mood change, headache, anorexia, "felt funny").
Conclusion: Out of the patients that tried both a modafinil product and solriamfetol, most preferred solriamfetol. Additional analysis targeting patients naive to both agent types would be beneficial to eliminate sampling bias.
Support (if any): N/A

Abstract citation ID: zsaf090.0865

0865

DOSAGE COMPARISON OF PATIENTS SWITCHING FROM TWICE NIGHTLY OXYBATE (TN-OXB) TO ONCE NIGHTLY OXYBATE (ON-OXB): A SINGLE CENTER COMPARATIVE ANALYSIS

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Introduction: Narcolepsy is a chronic neurological condition associated with excessive daytime sleepiness (EDS), sleep fragmentation, and features of rapid eye movement (REM) dissociation. Sodium oxybate has been standard of care in narcolepsy management, starting with the FDA approval of TN-OXB in 2002. ON-OXB was FDA approved in 2023. As patients switch from TN-OXB to ON-OXB, it's becoming increasingly important to find the appropriate dose for switching patients to stabilize. However, there is little information published regarding dosing guidelines or real-world experience of patients switching from an established TN-OXB dose to ON-OXB.
Methods: In a comprehensive sleep center in Sugar Land, TX, a cohort of narcolepsy type 1 and 2 patients were studied from 6/1/2023 to 12/18/2024 to assess optimized ON-OXB dosing after switching from an established stable TN-OXB dose. Patient records were reviewed manually for dosages. The total amount of nightly oxybate and percentages of doses that increased, decreased, or remained the same were calculated.
Results: Twenty-three patients were found to have switched from TN-OXB and currently remain on ON-OXB. From these, 10 (43.5%) had an overall dose increase after switching, 4 (17.4%) had a dose decrease, and 9 (39.1%) had their total dose remain the same. Only 1 (4.3%) patient who was taking 9 grams of TN-OXB ended up on a lower dose of ON-OXB. The average total dosage went from 7.02 g nightly to 7.30 g nightly (mean difference 0.28; 95% CI -0.70-1.27).
Conclusion: The majority of patients (19 out of 23, 82.6%) who switched from TN-OXB to ON-OXB either maintained or increased their total nightly dosage of oxybate. These findings could provide dosing guidelines for the treatment of narcolepsy using oxybate therapy.
Support (if any): N/A

Abstract citation ID: zsaf090.0866

0866

EFFECT OF PITOLISANT ON IDIOPATHIC HYPERSOMNIA SYMPTOMS DURING A DOUBLE-BLIND WITHDRAWAL PERIOD IN A PHASE 3 TRIAL

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Introduction: Pitolisant is FDA approved for the treatment of excessive daytime sleepiness (EDS) or cataplexy in adult patients with narcolepsy and for the treatment of EDS in pediatric patients ≥6 years with narcolepsy. Given the adjacency between IH and narcolepsy and pharmacological treatments for IH are limited, the efficacy of pitolisant is being evaluated in adult patients with IH.
Methods: The present analyses focused on a 4-week double-blind randomized withdrawal period (DBRWP) within a 12-week phase 3 clinical trial to evaluate the safety and efficacy of pitolisant in adult patients with IH (NCT05156047). Patients (213) initially received pitolisant for an 8-week open-label period (OLP) and then were assessed for their treatment response. Treatment responders (≥3-point reduction in their Epworth Sleepiness Scale [ESS] scores across the OLP) entered the DBRWP and were randomized to continue receiving dose-matched pitolisant or placebo. Primary and key-secondary efficacy measures included the ESS and the Idiopathic Hypersomnia Severity Scale (IHSS), respectively; change scores were evaluated from the end of the OLP to the end of the 4-week DBRWP for pitolisant compared with placebo.
Results: Among the 173/213 patients who completed the OLP (81.2%), 139 (80.3%) of them were considered treatment responders and entered the DBRWP (mean±SD age: 39.9±11.91 years; 78.6% female). During the DBRWP the LSM difference (95% CI) in total score between the pitolisant and placebo treatment groups was not statistically significant for the ESS (-0.85 [-2.24, 0.54]; P=0.228) and narrowly missed nominal statistical significance for the IHSS (-2.27 [-4.62, 0.08]; P=0.058). When statistically adjusting for the suspected placebo effect and suspected regression to the mean, there was a nominally statistically significant difference between pitolisant and placebo on the ESS (-1.51 [-2.84, -0.18] P=0.026) and the IHSS (-3.20 [-5.49, -0.90] P=0.006). No new safety signals were observed.
Conclusion: During the 4-week DBRWP, positive trends favoring pitolisant were observed on the ESS and IHSS; however, they did not reach prespecified statistical significance. Ad hoc analyses showed nominally statistically significant improvements in ESS and IHSS. Pitolisant may offer a favorable benefit-risk profile and could be a potential treatment option for patients with IH.
Support (if any): Harmony Biosciences

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0867

EFFECT OF PITOLISANT ON SYMPTOMS OF IDIOPATHIC HYPERSOMNIA DURING AN OPEN-LABEL PERIOD IN A PHASE 3 CLINICAL TRIAL

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Introduction: Idiopathic Hypersomnia (IH) is a rare and chronic neurological disorder. People with IH experience severe excessive daytime sleepiness (EDS), sleep inertia, and a multitude of adverse functional outcomes. Pharmacological treatments for IH are limited. Pitolisant is FDA approved for the treatment of EDS and cataplexy in adult patients and for excessive daytime sleepiness in pediatric patients ≥6 years with narcolepsy.
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 mg, 17.8 mg, and 35.6 mg), then began a three-week flexible dose period, and concluded with a two-week stable dose period. Efficacy measures included the Epworth Sleepiness Scale (ESS), Sleep Inertia Questionnaire (SIQ), Functional Outcomes of Sleep Questionnaire (FOSQ-10), Patient-Reported Outcomes Measurement Information System, Sleep Related Impairment (PROMIS-SRI), Idiopathic Hypersomnia Severity Scale (IHSS), Patient Global Impression of Severity of EDS (PGI-S), and Clinician Global Impression of Severity of IH (CGI-S). Efficacy measures were evaluated for change from OLP baseline to the end of the eight-week OLP.
Results: Two hundred and thirteen patients (mean±SD age; 39.7±12.85 years; 79.3% female) were enrolled in the trial. There was a nominally statistically significant (P< 0.0001) group mean reduction in all efficacy measures from the OLP baseline to the end of the eight-week OLP (mean±SD): ESS (16.2±3.40, 8.7±5.04; delta=-7.6±5.12); SIQ (70.0±16.91, 52.8±19.86; delta=-18.0±19.14); FOSQ-10 (11.23±2.70, 13.72±3.56; delta=2.60±3.00); PROMIS-SRI (28.7±4.85, 21.6±6.58; delta=-7.2±6.36); IHSS (33.3±7.48, 25.8±9.44; delta=-7.7±7.94); PGI-S (3.8±0.72, 2.8±0.96; delta=-1.1±1.07); and CGI-S (3.7±0.60, 2.6±0.89; delta=-1.1±0.87). Among the 173 patients who completed the OLP (81.2%), 144 (83.2%) of them achieved a ≥3-point reduction on their ESS score, and 136 (78.6%) achieved a ≥4-point reduction on their IHSS score.
Conclusion: In an 8-week OLP of a phase 3 clinical trial in adult patients with IH, pitolisant demonstrated robust improvements in EDS, sleep inertia, and a multitude of functional outcomes. A large majority of patients exhibited clinically meaningful reductions in their EDS and IH symptoms.
Support (if any): Harmony Biosciences

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0868

LONG-TERM SAFETY AND EFFECTIVENESS OF PITOLISANT USE IN ADULT PATIENTS WITH IDIOPATHIC HYPERSOMNIA (IH)

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Introduction: Pitolisant is being evaluated for use in adult patients with IH in two phase 3 clinical trials, a double-blind randomized withdrawal (DBRW) and an open-label extension (OLE). The present analyses focused on the safety and effectiveness of long-term administration of pitolisant in adult patients with IH across 13 months. The OLE study is ongoing.

Methods: Open-label data were integrated across two contiguous phase 3 clinical trials (DBRW: NCT05156047; OLE: NCT05458128). Safety measures included treatment-related treatment-emergent adverse events (TR-TEAEs). Effectiveness measures included the Epworth Sleepiness Scale (ESS); Idiopathic Hypersomnia Severity Scale (IHSS); Patient-Reported Outcomes Measurement Information System, Sleep Related Impairment-8a (PROMIS-SRI); Patient Sleep Inertia Questionnaire (SIQ); Functional Outcomes of Sleep Questionnaire (FOSQ-10); Patient Global Impression of Severity of EDS (PGI-S); and Clinician Global Impression of Severity of IH (CGI-S). Effectiveness measures were assessed at baseline, Month 2, Month 4, Month 10, and Month 16.

Results: The safety population included 213 patients who received at least one dose of pitolisant (mean±SD age, 39.7±12.85 years; 79.3% female). The median duration of pitolisant exposure was 39.14 weeks (range: 0.71-93.29 weeks) and the median maximum pitolisant dosage was 35.6 mg (median [range: 8.9-35.6 mg]). Among this population, 102 participants (47.9%) experienced a TR-TEAE; most frequent TR-TEAEs were headache (17.8%), insomnia (16.0%), and abnormal dreams (5.2%). The effectiveness population included 119 adult patients who enrolled in both trials (mean±SD age, 40.1±11.96 years; 79.8% female). Generally, the sample size remained stable across timepoints. All effectiveness measures demonstrated a nominally statistically significant reduction ($P< 0.0001$) from study baseline at every timepoint. Effectiveness measures are reported as baseline mean±SD, and change from baseline across all timepoints (range: lowest, highest change across endpoints [mean±SD]): ESS, 16.6±2.99 (-8.4±4.46, -9.7±4.69); IHSS, 33.7±7.10 (-9.8±7.56, -13.4±8.66); PROMIS-SRI, 64.16±4.89 (-8.35±7.26, -10.11±5.56); SIQ, 71.8±17.14 (-21.2±17.21, -24.9±18.91); FOSQ-10, 11.14±2.77 (3.31±2.99, 4.24±3.07); PGI-S, 3.9±0.74 (-1.2±0.99, -1.4±0.95); and CGI-S, 3.6±0.60 (-1.2±0.89, -1.3±0.78).

Conclusion: Pitolisant was well-tolerated, and the safety profile was consistent with the established safety profile for patients with narcolepsy. Pitolisant showed clinically meaningful and sustained improvements in multiple symptoms of IH across a >1-year dosing period.

Support (if any): Harmony Biosciences

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0869

SHIFT WORKER ADAPTATION SUBTYPES: K-MEANS CLUSTERING FOLLOWED BY CIRCADIAN RHYTHM AND STRESS REACTIVITY ANALYSES

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Introduction: Shift work disrupts sleep and circadian rhythms, causing sleep and mood disturbances, and reduced quality of life. Symptom variability among shift workers remains insufficiently characterized. We aimed to classify adaptation subtypes in shift workers using K-means clustering based on psychiatric symptom scores. Subsequently, circadian rest/activity rhythms (RARs) and stress reactivity among these subgroups were examined.

Methods: 109 shift workers (93 females; mean age: 35.52 ± 10.54 years) completed self-report questionnaires, including the Beck Depression Inventory (BDI), Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), and Ford Insomnia Response to Stress Test (FIRST). Actigraphy and sleep diary data were collected over 7-14 days to assess circadian RARs. K-means clustering used BDI, ISI, and ESS scores. Statistical analyses included ANOVA/Kruskal-Wallis, post-hoc tests, and ANCOVA adjusting for age, sex, and drinking.

Results: K-means clustering identified four distinct subtypes. Subtype 1 (well-adapted, n=40) showed the lowest BDI (3.27 ± 2.66), ISI (4.5 ± 2.09), and ESS (7.2 ± 2.79) scores. Subtype 2 (insomnia-predominant, n=28) represented high ISI (11.11 ± 2.62) but moderate BDI (5.00 ± 2.15) and ESS (8.86 ± 3.08). Subtype 3 (depression-predominant, n=28) presented high BDI (12.54 ± 2.96) but moderate ISI (9.29 ± 3.42) and ESS (8.61 ± 3.20). Subtype 4 (maladaptive, n=13) exhibited markedly high BDI (20.69 ± 3.85), ISI (15.69 ± 2.97), and ESS (12.15 ± 3.98). Significant differences in circadian RARs were observed between subtype 2 (insomnia-predominant) and subtype 3 (depression-predominant), with subtype 2 exhibiting lower RA (p=0.028) and higher L5 (p=0.015) than subtype 3. FIRST was lowest in subtype 1 (well-adapted) and highest in subtype 4 (maladaptive). Subtype 4 significantly differed from both subtype 1 (p=0.0023) and 2 (p=0.015). ANCOVA showed significant L5 (p=0.037) and FIRST (p=0.029) differences, while RA was approaching significance (p=0.063).

Conclusion: This study proposed four shift worker adaptation subtypes: well-adapted, insomnia-predominant, depression-predominant, and maladaptive, based on psychiatric and sleep-wake symptoms. Mood disturbances and insomnia emerged as key contributors to symptom heterogeneity. The shift worker subtypes in this study showed different characteristics in circadian RARs (RA and L5) and stress reactivity (FIRST), providing insights into individual differences in shift work tolerance.

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0870

SHIFT WORK DISORDER PREVALENCE AND ASSOCIATED CHARACTERISTICS USING THE MOBILE APPLICATION SLEEP BY CLEVELAND CLINIC™

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Introduction: Shift Work Disorder (SWD) arises from recurring work schedules overlapping typical sleep times. SWD is associated with increased risks of medical and psychiatric disorders with estimated prevalence of 2-5%, likely to be underestimated. We studied the prevalence and associated characteristics of SWD using a mobile application developed to estimate sleep disorder risk in adults.

Methods: SLEEP by Cleveland Clinic™ is a free iOS/Android mobile application that evaluates sleep disorder risk including Cleveland Clinic Sleep Apnea Probability Score (Katzan, Sleep Med 2016), Insomnia Severity Index (ISI; Morin, Sleep 2011), 24-hr sleep duration, and SWD (Barger, Sleep 2012). Demographic, comorbidity and sleep disorder risks were compared between high-risk (HR) and low-risk (LR) SWD groups using Pearson chi-square and t-tests, where appropriate.

Results: There were 5,217 unique user downloads Nov 2019-Dec 2024. Of these 3,515 provided geographic information and 2,149 (61%) were Ohio residents. Among 445 users who completed SWD screening, 198 (44.5%) were HR and 247 (55.5%) LR. HR SWD users were younger (40 + 13 vs 44 + 14 yrs) and more likely to be female (69 vs 57%), both p=0.009, work full time (85 vs 71%; p< 0.001), work nights/rotating shifts (80 vs 67%; p=0.006) and work longer shifts (p< 0.001) without difference in race or BMI. HR SWD was associated with higher mental health disorder diagnoses (66% vs 38%, p=0.001), more alcoholic drinks/week (0.0 (0.0,2.0) vs 1.0(0.0,3.0; p=0.032)), and more sleep aid use (53 vs 40%; p=0.035), but were similar on caffeine and tobacco use. ISI was higher in HR SWD (18(14,21) vs 13(9,17); p< 0.001)) but habitual sleep duration was comparable. LR SWD had higher probability of OSA and moderate-severe OSA 57(23,80)/15(6,9) vs 36(11,72)/9(3,23; p=0.002).

Conclusion: Among users of a sleep screening mobile application who completed SWD screening, nearly half classified as HR SWD were more likely to work nights/rotating shifts, use alcohol and sleep aids, have mental health disorders and have higher insomnia severity, but lower risk of OSA. The application provides immediate accessibly to sleep disorder risk that can help identify SWD, insomnia and OSA among adults with smartphones.

Support (if any):

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0871

SLEEP MEASUREMENT OF 3-SHIFT WORKERS AT A CHEMICAL PRODUCT FACTORY USING AN IN-HOME SLEEP EEG

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Introduction: In Japan, over 12 million workers are engaged in night and shift work. Such irregular and long working hours may lead to reduced or fragmented sleep, as well as disruptions in circadian rhythms, which have been associated with an increased risk of sleep disorders, prostate cancer, and breast cancer. Previous research on shift workers' sleep has mainly relied on questionnaires or actigraphy, with limited studies utilizing electroencephalography (EEG) to analyze detailed sleep architecture.
Methods: Six shift workers aged 23–42 at a chemical plant in Osaka participated in this study. The plant follows a reverse-rotating schedule comprising four consecutive night shifts (22:50–7:00), followed by four afternoon shifts (14:50–23:00) and four morning shifts (6:50–15:00), with 1–2 rest days between shifts. Sleep was measured using a simplified EEG device developed at the University of Tsukuba. Each participant's sleep duration and sleep stages were recorded at least twice for each shift type and during rest days. Missing data due to sudden schedule changes were corrected through linear estimation. The study was approved by the ethical committee.
Results: The average sleep duration was 223 minutes on night shifts, 337 minutes on afternoon shifts, and 393 minutes on morning shifts. Regarding sleep stages, N2 and REM sleep were notably shorter on night shift days compared to other shifts, although no significant differences were observed for N1 or N3 stages. Additionally, Sleep Onset REM Periods (SOREMP), characterized by REM sleep occurring within 15 minutes of sleep onset, were observed in 50% (3/6) of participants.
Conclusion: Night shifts were associated with reduced N2 and REM sleep, suggesting that workers may compensate for these deficits on non-night shift days. The high occurrence of SOREMP further reflects REM sleep deprivation on night shift days.
Support (if any):

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0872

AGE-RELATED DIFFERENCES IN HEART RATE AND VARIABILITY DURING SIMULATED JET LAG: EFFECTS OF BRIGHT LIGHT, EXERCISE, AND MELATONIN

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Introduction: Jet lag is a circadian rhythm disorder caused by misalignment of the body's internal clock with local time after traveling through multiple time zones. The effects of jet lag may intensify with age. This study evaluates age-related differences in heart rate and heart rate variability (HRV) during simulated jet lag and in response to interventions, including bright light, exercise, and melatonin.
Methods: Participants underwent a 5.5-day laboratory protocol with Holter monitoring. On Day 1, they followed a normal sleep schedule. On day 2, they adopted an ultra-short sleep-wake cycle (2 hours awake, 1 hour asleep) for 26 hours. On days 3-5, an 8-hour delay in the sleep-wake and light-dark schedules simulated westward travel. Participants were randomized into one of three groups: placebo, bright light (5,000 lux), or a combination of bright light, melatonin (0.5 mg), and exercise. Treatments were administered for three days, followed by a second 26-hour ultra-short sleep-wake cycle on Days 5-6. Heart rate and HRV were measured, and results were analyzed by age group (< 26 years and >26 years)
Results: 16 participants (86% male; mean age 28.4 ± 9.56 years) were randomized into placebo (N=5), bright light (N=7), or bright light + exercise + melatonin (N=3). In participants < 26 years, heart rate increased during the first ultra-short sleep period in the placebo group (72.66 ± 8.01; p=0.0157) but decreased with bright light treatment (64.36 ± 5.48; p=0.0425) compared to baseline (68.93 ± 10.8). HRV increased significantly in this group during treatment (1.83 ± 2.23 vs. 6.65 ± 1.54; p=0.0313). For participants >26 years, heart rate increased during the first ultra-short period in the placebo group (81.17 ± 9.70; p=0.0504) and decreased with bright light (77.49 ± 11.84; p=0.0754) compared to baseline (79.68 ± 11.92). No changes in HRV were observed in participants >26 years.
Conclusion: Bright light therapy increased HRV in participants < 26 years, while no such changes were observed in those >26 years. These results suggest age-specific differences in responses to circadian interventions and highlight the potential for targeted treatments to mitigate jet lag effects.
Support (if any): Department of Defense

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0873

THE EFFECTS OF JET LAG AND CIRCADIAN ACCLIMATION OF PERFORMANCE, SLEEP, AND 6-SULFATOXYMELATONIN ON PSYCHOMOTOR VIGILANCE REACTION TIMES

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Introduction: Jet lag is a disruption of circadian rhythms caused by a mismatch between the body's internal clock and the local time, often resulting from travel across time zones or significant shifts in sleep patterns due to work or social obligations. This misalignment can influence hormonal balance and lead to various symptoms, including impaired mental health, reduced physical and cognitive performance, and poor sleep quality. This study aims to evaluate the effects of jet lag treatments on the psychomotor vigilance test.
Methods: After an 8-hour baseline sleep recording, participants followed a 26-hour protocol of 2 hours awake and 1 hour asleep. Subsequently, they underwent an 8-hour simulated time zone delay, maintained for three days. Participants were randomized into one of three treatment groups: (1) Dim Red Light + Placebo Capsules, (2) Bright Light Alone, or (3) Bright Light + Exercise + Melatonin. A final 26-hour protocol repeated the 2-hour wake and 1-hour sleep schedule. Psychomotor Vigilance Task (PVT) assessments were conducted every three hours, excluding sleep, with mean reaction time as the primary outcome measure.
Results: The study included 25 participants (19 males, 6 females; mean age 28.6 ± 9.48 years). Six participants received placebo, nine bright light alone, and ten bright light + exercise + melatonin. In the placebo group, mean reaction time was 256.031ms. The bright light alone group showed a non-significant increase of 4.576ms (p=0.719), while the bright light + exercise + melatonin group exhibited a non-significant decrease of 5.639ms (p=0.652). Across all groups, baseline mean reaction time was

233.249ms, increasing by 25.689ms during the treatment phase (p=5.63e-08), reflecting a significant effect of the simulated jet lag.
Conclusion: While the differences between treatment groups were not statistically significant, the overall treatment phase significantly impacted reaction times, highlighting the measurable effects of jet lag on cognitive performance. Further research is needed to determine the effectiveness of specific interventions.
Support (if any): Department of Defense

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0874

ACTIGRAPHY DATA ANALYSIS OF LIGHT EXPOSURE AND SLEEP PATTERNS IN CANCER SURVIVORS USING A DATA SCIENCE APPROACH

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Introduction: Sleep-wake disturbance affects 30%-75% of cancer survivors that significantly threatens to exacerbate fatigue, depression, treatment outcomes, disrupted circadian rhythms impacting quality of life. Thus, understanding the influence of light as an effective environmental cue to regulate circadian rhythms may give insight into improved sleep-wake cycles. Current literature on light therapy protocols is missing key information that could be understood by a Data Science approach. Actual light measurements such as daily light timing, intensity, and duration could be measured in waveform data using wrist-worn actigraphy. This data provides 1-minute epochs of data light measurements (light exposure, time, duration, intensity) to compare with sleep pattern variables (total sleep time, sleep efficiency, sleep onset latency, and wake after-sleep onset) which reflect sleep quality related to light exposure. This paper will explain the analytical approach to comprehensively analyze the relationship between light exposure indicators and sleep-wake patterns.
Methods: This study will comprise a retrospective secondary data analysis using baseline actigraphy data from a randomized controlled trial (RCT) (NCT 03810365). The dataset was collected between June 2019 and October 2022 using the actigraphy data from 132 cancer survivors for 7 consecutive days. The analysis includes dataset preparation of actigraphy data of rest-activity and light exposure in a sample of 7 days of data per patient. R programming will be used to transform raw light exposure data into usable information. The analysis of data includes using conditional inference trees and random forest plots to visualize the results and identify important factors in the model that will examine the relationship between light exposure and sleep outcomes. Extreme gradient boosting will be used for prediction of sleep outcomes. The impact of light exposure on sleep outcomes during the 1, 2, and 3 hours before bedtime, as well as the relationship between 24-hour continuous light exposure patterns and sleep outcomes, will also be analyzed.
Results: The paper will outline the procedures for preparing, cleaning data, and analysis.
Conclusion: This paper will explore a data science approach to understand the analysis method of evaluating light exposure and sleep outcomes. Future research could consider alternative light measurement tools to provide more reliable insights.
Support (if any):

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0875

AGE-RELATED INCREASE OF CIRCANNUAL CORRELATION BETWEEN DAY LENGTH AND SEVERE SEIZURES

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Introduction: Recent work at Earth's extreme poles in the northern and southern hemispheres has shown a significant correlation between increasing day length (i.e. solar time and severe seizures across the year with higher frequency during months of increasing day length). Age-wise, however, epilepsy prevalence is bimodal, peaking once in younger life and again in later life. It remains unknown whether the correlation between day length and seizure occurrence is uniform across the lifespan.
Methods: Secondary analysis of circannual severe seizure frequency from the Canadian Arctic (Kivalliq, Nunavut) in 2009-2020 (n=117) and New Zealand (Auckland) in 2015-2016 (n=361) dichotomized by age. Rayleigh's test was conducted to assess for a statistically significant departure from circular uniformity (e.g. representing equal likelihood occurrence throughout the year) for each age group (e.g. older vs. younger than x-years-old) at each site, over different dichotomized age thresholds (x=30, 35, 40, 45).
Results: At each site, there was a significant correlation between increasing day length and severe seizure occurrence for the "younger" age group at the 30, 35, 40, and 45-year-old age thresholds. The respective mean resultant lengths in Kivalliq were 0.33 (p=0.018), 0.31 (p=0.012), 0.25 (p=0.028), and 0.24 (p=0.022) averaging calendar directions from April 8-15. In Auckland, the mean resultant lengths were 0.18 (p=0.0005), 0.18 (p=0.0002), 0.19 (p< 0.0001), and 0.17 (p=0.0005) averaging calendar directions from July 15-24. In contrast, there were no significant correlations in the "older" age group at either site for any age threshold.
Conclusion: There were significant and reproducible correlations of severe seizures with increasing day length after the respective winter solstices of the northern and southern hemispheres in the younger patient cohorts of the Canadian Arctic and New Zealand. In contrast, these correlations were lost in each older patient cohort at each site. These findings demonstrate an inverse age-dependent increase in the circannual link between day length exposure and severe seizures, which may suggest that environmental influences on seizure expression are stronger in younger individuals but degrade with age; for example, possibly from selective degeneration of retino-geniculo-hypothalamic afferents reportedly more attuned to zeitgebers from twilight, moonlight, and the seasons.
Support (if any): None.

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0876

AGE-DEPENDENT EFFECTS OF JET LAG ON VENTRICULAR DEPOLARIZATION: IMPACT OF BRIGHT LIGHT, MELATONIN, AND EXERCISE

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Introduction: Jet lag is a circadian rhythm disorder that disrupts the body's biological clock, with its effects potentially varying by age. This study investigates the influence of age on ventricular depolarization, measured by corrected QT interval (QTc) and QTc variability, in treatments designed to promote adjustment to jet lag.
Methods: Participants underwent a 5.5-day laboratory protocol with continuous Holter monitoring. On Day 1, participants followed a normal sleep schedule. On Day 2, they followed an ultra-short sleep-wake cycle (2 hours awake, 1 hour asleep) for 26 hours. Days 3–5 included an 8-hour delay in sleep-wake and light-dark schedules. Participants were randomized into three treatment groups: placebo, bright light (5,000 lux), or a combination of bright light, melatonin (0.5 mg), and exercise. Treatments were administered for three days, followed by a second 26-hour ultra-short sleep-wake cycle on Days 5–6. QTc intervals and QTc variability, calculated using Bazett's formula, were analyzed for participants aged < 26 and >26.
Results: Sixteen participants (86% male; mean age 28.4 ± 9.56 years) were randomized as follows: placebo (< 26 years, n=2; >26 years, n=3), bright light (< 26 years, n=4; >26 years, n=3), and bright light + melatonin + exercise (< 26 years, n=1; >26 years, n=2). In the placebo group, QTc intervals increased in participants aged < 26 from baseline to ultrashort 1 (401.5 ± 8.5 vs. 405.2 ± 8.2; p=0.0515), while QTc variability increased in participants aged >26 from ultrashort 1 to treatment (5.79 ± 0.78 vs. 6.57 ± 0.76; p=0.0355). In the bright light group, QTc intervals decreased in participants aged < 26 from ultrashort 1 to ultrashort 2 (391.78 ± 5 vs. 382.58 ± 5.27; p=0.0521), while QTc variability decreased in participants aged >26 from baseline to ultrashort 1 (7.233 ± 2.62 vs. 6.407 ± 2.57; p=0.032). No significant changes were observed in the bright light + melatonin + exercise group.
Conclusion: Jet lag increases QTc and QTc variability without treatment in both age groups. Bright light therapy reduces QTc and QTc variability, regardless of age. Therapeutic interventions for jet lag show promise but require further research to confirm these findings.
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0877

EFFECT OF CIRCADIAN RHYTHM ON COGNITIVE FUNCTION IN AMNESTIC MILD COGNITIVE IMPAIRMENT (AMCI) PATIENTS

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Introduction: Circadian disturbance has been implicated in accelerated aging and incident dementia. In particular, greater rest-activity rhythm(RAR) disturbance has been reported to be associated with larger cognitive decline in AD patients. However, the relationship between circadian rhythm disturbance and cognitive function in MCI patients is poorly understood. We aimed to compare circadian parameters between amnestic MCI(aMCI) patients and normal controls(NC), and to examine whether changes in circadian parameters can be related with cognitive function.
Methods: Participants over 50 years were recruited from Kangwon National University Hospital, and two public Dementia Care Centers. The Korean version of the Consortium to Establish a Registry for Alzheimer'sDisease(CERAD-K) was administered to eligible patients. The neuropsychological battery included verbal fluency, Word List Recall, Word List Recognition(WLR2), Constructional Recall(CR), and the Stroop Color-Word Test(SCWT). The diagnosis of aMCI was made according to Petersen's criteria. Actigraphy monitoring was conducted at home for five days. Nonparametric variables including the inter-daily stability(IS), intra-daily variability(IV) and relative amplitude(RA) were calculated for rest-activity rhythm (RAR). DLMO was determined from five hourly saliva samples obtained before sleep onset. Eighteen aMCI patients (76.6 ±6.1 years) and 21 NCs (70.4±6.7years) were finally analyzed. Generalized linear models(GLMs) were used to assess the effects of circadian parameters on cognitive functions.
Results: There were no significant differences in the RAR variables (IV, IS and RA), and the DLMO between the aMCI and NC groups. In GLMs, a significant group by RA interaction was observed on the scores of WLR2 (β =-9.22, p=.010). And there were significant main effects of IS on the scores of CR and SCWT (β =2.61, p=.027; β = 2.03, p=.049, respectively).
Conclusion: In our study, the regularity of RAR reflected improved non-verbal memory and executive function, regardless of cognitive impairment status. The robustness of RAR was implicated with increased verbal memory function. However, this relationship in aMCI patients, who are considered as preclinical AD, was found to be different from that of normal cognitive individuals.
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0878

A TWO-YEAR FOLLOW-UP STUDY ON THE COURSE OF AT-RISK DELAYED SLEEP-WAKE PHASE DISORDER IN THE YOUNG GENERATION

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Introduction: The prevalence of Delayed Sleep-Wake Phase Disorder (DSWPD) in the general population, especially among young people, and its impact on daytime functioning have been studied in various countries. However, there is currently a lack of longitudinal research examining the prognosis of DSWPD in a consistent population. This study investigated the progression of at-risk DSWPD in the young general population through follow-up surveys conducted at two-year intervals.
Methods: In 2019, 7,810 individuals responded to a web-based questionnaire, and in 2021, the same survey was completed by

2,375 participants, of whom 1,370 met the inclusion criteria. The survey assessed demographic variables, sleep habits, and daytime functioning, including the number of absent days in the preceding month, scores of the Biological Rhythms Interview of Assessment in Neuropsychiatry (BRIAN) evaluating DSWPD status, Work Limitation Questionnaire, SF-8, and Kessler Psychological Distress Scale (K6). Individuals were considered at risk for DSWPD if they had a BRIAN score of 40 or higher and four or more days absent per month.
Results: At follow-up, 1.9% of the population was at risk for DSWPD, with 14.5% of those initially at risk remaining, representing 0.5% of the total subject population. The persistently at-risk group showed higher absenteeism, while the newly onset group experienced similar work productivity and quality of life declines. Additionally, although the recovery group had reduced absenteeism to a level below the cutoff at follow-up, their sleep-wake schedule was still delayed, their BRIAN score was higher, and their K6 and productivity loss scores were worse than those in the persistently normal group.
Conclusion: Small but significant individuals were at risk for DSWPD at both time points. Small but significant individuals were at risk for DSWPD at both time points, however, the persistently at-risk group showed increased absenteeism. However, the persistently at-risk group exhibited increased absenteeism. Additionally, the newly onset group demonstrated poorer daytime functioning than healthy peers. These findings highlight the importance of continuous monitoring of DSWPD.
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0879

DIM LIGHT MELATONIN ONSET IN A DELAYED SLEEP-WAKE PHASE DISORDER COHORT: ONGOING CLINICAL TRIAL UPDATE

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Introduction: We are conducting a double-blind, randomized, clinical study in Delayed Sleep-Wake Phase Disorder (DSWPD) participants with extensive clinical phenotyping. We evaluated screening Dim Light Melatonin Onset (DLMO) assessments in participants with a DSWPD diagnosis to determine the proportion of participants with and without a circadian delay.
Methods: Delayed DLMO is DLMO occurring after or within 30 minutes before desired bedtime, and after 21:30. Each DLMO assessment consisted of eight saliva collections performed at five, four, three, two, and one hour before bedtime, at planned bedtime, and one and three hours after bedtime. DLMO assessments were distributed to participants at Visit 1 (screening) and Visit 3 (treatment) with a questionnaire to record planned and actual collection times. The PROMIS Sleep Disturbance Questionnaire was also completed by participants at V1 to evaluate subjective levels of sleep difficulty, with higher scores indicating a greater sleep/wake disturbance. DLMO was defined as the clock time when the melatonin concentration exceeded the mean of three low consecutive values, plus twice the standard deviation of these points. Additionally, a sample for whole genome sequencing was collected.
Results: Fifty-six participants with DSWPD completed the screening DLMO assessment, 39 of which had a delayed DLMO (69.64%). Sub-analyses were conducted on these participants who had delayed DLMO. Within this subset, the average DLMO time was 00:17 (SD = 02:07) and the average PROMIS Sleep Disturbance Questionnaire score was higher compared to those without a delay (80.33 vs. 69.18, respectively). Of these 39 participants, 21 had a DLMO time after 00:00 (53.85%). Furthermore, we completed a linear regression analysis on DLMO time in a circadian gene set. The top scoring variant was 3' UTR rs10181401 in PER2, amongst others detected.
Conclusion: These initial data indicate that, on average, participants with DSWPD that completed the screening DLMO assessment had delayed DLMO. Further analyses show that more than half of this subset had significantly delayed DLMO (00:00 or later). This study is currently ongoing and blinded. Further data will be analyzed as more participants enroll. 'Phase typing' will be important in further understanding the underlying pathophysiology and in the treatment selection for patients with DSWPD.
Support (if any):

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0880

NIGHT AND DAY: A SYSTEMIC REVIEW OF THE PAST 20 YEARS OF CRSWD RESEARCH

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Introduction: Circadian rhythm sleep-wake disorders (CRSWDs) are a misalignment between a person's sleep period and the biosocial 24-hour cycle. Advanced sleep-wake disorder (ASWPD) and delayed sleep-wake disorder (DSWPD) are rare conditions mainly attributed to genetic and physiological factors. Diagnosis can be challenging due to a lack of access to resources, and symptoms of these disorders are often ignored or misdiagnosed as insomnia, with ~10% of insomnia patients having DSWPD. Treatment mainly consists of the use of melatonin and chronotherapy to reset the circadian clock, a process vulnerable to environmental factors.
Methods: This systematic review aimed to examine available research on diagnosing and treating ASWPD and DSWPD. The main goals were to: 1) Deliver a comprehensive overview of diagnostic methods and treatment tools 2) Examine study definitions of ASWPD and DSWPD 3) Evaluate the quality of studies 4) Identify current gaps in knowledge We used 5 main search phrases to identify and screen 1,805 records using the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) through CADIMA. Our review identified 49 published articles, spanning 20 years of research. We then tested the capabilities of ChatGPT-4.0's Advanced Data Analysis to extract and summarize data.
Results: The majority of studies focused on DSWPD, with an equal percentage focusing on diagnosis and treatment. Most studies used the 2nd and 3rd editions of the International Classification of Sleep Disorders to base their definitions of ASWPD and DSWPD. The most popular diagnostic method was a combination of clinician-reviewed surveys, actigraphy, and DLMO used by 23.5% of studies. The most popular treatment approach was a combination of melatonin, phototherapy, and CBT used by 17.6% of studies. Finally, ChatGPT 4.0 was accurate about 80% of the time, more skilled in summarizing than extracting data.
Conclusion: This review identified a general set of diagnostic criteria for ASWPD and DSWPD, and a need for increased

studies of ASWPD and more diverse data across the lifespan. ChatGPT's expedited data extraction will be a beneficial asset in medical chart review, and with this veritable library of literature, aid in combating misdiagnosis by allowing for a systematic, more accessible way to diagnose and treat patients.
Support (if any):

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0881
CLINICAL TRIAL OF SOLRIAMFETOL FOR EXCESSIVE SLEEPINESS RELATED TO EARLY MORNING SHIFT WORK DISORDER

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Introduction: Shiftwork is common and in 10-43% of individuals it leads to a diagnosis of shift work disorder (SWD), characterized by excessive sleepiness accompanied by reduced sleep duration and/or insomnia. While more individuals work early morning shifts compared to overnight shifts, few studies have investigated this population. We aimed to evaluate the efficacy of solriamfetol for the treatment of excessive sleepiness during workdays in participants with SWD who work early-morning shifts.
Methods: We conducted a randomized, double-blind, placebo-controlled 4-week clinical trial in early morning shift workers (shift start 3-7AM). Participants had to report excessive daytime sleepiness and be at high risk for SWD as determined by a SWD questionnaire. Following screening and 2 weeks of baseline, participants were randomized into 4 weeks of placebo or solriamfetol (150mg taken after waking on workdays). The primary outcome was objective sleepiness measured by Maintenance of Wakefulness Test (MWT). Secondary outcomes included subjective sleepiness [measured by Karolinska Sleepiness Scale (KSS) and Epworth Sleepiness Scale (ESS)] and severity of illness [measured by Clinical Global Impression (CGI-Change) and Patient Global Impression (PGI-Change)]. Mixed-effects and logistic regression models were used to analyze the data.
Results: 74 participants completed study (median age 37 [28-46]; 27 females); 38 in the solriamfetol group and 36 in the placebo group. There was a significant difference between groups in the change in MWT sleep latency from baseline to end-of-treatment ($p< 0.0001$), with a greater increase in the solriamfetol group (12.5min, $p< 0.0001$) compared to placebo (3.1min, $p=0.0108$). There was a significant difference ($p=0.0001$) between the groups in the change in KSS and ESS scores, with a greater decrease in the solriamfetol group (KSS: -1.7, $p< 0.0001$; ESS: -7.2, $p< 0.0001$) compared to placebo (KSS: -0.5, $p=0.0167$; ESS: -2.4, $p=0.0044$). Finally, solriamfetol resulted in a higher percentage of participants showing improvement at end-of-treatment visit compared to placebo on CGI-Change (OR=4.4, $p=0.0014$) and on PGI-Change (OR=5.4, $p=0.0002$).
Conclusion: Solriamfetol significantly improved objective and subjective sleepiness and reduced the severity of illness compared to placebo in participants with SWD who work early-morning shifts. www.clinicaltrials.gov (NCT04788953).
Support (if any): Axsome Therapeutics, Jazz Pharmaceuticals, and Brigham and Women's Hospital Center for Clinical Investigation.

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0882
ARIPIPRAZOLE (ABILIFY) AS A NEW TREATMENT FOR CIRCADIAN RHYTHM SLEEP-WAKE DISORDERS AND ITS MECHANISM OF ACTION

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Introduction: circadian rhythm sleep-wake disorders (CRSWDs), especially delayed sleep-wake phase disorder (DSWPD), are common among young people and are a major problem in sleep medicine. They are usually treated with melatonin, bright light therapy, and lifestyle guidance, but nighttime sleep time is often extended, making them difficult to treat. We have reported that administration of 0.5-3 mg of aripiprazole to 12 patients with CRSWDs resulted in sleep onset time 1 hour earlier, sleep time 1.3 hours shorter, and wake time 2 hours earlier (Omori, 2018). However, the mechanism of action is unknown, which is a drawback in clinical application.
Methods: A total of 10 clinical reports of CRSWDs, DSWPD and non-24-hour sleep-wake disorder have been published in Japan, and a meta-analysis was performed. In vivo and ex vivo experiments were performed in mice to clarify the mechanism of action. The study was approved by the ethical committee.
Results: In a total of 45 cases, an average dose of 2.7 mg of aripiprazole resulted in 0.5 hours earlier sleep onset, 1.1 hours shorter sleep time, and 2.5 hours earlier wake-up time. In vivo study involved administering mice with aripiprazole through drinking water and subjecting them to a 6-hour advance jet lag. This administration led to the rapid re-entrainment of the shifted light-dark cycle (Li, 2023). Ex vivo experiments with suprachiasmatic nucleus (SCN) slice cultures have revealed that aripiprazole causes desynchronization of SCN neurons via the serotonin 1A receptor. The mathematical modeling suggests that mild disruption of SCN coupling by aripiprazole enhances photic entrainment without being so disruptive as to cause arrhythmicity.
Conclusion: A meta-analysis confirmed that aripiprazole is highly effective as a treatment option for CRSWDs. It was also confirmed that the mechanism of action is a direct effect on SCN. Melatonin as a therapeutic drug promotes sleep onset, but aripiprazole promotes early awakening, so it is expected that its effectiveness will be enhanced by using it in combination.
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0883
USE OF APPLE WATCH TO OPTIMIZE LIGHT THERAPY AND REDUCE CIRCADIAN MISALIGNMENT FOR NIGHT SHIFT WORKERS

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Introduction: Circadian misalignment can be alleviated with targeted light interventions. However, general "light at night" interventions do not account for shift workers' variable circadian phases. Recently, our lab validated Apple Watch (AW) as a noninvasive means of predicting circadian timing (i.e. dim light melatonin onset, DLMO). Here, we extend this by examining the clinical utility of AW in informing circadian interventions. We hypothesized the AW-informed group would result in higher rates of circadian alignment following treatment vs the control (non-personalized) group. We also compared the magnitude of phase shifts between these interventions.
Methods: Participants (N=46) were randomly assigned to either the AW or control group, and DLMO was measured before and after treatment. AW data (accelerometer and heart rate) was collected over 2 weeks and processed through a biomathematical model of the human circadian system to produce estimated DLMOs. Light therapy schedules were created from the corresponding phase response curves and implemented with light boxes and blue-blocker glasses (at-home or in-lab) to induce phase shifts. Participants in the control group followed a non-personalized light schedule (light from 18:00 and 21:00; light avoidance from 04:00 and 10:00). Circadian alignment was operationalized as DLMO between 02:00 and 14:00, and a relative risk ratio was used to compare the rate of circadian alignment between the two groups.
Results: The rate of circadian alignment post-treatment was 2.6 times higher in the AW group (56.8%) compared to the control group (22.2%). Additionally, those in the AW group achieved phase delays that were 8.5-times greater than the control group (AW group: delay of 2.5 hours ± 5.0 SD; control group: 0.3 hours ± 4.0 SD).
Conclusion: These findings support the use of AW to generate personalized light treatments. Accessible and effective circadian treatments are key to improving the safety of nightshift workers. In the future we aim to perform sensitivity analyses and compare the efficacy of personalized light interventions at-home versus in-lab, to establish the feasibility of prescribing personalized light therapy as an at-home treatment option.
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0884

USER EXPERIENCE OF A MOBILE APPLICATION TO REDUCE CIRCADIAN MISALIGNMENT IN NIGHT SHIFT WORKERS

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Introduction: Around 80% of night shift workers experience circadian misalignment, leading to excessive sleepiness and decline of safety and work satisfaction. To address this, our team developed a mobile application, Arcashift, which tracks users' circadian rhythms and makes personalized activity recommendations (i.e. when to avoid light, when to exercise, etc.) based on user goals (i.e. wake up earlier). While the app was built with patient input and has been tested in randomized controlled trial settings, the real-world user experience is not yet well-established.
Methods: Night shift workers who habitually slept for less than 6 hours and presented with excessive sleepiness used Arcashift with premium access for 30 weeks (n = 28) in a hybrid type I effectiveness-implementation trial. Upon completion of the implementation period, participants completed a user feedback survey in which participants rated overall experience and ease of use on a 5-point scale ranging from negative to positive and completed 6 short answer questions.
Results: Among the users, 64% rated their overall experience as positive ("positive" or "somewhat positive") and 36% rated their experience as neutral. No users reported a negative ("negative" or "somewhat negative") experience. Eighty-two percent of users reported Arcashift was easy to use, whereas only 11% and 7% reported neutral and negative ease of use, respectively. Most liked features were the personalized recommendations (39%), the ease of inputting their work shifts and other obligations to the calendar (21%). The most common complaints were the app being unintuitive to use (11%) and the desire for more information about sleep in the app (14%). Other barriers included app glitches when entering shifts and other events into the calendar (7%).
Conclusion: Participants generally appreciate the individualized approach of Arcashift. The app was well received but modifications may be needed to further improve the user experience. Future directions include the information about improving sleep in Arcashift being made more accessible to the users of the app, as well as continuing to improve and providing great support to night shift workers in adapting to their schedules and decreasing their circadian misalignment.
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0885

FEASIBILITY AND ACCEPTABILITY OF SELF-DIRECTED, REMOTE DIM-LIGHT MELATONIN ONSET COLLECTION IN ADOLESCENTS

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Introduction: Sleep dysregulation is highly prevalent in adolescents with chronic pain conditions and associated with poorer clinical outcomes, however, interactions between underlying circadian misalignments and pain in pediatric populations remain unclear. Melatonin serves as an effective biomarker of circadian dysregulation. Dim-light melatonin onset (DLMO) collections are the current gold standard method for measuring circadian rhythmicity by examining fluctuations in melatonin levels. Traditional DLMO collections conducted in external lab settings have limitations, including their inability to capture typical sleep patterns and restricted accessibility due to geographic, financial, and temporal barriers. We investigated the feasibility of a novel approach in which participants complete DLMO collections in an entirely self-directed manner using an at-home diagnostic kit.
Methods: Participants included adolescents with diagnosed chronic pain and healthy controls. The 3-week protocol involved sleep, activity, and light tracking; self-reported sleep diaries; a

survey determining morningness-eveningness chronotypes; one self-directed home DLMO collection with objective compliance measures; and a final instrument assessing participants' acceptability of study protocols. Main outcomes were feasibility and acceptability of self-directed remote DLMO collection.
Results: The study included adolescents with chronic pain (N=6, mean age=14.5, SD=2.74, 66.7% female) and healthy controls (N=6, mean age=13.3, SD=2.73, 50% female). Salivary DLMO times were successfully calculated using the Hockeystick method in 8 of 12 participants. On average, DLMO times were 2 hours and 32 minutes earlier than self-reported sleep onset times.
Conclusion: Our results demonstrate the feasibility and accuracy of self-directed, remote DLMO collections in adolescent populations. With further validation, this approach could enhance the measurement of endogenous circadian phases, allowing for more targeted sleep interventions to optimize clinical outcomes in pediatric patients with chronic pain.
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0886
FAST ASLEEP: EARLY TIME-RESTRICTED EATING ADVANCES SLEEP IN LATE SLEEPERS

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Introduction: In a globally-connected society, habitually late sleep timing has become increasingly problematic. Late sleep timing is associated with adverse health outcomes including insulin resistance, depression, and impaired cognition. Exposure to morning light and limiting evening light can shift the timing of the suprachiasmatic nucleus, helping some individuals fall asleep earlier. However, with widespread nighttime use of devices like smartphones and tablets, completely avoiding light in the evening is challenging. One potential alternative approach to advancing sleep timing involves using early time-restricted eating (eTRE) to target the food-entrainable oscillator (FEO). This pilot randomized controlled trial (RCT) investigated whether eTRE could advance sleep timing in late sleepers.
Methods: Fifteen adults with habitual late sleep timing were randomized to eTRE or a sleep and nutrition hygiene control. The eTRE group adopted a 16-hour overnight fast aligned with a target wake time (e.g., fasting from 4 PM to 8 AM). All participants completed a 1-week baseline phase and a 2-week intervention phase, during which continuous actigraphy and daily sleep and nutrition diaries were maintained. Primary outcomes included changes in sleep onset, midpoint, and offset, measured via self-report and actigraphy. Total sleep time (TST) was a secondary outcome. Data were analyzed using linear mixed-effects modeling.
Results: Participants in the eTRE group showed significant advancements in sleep timing compared to controls. Self-reported sleep onset (56.1 minutes), midpoint (19.5 minutes), and offset (42.2 minutes) were earlier in the eTRE group. Actigraphy findings corroborated these results, with sleep onset, midpoint, and offset advancing by 66.5, 21.9, and 39.3 minutes, respectively. No significant differences in TST were observed between groups, though a trend toward increased TST in the eTRE group was noted.
Conclusion: A single 30-minute session on eTRE significantly advanced sleep timing in late sleepers. These findings suggest eTRE as a promising intervention for circadian misalignment. Future research with larger, diverse populations is warranted to validate these results and explore long-term effects.
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0887
DAILY MORNING BLUE LIGHT EXPOSURE AFFECTS POLYSOMNOGRAPHIC SLEEP IN A REAL-WORLD SETTING

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Introduction: The circadian rhythm of sleep is particularly sensitive to ocular exposure to light, particularly blue wavelength light. 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. Despite its well-established effect on shifting the circadian timing of sleep, there have been no published placebo-controlled trials directly examining whether morning blue-wavelength light produces measurable changes in subsequent nighttime sleep architecture via polysomnography (PSG).
Methods: Thirty-six military participants (27 male; age=33.8, SD=6.9 years) meeting criteria for mild depression completed a 6-week counterbalanced, crossover, placebo-controlled clinical trial of blue (462 nm; active) versus red (661 nm; placebo) light using a commercially available eye-glass style device (AYO®) that was fitted with four LEDs at the appropriate wavelength. In a cross-over design, participants wore one device for 30-minutes each morning over a two-week treatment period, followed by a 2-week washout period, and a subsequent 2-week trial with the alternate intervention. Sleep was measured each night using an at-home ambulatory electroencephalographic sleep monitor (Dreem3®).
Results: Compared to red placebo light, daily morning blue light produced significant ($p<.05$) reductions in the duration of stage N1, N2, and N2%, and an increase in REM%, as well as decreased latency to stage N2 and REM sleep. There was also a trend level decline in microarousals with blue light. No differences were observed for N3, total sleep time, or WASO.
Conclusion: These data provide the first placebo-controlled evidence that a daily morning blue-wavelength light intervention produces significant changes in PSG sleep architecture in a real-world environment. Within a counterbalanced cross-over design, daily morning blue light reduced the amount of time spent later in non-restorative light stages of sleep and facilitated more rapid entry into restorative stages, including REM sleep. Moreover, blue light also reduced the latency to the first REM episode and increased the percent of time spent in REM. As prior work has emphasized the role of REM sleep in emotional processing, memory consolidation, and cognitive flexibility, these findings have implications for potentially managing sleep to facilitate cognitive and emotional health without pharmacologic interventions.
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0888

ADVANCING SLEEP TIMING AND IMPROVING SLEEP QUALITY IN ADOLESCENTS: RESULTS FROM A TRANS-C INTERVENTION

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Introduction: Most adolescents obtain insufficient sleep, which has been linked to negative mental and physical health outcomes. The purpose of this investigation was to examine the effectiveness of a sleep intervention known as the Transdiagnostic Intervention for Sleep and Circadian Dysfunction (TranS-C) in improving sleep and circadian outcomes adolescents experiencing circadian misalignment.

Methods: Adolescents with a self-reported sleep weekday bedtime of midnight or later (N = 31) completed a 6-week TranS-C sleep intervention in which they met with a sleep interventionist weekly for 40–50-minutes each week to implement behavioral sleep interventions. Sleep measurements (one-week of sleep monitoring via wrist-worn actigraphy and a sleep diary, a six-hour dim-light melatonin onset (DLMO) assessment, and a battery of sleep questionnaires (i.e., the Pittsburgh Sleep Quality Index (PSQI) and the Morningness/Eveningness Questionnaire (MEQ) occurred pre- and post-intervention. We ran a series of repeated-measure t-tests to evaluate changes in actigraphy measurements (averaged sleep duration, sleep onset latency (SOL), sleep midpoint, wake after sleep onset (WASO), sleep efficiency, and weekend/weekday sleep timing), DLMO, and in reported PSQI and MEQ total score.

Results: We observed significantly improved sleep quality (PSQI total scores) in adolescents following the intervention (p=.003; d=0.633). No significant changes were observed in actigraphy-derived sleep duration, SOL, sleep efficiency, or WASO (p>.05). On average, the adolescents' sleep midpoint shifted 30 minutes earlier across the week (p=.023; d=0.591), and average sleep onset also shifted about 30 minutes earlier across the week (p=0.044, d=0.498). Sleep onset for weekend sleep was, on average, 70 minutes earlier post-intervention (p=0.003, d=0.902), and weekend sleep offset was, on average, an hour earlier post-intervention (p=0.003, d=0.902). No significant changes were observed in DLMO or the MEQ total score (p>.05).

Conclusion: Although we failed to find significant support for increases in total sleep time, our findings support the effectiveness of TranS-C in improving the perception of sleep quality and in advancing sleep timing, particularly during the wekeend, among adolescents experiencing circadian misalignment. These findings suggest that TranS-C may serve as a helpful intervention target for adolescents who experience delayed sleep timing or perceive their sleep quality to be poor.

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0889

RECOGNIZING, DIAGNOSING, AND TREATING CIRCADIAN DISORDERS - LESSONS FROM A CIRCADIAN CLINIC

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Introduction: Patients with circadian rhythm disorders (CRDs) are commonly misdiagnosed. Up to 22% of patients diagnosed with primary insomnia have been shown to have a bedtime out of phase with their circadian sleep time, suggesting a circadian etiology instead. Such misdiagnoses lead to expensive and unsuccessful medication trials with risk for significant morbidity. In contrast, first-line treatments for CRDs, such as timed melatonin and light exposure, are low risk and efficacious for CRD in controlled settings (Burke et al). However, there is currently a lack of effectiveness studies to reaffirm these CRD treatments are also useful in less-controlled, real-world, clinical care settings. We aim to describe patient characteristics and outcomes among patients treated at a circadian disorder specialty clinic over the last 7 years to offer insight on effectiveness of CRD treatments in clinical settings.

Methods: We conducted a retrospective descriptive analysis including patients treated for CRDs at the Brigham and Women's Faulkner Circadian Clinic from 2017 – 2024. CRD treatment protocols were based on national guidelines and implemented prior to study initiation. Diagnostic evaluation included clinical history, sleep diaries, actigraphy, and dim-light melatonin onset saliva testing when appropriate and financially attainable for patients. Descriptive statistics included frequency of comorbidities and medication use. Chi-squared tests were performed to assess the association between two categorical variables.

Results: Preliminary data from July 1, 2017-Aug 1, 2019 demonstrate 133 patients met inclusion criteria. Among them were 117 with Delayed Sleep Wake Phase Disorder (SWPD) 12 with Advanced SWPD, one with jet lag and 3 with a non-24 hour disorder. The mean number of visits was = 3.32, std(1.50). There was a significant difference in improvement of symptoms when instructions about melatonin timing and brand was given (X-squared = 22.863, df = 1, p-value = 1.74e-06).

Conclusion: Preliminary analysis suggests significant effectiveness of CRD treatments even after after adjusting for comorbidities and medication use.

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0890

CHARACTERISTICS OF RESTLESS LEG SYNDROME IN SHIFT WORKERS

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Introduction: Both shift work and restless leg syndrome (RLS) are common and can disrupt sleep and mood. However, the effects of shift work on RLS remain unclear. The current study aims to explore the prevalence, severity, and related sleep and mood symptoms of RLS in shift workers (SWs) compared to non-shift workers (NSWs).

Methods: This study recruited 4,562 SWs (age 36.98±9.84, 2,150 males and 2,422 females) and 2,093 NSWs (age 37.79±9.73, 999 males and 1,094 females). All participants completed online self-report questionnaires regarding RLS, sleep, and depression. The presence of RLS was screened using a single standard question for rapid screening of RLS. The severity of RLS was assessed using the International Restless Legs Syndrome Rating Scale (iRLS). Additionally, the Epworth Sleepiness Scale (ESS), Insomnia Severity Index (ISI), and short-term Center for Epidemiologic Studies Depression Scale (CES-D) were used to assess daytime sleepiness, insomnia, and depressive symptoms, respectively.

Results: Of participants, 1,255 (27.45%) of SWs and 548 (26.18%) of NSWs were screened as having RLS, with no significant differences in the prevalence of RLS between the groups. However, among those with RLS, SWs with RLS showed higher iRLS scores compared to NSWs with RLS after controlling for age and sex (SWs: 9.55±7.26, NSWs: 6.75±6.05, F=64.15, p< 0.01). In addition, SWs with RLS exhibited higher ISI scores (SWs: 11.81±6.27, NSWs: 9.54±5.95, F=46.09, p< 0.01), higher ESS scores (SWs: 8.77±4.06, NSWs: 8.22±3.94, F=4.80, p=0.03), and higher CES-D scores (SWs: 10.43±6.54, NSWs: 8.38±6.15, F=33.50, p< 0.01) than NSWs with RLS.

Conclusion: Although there was no significant difference in RLS prevalence between SWs and NSWs, SWs with RLS exhibited more severe RLS symptoms and RLS-related symptoms, such as insomnia, sleepiness, and depression, compared to NSWs with RLS. The current study suggests that shift work may exacerbate RLS severity and RLS-related sleep and mood symptoms, although it may not be associated with the onset of RLS.

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0891

ASSESSING RISK FACTORS FOR REM SLEEP BEHAVIOR DISORDER AMONG PATIENTS WITH INFLAMMATORY BOWEL DISEASE

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Introduction: REM Sleep Behavior Disorder (RBD) is a sleep disorder in which individuals act out their dreams and strongly predicts incident Parkinson's Disease (PD). Inflammatory Bowel Disease (IBD) is also associated with PD. Given the links among PD, RBD, and IBD, we assessed RBD prevalence in IBD and determined IBD factors associated with RBD. We hypothesized that RBD prevalence in IBD is greater than in age-sex matched controls.

Methods: 158 controls from the community and 462 IBD patients from IBD Partners, an IBD patient registry, completed online questionnaires to assess RBD symptoms, medical history, and IBD-related medical history. RBD was assessed using the validated RBD Single-Question Screen (RBD1Q). Also assessed were IBD severity using IBD disease duration, number of IBD-related hospitalizations, presence of IBD-related surgery, and Crohn's disease or simple clinical colitis activity indices. Logistic regression and generalized linear models were used for the outcome RBD1Q, while adjusting for age, sex, and race. Prevalence of RBD was assessed between groups using chi-squared testing.

Results: IBD and control participants were comparable in age; the IBD cohort had proportionally more women and more Caucasians. 462 IBD participants had a mean age of 57.1±10.9 years, 71.6% female and 95.2% Caucasian; 158 controls had a mean age of 57.4±11.7 years, 62.6% female, and 91.1% Caucasian. Among the IBD group, 14.1% had RBD, screening positively with the RBD1Q, compared to 5.1% of controls (p = 0.002). Logistic regression revealed that RBD was significantly associated with IBD after controlling for age, sex, and race (OR 3.2 [CI 1.48,6.82]; p=0.003). Among the IBD cohort, RBD was not associated with IBD type, IBD duration, or report of past gastrointestinal surgery. Males with RBD were more likely to report IBD-related hospitalizations (95.2%; p=0.004) than male IBD patients without RBD. RBD was not associated with IBD activity indices.

Conclusion: RBD is more prevalent in IBD patients than controls without IBD and may be related to IBD disease severity. Future studies are needed to determine if those with IBD and RBD on particular immunotherapies are at decreased risk for synucleinopathy phenoconversion.

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0892

PRODROMAL PARKINSONISM IN POST-9/11 VETERANS WITH PROBABLE REM SLEEP BEHAVIOR DISORDER: A PILOT STUDY

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Introduction: Rapid eye movement (REM) sleep behavior disorder (RBD) is the single strongest predictor of Parkinson's disease (PD) risk. Given neurotrauma and psychiatric morbidity, the aging post-9/11 Veteran cohort is a target population for understanding probable RBD frequency and neuroprotection opportunities. We previously reported over 50% of post-9/11 Veterans screened positive for probable RBD. We aimed to examine frequencies of prodromal PD markers and polysomnography (PSG)-confirmed RBD in post-9/11 Veterans.

Methods: Veterans with probable RBD based on the single-question RBD screen (n=12) were recruited from the Translational Research Center for Traumatic Brain Injury (TBI) and Stress Disorders (TRACTS) Houston cohort. Participants were assessed for subthreshold parkinsonism (Unified Parkinson's Disease Rating Scale-III Motor score >3, excluding action tremor), olfactory loss (12-item Sniffin' Sticks), TBI exposures, autonomic symptoms, orthostasis, excessive daytime sleepiness, post-traumatic stress disorder (PTSD), and psychiatric comorbidities. PSG studies were conducted per American Academy of Sleep Medicine guidelines. A board-certified sleep physician confirmed the presence of REM sleep without atonia. We compared the frequency of prodromal marker positivity between participants with and without subthreshold parkinsonism.
Results: All 12 participants were male (6 [50%] Black, 3 [25%] Hispanic) with a mean (SD) age of 44.4 ± 6.7 years. PSG data (n=10) revealed REM sleep without atonia in 5 (50%), moderate obstructive sleep apnea (OSA) in 2 (20%), and severe OSA in 2 (20%) participants. Five (41.6%) participants had mild motor dysfunction suggestive of subthreshold parkinsonism on the UPDRS-III (M±SD score of 8.6 ± 5.9), while 7 participants had normal or low UPDRS-III ratings (2.3 ± 1.3; p=0.02). Veterans with subthreshold parkinsonism had lower Sniffin' Sticks scores than those without (M±SD 9.4 ± 2.07 vs. 11.29 ± 0.76; 95% CI: 0.01–3.76, p=0.049).
Conclusion: This pilot study suggests that motor and olfactory prodromal PD markers are frequent in post-9/11 Veterans with probable RBD. Larger prospective cohort studies are required to further quantify REM sleep without atonia and assess synuclein-specific biomarkers in this population.
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0893

EXPERT ANNOTATION OF FREE-TEXT DESCRIPTIONS OF DREAM ENACTMENT BEHAVIORS ASSOCIATED WITH REM SLEEP BEHAVIOR DISORDER

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Introduction: We developed a database of free-text descriptions of dream enactment behavior (DEBs) from unstructured clinical notes of Veterans with electronic diagnoses of rapid eye movement sleep behavior disorder (RBD). We additionally examined characteristics of DEBs considered essential for the diagnosis of RBD according to expert consensus.
Methods: We randomly sampled electronic medical records of 200 Veterans with electronic medical records in the national Veterans Health Administration from 10/01/1999 – 09/30/2020; ≥2 electronic diagnoses of RBD (>30 days but < 390 days apart); and procedural codes for in-lab polysomnography within 6 months. DEB descriptions manually extracted from clinical notes were reviewed in expert consensus meetings and labeled as "essential" for RBD diagnosis, "supporting," or "unclear." Phrases were categorized according to DEB type (movements, vocalizations, consequences [e.g., descriptions of injuries], and dream content). Movements were further characterized as potentially violent or injurious, non-injurious, or unclear. Proportions were compared with Chi-square tests.
Results: Removal of 3 repeated phrases yielded 208 DEB descriptions for classification. Expert consensus labeled 124 (59.6%) phrases "essential," 71 (34.1%) "supporting," and 13 (6.25%) "unclear" for RBD diagnosis. Essential phrases included dream enactment variations (e.g., "acted out dreams"); hitting, punching, or kicking bedpartners, pets, and/or bedside objects; and other mentions of sleep-related injury or violence (e.g., "trying to strangle"). Supporting phrases described sleep-talking, thrashing, vivid dreams, nightmares, sleeping in separate beds, and non-descript behaviors. Excerpts describing sleep-related movements (121 [58.2%]) were more likely labeled as essential versus supporting or unclear (p=0.00). Conversely, descriptions of dream content (p=0.017) and vocalizations (p=0.012) were more likely to be considered supporting or unclear than essential. Potentially violent or injurious movements were also more likely to be labeled as essential than supporting or unclear (p=0.00).
Conclusion: Expert labeling emphasized the significance of sleep-related movements and associated injury risks for detecting RBD in free-text medical records. A natural language processing (NLP) algorithm that detects DEBs from free-text is needed to further characterize sleep-related violence and injury risks associated with DEBs according to demographics and comorbidities.
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0894

EYE BLINKING CHARACTERISTICS AS POTENTIAL BIOMARKERS IN ISOLATED REM SLEEP BEHAVIOR DISORDER DURING VISUOSPATIAL ATTENTION TASKS

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Introduction: Isolated REM sleep behavior disorder (iRBD) is a prodromal stage of alpha-synucleinopathies, including Parkinson's disease (PD), dementia with Lewy bodies (DLB), and multiple system atrophy (MSA). Although eye blinking characteristics were reported to be associated with the pathophysiology of PD, such as hypomimia, no studies have explored these features in the prodromal stage. This study aimed to investigate eye blinking characteristics in iRBD patients during Posner's cueing paradigm.
Methods: A total of 136 patients with video-polysomnography (v-PSG)-confirmed iRBD were enrolled (aged 67.1 years). Patients who developed synucleinopathies were classified as converters (iRBD-CV), while the others as non-converters (iRBD-NC). Fifty healthy controls (HCs) were also participated (aged 66.2 years). At baseline, all participants performed Posner's visuospatial cueing task, with cue-to-target interval (CTI; long-CTI or short-CTI) and the validity conditions set to 50%. During the tasks, 60-channel electroencephalogram (EEG) and two-channel electrooculogram (EOG) signals were recorded. After pre-processing, vertical EOG components were extracted through independent component analysis. The acquired components were robust-scaling normalized and then eye blinking events were automatically identified based on a thresholding approach from two temporal windows of interest (300-800 ms and 1300-1800 ms). In each window, we calculated blink latency to target stimuli (i.e., mean), synchrony (standard deviation), and rate. For group comparisons, independent t-tests

were performed in two steps: (i) iRBD vs. HC, (ii) iRBD-CV vs. iRBD-NC.
Results: iRBD exhibited delayed blink latency compared to HC in the second window for both long-CTI (1549 > 1529 ms, p = 0.017) and short-CTI (1543 ms > 1524 ms, p = 0.018). iRBD-CV (n = 31) exhibited a decreased blink rate compared to iRBD-NC in long-CTI (31.24% < 40.92%, p = 0.034), and a decreasing trend in short-CTI (26.90% < 34.37%, p = 0.080), which was more pronounced in PD-converters (n = 17, 26.19% and 21.75%, respectively). However, no significant group differences were observed in blink synchrony.
Conclusion: Delayed blink latency and decreased blink rate may be associated with the pathophysiology of the prodromal phase of synucleinopathies. Our results suggest that eye blink characteristics potentially serve as biomarkers reflecting the pathophysiology of iRBD and predicting their phenoconversion.
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0895
THE ASSESSMENT OF RMMA CLUSTERS AS A NOVEL DIAGNOSTIC APPROACH FOR SLEEP BRUXISM

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Introduction: Sleep bruxism (SB) is a prevailing sleep-related movement disorder characterized by clenching and grinding of teeth, or thrusting and bracing of the mandible, that may occur without conscious awareness. It is also related to rhythmic masticatory muscle activity (RMMA) during sleep. Currently, polysomnography (PSG) is a gold standard for SB diagnosis. However, since this method is time-consuming, new approaches for diagnosing SB are currently under review. This study examines the potential of RMMA cluster analysis as an innovative and time-efficient diagnostic tool for SB in the future. Analyzing RMMA patterns, we determined specific profiles associated with SB episodes that could become a broadly used alternative to traditional diagnostic methods.
Methods: This study involved 200 Caucasian patients who were admitted to the Sleep Laboratory in Wroclaw University Hospital, Poland, for polysomnography examination as a diagnostic method for SB. Participants willingly agreed to attend the examination. The average age of the study group was 34.9 ±10.5 years. Before participation, all patients provided written informed consent, confirming their understanding of the objectives and procedures of the study, as well as potential risks and benefits.
Results: The findings of the study indicate that RMMA clusters are very specific for diagnosing sleep bruxism. When clusters are present, the diagnosis of bruxism is definitive (specificity 100%). However, the absence of clusters does not reliably exclude the presence of SB (false-negative diagnosis), possibly regarding tonic and phasic episodes and arousals. Therefore, diagnostic assessment through polysomnography and calculation of the bruxism episode index (BEI) is necessary. Cluster Index (AUC 0.77) and Cluster Event Index (AUC 0.8) were effective assessment tools for diagnosing bruxism. The Cluster Index is also useful for distinguishing severe bruxism (BEI >4) with a sensitivity of 71.9%, specificity of 87.4%, and accuracy of 80.5%.
Conclusion: RMMA cluster analysis shows notable promise as a specific and efficient diagnostic tool for SB. However, refining the method to address false-negatives through threshold values for tonic and phasic episodes is essential. This approach has the potential to streamline SB diagnosis and provide a basis for future research into its mechanisms and subtypes.
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0896
LONGITUDINAL CHANGES IN DIFFUSION TENSOR IMAGING ALONG THE PERIVASCULAR SPACE IN REM SLEEP BEHAVIOR DISORDER

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Introduction: This study aimed to evaluated whether diffusion tensor image analysis along the perivascular space (DTI-ALPS) differed in isolated REM sleep behavior disorder (iRBD) patients who converted to neurodegenerative disease during follow-up and tracked DTI-ALPS changes longitudinally with repeated imaging.
Methods: Fifty patients diagnosed with iRBD by video-polysomnography (vPSG) at the Seoul National University Hospital who underwent MRI and were followed-up for at least 3 years, and 20 age- and sex- matched controls were included. DTI-ALPS index was calculated and compared between iRBD patients who converted (iRBD-C) or not (iRBD-NC), and the controls. Thirty of the iRBD patients and 5 of the controls underwent repeated imaging after mean duration of 40.9±10.1 months.
Results: The mean duration of RBD was 5.6±4.7 years from symptom onset and 14 of the patients were iRBD-C [to Parkinson's disease (n=10), Multiple system atrophy (n=3), or Dementia with Lewy bodies (n=1)] after 25.8±20.3 months from the baseline imaging. At baseline, significant difference was observed in baseline ALPS index between the controls, iRBD-C, and iRBD-NC (p=0.035), and post-hoc analysis revealed reduced ALPS index only in the iRBD-C group compared to the controls (post-hoc p=0.033). After longitudinal follow-up, iRBD patients showed significant decrease in ALPS index (baseline 1.38±0.17, follow-up 1.34±0.17, p=0.003). Compared to the controls at baseline, the ALPS index was lower only at follow-up (p=0.018), but not at the baseline (p=0.106).
Conclusion: Baseline DTI-ALPS index was associated with phenoconversion to alpha-synucleinopathy in iRBD patients during follow-up. Decreases in DTI-ALPS index on repeated imaging in iRBD may reflect neurodegenerative progression.
Support (if any):

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0897
DREAM ENACTMENT BEHAVIOR IN VETERANS WITH PTSD: THE IMPACT OF SSRIS

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Introduction: Dream enactment behavior (DEB) has been reported among those with PTSD and a new parasomnia called

Trauma Associated Sleep Disorder has been proposed to characterize these sleep difficulties in trauma survivors. The most recent practice guidelines identified strong evidence for the use of SSRIs in veterans with PTSD. However, a condition referred to as 'serotonergic RBD' has been identified and may be secondary to use of these antidepressants.
Methods: Veterans at risk for sleep apnea at the Miami VA Sleep Center underwent a home sleep apnea test (HSAT) and completed questionnaires including demographics and the Munich Parasomnia Screening (MUPS). The frequency of dream enactment behavior was determined from two items on this scale regarding 'acting out dreams' and 'punching and kicking' during sleep. Electronic Medical Records were reviewed to obtain active medical and psychiatric diagnoses and active medication orders contemporaneous with the sleep evaluation. These data had a preponderance of veterans reporting no DEB (zero-inflated) so two-part regression model was used. The first logistic part identifies predictors of the susceptibility to DEB and the second linear part (which excludes those without DEB) identifies predictors of DEB severity.
Results: The study involved 607 veterans, predominantly male (84%) with mean age of 50 ± 14 years. Within this cohort, 49% were diagnosed with depression, and 33% with PTSD. Additionally, 44% of the cohort were prescribed antidepressants. No DEB was reported by 32.3% indicated and the other 67.7% reported DEB from "less than once a year" to "almost every night". PTSD was positively associated with DEB (p=0.001), but not antidepressants. All models controlled for depression, AHI, age and gender. With linear regression DEB severity was again predicted by PTSD but not antidepressants. When antidepressants were restricted to SSRIs, PTSD predicted DEB in the logistic model, but not SSRIs. However, both PTSD and SSRI use predicted DEB in the linear regression model.
Conclusion: These findings highlight the prevalence of DEB among veterans. Furthermore, PTSD strongly predicts the susceptibility to and the severity of the report of DEB. Also, antidepressant use, specifically SSRIs, appear to worsen the report of DEB in those with PTSD.
Support (if any): N/A

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0898

PREVALENCE AND INCIDENCE OF PERIODIC LIMB MOVEMENTS IN SLEEP IN SÃO PAULO: FINDINGS FROM THE EPISONO STUDY

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Introduction: Periodic limb movement in sleep (PLMS) refers to repetitive, involuntary limb movements that occur during sleep. When these movements exceed 15 events per hour, they can significantly disrupt sleep quality and contribute to various health risks. Objective: This study aimed to examine the prevalence, incidence, and remission rates of PLMS in a population sample from São Paulo, one of the largest and most populous cities in the world.
Methods: The analysis utilized data from the 2007 EPISONO study, its 2015 follow-up, and the 2018 edition—the first 2 being part of a longitudinal investigation on sleep in a population sample representative of São Paulo, Brazil. PLMS prevalence rates were determined for 2007 and 2018, while incidence and remission rates were evaluated between 2007 and 2015.
Results: In 2007, the prevalence of PLMS was 9.02%, which increased to 15.60% by 2018. The incidence of new PLMS cases from 2007 to 2015 was 6.54%, with a remission rate of 50.82%. Aging significantly influenced the increase in both the prevalence and severity of PLMS over time.
Conclusion: This study demonstrated a rise in PLMS prevalence over a decade, which may be associated with aging demographics and shifts in lifestyle factors. These results underscore the need for continued research into the long-term health effects of PLMS and its contribution to sleep-related disorders.
Support (if any): This study was supported by the Associação Fundo de Incentivo à Pesquisa (AFIP), São Paulo, Brazil. MLA, ST and VDA are recipients of CNPq fellowships. MLA and VDA receive grants from the Fundação de Amparo à Pesquisa do Estado de São Paulo (#2020/13467-8 and #23/08657-0, respectively).

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0899

PREVALENCE AND ASSOCIATED FACTORS OF INSOMNIA AND EXCESSIVE DAYTIME SLEEPINESS IN PATIENTS WITH PERIODIC LIMB MOVEMENTS IN SLEEP

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Introduction: Excessive daytime sleepiness (EDS) and insomnia symptoms are commonly reported by patients with periodic limb movements in sleep (PLMS). However, the prevalence of symptoms and more importantly associated factors are not fully understood.
Methods: We analysed the demographics, clinical history and polysomnography (PSG) results of 95 patients (57% men, 50±13 years) who were diagnosed with PLMS based on PLMS index≥15/h. EDS was defined by an Epworth Sleepiness Scale (ESS≥11) and insomnia was defined in patients who reported either difficulties in falling asleep or maintaining sleep.
Results: Sixty-four percent reported EDS and 30% insomnia (18% sleep initiation and 19% sleep maintenance). Neither ESS, nor the presence of EDS correlated with demographics, comorbidities or PSG parameters. In contrast, patients with insomnia were likely to be females (75% vs. 34% in non-insomnia group, p< 0.01), more commonly complained about restless leg syndrome (64% vs. 23%, p< 0.01), less likely had diabetes (0% vs. 23%, p=0.03), had longer REM latency (212±103 mins vs. 150±102 mins, p=0.03) and lower proportion of N1 sleep (8.4±6.0% vs. 12.9±8.6%, p=0.05).
Conclusion: Whilst daytime sleepiness seems to be more common in patients with PLMS than the general population, it is not related to disease severity or other PSG parameters. On the other hand, insomnia, which was also commonly reported by our patients was related to some PSG features. Understanding factors associated with common symptoms in PLMS may help us to better tailor treatment for these patients.
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0900

THE CLINICAL IMPACT OF PERIODIC LIMB MOVEMENTS: UNDER-RECOGNITION IN SLEEP DISORDERED BREATHING AND ASSOCIATIONS WITH KEY OUTCOMES IN 493,085 PATIENTS

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Introduction: We evaluated PLMS in a large cohort, exploring their association with sleep disordered breathing (SDB) and apnea scoring, and associations with key clinical outcomes.
Methods: This retrospective analysis included 493,085 adults who completed polysomnography (PSG) and a sleep questionnaire. Data were collected from 240 sleep centers across 30 U.S. states (2004–2019). Periodic limb movement index (PLMI) was calculated from technician-scored PSGs. Subjective outcomes included medical comorbidities, depression, and insomnia, and objective outcomes included PSG measures. Multivariate analysis included significant variables identified in univariate analyses.
Results: The sample included 54.2% males, with a mean age of 54.6±14.4 years (range:18–107 years). PLMI was strongly negatively associated with SDB variables, suggesting under-recognition of PLMs in the presence of apnea. Therefore, we controlled for SDB (e.g., AHI, RDI) and demographic variables (i.e., age, sex, body mass index) in all additional analyses. Regarding self-reported outcomes, PLMI was associated with higher prevalence of depression (β= 0.14,$p< 0.001$), insomnia (β= 0.14,$p< 0.001$), heart attack (β=0.09,$p< 0.001$) and later awakening (β=0.15,$p< 0.001$). Multivariate analysis of self-reported outcomes confirmed independent associations with depression (β=0.09,$p< 0.001$), insomnia score (β=0.02,$p< 0.001$), later awakening (β=1.26,$p< 0.001$), and heart attack (β=0.07,$p< 0.001$). Regarding PSG outcomes, PLMI was associated with higher arousal index (β=0.22,$p< 0.001$), and greater N3 latency (β=0.10,$p< 0.001$), latency to persistent sleep (β=0.09,$p< 0.001$) and sleep onset latency (β=0.07,$p< 0.001$). Multivariate analysis revealed independent associations with arousal index (β=5.03,$p< 0.001$), latency to persistent sleep (β=0.06,$p< 0.001$) and N3 latency (β=0.03,$p< 0.001$).
Conclusion: PLMS may be under-recognized due to AHI scoring criteria and are clinically relevant, given associations with insomnia, depression, heart attack, later awakening, and arousal index. These findings highlight the need to reconsider scoring methods and further investigate PLMS as a clinical entity.
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0901

ELEVATED DOWNLOAD AND AHI IN CPAP THERAPY: A MARKER FOR PERIODIC LIMB MOVEMENTS IN SLEEP (PLMS)?

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Introduction: Patients with periodic limb movements in sleep (PLMS) often present unique challenges in the management of obstructive sleep apnea (OSA). Anecdotal observations suggest that elevated download data and apnea-hypopnea indices (AHI) in patients using continuous positive airway pressure (CPAP) therapy may correlate with the presence of PLMS. This study aims to investigate the relationship between elevated download metrics on CPAP and confirmed PLMS diagnoses.
Methods: We conducted a retrospective analysis of 20 patients diagnosed with OSA and Statistical analyses were performed using chi-square. Inclusion criteria included the availability of detailed CPAP download data and polysomnography (PSG) ruling out PLMS. CPAP data were analyzed for average nightly usage, residual AHI, and percentage of flow limitations. Comparisons were made between patients with confirmed PLMS (PLMS+) and those without (PLMS-).
Results: Of the 50 patients analyzed, 14 patients were PLMS+. Statistical analyses were performed using chi-square, with a p-value of 0.002, indicating that the association between PLMS+ and PLMS- is statistically significant. Elevated download metrics were strongly predictive of PLMS diagnosis. Additionally, PLMS+ patients demonstrated greater CPAP pressure variability and lower subjective sleep quality scores compared to their PLMS- counterparts.
Conclusion: Elevated residual AHI and associated download metrics in patients undergoing CPAP therapy may serve as indirect markers for the presence of PLMS. These findings underscore the importance of comprehensive follow-up and PSG evaluations for patients presenting with suboptimal CPAP efficacy. Early identification of PLMS in this population could inform tailored therapeutic interventions, potentially improving sleep quality and overall treatment outcomes.
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0902

NEUROPHYSIOLOGY OF LARGE MUSCLE GROUP MOVEMENTS IN RLS: IMPLICATIONS FOR SLEEP ARCHITECTURE AND TREATMENT

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Introduction: Recent evidence has highlighted Large Muscle Group Movements during sleep (LMM) as a distinct phenomenon in restless Legs Syndrome (RLS), with neurophysiological and neurobiological differences from periodic leg movements during sleep (PLMS). While LMM are correlated with sleep fragmentation and instability, their relationship with treatment outcomes remains unclear. This presentation aims to characterize LMM in RLS, investigate their impact on sleep neurophysiology, and evaluate their response to recommended therapies.
Methods: Two complementary retrospective analyses were conducted. The first included 100 drug-free RLS patients and 67 controls to evaluate the relationship between LMM and various sleep parameters. LMM, PLMS and other movement measures were assessed. The second study focused on 51 drug-free RLS patients randomized to dopamine agonists (DA), clonazepam (CLO), or placebo. Patients underwent baseline and post-treatment nocturnal polysomnography, with LMM and PLMS scored and changes analyzed using ANCOVA and paired t-tests.
Results: In the first study, RLS patients demonstrated significantly higher LMM and other movement measures than controls. LMM showed a negative correlation with total sleep time, sleep efficiency, and restorative sleep stages (N3 and R) and a

positive correlation with awakenings and lighter sleep stages (N1 and N2) in RLS patients. No significant correlation was found between LMM or PLMS and RLS severity. In the second study, DA significantly reduced PLMS but had minimal effect on LMM, apart from a small increase in LMM duration. CLO showed no significant impact on either LMM or PLMS. The placebo group exhibited a decrease in LMM index, likely reflecting a first-night effect. Persistent arousals and NREM instability were observed post-treatment, suggesting incomplete resolution of sleep disruptions despite reduced PLMS.
Conclusion: These findings underscore the complex interplay between motor activity and sleep neurophysiology in RLS. LMM are associated with sleep architecture fragmentation and arousals, reflecting their distinct neurophysiological basis compared to PLMS. Current therapeutic strategies, while effective for PLMS, fail to adequately address LMM or the broader sleep disturbances in RLS. Future research should prioritize the development of targeted therapies that address LMM and their detrimental impact on sleep, leveraging insights into the underlying neurotransmitter networks involved in RLS pathophysiology.
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0903

SEX-RELATED DIFFERENCES IN PERIODIC LEG MOVEMENTS ACROSS THE LIFESPAN AND IN THEIR RESPONSE TO TREATMENT IN RLS

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Introduction: Restless Legs Syndrome (RLS) and its associated motor manifestations, such as periodic leg movements during sleep (PLMS), exhibit significant sex-related differences in prevalence, progression, and treatment response. Epidemiological studies suggest a higher prevalence of RLS in women, but the underlying mechanisms remain unclear. This presentation combines two studies to explore: (1) sex differences in PLMS patterns across various age groups and hormonal stages, and (2) sex-specific responses to dopamine agonists (DA), pramipexole and ropinirole, in adult RLS patients.
Methods: In the first study, a retrospective analysis of 184 drug-free RLS patients (95 females, 89 males, ages 2–83 years) evaluated PLMS index and periodicity index via polysomnographic (PSG) recordings, stratified by age. The second study analyzed 41 drug-free adult RLS patients (26 treated with pramipexole, 15 with ropinirole) using baseline and post-treatment PSG. Treatment efficacy was assessed through changes in sleep parameters, movement indices, and a Visual Analogue Scale (VAS) for symptom severity.
Results: The first study revealed distinct age-related PLMS trends: women experienced a rapid PLMS increase before age 10, plateauing until menopause, followed by a sharp rise post-55 years. Men showed a more gradual PLMS increase, peaking after age 75. Periodicity index increased progressively in both sexes but remained slightly higher in women during midlife. These patterns aligned with hormonal shifts and autonomic nervous system modulation. In the second study, DA treatment reduced total leg movements, PLMS, and periodicity index in all patients, with greater reductions in women. Women exhibited higher sleep efficiency and lower wakefulness after sleep onset compared to men. The VAS scores improved across both sexes, though no sex differences were observed.
Conclusion: These findings underscore the complex interplay between sex, age, and neurophysiological factors in RLS. Hormonal changes and differential D3 receptor expression likely contribute to the observed disparities in PLMS progression and DA response. The results highlight the need for personalized, sex-specific approaches in RLS management, considering both lifespan dynamics and pharmacological nuances. Future guidelines should integrate these insights to optimize treatment efficacy and improve sleep outcomes for diverse demographic groups.
Support (if any):

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0904

FIVE-YEAR OUTCOMES FROM THE NATIONAL RLS OPIOID REGISTRY: EFFICACY, STABILITY, AND TOLERABILITY

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Introduction: Opioids are effective in treating refractory or augmented restless legs syndrome (RLS) yet concerns about their long-term use in RLS are common. To investigate these concerns, the National RLS Opioid Registry tracks the long-term efficacy, dose stability, and tolerability of opioids for RLS.
Methods: This longitudinal, observational study initially interviewed and enrolled 500 participants prescribed opioids for RLS (median duration at baseline=2 years), from 44 US states and 4 countries. All participants had a history of therapeutic response to dopamine agonists and a majority experienced augmentation. Self-administered biannual surveys track opioid dosage, side effects, RLS severity, and other relevant factors. No clinical guidance or intervention is provided. Review of state-controlled substance records corroborate opioid dosing.
Results: At 5-years, 410 participants continue opioid treatment and study participation (7.0% lost to follow-up or withdrew, 3.6% died, 7.8% stopped opioids). Methadone (53.2%) and oxycodone (16.3%) are the most common opioids. Mean RLS severity (baseline IRLS=13.3; 5-year IRLS=13.1) and sleep disturbance (baseline ISI=10.6, 5-year ISI=9.6) were stable from baseline to 5-years. Median daily opioid dose increased slightly, to 36 MME (equivalent to methadone 9 mg or oxycodone 24 mg) from 30. Opioid doses increased in 51.0% of participants (median increase=15.0 MME) and decreased in 19.3% (median decrease=12.5 MME). Large dose increases (25-50 MME or >50 MME) occurred in 6.8% and 6.3% of participants, respectively. Several factors were predictors of such larger dose increases, including switching opioids to buprenorphine (OR=9.21, 95%CI [3.23-25.54]) or methadone (OR=4.39, 95%CI [1.95-9.68]), adding dopamine agonists (OR=4.55, 95%CI [1.46-12.94]), use of opioids for comorbid pain condition (OR=3.13, 95%CI [1.13-8.10]), higher baseline RLS severity (IRLS>20) (OR=2.79, 95%CI [1.17-6.60]), comorbid neuropathy (OR=2.79, 95%CI [1.14-6.62]), baseline sleep disturbance (ISI>7) (OR=2.42, 95%CI [1.18-5.4]), and under one year on opioids at baseline (OR=2.02, 95%CI [1.06-3.81]). 100% of participants who increased their dose by >25 MME had at least one predictor.

Conclusion: Low-dose opioids produced stable RLS symptoms over 5-years of follow-up. While 51.0% of participants increased their dose, most changes were small and larger dose increases were associated with specific risk factors.
Support (if any): Thank you to the Baszucki Group and the RLS Foundation.

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0905

TREATMENT OF RESTLESS LEGS SYNDROME AND PERIODIC LIMB MOVEMENT DISORDER: AN AASM CLINICAL PRACTICE GUIDELINE

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Introduction: This guideline establishes clinical practice recommendations for the treatment of restless legs Syndrome (RLS) and periodic limb movement disorder (PLMD) in adults and pediatric patients. This clinical practice guideline updates the previously published American Academy of Sleep Medicine (AASM) practice parameter for the treatment of RLS and PLMD 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 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: The following recommendations are intended as a guide for clinicians in choosing a specific treatment for RLS and PLMD in adults and children. Each recommendation statement is assigned a strength ("strong" or "conditional"). A "strong" recommendation (i.e., "The AASM recommends…") is one that clinicians should follow under most circumstances. A "conditional" recommendation (i.e., "The AASM suggests…") is one that requires that the clinician use clinical knowledge and experience, and to strongly consider the patient's values and preferences to determine the best course of action. Adult with RLS 1. In adults with RLS, the AASM recommends the use of gabapentin enacarbil over no gabapentin enacarbil (strong recommendation, moderate certainty of evidence) 2. In adults with RLS, the AASM recommends the use of gabapentin over no gabapentin (strong recommendation, moderate certainty of evidence). 3. In adults with RLS, the AASM recommends the use of pregabalin over no pregabalin (strong recommendation, moderate certainty of evidence). 4. In adults with RLS, the AASM recommends the use of IV ferric carboxymaltose over no IV ferric carboxymaltose in patients with appropriate iron status (see good practice statement for iron parameters) (strong recommendation, moderate certainty of evidence). 5. In adults with RLS, the AASM suggests the use of IV low molecular weight iron dextran over no IV low molecular weight iron dextran in patients with appropriate iron status (see good practice statement for iron parameters) (conditional recommendation, very low certainty of evidence). 6. In adults with RLS, the AASM suggests the use of IV ferumoxytol over no IV ferumoxytol in patients with appropriate iron status (see good practice statement for iron parameters) (conditional recommendation, very low certainty of evidence). 7. In adults with RLS, the AASM suggests the use of ferrous sulfate over no ferrous sulfate in patients with appropriate iron status (see good practice statement for iron parameters) (conditional recommendation, moderate certainty of evidence). 8. In adults with RLS, the AASM suggests the use of dipyridamole over no dipyridamole (conditional recommendation, low certainty of evidence). 9. In adults with RLS, the AASM suggests the use of extended-release oxycodone and other opioids over no opioids (conditional recommendation, moderate certainty of evidence). 10. In adults with RLS, the AASM suggests the use of bilateral high-frequency peroneal nerve stimulation over no peroneal nerve stimulation (conditional recommendation, moderate certainty of evidence). 11. In adults with RLS, the AASM suggests against the standard use of levodopa (conditional recommendation, very low certainty of evidence). 12. In adults with RLS, the AASM suggests against the standard use of pramipexole (conditional recommendation, moderate certainty of evidence). 13. In adults with RLS, the AASM suggests against the standard use of transdermal rotigotine (conditional recommendation, low certainty of evidence). 14. In adults with RLS, the AASM suggests against the standard use of ropinirole (conditional recommendation, moderate certainty of evidence). 15. In adults with RLS, the AASM suggests against the use of bupropion for the treatment of RLS (conditional recommendation, moderate certainty of evidence). 16. In adults with RLS, the AASM suggests against the use of carbamazepine (conditional recommendation, low certainty of evidence). 17. In adults with RLS, the AASM suggests against the use of clonazepam (conditional recommendation, very low certainty of evidence). 18. In adults with RLS, the AASM suggests against the use of valerian (conditional recommendation, very low certainty of evidence). 19. In adults with RLS, the AASM suggests against the use of valproic acid (conditional recommendation, low certainty of evidence). 20. In adults with RLS, the AASM recommends against the use of cabergoline (strong recommendation, moderate certainty of evidence). Special adult populations with RLS 21. In adults with RLS and end-stage renal disease (ESRD), the AASM suggests the use of gabapentin over no gabapentin (conditional recommendation, very low certainty of evidence). 22. In adults with RLS and ESRD, the AASM suggests the use of IV iron sucrose over no IV iron sucrose in patients with ferritin < 200 ng/mL and transferrin saturation < 20% (conditional recommendation, moderate certainty of evidence). 23. In adults with RLS and ESRD, the AASM suggests the use of vitamin C over no vitamin C (conditional recommendation, low certainty of evidence). 24. In adults with RLS and ESRD, the AASM suggests against the standard use of levodopa (conditional recommendation, low certainty of evidence). 25. In adults with RLS and ESRD, the AASM suggests against the standard use of rotigotine (conditional recommendation, very low certainty of evidence). Adults with PLMD 26. In adults with PLMD, the AASM suggests against the use of triazolam (conditional recommendation, very low certainty of

evidence). 27. In adults with PLMD, the AASM suggests against the use of valproic acid (conditional recommendation, very low certainty of evidence). Children with RLS 28. In children with RLS, the AASM suggests the use of ferrous sulfate over no ferrous sulfate in patients with appropriate iron status (see good practice statement for iron parameters) (conditional recommendation, very low certainty of evidence).
Conclusion: The treatment of RLS and PLMD should be based on a diagnosis established using ICSD-3 criteria and a comprehensive clinical history. The standard of care should be to provide one of the recommended interventions discussed within the guideline, taking into consideration the accessibility and resource requirements when deciding on the most appropriate treatment for a given patient. The treating clinician and the patient must make the ultimate judgment regarding any specific care.
Support (if any):

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0906
EVALUATING THE RISK OF CENTRAL SLEEP APNEA ASSOCIATED WITH LOW-DOSE OPIOIDS FOR RESTLESS LEGS SYNDROME

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Introduction: Guideline based therapy for Restless Leg Syndrome (RLS) includes recommendation for low-dose opioid therapy which is often prescribed for patients with refractory and augmented symptoms. Although the respiratory effects of opioid use, including hypoventilation and development of central sleep apnea (CSA), are well-characterized, most of the evidence rests on opioid doses that are well in excess of that used for RLS. Our goal was to investigate the effect of low-dose opioids on polysomnography data in patients being treated for RLS.
Methods: A retrospective chart review of patients seen in our clinic was performed via database search to identify those with sleep studies performed both prior to low-dose opioid initiation and while on therapy. Positive Airway Pressure titration studies were excluded from analysis. Sleep study data with attention to total AHI, Non-REM AHI, Central AHI (cAHI), and oxygenation status were recorded along with pertinent medical history and medication history.
Results: Upon review of our database, 3 patients (2 male and 1 female) mean age 76.6 years at time of sleep study without and 79.7 years at time of study with low-dose (mean 15 MME/ day) opioid therapy met criteria. One patient identified had known history of atrial flutter. Time between sleep studies was on average 5.7 years while length of time on opioid therapy prior to second sleep study was 0.87 years. Total AHI and cAHI off opioids was noted to be mean (range)= 42 (17 – 58) and 8.3 (5.3 – 13.9) respectively, while on therapy 27.2 (15.8 – 47) and 13.9 (1.8 – 38). During NREM sleep total AHI 26.4 (6.7 – 55) and 27.3 (15.4-52). Percent of Total Sleep Time (%TST) with SPO2 < 90% was 14.3 off opioid therapy and 16.5 % while on opioid therapy.
Conclusion: To our knowledge this is the first case series reporting data on a population of patients taking low-dose opioids who have had polysomnography performed both before and after therapy initiation. This type of data is crucial to understanding the true risk of CSA in patients taking low dose opioid therapy for RLS symptoms. Further studies are warranted to investigate.
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0907
TONIC MOTOR ACTIVATION FOR TREATMENT OF PATIENTS WITH PAINFUL VERSUS PAINLESS RESTLESS LEGS SYNDROME

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Introduction: Several studies characterized a more severe painful (versus painless) phenotype of restless legs syndrome (RLS). There is paucity of data comparing treatment of patients with painful and painless RLS. Bilateral high-frequency tonic motor activation (TOMAC) was recently approved for treatment of patients with medication-refractory RLS. The current study compared TOMAC efficacy in patients with painful and painless RLS.
Methods: Interim data were extracted for analysis from the THRIVE study, an ongoing multi-center post-market observational study assessing the long-term effectiveness and safety of the NTX100 TOMAC System for adult patients with RLS. Painful RLS classification was based on patients responding "Yes" to two consecutive questions at baseline: "Do you have unpleasant or uncomfortable feelings associated with the urge to move your legs?" and "Are these unpleasant or uncomfortable feelings painful?" Data collected at baseline included age, gender, RLS family history, age at RLS onset, RLS medications, augmentation severity, International RLS Severity Scale (IRLS), neuropathy diagnosis, and TOMAC titrated stimulation intensity. Primary endpoint was IRLS score change at 90-days. Secondary endpoints at 90-days included Clinical Global Impression-Improvement (CGI) score and CGI-responder rate. RLS medications change at 90-days was also evaluated.
Results: Data at 90-days were completed by 55 adult patients with medication-refractory and moderate-to-severe RLS (29 painful and 26 painless RLS). At baseline, painful (versus painless) RLS patients had more severe RLS symptoms (mean IRLS score: 28.8±5.2 versus 24.2±6.0; P=0.0034) and were more frequently treated with dopaminergic agents (65.5% versus 34.6%; P=0.0221). All other data at baseline were similar between the two groups. At 90-days, the mean change in IRLS score was not different between painful and painless RLS (-9.1±7.8 versus -7.7±7.0; P=0.5100). Mean CGI score (2.4 ±1.1 versus 2.5±0.9; P=0.6826), CGI-responder rate (65.5% versus 57.7%; P=0.5509), and RLS medications change at 90-days were also similar between the two groups.
Conclusion: This study reconfirms a more severe painful (versus painless) RLS phenotype. TOMAC efficacy was similar between the two RLS forms at 90-days. Whether TOMAC efficacy profile over a longer period is different between painful and painless RLS patients remains to be determined.
Support (if any): Sponsored by Noctrix Health, Inc.

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0908
PHENOTYPIC CLASSIFICATION OF RESTLESS LEGS SYNDROME

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Introduction: Restless legs syndrome (RLS) is diagnosed based on clinical features according to the IRLSSG diagnostic criteria. RLS exhibits significant heterogeneity among patients, complicating personalized management strategies. This study aimed to classify patients with RLS into phenotypic subgroups using unsupervised cluster analysis.
Methods: RLS patients who visited Seoul National University Hospital from 2014 to 2024 screened. Data on demographic and clinical characteristics, laboratory results, comorbidities, and sleep questionnaires were collected. Cluster analysis was performed to identify distinct phenotypes among patients with RLS.
Results: A total of 537 patients (mean age 60.4 ± 12.9 years; 64.2 female) were analyzed. The average onset age was 49.1 ± 15.4 years, and 173 patients (32.2%) had a family history of RLS. Cluster analysis identified five distinct phenotypes. Cluster 1: Late-onset female patients without a family history, with less severe RLS symptoms and mild sleep disturbances. Cluster 2: Female patients with longer disease duration and a family history, experiencing the most severe RLS symptoms and significant sleep disturbances. Cluster 3: Early-onset patients with moderate RLS severity and mild sleep disturbances. Cluster 4: Patients with longer disease duration but no family history. This cluster had the highest rate of augmentation (46.9%), with all patients requiring opioids for severe RLS symptoms. Cluster 5: Late-onset female patients without a family history, similar to Cluster 1, but characterized by lower education levels and occupation, with more severe RLS symptoms and sleep disturbances compared to Cluster 1.
Conclusion: This study identified five distinctive RLS phenotypes based on demographic, clinical, and sleep questionnaires. An individualized treatment approach tailored to these phenotypes may enhance the management of patients with RLS.
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0909

RESTLESS LEGS SYNDROME DURING PREGNANCY AND PUERPERIUM: DATA FROM THE LIFE-ON COHORT

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Introduction: Pregnancy is a significant risk factor for the development of Restless Legs Syndrome. The natural course and impact of advancing pregnancy and the postpartum period on RLS prevalence and symptom severity is still scarcely studied. We aimed to elucidate the prevalence, trajectory, and inadequately understood factors such as cumulative incidence, severity, and risk factors of RLS throughout pregnancy and the postpartum.
Methods: We used data from the multicenter Life-ON Cohort Study which recruited 439 pregnant women in the 10-15 gestational week and followed them up until 12 months after delivery. Participants had 11 scheduled visits. RLS was assessed based on the five essential criteria proposed by the International RLS Study Group. Women meeting the diagnostic criteria were further evaluated using the International RLS Study Group Rating Scale (IRLS). All women received one full polysomnograpy performed at the second trimester of pregnancy.
Results: 26.03% of women (n=113, 95% CI 22.0–30.4%) met the diagnostic criteria for RLS. A previous history of RLS outside of pregnancy was found in 50.68% of women who reported RLS during the current pregnancy (OR = 2.717, 95% CI: 1.791–3.782) and 18.7% had a positive family history. During the entire follow-up period we found a cumulative incidence of 34.7%. Previous history of depression ((HR 2.03, 95%CI 1.003 – 4.09, p= 0.049), positive family history for RLS (HR 2.00 95%CI 0.92 – 4.35, p= 0.08) and previous RLS (HR 7.86, 95%CI 4.09 – 15.07, p= < 0.0001) were statistically significant risk factors to RLS. Around 20% of women experienced severe to very severe symptoms (IRLS >20 pts). A PLMS index > 15 was found in 26% of women.
Conclusion: RLS is a highly frequent complaint during pregnancy, with women who have a positive personal or family history for RLS being especially predisposed to develop manifest symptoms. The symptom severity remains relatively stable across pregnancy with a significant proportion (20%) warranting evaluation for a specific pharmacologic treatment. A screening approach and treatment of eligible women could greatly improve quality of life and reduce comorbidity during pregnancy.
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0910

ESTIMATION OF RESTLESS LEGS SYNDROME TREATMENT RESPONSE BASED ON WEARABLE MOVEMENT SENSORS

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Introduction: To enable remote management of restless legs syndrome (RLS) treatment, it would be helpful to have an objective indicator of RLS treatment response that could be passively measured over a period of weeks or months in the home. Wearable movement sensors could provide the basis for such an indicator. The tonic motor activation (TOMAC) system is a wearable therapy for refractory RLS that also has the capability to measure leg motion. Here, we aimed to classify RLS treatment response based on leg motion signals measured by the TOMAC system.
Methods: Twenty-seven individuals with RLS completed 456 TOMAC therapy sessions over 385 nights in-home. TOMAC therapy units were worn bilaterally over the head of the fibula from bedtime until wake. Participants activated 30-minute therapy sessions of TOMAC peroneal nerve stimulation to help them fall asleep when RLS symptoms were present. TOMAC units recorded accelerometer data for up to 3 hours prior to and one hour after the start of each therapy session. TOMAC response was grouped based on subjective ability to rapidly fall asleep (within 30 minutes) after starting TOMAC therapy. Accelerometer features included vector magnitude, discretized leg movements based on adapted AASM criteria, and positioning information. Cluster permutation tests were used to identify time-series differences between groups. One node decision trees were used to explore the predictive ability of individual accelerometer-based features to classify responders.
Results: There were reductions in TOMAC-recorded accelerometer signals for individuals who reported falling asleep within 30

minutes during TOMAC sessions compared to individuals who did not; these differences were significant ($p < 0.05$) for the time period from 15-33 minutes after TOMAC session start. During this significant time period, the leg movements per hour were 76.7% higher (130.6 vs 73.9 LM/hr) and the vector magnitude was 138% higher (0.081 vs 0.034 g) for individuals who were awake during TOMAC compared to those who reported they fell asleep.
Conclusion: Accelerometer signals recorded during in-home treatment of RLS contain information about response to treatment. This work motivates further development of predictive models to classify responders to RLS therapy.
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0911
REAL-WORLD OUTCOMES OF TONIC MOTOR ACTIVATION (TOMAC) FOR REFRACTORY RESTLESS LEGS SYNDROME (RLS)

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Introduction: Tonic motor activation (TOMAC) is a noninvasive therapy that transmits bilateral high-frequency electrical stimulation to the peroneal nerves of the legs to treat refractory restless legs syndrome (RLS). TOMAC has previously been demonstrated as safe and efficacious in randomized controlled trials. Here, for the first time, we report real-world evidence from patients prescribed TOMAC.
Methods: We analyzed interim results from the THRIVE multicenter prospective observational post-market study of the NTX100 TOMAC System (Noctrix Health, Inc.). The intent-to-treat analysis population included all patients who were prescribed TOMAC, met the FDA indication of moderate-severe refractory RLS, and enrolled in the study prior to July 31, 2024. Baseline measures were assessed prior to starting TOMAC and interim outcomes were assessed at Day-90 relative to baseline. The primary efficacy endpoint was mean change to International RLS Study Group (IRLS) score and key secondary outcomes included clinical global impressions of improvement (CGI-I). The frequency and nature of adverse events and medication changes were assessed.
Results: The intent-to-treat population included 55 participants from 40 unique prescribers; mean age was 64.3 years (SD: 11.4), average duration of RLS symptoms was 27.6 years (SD: 16.6), and 62% were female. IRLS score improved from 26.6 at baseline to 18.1 at Day 90 of TOMAC treatment (Mean change: -8.5, SD: 7.4, 95% CI: -6.5 to -10.4). CGI-I responder rate was 62% and mean CGI-I score was 2.47 points (SD: 1.02, 95% CI: 2.20 to 2.74). Fourteen participants (25%) reduced RLS medication dose (average dose reduction: 62%) and four participants (7%) increased RLS medication dose. There were no serious or severe device-related adverse events.
Conclusion: These interim results suggest that TOMAC treatment is safe and effective in real-world treatment of refractory RLS.
Support (if any): The THRIVE study was sponsored by Noctrix Health, Inc.

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0912
OBSTRUCTIVE SLEEP APNEA AND PERIODIC LIMB MOVEMENTS OF SLEEP IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Introduction: Chronic obstructive pulmonary disease (COPD) coexisting with obstructive sleep apnea, the overlap syndrome, can worsen nocturnal hypoxemia, disrupted sleep architecture, and adverse consequences. OSA is often comorbid with elevated Periodic limb movements of sleep (PLMS). Sleep parameters have not been investigated across OSA and PLMS subgroups in patients with and without COPD. This study seeks to examine differences in sleep architecture, respiratory indices, and ST between COPD and non-COPD patients, categorized by OSA and PLMS subgroups
Methods: This retrospective study included 711 participants, 48 with COPD and 663 without NoCOPD. Participants were categorized into four OSA/PLMS groups: Group 1 (no OSA/PLMS), Group 2 (OSA only), Group 3 (PLMS only), and Group 4 (OSA + PLMS). Sleep architecture metrics, respiratory indices, and ST were compared between groups using ANCOVA adjusted for age. Cumulative distribution function (CDF) plots were created to visualize ST distributions.
Results: The mean age of participants was 57.172 ± 17.926 years, with 316 males (44.4%). COPD patients were older than NoCOPD (62.583 ± 11.899 vs. 56.769 ± 18.211 years, $p < 0.001$). No significant differences in total sleep time (TST) were observed between COPD and NoCOPD (277.729 ± 94.902 vs. 300.249 ± 91.359 minutes, $p = 0.841$). However, ST was significantly higher in COPD across all OSA/PLMS groups. For Group 1, ST was 43.425 ± 110.800 minutes in COPD vs. 1.485 ± 5.332 minutes in NoCOPD ($p < 0.001$). In Group 4, ST was 62.735 ± 68.843 minutes in COPD vs. 14.822 ± 40.229 minutes in NoCOPD ($p = 0.003$). CDF plots revealed a greater cumulative burden of ST in COPD, particularly in Group 4.
Conclusion: COPD significantly exacerbates nocturnal hypoxemia, with the greatest ST observed in patients with comorbid OSA and PLMS. These findings demonstrate the added risk of elevated PLMS in patients with COPD and OSA, emphasizing the need for targeted therapeutic interventions to mitigate nocturnal oxygenation deficits in patients with these comorbidities.
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0913
PROTEOMIC PROFILING IN RESTLESS LEGS SYNDROME

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Introduction: Restless legs syndrome(RLS) is a sensorimotor sleep disorder that affects up to 10% of people and significantly disrupts sleep, increases the risk of cardiovascular disease, hypertension, stroke, and causes overall poorer health. This project

leveraged large cohort studies using proteomics to replicate and extend our previous analyses in RLS.

Methods: The SomaScanv4 highly multiplexed aptamer assay profiled ~5K proteins from the Multi-Ethnic Study of Atherosclerosis(MESA) and the Stanford Technology Analytics and Genomics in Sleep study(STAGES). RLS was classified based on IRLSSG diagnostic criteria and individuals taking medication were excluded. Linear regression models were conducted to examine differentially expressed proteins(DEPs) in RLS(n=422) compared to controls(n=1,789). All models included log2-normalized relative protein expression as the dependent variable and important covariates (age, gender, BMI, sample storage time, blood draw time of day, study, and GWAS principal components). False discovery rate(FDR) was applied with an a-priori p-value of 0.05 to control for multiple testing.

Results: Linear regression analyses in MESA replicated our previous findings in STAGES with megalin(LRP2, p=0.026, Fold Change[FC]=1.41) and Cathepsin Z(CTSZ, p=0.013, FC=1.04) as upregulated in RLS; but significance diminished after FDR correction. Analyses in STAGES+MESA to extend our previous findings identified only megalin(q=0.045, FC=2.04) as significantly upregulated in RLS after FDR correction, which remained significant even after controlling for kidney function(Cystatin C), c-reactive protein, hypertension, and high cholesterol(q=0.031). Replication analysis of 464 DEPs identified in previous publications identified 11 proteins significant after FDR correction; 9 of which remained significant after controlling for kidney function(Cystatin C), c-reactive protein, hypertension, and high cholesterol, and included Megalin[LRP2], ANGL7[ANGPTL7], VIGLN[HDLBP], CHKB, FAM234B, TIGAR, ARF6, PTEN, FAM162A).

Conclusion: These large proteomic analyses confirmed Megalin as an independent protein overexpressed in people with RLS. Megalin(LRP2) is a large scavenger receptor that has major functions in the kidney but is also expressed in the brain, lung, placenta, and thyroid gland. It helps maintain iron homeostasis by promoting resorption of heme in the kidneys and mediates endocytosis of a variety of ligands, including proteins, heavy metals, hormones, and vitamins, notably vitamin D.

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0914

ADDITIVE AND SYNERGISTIC EFFECTS OF OBSTRUCTIVE SLEEP APNEA AND PERIODIC LIMB MOVEMENTS ON SLEEP PARAMETERS

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Introduction: Obstructive Sleep Apnea (OSA) is associated with an increased index of periodic limb movements of sleep (PLMS), which independently can be associated with sleep fragmentation. However, when both conditions coexist, they can potentially have additive effects on sleep. There is limited data about their possible additive or synergistic effect on sleep parameters. This study explores the combined impact of OSA and PLMS, hypothesizing both conditions have an additive or synergistic effect on sleep parameters compared to each condition alone.

Methods: We conducted a retrospective analysis of 581 adults undergoing polysomnography at UCSF-Fresno. Subjects were categorized into three groups: OSA-only (AHI ≥ 5 and PLMI < 15), PLMS-only (PLMI ≥ 15 and AHI < 5), and OSA-PLMS (AHI ≥ 5 and PLMI ≥ 15). Sleep parameters were compared using Kruskal Wallis test and Jonckheere Terpstra. Linear regression models were used to compare whether effects were additive or synergistic.

Results: OSA-only group (291 subjects, 50.1%; mean age 54.6 ± 17.9 years; 46.4% male), PLMS-only (72 subjects, 12.4%; mean age 63.2 ± 17.1 years; 40.2% male), and both OSA and PLMS (218 subjects, 37.5%; mean age 61.8 ± 15.8 years; 52.2% male). Combined OSA and PLMS were associated with significant reductions in TST (coefficient: -117.09, $p < 0.001$) and N2 (-14.79, $p < 0.001$), N3 (-6.25, $p < 0.001$), and REM sleep (-5.62, $p < 0.001$), with synergistic impairments in sleep architecture compared to either condition alone. In contrast, WASO showed an additive effect (coefficient: 9.76, $p = 0.102$). The severity of OSA amplified these disruptions, particularly in NREM and REM sleep stages, with more pronounced effects observed when PLMS was present.

Conclusion: The combination of OSA and PLMS has a synergistic negative impact on sleep architecture, significantly reducing TST and deep sleep stages (N2, N3, and REM) compared to either condition alone. These effects are further amplified with increasing OSA severity, highlighting the compounded burden of coexisting sleep disorders. The findings underscore the importance of identifying and addressing PLMS in patients with OSA to optimize sleep quality and mitigate associated health risks.

Support (if any):

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0915

PROFOUND POSTPARTUM SLEEP DISCONTINUITY IN FIRST-TIME MOTHERS

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Introduction: Maternal sleep is disrupted during the postpartum period, but the nature and severity of sleep disruption has not been adequately documented. Studies of sleep duration have reported only modest sleep loss beyond the first week after giving birth, leaving first-time mothers poorly prepared for what kind of sleep disruption to expect. Using sleep data from first-time mothers' personal wearables (Fitbit), we examined sleep duration and the longest stretch of sleep (LSS) – a sleep consolidation metric commonly used for infant sleep – to quantify maternal sleep during the first 13 postpartum weeks.
Methods: N=41 first-time mothers (ages 26–43y) provided their sleep/wake wearable data from a full year before childbirth to the end of the first postpartum year. Sleep data were analyzed in 5min bins, using ≥10min consecutive sleep and wake as criteria for onset and offset of sleep periods, respectively. Off-wrist detection was based on absence of heart rate data. Daily sleep duration and LSS were calculated for each 24-hour day and compared between the first 13 postpartum weeks and the equivalent days of the prior year (preconception baseline).
Results: During postpartum week 1, daily sleep duration was 4.4±0.2h (mean±SEM) compared to 7.8±0.2h at preconception baseline. Daily LSS was 2.2±0.2h versus 5.6±0.2h preconception. 31.7% of participants went >24h without sleep. Across postpartum weeks 2-7, daily sleep duration increased to 6.7±0.1h versus 7.7±0.1h preconception. However, daily LSS stayed low at 3.2±0.1h versus 5.5±0.1h preconception. Across postpartum weeks 8-13, daily sleep duration was 7.3±0.1h versus 7.9±0.1h preconception. Yet, daily LSS was still reduced at 4.1±0.1h versus 5.6±0.1h preconception. All differences were significant ($F>29.8$, $P< 0.001$).
Conclusion: Sleep duration was greatly reduced during the first postpartum week, but gradually returned to near baseline levels thereafter. However, sleep consolidation, as captured by LSS, stayed considerably below preconception baseline throughout the first 13 postpartum weeks. This suggests that in postpartum weeks 2-13, sleep discontinuity – more so than sleep loss – contributed most prominently to first-time mothers' sleep disruption. Sleep discontinuity may be a risk factor and intervention target for postpartum depression and other postpartum-related health issues.
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0916

SIPPING, SLEEPING, AND SEX DIFFERENCES: ALCOHOL'S IMPACT ON POLYSOMNOGRAPHIC SLEEP AND SPECTRAL ACTIVITY IN OLDER ADULTS

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Introduction: Findings regarding the relationship between alcohol use and objective sleep are inconsistent and studies in aging populations are limited. Despite known sex differences in alcohol use and sleep health, sex differences in the alcohol/sleep relationship remain underexplored. This study examined sex differences in the association between alcohol use and polysomnographic-assessed sleep and spectral power in older adults.
Methods: Older adults (Mage=68.0±5.6; 38 women/26 men) completed overnight polysomnography (Sleep Profiler) and the Alcohol Use Disorder Identification Test consumption items. Multiple regressions examined whether alcohol use was independently or interactively (with sex) associated with objective sleep [total sleep time, sleep efficiency%, sleep onset latency, wake time after sleep onset], sleep architecture [N1%, N2%, N3%, rapid eye movement (REM)%], or frontal spectral power (Delta, Theta, Alpha, Sigma, Beta frequencies during N1, N2/N3, and REM), controlling for age, body mass index, and apnea-hypopnea index.
Results: Sex moderated associations between alcohol use and total sleep time (R-squared=.10, p=.01), N1% (R-squared=.12, p=.002) and all REM spectral power frequencies (R-squared ranged from.08 to.15, ps<.01). In women, greater alcohol consumption was associated with shorter total sleep time (B=-.53, p=.01), higher N1% (B=5.15, p=.03), and reduced REM spectral power across all frequencies (Bs ranged from -.08 to -.29, ps<.001). Additionally, greater alcohol use was associated with lower N1% in men (B=-6.83, p=.02).
Conclusion: Findings highlight potential sex-specific risks of alcohol use on objective sleep health and frontal cortical activity in older adults, with alcohol use linked to more time spent in lighter-staged sleep, shorter sleep duration, and reduced REM spectral power among women relative to men. Given the higher prevalence of insomnia disorder in women compared to men, and the risk of poor sleep health on other comorbidities, including cognitive decline, women who engage in heavy drinking may be an especially vulnerable population in need of prevention, intervention, and treatment. Prospective studies evaluating sex-specific mechanisms (circulating sex hormones, blunted fronto-cortical activity) that may contribute to associations between alcohol use and objective sleep are encouraged.
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0917

HOUSEHOLD CHAOS AND PARENTAL SLEEP IN WORKING PARENTS AND PARENTS ON PARENTAL LEAVE

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Introduction: While family chaos and its links to children's sleep are well-studied, little attention has been given to its associations with parents' sleep. The early months of life are a delicate transition, requiring significant adjustments to sleep and routines. Despite one study examining the relationship between household chaos and sleep outcomes for both infants and parents in the first year of life, the potential connection between family chaos and the critical transition from parental leave to returning to work remains unexplored. Similarly, limited studies address how parental leave policies affect parental sleep outcomes. This study seeks to fill these gaps by examining the interplay of family chaos, parental sleep, and the return to work.
Methods: Among Nanit users, we recruited 740 parents of infants 1-7 months (82% mothers). Fifty-nine percent of them had returned

to work, while 41% were still at home. The sample was fairly highly educated (45.5% College degree; 42% Postgraduate degree;11% Some college or less) and affluent (34.7% More than $200,000; 18.2% $150,000-$200,000; 22%; $100,000-$150,000; 8.8% $75,000-$100,000; 9.9% Less $75,000). Parents completed the PROMIS Sleep disturbances (SD) and Sleep Related Impairment (SRI) and the The Confusion, Hubbub, and Order Scale (CHAOS).
Results: Higher CHAOS scores were associated with more SD and SRI for parents (SD:β=0.3±0.03,p< 0.001; SRI:β=0.4±0.03,p< 0.001). CHAOS scores were higher in families with more children and for parents reporting going to work in the office compared to flexible locations, but it did not differ by education or household income. CHAOS, parental SD and SRI did not differ between parents who had returned to work and those who had not returned to work, even after controlling for infant age and parent gender.
Conclusion: More household CHAOS was significantly associated with worse reported parental sleep. CHAOS and parental sleep did not differ between parents who had returned to work and those who were on parental leave. This is the first study to analyze parental sleep and household CHAOS in the context of the parental leave transition, but more studies are needed to better understand this complex interplay, including longitudinal data and more diverse samples.
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0918

SUBSTANTIAL MATERNAL SLEEP DISRUPTION AS A POTENTIAL MEDIATOR OF INCREASED HEALTH RISK IN THE FIRST POSTPARTUM WEEK

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Introduction: Maternal sleep disruption is common throughout the first postpartum year, and particularly severe in the first postpartum week. As nearly 75% of all pregnancy-related maternal deaths occur between postpartum days 1 and 7, maternal sleep disruption after birth could be a risk factor for maternal morbidity and mortality. Here, in a sample of first-time mothers, we quantified objectively measured sleep during the first 7 postpartum days.
Methods: N=41 first-time mothers (ages 26–43y) recorded their wrist activity (Fitbit) continuously across postpartum days 1-7. Sleep data were analyzed in 5min bins, using ≥10min consecutive sleep and wake as criteria for onset and offset of sleep periods, respectively. Sleep duration (including naps) and longest stretch of sleep (LSS) were calculated for each 24h day. Off-wrist detection was based on absence of heart rate data and controlled for in analyses.
Results: The incidence of acute total sleep deprivation (>24h without sleep) was 20% (n=8) on day 1, 20% (n=8) on day 2, and 10% (n=4) on days 3-7. Total 24h sleep duration ranged from a low of 2.7±2.2h (mean±SD) on day 1 to a high of 5.0±2.0h on day 7. LSS ranged from a low of 1.7±1.4h on day 1 to a high of 2.9±1.2h on day 7.
Conclusion: These results show that acute total sleep deprivation is common in new mothers after giving birth. The results also show severe chronic sleep restriction during the first postpartum week, with the average first-time mother in our sample obtaining no more than 5h total sleep duration per 24h and consolidated sleep periods shorter than 3h – much less even during the first few postpartum days. Our findings provide objective evidence of considerable maternal sleep disruption, making sleep disruption a plausible contributor to maternal health risks in the first postpartum week. Limitations of the study include that the sample was predominantly white, relatively affluent, and generally in good health. The sleep data nonetheless suggest that studies should investigate whether there is a causal relationship between maternal sleep disruption and health risks, and whether interventions to protect maternal sleep during the first postpartum week may improve health outcomes.
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0919

THE EFFECTS OF NOCTURIA ON SLEEP, MOOD AND QUALITY OF LIFE IN WOMEN

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Introduction: Historically nocturia has received more attention as a men's health issue, despite the high prevalence in women as well. Nocturia in women has been thought of as a symptom of other disorders such as overactive bladder or global polyuria, though nocturia often occurs without daytime symptoms. The aim of the present study was to observe the impact of nocturia on women's health and wellbeing.
Methods: Participants (n-180) (75 % Caucasian) women with 21 % transitioning through the menopause aged 19 to 86, took part in a cross-sectional survey study consisting of the Pittsburgh Sleep Quality Index (PSQI), Groningen Sleep Quality Scale (GSQS), Nocturia Sleep Quality Scale (NSQS), 36-item Short-Form (SF-36) and the Hospital Anxiety and Depression Scale (HADS).
Results: Subjective sleep quality (M: 2.23, SD: 0.68), sleep disturbances (M: 1.34, SD: 0.54) and daytime dysfunction (M: 1.09, SD: 068) was notably higher in comparison to other component scores, global PSQI scores also indicated worse sleep quality (M: 7.69, SD: 3.40). Time to go to bed differed a great deal, participants took on average 30 minutes to fall asleep. Sleep quality was also observed to be poor (>5) as reported by the GSQS. Lost sleep time (M: 3.68, SD: 1.66) due to voiding at night and the impact of voiding (M: 6.25, SD: 1.50) at night was also observed to be noticeably higher using the NSQS. Dimensions (SF-36) aligned to physical components such as physical function (M: 27.11, SD: 4.41), physical problems (M: 2.84, SD: 1.57), and energy and vitality (M: 46.15, SD: 20.18) have extremely low mean scores. Participants also reported high anxiety scores (M: 8.77, SD: 4.32) on the HADS.
Conclusion: The findings show the importance of considering individuals sleep, QoL and psychological well-being as well as acknowledging their clinical diagnosis. In clinical practice, administering a simple sleep questionnaire should become routine as part of the clinical assessment of the patient's disease and will also help in improving the patient's overall condition.
Support (if any):

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0920

HOW DO SLEEP PATTERNS RELATE TO LOW SEXUAL FUNCTION IN WOMEN? A STUDY FROM THE EPISONO DATABASE

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Introduction: Sleep disorders are highly prevalent among women, with nearly 47% reporting complaints related to sleeping less than 6 hours per night. These disturbances not only affect overall well-being, but are also associated with sexual dysfunction, which impacts over 40% of women. Despite the coexistence of these conditions, their relationship remains underexplored, particularly in women at reproductive age. Our study aimed to investigate objective sleep pattern in women at reproductive age and its association with sexual function.
Methods: We included a total of 76 women participants from the 4th edition of the epidemiological sleep study (EPISONO), conducted in São Paulo, Brazil, between 2018 and 2019. The participants responded the Female Sexual Function Index (FSFI) and underwent a full-night type 1 polysomnography to assess their sexual function and sleep parameters, respectively. Based on FSFI scores, the women were distributed into 2 groups: low and preserved sexual function.
Results: Considering low sexual function as the dependent variable, the results of the generalized linear model revealed that women with low sexual function exhibited a higher percentage of N2 sleep phase and a lower percentage of N1 sleep phase compared to those with preserved sexual function.
Conclusion: Our findings suggest that NREM sleep, particularly N2 sleep phase, may play a distinct role in sexual health, becoming relevant to investigate the mechanisms beyond the interaction of sleep and sexual function.
Support (if any): Our studies are supported by the following funding agencies: AFIP Associação Fundo de Incentivo à Pesquisa (AFIP). LHF is recipient of a grant from the Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) - 88887.980067/2024-00. ASP and MLA are recipients of a grant from the Fundação de Amparo à Pesquisa do Estado de São Paulo (ASP: 2021/05920-7; MLA: 2020/13467-8). MLA and ST are recipients of a grant from the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq).

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0921

THE SLEEP-HORMONE CONNECTION: SNOOZZZE COHORT INSIGHTS INTO MENOPAUSAL HORMONE THERAPY AND SLEEP ARCHITECTURE IN OLDER WOMEN

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Introduction: Obstructive sleep apnea(OSA) prevalence increases in women with aging, particularly after age 50yrs with menopause in association with loss of estrogen and progesterone. Therefore, we hypothesized that women over 50yrs on menopausal hormone therapy(HT) have a lower AHI4% and better sleep architecture(e.g.higher sleep efficiency) than those not on HT.
Methods: Using San Diego Multi-Outcome OSA Endophenotype(SNOOzzzE) cohort, results were obtained for women over age 50yrs to assess sleep characteristics. The SNOOzzzE cohort includes 3,319 consecutive adults who underwent a clinical polysomnography(PSG) after being referred to UCSD sleep clinics between 1/2017-12/2019(IRB #182136). HT status was determined by manual search of medical record medication lists. Independent sample t-tests were performed to assess differences($P < 0.05$) for multiple PSG parameters including AHI4%, sleep efficiency, and percent time per sleep stage.
Results: Of the 1297 women over 50yrs, 28 were found to be on HT. Women on HT were slightly younger(age (M)= 62±6.5yrs(SD)) than those not on HT(M= 63.4±8.9yrs). AHI4% was not significantly different between the two groups, but trended lower in HT group(M=14.3±23.5/h vs. 18.9±24.0/h). Sleep efficiency(SE) was significantly higher in women on HT(M= 77.9±11.3%) than those not on HT (M=71.3±18.1%,$p < 0.001$) percent N1 sleep was lower in women on HT(M= 5.9±4.1%) than those not(M= 10.6±11.3%, $p=0.003$). Sleep latency trended lower in women on HT(M= 25.0±25.4 vs M=32.2±41.1 min). AHI3% in REM sleep was significantly lower in women on HT (M=24.38± 24.92/h vs M=33.91± 25.02/h).
Conclusion: Although our study is underpowered, HT may be associated with improvement in SE, lower %stage 1 sleep, improved sleep latency, and lower AHI3% in REM Sleep. Medical records collect limited information on menstrual history, menopausal status, and HT treatments. Due to limited available information in this analysis, results may be confounded by age and other factors, which we hope to address in future analyses. Furthermore, we acknowledge possibility of confounding by indication, healthy user effect and selection bias. Nonetheless, our results suggest real differences in the sleep of older women on HT and more research on the sleep-hormone interaction is needed.
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0922

INFANT MILK TYPE AFFECTS MATERNAL SLEEP CONTINUITY IN FIRST-TIME MOTHERS

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Introduction: Postpartum maternal sleep is disrupted, even after stabilizing following the first three months. Evidence suggests that breastfeeding women wake more often during the night than those who use infant formula, while sleep duration is similar. Here we investigated the effects of breastmilk versus formula feeding on maternal sleep across postpartum weeks 14-52.
Methods: N=41 first-time mothers (26-43y) recorded their sleep (Fitbit) and reported infant milk type – breastmilk or formula – with 16 participants also logging daily infant feeding events (mobile app). Daily sleep duration and continuity (LSS: longest stretch of sleep) were assessed by 24h day. Effects of milk type were analyzed with mixed-effects ANCOVA, controlling for general trends across days.
Results: Mean daily sleep duration was 7.4h throughout postpartum weeks 14-52, whereas LSS increased from 4.3h to 5.3h. In week 14, 64.7% of participants fed breastmilk, 17.1% formula, and 18.2% mixed. By week 52, 47.2% fed breastmilk, 43.5% formula, and 9.3% mixed. Milk type did not affect sleep duration ($F=2.6$, $P=0.11$), but those feeding breastmilk had 0.4h shorter LSS than those feeding formula or mixed ($F=10.2$, $P=0.001$). Among those logging feeding events, milk

type did not affect sleep duration (F=0.8, P=0.38), but LSS was shorter by 6.2min per feeding event for breastmilk compared to formula (F=12.0, P< 0.001). There were no significant relationships with breastmilk pumping, breastfeeding versus breastmilk bottle feeding, infant weight gain, or infant sleep training. On average there were 9.1 daily feeding events for exclusive breastmilk feeding, compared to 7.3 for formula or mixed (F=10.9, P=0.001).
Conclusion: In this predominantly white and relatively affluent sample, maternal sleep duration in postpartum weeks 14-52 did not vary by infant milk type. However, participants who fed their babies formula had fewer daily feeding events and greater sleep continuity than participants who exclusively fed their babies breastmilk. As there was no effect of breastfeeding versus breastmilk bottle feeding, use of infant formula per se may have led to increased maternal sleep continuity. Whether a difference in infant sleep continuity is involved remains to be investigated. Regardless, current recommendations of exclusive breastmilk feeding may come at a cost to maternal sleep.
Support (if any): trackthatsleep LLC

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0923
ASSOCIATIONS BETWEEN SLEEP AND AFFECT IN MIDLIFE WOMEN: THE IMPORTANCE OF METHODOLOGICAL RIGOR

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Introduction: In midlife women, sleep difficulties are associated with prolonged mood states like depression. Sleep difficulties may also associate with positive and negative emotions ("affect") that can change rapidly over minutes and hours. Here we examined day-to-day bidirectional associations of actigraphy-assessed sleep measures with positive (PA; energetic, interested/involved) and negative affect (NA; angry/irritated, nervous/anxious, stressed) in midlife women. We compared those findings to results obtained from the same sample using more typical, but less rigorous methods (e.g., questionnaire-based sleep, cross-sectional associations).
Methods: Participants from the MsBrain I study completed: a) the Pittsburgh Sleep Quality Index (PSQI; total sleep time, TST; sleep efficiency, SE; sleep disturbance); b) sleep assessment via wrist actigraphy over 72-hours (TST; SE; wake after sleep onset, WASO); and c) ecological momentary assessment (EMA) of PA and NA over 72-hours. Multiple linear regression models evaluated cross-sectional associations of sleep (72-hour average actigraphy, PSQI) with PA and NA (72-hour average). Mixed-effects models evaluated day-to-day bidirectional associations between sleep (actigraphy) and affect.
Results: Participants included 247 postmenopausal women (mean age=59.2 years, 80.1% White). In cross-sectional analyses, actigraphy-assessed longer TST (p=.009) and greater WASO (p<.001) were associated with lower PA. PSQI measures were unrelated to affect. In day-to-day bidirectional associations using actigraphy and EMA, moderate TST (p=.035), higher SE (p=.017), and lower WASO (p=.001) were associated with higher next day PA; conversely, higher PA was associated with shorter next night TST (p=.029). Sleep was not significantly related to NA.
Conclusion: In cross-sectional analyses, questionnaire-based sleep measures were not associated with affect while worse actigraphy-assessed sleep measures were associated with lower PA. Day-to-day analyses indicated bidirectionality of associations between sleep and affect such that better sleep predicted higher next day PA yet higher PA predicted shorter next night sleep. Therefore, cross-sectional associations do not fully capture the dynamic, bidirectional associations between sleep and affect observed on a day-to-day basis and findings underscore the importance of rigorous methods for assessing sleep and affect in midlife women.
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0924
SLEEP DISORDERS AND POLYSOMNOGRAPHIC FINDINGS IN TRANSGENDER PATIENTS ON HORMONAL THERAPY: A DESCRIPTIVE REVIEW

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Introduction: Cisgender men and women exhibit notable differences in objective and subjective sleep quality. Sleep differences are influenced by sex steroids (estrogen, progesterone, testosterone), though mechanisms remain unclear. Gender-affirming hormonal therapy (GAHT) impacts sleep in transgender individuals, with transgender males (TM) showing increased snoring and phase delays, and transgender females (TF) reporting phase advancement and, in some cases, OSA resolution. Limited data on transgender populations highlight the need for targeted research into their unique sleep challenges.
Methods: Patients seen at Beth Israel Deaconess Medical Center's sleep and neurology clinics (2018–2024) were selected using ICD-10 codes: F64.0, F64.1, F64.2, F64.8, F64.9, F64.89, and Z87.890. Chart reviews assessed sleep diagnoses, medications, and results from in-laboratory and home-based sleep studies. Statistical analyses (descriptive metrics, t-tests) were performed using STATA-18.
Results: Thirty-six patients were included (7 TF, 29 TM), with 34 (27 TM, 7 TF) on GAHT. Non-restful sleep and obstructive sleep apnea (OSA) were the most common diagnoses, affecting 26 patients (22 TM, 4 TF). Complex sleep apnea occurred only in TM (10 patients). Insomnia and delayed sleep phase disorders were diagnosed in 16 (13 TM, 3 TF) and 8 (7 TM, 1 TF), respectively. Rarer diagnoses included hypersomnia, sleep-wake cycle instability, and one case of Klein-Levin syndrome in a TF patient following GAHT. Polysomnograms (PSG) were available for 23 patients (4 TF, 19 TM), and home sleep tests (HST) for 16 patients (1 TF, 15 TM). No significant differences were seen between transtypes in PSG and HST results. Sleep stage analysis revealed a mild decrease in N3 (10%) and REM sleep (16%) across all PSG, with no transtypic differences. Compared to cisgender controls, transgender patients had significantly longer total sleep time (298 vs. 416 minutes, p < 0.0001).
Conclusion: Transgender individuals, particularly those on GAHT, experience diverse sleep challenges, including circadian rhythm disorders, OSA, periodic breathing, and insomnia. Although no significant differences in objective measures were observed in our study, the small sample size underscores the need for further research to better inform clinical practice.
Support (if any): Institute for Personalized Sleep Health, Beth Israel Deaconess Medical Center, Boston

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0925

SLEEP DISORDERS IN MENOPAUSAL WOMEN IN A COLOMBIAN COMMUNITY

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Introduction: During menopause, women experience symptoms related to hormonal changes, which can lead to sleep disorders such as insomnia, hypersomnia and restless legs syndrome. The aim of this study was to determine the prevalence of sleep disorders associated with menopause in a community in Colombia.
Methods: Observational, descriptive, cross-sectional study. All women with menopause who attended the Avanzar clinic in Floridablanca, Colombia from January to April 2024 were invited to participate. After signing the informed consent, the Athens (cut point 4), Epworth (cut point 6) and International Restless Legs Scale (cut point 10) questionnaires were applied. Statistical analysis was performed with SPSS 22 and significance was considered to be less than 0.05. Chi-square was used for categorical variables and Pearson correlation for numerical variables. The study was approved by the ethics committee of the University of Santander.
Results: 118 women were included. Mean age 62.45 years (SD: 5.93; min: 49 and max: 79). Mean age at menopause onset was 49.48 years (SD: 2.85; min: 44 and max: 60). 39.83% presented menopause between 44 and 49 years of age and 60.17% at 50 or more years. 93.22% presented insomnia (Athens ẋ: 9.31; SD: 4.13; min: 0 and max: 19), 77.97% daytime sleepiness (Epworth ẋ: 7.95; SD: 2.23; min:1 max:14) and 9.32% restless legs syndrome (RLS ẋ: 5.68; SD: 6.69; min:0 max:27). It could be seen that the younger the age of menopause onset the higher the Athens score (P=NS), the lower the Epworth score (P=NS) and the higher the RLS score (P=NS). The higher the Athens score, the higher the Epworth score (Pearson 0.39: P< 0.0001); and the higher the SPI score, the higher the Epworth score (Pearson 0.31: P=0.001). No significance was found in any other variable or in the medical comorbidities studied.
Conclusion: There is a high prevalence of insomnia, daytime sleepiness and RLS in menopausal patients, which seems to be higher in those who start menopause at an earlier age. Insomnia and restless legs syndrome appears to worsen daytime sleepiness. Measures should be taken to avoid sleep complications and comorbidities in this group of patients.
Support (if any):

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0926

THE DISPROPORTIONATE BURDEN OF OSA IN WOMEN IN THE UNITED STATES: A CALL FOR IMPROVED AWARENESS AND DIAGNOSIS

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Introduction: While obstructive sleep apnea (OSA) is widely recognized as a condition that predominantly impacts men, the burden on women is significant, yet often under-appreciated. Given increased attention on understanding gender differences in chronic diseases, especially related to menopausal changes (e.g., body weight and hormones), it is critical to better understand how the burden of OSA develops over time in women. Therefore, we sought to estimate the prevalence of OSA by gender across the United States (US) through the year 2050.
Methods: A dynamic open cohort population Markov model was developed to simulate population dynamics from 2020 to 2050. Population growth, OSA development, BMI trajectories, all-cause mortality, and OSA and BMI-related mortality were derived from literature estimates and modeled across subgroups of age, sex, and BMI trends in 5-year increments. OSA prevalence was calibrated for subgroups by age, sex and BMI, and distributions of OSA severity grades were modeled based on sex, apnea hypopnea index (AHI) and BMI. OSA prevalence (AHI >5) was projected among those aged 30-69 years.
Results: The burden of OSA across the US is expected to rise significantly by 2050, with total cases projected to increase by 34.7%, from 56.9 million in 2020 to 76.6 million by 2050. The prevalence of OSA is estimated to increase for both males and females, but the rise is notably more pronounced among women, with the number of female OSA cases projected to grow by 64.4%, from 18.9 million in 2020 to 30.4 million in 2050, while male cases are expected to increase by 19.0%, from 38.0 million to 46.2 million.
Conclusion: Our modeling study projects a significant increase in OSA prevalence across the US through 2050, with a disproportionate rise in the burden among women. This data serves as a call to action to increase awareness in primary healthcare settings, particularly regarding peri-menopausal and post-menopausal women who face weight gain and hormonal changes that increase OSA risk. The findings highlight the need for efficient and accurate diagnostic tools which are appropriate for characteristics of female OSA, along with optimal treatment pathways for female patients.
Support (if any): ResMed

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0927

EFFECT OF A NONHORMONAL SLEEP SUPPLEMENT ON SLEEP QUALITY IN PERI- AND POSTMENOPAUSAL FEMALES: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL

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Introduction: Sleep disturbances are common during menopause due to hormonal changes. This clinical trial evaluated the safety and efficacy of a nonhormonal sleep supplement (NSS) containing S-adenosyl-methionine, propyl gallate, gamma-aminobutyric acid, magnesium glycinate, and theanine on sleep and sleep quality in peri- and postmenopausal females with impaired sleep.
Methods: A randomized, double-blind, placebo-controlled trial was conducted over three weeks in peri- and postmenopausal females aged 40–65 years with moderate-to-severe sleep disturbances [T-score ≥ 60 on the Patient-Reported Outcomes Measurement Information System Sleep Disturbance

(PROMIS-SD)]. Participants were randomly assigned to NSS or placebo (PLB) 60 minutes before bedtime each night for three weeks. A repeated measures analysis of variance (RMANOVA) was conducted to assess changes between conditions in total sleep time (TST) as measured by daily diaries, PROMIS-SD score, sleep quality visual analog scales (VAS), and safety, between baseline and Wks 1, 2, and 3.
Results: A total of 127 females completed the trial (NSS [n=65]: 54.1±8.7 yr; PLB [n=62]: 54.4±5.6 yr). All improvements were statistically significant (p≤0.05) compared to PLB. TST increased with NSS supplementation, on average, at Wk2 (NSS +21.6 min [+5.6%] vs PLB -17.1 min [-4.3%]) and Wk3 (NSS +40.9 min [+10.7%] vs PLB -15.0 min [-3.8%]). PROMIS-SD scores improved progressively over three weeks (Wk1: NSS -15.9% vs PLB -10.6%; Wk2: NSS -20.0% vs PLB -12.1%; Wk3: NSS -28.3% vs PLB -10.3%). Improvements were observed in several VAS measures over the course of the study. Ease of returning to sleep showed consistent improvement (Wk1: NSS -30.9% vs PLB -13.1%; Wk2: NSS -35.1% vs PLB -14.6%; Wk3: NSS -42.9% vs PLB -18.4%). Sleep quality demonstrated significant improvements at Wk2 (NSS -34.0% vs PLB -19.8%) and Wk3 (NSS -41.2% vs PLB -14.4%). Sleep satisfaction showed marked improvement by Wk3 (NSS -43.5% vs PLB -16.3%).
Conclusion: NSS clinically and significantly improved TST and significantly improved sleep quality in peri- and postmenopausal females with moderate-to-severe sleep disturbances. Additionally, NSS demonstrated rapid efficacy and a favorable safety profile, supporting its use as a potential option for enhancing sleep quality in peri- and postmenopausal females.
Support (if any): Bonafide Health, LLC

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0928

SOMATIC SYMPTOMATOLOGY AND SLEEP-RELATED DAYTIME DYSFUNCTION POST-MILD TRAUMATIC BRAIN INJURY: EXPLORING GENDER SPECIFIC ASSOCIATIONS

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Introduction: Somatization is the manifestation of physical symptoms such as, pain or weakness, and is linked to impaired daytime functioning from poor sleep quality. Pre-injury somatization has been linked to higher concussion symptom scores and prolonged recovery, with worse effects in females. We hypothesized that somatization would be associated with sleep-related daytime dysfunction in women, but not men.
Methods: Participants included healthy adults (n=30) and individuals with mild traumatic brain injury (mTBI; n=150). Measures were collected from 113 adults (72 females; M age=23.79, SD=6.90, and 41 males; M age=26.88, SD=8.51) at five timepoints following injury (2-weeks, 1-month, 3-months, 6-months, 12-months). Daytime dysfunction was measured using a subscale of the Pittsburgh Sleep Quality Index (higher scores indicated greater sleep-related dysfunction). Somatization was assessed using the Personality Assessment Inventory. Multivariate regression and Pearson correlation analyses were used to examine the relationship between somatization and daytime dysfunction for the group and separately for males and females, controlling for age and time since injury.
Results: Somatization accounted for 62.3% of the variance in sleep-related daytime dysfunction at two-weeks (R2=0.62,F(2,7)=8.42) post-injury. When evaluated separately by sex, somatization predicted sleep-related daytime dysfunction in females (β=1.11, p=0.04) but not males (β=0.31, p=0.51). At one-month, somatization accounted for 21.9% of the variance in daytime dysfunction (R2=0.219,F(2,18)=3.80). After Bonferroni correction (p=0.042), males trended toward significance (β=1.041, p=0.083) but not females (β=0.57, p=0.33). There were no significant correlations at three-months. At six-months, somatization accounted for 49.5% of the variance in daytime dysfunction (R2=0.495,F(2,17)=10.30). Somatization predicted daytime dysfunction for both females (β=1.540, p< 0.001) and males (β=1.686, p< 0.001). There were no significant correlations at twelve-months post-injury.
Conclusion: Somatization was strongly associated with sleep-related daytime dysfunction, with notable sex differences at various points following injury. Early post-injury, females with somatization experienced greater sleep-related daytime dysfunction while males demonstrated stronger correlations over time. These findings suggest that females may show the strongest association between sleep-related dysfunction and somatization early in the course of injury, but these effects may be more apparent later in men.
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0929

EXCESSIVE DAYTIME SLEEPINESS AND ALL-CAUSE MORTALITY IN FEMALE VETERANS: A RETROSPECTIVE COHORT ANALYSIS

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Introduction: Excessive Daytime Sleepiness (EDS) has been associated with all-cause mortality in previous studies, which primarily focused on male populations. This study aims to examine the presence of this relationship in a large cohort of female Veterans.
Methods: We conducted a retrospective analysis of Veterans' medical records from 1999 to 2022, focusing on individuals with sleep-related ICD-9/10 codes or those who received clinical sleep services. Using a validated natural language processing (NLP) pipeline, we extracted Epworth Sleepiness Scale (ESS) data from clinical notes. ESS scores were categorized as normal (0–10) and high (11–24). The cohort was further stratified into three age groups: young (< 50 years), middle-aged (≥50 to < 65 years), and older adults (≥65 years). Logistic regression models were used to estimate odds ratios (ORs) for all-cause mortality, with the normal ESS group serving as the reference. Results were adjusted for age, race, ethnicity, Body Mass Index (BMI), and Charlson Comorbidity Index (CCI).
Results: ESS data were extracted for 40,250 female Veterans (mean age: 48.08 ± 12.08 years; mean BMI: 32.9 ± 6.7 kg/m²; 54.9% White; 15.4% with CCI ≥2). Cardiovascular, metabolic, neurologic, and renal comorbidities were more common in the normal ESS group compared to the high ESS group. In the overall cohort, the adjusted odds ratio (aOR) for all-cause mortality in the high ESS group compared to the normal ESS group was not statistically significant. However, when stratified by age, middle-aged females in the high ESS group had significantly higher

odds of all-cause mortality (aOR: 1.16; 95% CI: 1.03–1.31). No significant associations were observed in the younger or older age groups.
Conclusion: EDS is significantly associated with higher odds of all-cause mortality in middle-aged females but not in other age groups. Further studies are warranted to explore potential mechanisms, including sex-specific responses to sleepiness and the role of age in this association.
Support (if any): NIH-NHLBI-K25 funding (#1K25H152006-01 [J.R.]); Center for Innovations in Quality, Effectiveness, and Safety (CIN 13-413), Mihael E. DeBakey VA Medical Center.

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0930

VASOMOTOR SYMPTOMS AND SLEEP QUALITY AMONG MIDLIFE WOMEN OF MIDDLE EASTERN AND NORTH AFRICAN ANCESTRY

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Introduction: Vasomotor symptoms (VMS) are common disturbances associated with menopause, affecting nearly 80% of midlife women. These symptoms, i.e., hot flashes and night sweats, have been infrequently studied in relation to sleep quality of women from diverse racial and ethnic background. We therefore examined associations between VMS and sleep quality in a unique sample of women from Middle Eastern and North African (MENA) ancestry.
Methods: This cross-sectional study enrolled 101 women (40-60y) of MENA ancestry, most of whom live in Michigan. These women provided demographic, lifestyle, sleep, and health information through structured interviews with validated questionnaires, including the Menopause Rating Scale (MRS), Pittsburgh Sleep Quality Index (PSQI), Patient Health Questionnaire (PHQ-9), and GAD-7 anxiety scale. We used the first item in the MRS to collect data on the frequency of VMS: "Which of the following symptoms apply to you at this time? Hot flashes, sweating (episodes of sweating)". Likert scale responses were: none, mild, moderate, severe, extremely severe. Women reporting moderate to extremely severe VMS frequency were classified as having VMS. Sleep quality was evaluated with the PSQI assessing their quantity, sleepiness, sleep disturbances, efficiency, quality, latency, and sleep medication use. An overall sleep quality score>5 defined poor sleep quality, and a score< 5 indicated good sleep quality. We implemented logistic regression models to estimate the association between VMS and sleep quality adjusting for BMI, depressive symptoms, and anxiety. All data analyses were conducted using JASP, Version 0.19.1 (University of Amsterdam).
Results: The median age of women was 47y (IQR=8) and median BMI was 27.5 kg/cm2 (IQR=7.2). Most women (>60%) experienced poor sleep quality and 36% reported moderate-to-severe hot flashes. The presence of hot flashes was associated with poor sleep quality, after adjusting for BMI, anxiety, and depressive symptoms. Specifically, women who reported moderate-to-severe hot flashes had 4-fold likelihood to experience poor sleep quality (OR= 3.99, 95% CI 1.01, 15.69).
Conclusion: Women in midlife who experience hot flashes are vulnerable to poor sleep quality, independent of depression and anxiety. Future studies are warranted to determine whether menopause hormone therapy benefits sleep quality.
Support (if any):

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0931

SLEEP QUALITY AND MENTAL HEALTH IN LATE PREGNANCY: IMPACTS ON MATERNAL AND FETAL OUTCOMES

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Introduction: Pregnancy induces significant physiological changes, particularly during the perinatal period. Sleep disorders in late pregnancy are associated with poorer physical and mental health outcomes during puerperium. This study aimed to assess the sleep quality of postpartum women and its correlation with maternal and neonatal health outcomes.
Methods: A prospective cross-sectional study included 67 postpartum women admitted for labor at a public maternity hospital in São Paulo, Brazil, from June 2019 to February 2020. Participants with pre-existing sleep disorders, severe comorbidities, or substantial obstetric complications were excluded. Data collection involved self-designed questions and validated tools: the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Hospital Anxiety and Depression Scale (HADS). Data were analyzed using IBM SPSS 25.0, with significance threshold set at $p \leq 0.05$.
Results: Participants' ages ranged from 14 to 46 years (M = 26.9, SD = 6.4). Poor sleep quality (PSQI ≥ 5) was reported in 89.6% (M = 9, SD = 2.2), and excessive daytime sleepiness (ESS > 10) in 76.1% (M = 11, SD = 4.4). Symptoms suggestive of anxiety (HADS-A > 8) and depression (HADS-D > 8) were observed in 31.3% and 17.9% of participants, respectively. Anxiety was significantly associated with low birth weight (< 2.500g, regardless of gestational age at birth) ($t(65) = -2.93$, $p < 0.005$), as was depression ($t(65) = -2.59$,$p < 0.01$). Poor sleep quality (PSQI > 5) showed a trend toward significance with low birth weight ($t(65) = -1.9$, $p = 0.062$).
Conclusion: Anxiety and depressive symptoms were significantly associated with low birth weight, while poor sleep quality showed a trend toward significance. Although these associations may be influenced by confounding factors, they suggest potential pathways through which maternal mental health and sleep disturbances may impact fetal development. These findings underscore the need for targeted interventions to improve maternal sleep and mental health during the perinatal period.
Support (if any): n/a

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0932

IMPACT OF BODY MASS INDEX (BMI) AND POSITION ON OBSTRUCTIVE SLEEP APNEA (OSA) IN POSTMENOPAUSAL WOMEN

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Introduction: Obstructive sleep apnea (OSA) is influenced by age, body mass index (BMI), and sex, with postmenopausal women showing increase in OSA. The role of BMI in postmenopausal women remains poorly understood. This study investigates how BMI affects supine AHI in postmenopausal women compared to men and premenopausal women.
Methods: 846 subjects ≥18 years (383, 45.3%, males and 463, 54.7%, females) with polysomnograms at the University of Iowa Hospitals and Clinics from July 2011 to June 2012, were categorized into four groups: men < 55 years (YM, n = 187), men ≥55 years (OM, n = 264), premenopausal women (YW, women < 55, n = 197), and postmenopausal women (OW, women ≥55, n = 257) and placed into BMI categories: normal (< 25 kg/m²), overweight (25–30 kg/m²), obese (30–40 kg/m²), and morbidly obese (≥40 kg/m²). Supine AHIs were analyzed across groups to assess the impact of BMI on OSA severity. Linear regression, analysis of covariance (ANCOVA), and Tukey's HSD test were performed for analysis.
Results: The supine AHI values for each BMI group were: men < 55 years: 3.2, 10.1, 18.1, 21.0; men ≥55 years: 9.5, 13.9, 23.2, 29.4; premenopausal women (women < 55): 1.1, 2.9, 7.0, 12.0; and postmenopausal women (women ≥55): 13.2, 14.8, 17.3, 15.5. Using linear regression model, slopes of supine AHI value for BMI changes were as the following for each group (YM 0.65, OM 0.29, YW 0.24, OW -0.05). Multiple regression model showed much attenuated effect of BMI on supine AHI in postmenopausal women compared to all other groups (p = 0.023 compared to the reference group OM). YM group showed stronger effect of BMI on supine AHI than OM (p =0.024).
Conclusion: BMI's effect on Supine AHI differs across groups with the postmenopausal women showing significantly attenuated relationship between BMI and supine AHI. This underscores the importance of considering non-BMI factors, such as age- and sex-related physiological changes in postmenopausal women to improve the effectiveness of treatments like positional therapy and CPAP. Further studies are warranted to investigate the underlying mechanisms and develop targeted interventions for postmenopausal women with OSA.
Support (if any):

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0933

SLEEP QUALITY, RACE AND PREGNANCY OUTCOMES

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Introduction: Poor sleep quality is common during pregnancy and linked with adverse pregnancy outcomes. African-Americans have worse perinatal outcomes compared to Caucasians; data are limited on whether sleep quality differs between racial backgrounds. We examined predictors and frequency of poor sleep quality between Caucasian and African-American women and its association with adverse outcomes.
Methods: Third trimester pregnant participants were recruited from an academic medical center and screened for sleep disruption including snoring, sleep duration, restless leg syndrome (RLS) and the General Sleep Disturbance Scale (GSDS). Sleep quality was ascertained by the GSDS sleep quality domain on the GSDS and poor sleep quality was defined as a score of at least 3. Demographic and delivery information were abstracted from medical records. Participants were included if they were either African-American or Caucasian.
Results: Overall, 976 Caucasians and 224 African-Americans were enrolled. Poor sleep quality was found to be similarly common in each racial group (74.3% vs. 74.0% respectively). In regression models, variables that explained poor sleep quality differed by race, with poor sleep quality in Caucasians explained by presence of RLS (aOR 1.7, 95%CI 1.8-2.3), higher BMI, (aOR 1.03, 95%CI 1.01-1.06) and prior pregnancy loss, (aOR 1.2, 95%CI 1.0-1.4). However, in African-Americans it was explained only by gestational age (aOR 1.09, 95%CI 1.02-1.17). While poor sleep quality was associated with depressive symptoms in both racial groups, it had a stronger association in African-Americans compared to Caucasians (aOR 4.6 vs. 1.7). In Caucasians, poor sleep quality was independently associated with induction of labor (aOR 1.4, 95%CI 1.0-2.0) which was not observed in African-Americans. In addition, Caucasian women with poor sleep quality had increased frequency of gestational hypertension (3.1% to 5.6%) whereas the frequency did not change in African-Americans (3.5% to 3.7%). Conversely, African-Americans with poor sleep quality had an increase in pre-eclampsia diagnoses (17.9% to 22.6%) while Caucasians did not (12.1% to 12.9%).
Conclusion: Our findings suggest that while the frequency of poor sleep quality is the same between Caucasians and African-Americans, explanatory variables differ and associations with pregnancy outcomes may differ by race. Such differences should be considered when addressing perinatal health.
Support (if any): R21HL089918; K23HL095739

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0934

OBJECTIVE AND SUBJECTIVE SLEEP QUALITY ACROSS THE MENSTRUAL CYCLE IN TRANSDIAGNOSTIC PSYCHIATRIC OUTPATIENTS WITH SUICIDALITY

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Introduction: Most studies on sleep across the menstrual cycle use small, healthy samples in laboratory settings with infrequent measurements. Longitudinal evidence shows sleep quality worsens perimenstrually, predicting increases in affective symptoms. However, no studies have examined nightly objective and subjective sleep in high-risk psychiatric outpatients with suicidal ideation.
Methods: Across 1–3 cycles, 56 psychiatric outpatients with past-month suicidal ideation wore Oura® rings to measure nightly sleep metrics (total sleep time(TST), wakefulness after sleep onset(WASO), sleep efficiency(SE%), sleep midpoint(SM), sleep onset latency(SOL), percentage of light sleep(N1N2%), percentage of deep sleep(N3%), and percentage of REM sleep(REM%)) (n=3591). Participants (N=142) also completed daily subjective sleep ratings (overall sleep quality, slept too much, trouble sleeping, feeling lethargic/tired) (n=9775). Ovulation was verified via LH-tests and basal body temperature. Percent luteal/follicular phase elapsed (cycle-time) was used to predict sleep outcomes via generalized additive mixed models.
Results: Intraclass correlations (ICCs) showed significant within-person variability in objective sleep outcomes (SOL=0.086 to SM=0.329) and high trait stability for sleep stages (REM%=0.516 to N3%=0.697). Subjective sleep ICCs ranged from 0.315 (slept more) to 0.362 (lethargic/tired), with ~two-thirds of variance being within-person. Cycle-time predicted nonlinear trends

in SE% (F=2.38,p=0.056), slept more (F=4.66,p<.001), trouble sleeping (F=5.51,p<.001), lethargy/tired (F=9.09,p<.001), N1N2% (F=3.06,p<.01), N3% (F=3.91,p<.01), and REM% (F=2.20,p=0.09). Significant random slopes of cycle-time for SE% (p<.01), WASO (p=.07), sleep quality (p<.01), trouble sleeping (p<.01), lethargy/tired (p<.01), and REM% (p<.05) indicate substantial individual differences in degree of cyclical change. A significant interaction between weekend status and cycle-time was observed for REM%, though the main nonlinear trend of cycle-time remained marginally significant (p=0.08). While cycle-time showed significant nonlinear effects on sleep outcomes, it accounted for only 1.85–8.21% of model-explained variance, suggesting most outcome variance stems from unmeasured individual differences.

Conclusion: Menstrual cycle time has significant nonlinear effects on sleep outcomes in psychiatric outpatients. The small percentage of variance explained by cycle-time suggests that other factors, such as individual traits or external influences (e.g. substance use, acute stressors), play a larger role in shaping sleep outcomes. Future research should focus on how trait indices of sleep outcomes moderate cyclical symptom changes among patients with affective sensitivity to the menstrual cycle.

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0935

SEX DIFFERENCES IN THE INTERPLAY BETWEEN PHYSICAL ACTIVITY, SLEEP QUALITY, AND SUBJECTIVE COGNITIVE COMPLAINTS AMONG ADULTS AND OLDER ADULTS

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Introduction: Subjective cognitive complaints (SCC) are associated with future cognitive decline and increased risk of dementia among adults and older adults. Sedentary lifestyle and poor sleep are risk factors for dementia with a complex association with SCC. However, there are limited explorations of sex differences in the interaction between sleep and SCC. Likewise, physical activity's [PA] effect on this association is poorly understood. The current analysis examined whether PA moderated the relationship between SCC and sleep and if this relationship was further moderated by sex (i.e., 3-way interaction).

Methods: Adults (N=732, Mage=59.80, 53%-female) reported their average sleep quality, sleep onset latency, and total sleep time over the past month using the Pittsburgh Sleep Quality Index (PSQI) as part of online data collection study. They also completed the International Physical Activity Questionnaire (total weekly minutes; proxy for PA) and Everyday Memory Questionnaire-20-Item Revised (EMQ; total score; proxy for SCC). SPSS PROCESS evaluated interactions between sex, SCC, and PA on sleep, controlling for age, race, and educational attainment.

Results: PA moderated the relationship between SCC and sleep quality for males [F(1,337)=4.65, p=.032], such that less PA was associated with worse sleep quality for men with lowest SCC (t=7.06, p<.001), intermediate SCC (t=7.15, p<.001), and highest SCC (t=6.45, p<.001). PA moderated the relationship between SCC and sleep quality for females [F(1,318)=4.50, p=.035], such that greater PA was associated with worse sleep quality for women with lowest SCC (t=5.41, p<.001), intermediate SCC (t=6.64, p<.001), and highest SCC (t=8.10, p<.001). A 3-way interaction (PA x SCC x sex) occurred for sleep quality [F(1,721)=9.30, p=.002].

Conclusion: In a community sample of adults, poor sleep quality was associated with greater subjective cognitive complaints, with physical activity moderating the association differently between males and females. Differences in social factors (socioeconomic, lifestyle, responsibilities at home) could explain the sex differences. Behavioral sleep interventions may benefit from addressing and optimizing the ideal level of physical activity, which may differ for men and women. Longitudinal data and objective measures of sleep will be imperative to understand this complex relationship and inform interventions.

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0936

EXPLORING SEX-SPECIFIC DIFFERENCES BETWEEN STRESS, SLEEP, AND CHRONOTYPE IN ASIAN AMERICAN ADULTS

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Introduction: Sex differences in stress, sleep, and chronotype (morning-eveningness) are essential for understanding sleep health disparities across diverse populations due to their significant impact on physical and mental health outcomes. However, existing studies are limited by insufficient representation of Asian Americans, furthering the need to investigate unique gender and ethnic differences that may influence health disparities. Therefore, we aim to examine sex differences in stress, sleep, and chronotype among Asian American men and women.

Methods: Asian American adults (N=51, Mage=54.41, 41%-female) reported their average sleep onset latency (SOL), total sleep time (TST), and sleep quality using the Pittsburgh Sleep Quality Index over the past month as part of an online data collection. They also completed the Morning Eveningness Questionnaire and Perceived Stress Scale. SPSS t-tests evaluated how variables differed for Asian American men and women.

Results: Asian American women reported less TST in hours (M=6.19+\-2.06) than Asian American men (M=7.30+\-1.26, p=.021). Results trended toward significance, where Asian American women reported greater WASO in minutes (M=38.29+\-60.78, p=.097) and preference for mornings (M=58.29+\-9.19, p=.074) than Asian American men (M=15.61+\-13.64, M=51.33+\-12.80). There was no significant difference in SOL or stress between the two groups.

Conclusion: Asian American women reported sleeping less than Asian American men, suggesting Asian American women may be at particular risk for experiencing sleep health disparities. This might be due to gender expectations of Asian women fulfilling cultural and familial obligations and duties, such as caregiving, alongside other roles, such as academics and professional work. Thus, behavioral sleep interventions might benefit from cultural tailoring to incorporate the unique cultural practices, social factors, and gender expectations of Asian cultures.

The current study is limited by its small sample size, and future studies should utilize larger samples and longitudinal and experimental methodologies to elucidate sex differences further.
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0937

EFFECT OF A NONHORMONAL SLEEP SUPPLEMENT ON DAYTIME FUNCTIONING IN MENOPAUSAL FEMALES: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL

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Introduction: Menopause significantly impacts females' well-being, often causing severe sleep disturbances driven by hormonal fluctuations. These disturbances impair daytime functioning in up to 26% of females, leading to symptoms such as daytime sleepiness, morning grogginess, and fatigue. This clinical trial evaluated the safety and efficacy of a nonhormonal sleep supplement (NSS) containing s-adenosyl methionine, propyl gallate, gamma-aminobutyric acid, magnesium glycinate, and theanine on daytime functioning in peri- and postmenopausal females with menopause-related sleep disturbances.
Methods: A randomized, double-blind, placebo-controlled trial was performed in females aged 40–65 with moderate-to-severe sleep disturbances [T-score ≥ 60 on the Patient-Reported Outcomes Measurement Information System Sleep Disturbance (PROMIS-SD)]. Participants were randomly assigned to NSS or placebo (PLB) 60 minutes before bedtime for three weeks. Repeated measures analysis of variance (RMANOVA) evaluated changes in PROMIS Sleep-Related Impairment (SRI), daytime functioning Visual Analog Scales (VAS), and safety at baseline and Wks 1, 2, and 3.
Results: The groups included 65 NSS and 62 PLB participants (NSS: 54.1±8.7 yr; PLB: 54.4±5.6 yr; 127 completed the trial). Compared to PLB, all NSS improvements were statistically significant ($p \leq 0.05$). Overall daytime functioning (PROMIS SRI) improved with NSS at Wk1 (-13.0% vs PLB -8.8%), Wk2 (-16.7% vs PLB -10.5%), and Wk3 (-18.6% vs PLB -10.3%). Improvements were observed in several VAS measures over the course of the study. Morning ease improved at Wk2 (-42.4% vs PLB -12.9%) and Wk3 (-47.7% vs PLB -28.4%). Morning grogginess showed marked improvement at Wk2 (-33.6% vs PLB -8.5%) and Wk3 (-41.8% vs PLB -2.8%). Daytime sleepiness improved at Wk2 (-20.0% vs PLB -0.7%) and Wk3 (-49.3% vs PLB -6.4%). Restfulness and rejuvenation improved at Wk3 (-30.3% vs PLB -7.7%).
Conclusion: NSS significantly improved daytime functioning, morning ease, and morning grogginess in peri- and postmenopausal females with moderate-to-severe sleep disturbances. Additional improvements were observed in daytime sleepiness and restfulness. This study demonstrates NSS as a potential therapy for enhancing daytime functioning in menopausal females with sleep disturbances.
Support (if any): Bonafide Health, LLC

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0938

DEVELOPMENT OF A CULTURALLY TAILORED SLEEP INTERVENTION FOR MIDLIFE AFRICAN AMERICAN WOMEN: A SCOPING REVIEW

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Introduction: Sleep disturbances are prevalent among African American women (AAW), particularly during midlife. These women experience unique challenges, including earlier menopause, greater vasomotor symptoms, more depressive symptoms, and poorer sleep quality and quantity than White women. Given the cultural and psychosocial factors influencing AAW's sleep health, it is crucial to develop culturally tailored sleep interventions that address their unique needs.
Methods: This scoping review examines (1) sleep in midlife AAW, (2) factors contributing to their sleep disturbances, (3) previous culturally tailored sleep interventions evaluated in this population, and (4) strategies for developing culturally tailored sleep interventions for midlife AAW. CINAHL, PubMed, and PsycINFO were searched for relevant sources.
Results: Midlife AAW experience worse sleep quantity and quality, both objective and subjective, than White women. Factors contributing to midlife AAW's sleep disturbances include vasomotor symptoms, racism-related stress, various stressors and psychological factors, the superwoman/strong Black woman schema, and environmental factors. A very few studies have applied culturally tailored sleep interventions involving midlife AAW, including sleep health education delivered by peer educators. Recommendations for developing and evaluating a culturally tailored sleep intervention for midlife AAW include the following: (1) use linguistically and culturally tailored methods for recruitment and content, (2) incorporate cultural concepts and values such as religious beliefs and spirituality, (3) address population-specific sleep barriers such as racism-related stress, (4) involve family members, (5) involve community facilitators, and (6) implement interventions in culturally familiar settings, such as churches.
Conclusion: The sleep challenges faced by midlife AAW warrant culturally sensitive, tailored interventions. Incorporating cultural values, addressing specific barriers such as stress, and involving family and community members have potential to enhance the effectiveness of such interventions. Future research should continue to explore and refine these approaches to improve sleep health outcomes for AAW and promote their overall well-being.
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0939

SLEEP DISTURBANCE AND SYMPTOM BURDEN IN WOMEN WITH SARCOIDOSIS

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Introduction: Sarcoidosis is a systemic inflammatory disease with many symptoms, including sleep disturbance, fatigue, dyspnea, and pain. This study aims to address the relationship between sleep disturbances and symptom burden in women with sarcoidosis.

Methods: We used data from the UCSF Sarcoidosis Research Program longitudinal cohort which enrolled participants with pulmonary sarcoidosis and unaffected healthy controls. We collected demographic and clinical characteristics. Sleep disturbance was assessed using General Sleep Disturbance Scale (GSDS), depression with the Patient Health Questionnaire-9 (PHQ9), fatigue with the Fatigue Assessment Scale (FAS), cognitive difficulties with the Multiple Sclerosis Neuropsychological Questionnaire, and shortness of breath with the San Diego Shortness of Breath Questionnaire.
Results: The cohort consisted of 55 men and 72 women. Women had a higher mean score for sleep disturbances compared to men (45.4 +/- 22.8 vs 37.5 +/- 22.8, p = 0.043). Compared to men, women were more likely to report waking after sleep onset (48/72 women vs 26/55 men, p = 0.028) and early awakening (35/72 women vs 15/40 men, p = 0.015). Across women with sarcoidosis and healthy controls, unadjusted analyses revealed that current immunosuppressant usage (p = 0.020) and sarcoidosis diagnosis (p = 0.021) were associated with occasional or frequent sleep disturbance. Only two of the participants with occasional sleep disturbances also had obstructive sleep apnea. Of the women with sarcoidosis 31% (17/54) reported clinically significant sleep disturbances as defined by the DSMV (GSDS score > 63). 59% (32/54) of women reported occasional or frequent sleep disturbance (GSDS score > 42), and 89 % (48/54) of women with sarcoidosis reported some form of sleep disturbance (GSDS score > 21). Occasional or frequent sleep disturbances (scores>42) in women with sarcoidosis were positively correlated with depression, shortness of breath, and fatigue (p < 0.001), as well as cognitive difficulties (p = 0.002)
Conclusion: Women experienced higher sleep disturbances than men and were more likely to report waking after sleep onset and early awakening. 89% of women with sarcoidosis reported some form of sleep disturbance, which correlated with high fatigue scores, depressive symptoms, cognitive difficulties, and shortness of breath.
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0940

THE ASSOCIATION OF OBSTRUCTIVE SLEEP APNEA WITH MARKERS OF ACCELERATED AGING: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: There is differing susceptibility to age-related health complications. A variety of circulating biomarkers of biological aging have been developed. Obstructive sleep apnea (OSA) is a prevalent sleep disorder that may contribute to premature aging, possibly through pathways involving intermittent hypoxia, sleep fragmentation, oxidative stress, and inflammation. The aim of this study was to systematically review and summarize the literature with respect to the relationship between OSA and circulating markers of premature aging.
Methods: Following the 2020 PRISMA guidelines, five electronic databases (MEDLINE, Embase, CINAHL, Cochrane, PsycINFO) were searched from inception to October 2024. Eligibility criteria included full manuscript English studies on adult humans with OSA (apnea-hypopnea index ≥ 5) that evaluated a circulating marker of aging. Quality assessments were conducted using standard methods. A random-effects meta-analysis was conducted on each marker. Studies investigating multiple markers at the same time were corrected using robust variation estimation (RVE).
Results: Twenty-five studies (8396 participants) were included in our review. Four studies investigated two markers simultaneously. Biomarkers included telomere length (TL, n=17), mitochondrial DNA (mtDNA, n=4), epigenetic age acceleration (EAA, n=2), sirtuins (SIRT, n=4), cyclin-dependent kinase inhibitor 2A (P16) (n=1), and autophagy protein 5 (ATG5) (n=1). Meta analyses were conducted on 15 studies that had a mean with standard deviation. There was significant association between OSA and shorter TL (unadjusted mean (95%CI) = -0.405 (-0.606, -0.203), p=0.0019). SIRT levels were lower in OSA participants; however, the meta-analysis was only borderline significant after RVE (mean (95%CI) = - 1.93 (-4.74, 0.879), p=0.09). MtDNA (mean (95%CI) = 0.669 (-1.29, 2.63), p=0.144) studies yielded mixed results. OSA was linked to increased EAA. The sole P16 and ATG5 studies demonstrated greater premature aging in OSA.
Conclusion: This systematic review highlighted a variety of markers of premature aging that may be impacted by OSA. Some markers were referenced in much higher frequency than others (TL), and thus had stronger evidence. OSA is greatly underdiagnosed, but the presence of OSA likely has an important role in premature aging. Further research is needed to understand the effects of OSA on biological aging, and assess whether these are associated with more robust age-related clinical outcomes.
Support (if any):

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0941

AN HERBAL SUPPLEMENT IMPROVES RESTORATIVE SLEEP AND SLEEP QUALITY, ELEVATES MOOD, AND INCREASES TOTAL SLEEP TIME

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Introduction: Boswellia serrata (Indian Frankincense) and Zingiber Officinale (Ginger) are therapeutic botanicals used widely in traditional Indian medicine. This randomized, double-blind, placebo-controlled trial assessed the effects of B. Serrata gum resin and Z. Officinale rhizome extracts (BSG) on musculoskeletal pain, restorative sleep, sleep quality, sleep parameters, mood, and inflammatory biomarkers.
Methods: Sixty (23M/37F) healthy volunteers aged 40-70 (mean 52 ± 8) with a BMI of 20-29.9 kg/m2 (mean 25.1 ± 2.1) and self-reported poor sleep due to mild musculoskeletal pain were randomized to receive 300 mg BSG or Placebo (PLA) daily for 28 days. Daytime and nighttime pain was assessed weekly by a visual analog scale (VAS). Restorative sleep and sleep quality measures were evaluated using the Restorative Sleep (RSQ) and Leeds Sleep Evaluation (LSEQ) Questionnaires. Mood changes were assessed through the Profile of Mood States Questionnaire (POMS-SF) and self-reported sleep parameters were tracked through the Consensus Sleep Diary (CSD). Inflammatory biomarkers were also assessed.
Results: There was a significant (p< 0.001) time x treatment interaction for daytime pain, nighttime pain, RSQ, each of the four domains of the LSEQ (getting to sleep, quality of sleep, ease of waking up, behavior following waking), and POMS-SF. Planned

group comparisons indicated BSG improved restorative sleep and pain scores compared to PLA on days 7, 14, and 28 ($p< 0.05$), while each LSEQ domain and the overall mood disturbance score improved compared to PLA on days 14 and 28 ($p< 0.05$). Serum TNF-α was significantly lower with BSG than PLA on day 28 ($p< 0.01$). Pearson's Chi2 analysis of the CSD demonstrated that 28 days of BSG significantly ($p< 0.001$) improved the likelihood of improving total sleep time by at least 45 minutes. A secondary analysis of the women-only cohort also demonstrated significant ($p< 0.05$) improvements in pain, RSQ, LSEQ, and POMS-SF.
Conclusion: Daily BSG supplementation decreased pain and improved restorative sleep after one week, while sleep quality and mood improved after 14 days in all subjects and the women-only cohort. BSG increased total sleep time and decreased serum TNF-α in healthy adults with self-reported poor sleep secondary to mild-to-moderate musculoskeletal pain.
Support (if any): Laila Nutraceuticals, Vijayawada, India

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0942

THE ASSOCIATION OF INSOMNIA WITH CIRCULATING BIOMARKERS OF ACCELERATED AGING: A SYSTEMATIC REVIEW

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Introduction: Insomnia is a prevalent sleep disorder defined by difficulty initiating or maintaining sleep or waking up earlier than intended. Studies suggest that insomnia may contribute to premature biological aging and increase susceptibility to age-related health complications. Various circulating biomarkers of biological aging have been used to assess the aging processes; increased biological age compared to chronologic age indicates premature biological aging. This study aims to systematically review and summarize the literature with respect to the relationship between insomnia and circulating biomarkers of premature aging.
Methods: Following the 2020 PRISMA guidelines, five electronic databases (MEDLINE, Embase, CINAHL, Cochrane, PsycINFO) were searched from inception to October 2024. Eligibility criteria included full manuscript English studies on adult humans with insomnia that evaluated a circulating marker of aging. We only included studies that assessed insomnia symptoms and severity with validated sleep surveys or by the Diagnostic and Statistical Manual of Mental Disorders. Quality assessments were conducted using standard methods.
Results: Twenty-two studies (17422 participants) were included in our analysis: biomarkers included telomere length (TL, n=17 studies), epigenetic age acceleration (EAA, n=3), mitochondrial DNA (MtDNA, n=1) and klotho (n=1), a protein involved in the aging process. Several studies (N=13) found insomnia was associated with reduced TL, with greater reductions in more severe insomnia, as indicated by higher survey scores. Additionally, there was a positive correlation between the number of insomnia symptoms and the degree of EAA. Single studies on MtDNA copy number and klotho showed lower values in insomnia. One study found longer TL in insomnia that was not significant. However, despite promising associations, the findings are undermined by the variety of surveys (five surveys) used and subsequent definitions of the control and exposure group.
Conclusion: Insomnia is associated with increased biomarkers of premature aging, such as reduced TL and EAA. Although the data is suggestive, the inconsistency and breadth of methodological approaches limits the conclusions that can be made. This underscores the need for further research in this area, including the study of additional markers not included in our review (e.g. sirtuin levels, autophagic activity), and the association of these markers with robust age-related clinical outcomes.
Support (if any):

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0943

EXAMINATION OF SAVORING, SAVORING BELIEFS, AND MULTIDIMENSIONAL SLEEP HEALTH IN ADULTS WHO ARE AGE 65 YEARS AND OLDER

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Introduction: Savoring is an approach to positive emotion regulation that involves thinking about and appreciating positive experiences. Few studies have examined associations of savoring with sleep; those that have focused on sleep-related impairment and sleep disturbance without assessing associations with multidimensional sleep health. The current study expands on the existing literature by evaluating the association of savoring beliefs with multidimensional sleep health and estimating the frequency of engagement in savoring in a sample of adults who are age 65 years and older.
Methods: Study aims were assessed using a cross-sectional survey. Recruitment and study procedures occurred online. The sample included 148 adults who were 65-82 years old (M=69.6, SD=4.1); 63.5% identified as women, 36.5% as men. Participants completed self-report questionnaires assessing sociodemographic characteristics, perceived health status, and engagement in savoring during the past 30 days; savoring beliefs (i.e., perceived savoring ability) were assessed via the Savoring Beliefs Inventory and multidimensional sleep health via the RU_SATED V4.0 questionnaire. Hierarchical regression was used to test the association of savoring beliefs with multidimensional sleep health; gender, age, and self-rated health status were included in the model as covariates. Frequency counts were used to estimate engagement in savoring.
Results: Adjusting for gender, age, and self-rated health status, savoring beliefs were positively associated with multidimensional sleep health ($\beta=.24$, $p=.003$). Approximately 75% of participants reported engagement in savoring during the day at least some days in the past 30 days, and approximately 39% reported savoring before attempting to initiate sleep at least some days.
Conclusion: In this sample of adults aged 65 years and older, higher perceived savoring abilities were significantly associated with better subjective, multidimensional sleep health. Most of the sample reported some extent of engagement in daytime savoring, with comparatively fewer people reporting savoring before sleep on a regular basis. This study adds to the growing literature linking positive psychological constructs with sleep health. Future directions for this research may include conducting prospective, microlongitudinal studies to evaluate daily, temporal associations of savoring and sleep health, and experimental studies to evaluate the effect of savoring on sleep health.
Support (if any):

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0944

SLEEP AND COGNITIVE TRAJECTORIES AMONG OLDER ADULTS WITH SUBJECTIVE COGNITIVE DECLINE: THE ROLE OF AGE

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Introduction: Growing evidence indicates that subjective cognitive decline (SCD), characterized by self-reported cognitive deterioration without measurable cognitive impairment, may be an early indicator of Alzheimer's disease. The impact of sleep disturbance on cognitive decline in individuals with SCD, and the extent to which this differs across age groups, remains unknown. This study investigated the association between baseline sleep disturbance and a 10-year trajectory of cognitive performance in individuals with SCD and examined if this association differed between age groups (50–64 years and ≥65 years).

Methods: Using six waves (2010–2020) of the Health and Retirement Study, we included individuals aged ≥50 years who were cognitively unimpaired with SCD at baseline and had ≥3 waves of cognitive function data (n = 1,372). Sleep disturbance was assessed using the modified Jenkins Sleep Scale, while global cognitive function was measured with the 27-point Modified Telephone Interview for Cognitive Status (TICS-M). Latent growth curve modeling was employed to examine the associations between sleep disturbance and cognitive trajectories, controlling for sociodemographic and health factors. To explore potential age-related differences, an interaction term between sleep disturbance and age group was included in the model. Subgroup analyses were conducted when the interaction term was statistically significant.

Results: Results showed that sleep disturbance was not significantly associated with cognitive change rate in SCD individuals overall. However, a significant sleep disturbance by age group interaction was observed, when added to the model (estimate = -0.05, 95%CI: -0.08, -0.01). Further subgroup analyses revealed that in those aged 50–64 years (n = 814), baseline sleep disturbance was not significantly associated with cognitive change (estimate = 0.02, 95%CI: -0.01, 0.04). In contrast, among those aged ≥65 years (n = 558), poorer sleep at baseline was associated with accelerated cognitive decline (estimate = -0.04, 95%CI: -0.07, -0.01).

Conclusion: These findings suggest that sleep disturbance may impact cognitive decline more with advancing age in individuals with SCD, underscoring the importance of sleep health for older adults. Future research could investigate the potential of sleep interventions to mitigate further cognitive decline in older adults with SCD.

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0945

ENHANCING COGNITIVE HEALTH THROUGH SLEEP-BAND THERAPIES: A CALL TO ACTION FOR ADVOCACY AND REIMBURSEMENT PATHWAYS

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Introduction: Mild cognitive impairment (MCI) and age-related cognitive decline present significant challenges for aging populations. Slow-wave sleep (SWS) has been shown to play a crucial role in cognitive health, particularly in memory consolidation and brain repair. Emerging technologies, such as sleep-bands utilizing closed-loop acoustic stimulation, have demonstrated potential in enhancing SWS. However, the integration of sleep studies into diagnostic frameworks for MCI and the lack of reimbursement pathways for sleep-band therapies hinder their clinical adoption and accessibility.

Methods: This work synthesizes evidence from recent peer-reviewed studies on the efficacy of acoustic stimulation technologies in enhancing SWS. Policy analysis was conducted to evaluate existing reimbursement frameworks for sleep-related devices, such as CPAP, and their adaptability for sleep-band therapies. Additionally, actionable steps for clinicians, researchers, and policymakers were proposed to address current barriers to implementation.

Results: Current studies highlight the clinical potential of sleep-band technologies in improving SWS and mitigating cognitive decline in aging populations. Despite these promising results, the absence of established reimbursement models and limited integration of sleep studies into MCI diagnostic protocols remain critical barriers. Lessons from CPAP reimbursement pathways suggest a viable framework for developing similar pathways for sleep-bands, emphasizing clinical validation, regulatory alignment, and stakeholder engagement.

Conclusion: Sleep-band therapies represent a promising intervention for enhancing SWS and addressing cognitive decline in aging populations. To realize their potential, advocacy is needed to include sleep studies in MCI diagnostic protocols and establish reimbursement pathways similar to those for CPAP devices. Collaborative efforts among clinicians, policymakers, and researchers are essential to advancing these goals and improving access to sleep-band therapies.

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0946

SLEEPLESS GOODBYE: UNDERSTANDING BEREAVED DEMENTIA CAREGIVER SLEEP QUALITY THROUGH A TELEPHONIC SURVEY

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Introduction: Dementia is a leading cause of death among older adults (65+) in the U.S. Caring for a person with dementia worsens family caregivers' sleep quality, which may persist following bereavement. Few studies have explored post-death sleep quality in bereaved dementia caregivers. Caregiving characteristics and psychological resources of bereaved dementia caregivers may influence their post-death sleep quality differently. This study aimed to characterize post-death sleep quality, examining independent associations of caregiving characteristics (i.e., age, sex, relationship types) and psychological resources (i.e., coping styles) with post-death sleep quality in bereaved dementia caregivers.

Methods: A cross-sectional phone survey included 581 bereaved dementia caregivers. Post-death restless sleep was measured using the following item: "During the past week, your sleep was restless", and the responses were coded as "Yes" or "No".

Pre-death sleep duration was measured in hours using the following question: "On a typical care day in the month before [Care Recipient] died, how much time per day and night did you spend asleep?" Restoration-oriented and loss-oriented coping styles were assessed with the Dual Coping Inventory. Regression models estimated the associations between age, sex, relationship type to the deceased (e.g., spouse, child), coping styles, and post-death sleep quality, controlling for pre-death sleep duration.
Results: Most bereaved dementia caregivers (n=389; 67.8%), with an average time since death of 4.6 years, reported short pre-death sleep duration (< 7 hours). Approximately half (n=259; 44.6%) reported post-death restless sleep within the past week. Sex and relationship type were not associated with post-death sleep quality. In the unadjusted model, a one-unit increase in loss-oriented coping style was associated with an increased likelihood (OR: 1.74; 95% CI:1.32-2.30) of restless sleep. In adjusted (controlling for sex, family relationship type, coping styles, and pre-death sleep duration) models, a one-unit increase in loss-oriented coping style was associated with an increased likelihood (OR: 1.47; 95% CI: 1.07-2.02) of restless sleep.
Conclusion: Restless sleep among bereaved dementia caregivers was common, particularly those using more loss-oriented coping strategies. Empirical studies using representative samples can help validate these findings. Qualitative work is also warranted to better understand subjective sleep experiences, which might help inform interventions to improve sleep.
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0947

RECIPROCAL ASSOCIATIONS BETWEEN DAILY SLEEP AND PAIN AMONG INDIVIDUALS WITH RHEUMATOID ARTHRITIS

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Introduction: Rheumatoid arthritis (RA) is a chronic autoimmune condition characterized by joint pain. Self-reported poor sleep is common in RA. This study examined the potential reciprocal relationship between sleep health and pain in RA.
Methods: Participants completed four waves of data collection with approximately 6 months between visits. 118 participants completed at least one wave of data collection with 7-day daily diary collecting multidimensional information on sleep (e.g., timing, perceived sufficiency) and pain severity (e.g., night, morning). A linear mixed-effects model was used to examine the associations between sleep (the primary predictor) and the next-day pain (outcome). Fully adjusted models controlled for age, sex, race, education, marital status, health covariates (e.g., depression), and medication use. Statistical significance was defined as p-value<.05.
Results: The sample mean age was 57.9 years and 87.3% were female. Overall, those with more severe average pain for the day, night pain, morning pain, and joint stiffness had longer sleep onset latency, more nighttime awakenings, and lower perceived sleep sufficiency (feeling rested). This between-person effect remained significant when examining the inverse of the relationship, such that those with longer sleep onset latency, nighttime awakenings, and lower sleep sufficiency had more average pain for the day, night pain, morning pain, and joint stiffness. Turning to the daily associations, experiencing night pain, morning pain, and joint stiffness were associated with longer sleep onset latency, more nighttime awakenings, and lower sleep sufficiency the following night's sleep. Average pain for the day was associated with lower sleep sufficiency and this association was reciprocal. Inversely, earlier bedtime and later waketime were associated with more night pain and joint stiffness the following day.
Conclusion: Findings highlight the daily and temporal relationship between sleep and pain. Average pain for the day and sleep sufficiency were found to have a reciprocal relationship, yet this relationship was not observed for sleep timing, sleep onset latency, and nighttime awakenings.
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0948

TOTAL SLEEP TIME MODULATES THE ASSOCIATION BETWEEN SLEEP EFFICIENCY AND MORTALITY: INSIGHTS FROM BIG DATA

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Introduction: Sleep efficiency (SE) and total sleep time (TST) are crucial parameters for sleep quality and quantity and affect health outcomes. Previous studies suggest an association between poor sleep metrics and increased mortality. This study explores how TST modulates the relationship between SE and survival using a large-scale polysomnography (PSG) dataset.
Methods: We analyzed PSG data of 134,225 patients from the VA Corporate Data Warehouse (CDW) spanning 1999–2024. A large language model (LLM), with >95% accuracy, was employed via prompting to extract TST and SE. We used unsupervised k-mean clustering method on SE and TST to identify the optimal number of clusters, i.e. five strata: high TST & high SE (high-high); low TST & low SE (low-low); low TST & high SE (low-high); intermediate TST & intermediate SE (mid-mid); and intermediate TST and low SE (mid-low). We compared the mortality rate among these strata.
Results: The low-low cluster (TST, 105.0 minutes; SE, 33.3%), had the highest mortality rate (33%) and the high-high cluster (TST, 400.8 minutes; SE, 89.5%) had the lowest mortality rate (12%). Additionally, when comparing the low-low and low-high clusters, the one with lower SE showed a higher mortality rate (33% vs 21%). Comparing mid-low to low-high clusters showed higher mortality rate in the former (25% vs 21%). The Charlson Comorbidity Index (CCI) exhibited a direct negative relationship with SE, with higher CCI values associated with lower SE, namely, average CCI of 0.9 for SE of 89.5% (high-high cluster), and 1.9 for SE of 33.3% (low-low cluster).
Conclusion: We confirmed that higher TST and SE associated longevity. Among those with decreased TST, diminishing SE is associated with increased mortality. As TST declines, the importance of SE in modulating mortality will be highlighted. Further analysis is warranted to assess the interactions of medical interventions in the interplay of TST and SE.

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0949

VALIDATION OF SELF-REPORTED SLEEP DURATION USING THE METHOD OF TRIADS AMONG OLDER ADULTS WITH SLEEP DISTURBANCES

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Introduction: Self-reported measures of sleep duration (SD) may not be accurate, especially among older adults. However, comparisons of self-report with actigraphy or polysomnography (PSG) alone may have limitations, as actigraphy is not a direct measure of sleep, and PSG may be skewed by the "first night effect." Thus, we employed the method of triads, an estimation technique using sleep diaries and two additional objective measures, to robustly assess the validity of SD collected by sleep diary.
Methods: Seventy community-living adults ≥55 years with symptoms of insomnia and/or daytime sleepiness ≥once/week completed an 8-day home-based protocol with 7 days of sleep diary (done electronically using daily email reminders or on paper per participant preference), 7 nights of EEG-headband (Beacon Biosignals), 7 days and nights of wrist actigraphy (Philips Respironics), and one night of home-based PSG (NOX Medical). SD measures from the sleep diary, EEG-headband, and actigraphy were averaged over 7 days, while SD from PSG represented one night of measurement. The method of triads, a technique in factor and path analysis, was used to estimate validity coefficients (VC), which represent the correlation between an individual measure and the "true" latent SD value in a triangular comparison. We constructed two triads among: 1) sleep diary-, actigraphy-, and PSG-measured SD; and 2) EEG-headband-, actigraphy-, and PSG-measured SD. Bootstrapping was used to calculate 95% confidence intervals.
Results: Mean age was 73 years ±9 years, 59% were women, and 27% were minority race/ethnicity. Pairwise correlations between sleep diary-reported SD and actigraphy or PSG were low (r< 0.30). In the first triad, the VC for sleep diary-reported SD was 0.35 (95% CI 0.08-0.70); in comparison, VCs for actigraphy (0.74, 0.30-1.3) and PSG (0.75, 0.33-1.9) showed stronger performance when compared to latent SD. In the second triad, VCs for EEG-headband, actigraphy, and PSG were 0.67 (0.28-0.90), 0.71 (0.44-1.0), and 0.78 (0.52-1.1), respectively.
Conclusion: Sleep diary-reported average SD is a weak measure of latent SD when validated in a triangular comparison with actigraphy and PSG. Future work examining the association of SD with adverse outcomes among older adults with sleep disturbances should use objective measures to evaluate SD.
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0950

COGNITIVE BEHAVIORAL THERAPY FOR MILD COGNITIVE IMPAIRMENT IN OLDER ADULTS

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Introduction: Mild cognitive impairment (MCI) is a transitional state from normal cognition to dementia. Identifying predictors of dementia in individuals with MCI is of great interest. The prevalence of MCI in adults older than 60 years increases with age and a lower level of education. Sleep fragmentation, insufficient sleep, and irregular sleep–wake rhythm can increase levels of beta-amyloid and phosphorylated tau levels. Given the relationships between sleep and cognitive function, it is important to examine the efficacy of non-pharmacological cognitive behavioral therapy for insomnia (CBT-I) as the first step in insomnia. We investigated the effects of CBT-I on cognitive function in older adults.
Methods: Twenty volunteers aged 60 years or older (mean age 70.1 ± 4.7 years) with suspected MCI using Touch Panel-type Dementia Assessment Scale (TDAS) were included in this study. Participants taking tranquilizers or hypnotic medications and those with moderate-to-severe sleep disordered breathing (SDB) were excluded. Cognitive function was assessed using the Mini-Mental State Examination (MMSE), Wisconsin Card Sorting Test (WCST), and N-back tasks. To assess the severity of SDB at home, we used a portable device to perform (SAS-2100, NIHON KODEN, Tokyo, Japan) the home sleep apnea test. Sleep complaints were evaluated using the Pittsburgh Sleep Quality Index (PSQI). CBT-I involved three components. The first was to discuss sleep hygiene recommendations, such as avoiding caffeine before bedtime and avoiding napping. The second was informing and supporting individuals to change their bedroom and bedtime activities, such as going to bed only when sleepy. The third component was sleep restriction therapy. The Chubu University Ethics Review Committee approved the study protocol. We obtained written informed consent from each participant after fully explanation of the protocol.
Results: Ten participants were enrolled in the CBT-I group and 10 in the control group. The CBT-I group showed significant improvement in the percentage of correct answers on the 2-back tasks, WCST category achievement, TDAS score, and PSQI, however, the control group did not.
Conclusion: CBT-I may positively affect cognitive function in older adults with MCI. Our findings suggest that the appropriate management with CBT-I should thus be considered as a non-pharmacological adjunct for MCI.
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0951

ASSESSING SLEEP QUALITY IN A PILOT SAMPLE OF CHRONIC PAIN PATIENTS: A COMPARATIVE STUDY OF PSQI AND OURA© RING MEASURES

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Introduction: This study focuses on two critical aspects of health and well-being in middle-aged and older individuals: sleep quality and pain. It compares two contrasting yet complementary methods of evaluating sleep quality. The first is the Pittsburgh Sleep Quality Index (PSQI), a validated self-reported measure commonly used in sleep research. The second is the OURA© Ring, a wearable technology that collects objective sleep data. By integrating subjective and objective measures, this research aims to provide a more comprehensive understanding of sleep quality, particularly in individuals experiencing chronic musculoskeletal pain.

Methods: The study analyzed baseline and post-intervention data from 33 adults with chronic musculoskeletal pain (pain >4/10 for ≥3 months) and self-reported sleep disturbances (PSQI >5). Participants completed pain and sleep questionnaires and experimental pain assessment. Objective sleep measures, including sleep duration, latency, and efficiency, were collected over 30 days using the OURA© ring. PSQI and OURA© outputs were compared to identify equivalent sleep components (C1–C5). Data analysis included Pearson's and Spearman's correlations, with partial correlations conducted and significance set at $p < 0.05$ after correction for multiple comparisons.
Results: The analysis revealed significant correlations between several PSQI components and their OURA©-derived equivalents. PSQI component 2 (C2) showed a strong positive correlation with OURA© sleep latency ($r = 0.797$, $p = 0.008$), while PSQI questions 2, 3–1, and 4 demonstrated moderate to strong correlations with their OURA© counterparts ($r = 0.50–0.83$, $p \leq 0.049$). Sleep duration (C3) correlated strongly with its equivalent ($r = 0.66$, $p = 0.002$), but sleep latency over 30 minutes (PSQI5a), sleep efficiency (C4), and sleep disturbances (C5) showed no significant correlations. Total PSQI and component C2 also correlated moderately with pain measures, including WOMAC, MPQ, and GCPS ($r = 0.45–0.58$, $p \leq 0.026$).
Conclusion: These results emphasize the need to integrate subjective and objective measures for a comprehensive assessment of sleep quality. Discrepancies, particularly in sleep latency and disturbances, highlight the limitations of the PSQI. Further research is needed to refine sleep evaluation methods in aging populations with chronic pain.
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0952
PREVALENCE OF OBSTRUCTIVE SLEEP APNEA IN THE ELDERLY ACROSS THE UNITED STATES THROUGH 2050

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Introduction: Chronic conditions such as cardiovascular disease, diabetes, and chronic obstructive pulmonary disease are associated with obstructive sleep apnea (OSA). These conditions are more prevalent in older adults, who may be at heightened risk for OSA. Studies on OSA prevalence have primarily focused on individuals aged up to 70 years, leaving a significant gap in data regarding the population >70 years. Therefore, it is crucial to assess the prevalence of OSA in this group. We aimed to estimate the prevalence of OSA among older adults across the United States through 2050.
Methods: A dynamic open-cohort Markov model was constructed to simulate changes in population structure from 2020 to 2050. Parameters for population growth, the progression of OSA, body mass index (BMI) trajectories, all-cause mortality, and mortality linked to OSA and BMI were based on estimates from existing literature and were modeled across various subgroups categorized by age, sex, and BMI trends, updated every five years. OSA prevalence was adjusted according to age, sex, and BMI subgroups. The projection of OSA prevalence (defined as AHI >5) was focused on individuals aged 70-85 years.
Results: From 2020 to 2050, the prevalence of OSA in older adults is projected to increase substantially. The overall prevalence of OSA with AHI ≥ 5 is expected to rise by 136%, from 11.9 (33%) million cases in 2020 to 28.2 (53.7%) million cases in 2050. For older females, the prevalence of OSA (AHI ≥ 5) will see an increase of 159%, from 4.7 million (23% of females 70-85 years) cases in 2020 to 12.1 million (45.0%) cases in 2050. For older males, the increase will be more moderate than for females, with a rise of 121%, from 7.3 million (45.7%) cases in 2020 to 16.1 million (63.4%) cases in 2050.
Conclusion: The prevalence of OSA in older adults is expected to rise significantly through 2050, with the most pronounced increase among older females. The potential clinical implications of these findings highlight the need for targeted healthcare strategies in the United States to address the anticipated growth in OSA burden in the aging population.
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0953
WITHDRAWN

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0954
IMPACT OF SEX, AGE, AND ETHNICITY ON SLEEP PARAMETERS AND DISORDERS: A POLYSOMNOGRAPHIC ANALYSIS

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Introduction: Sleep patterns and disorders, such as obstructive sleep apnea (OSA) and periodic limb movements of sleep index (PLMI), vary by age, sex, and ethnicity. Despite research on these disorders, the interaction of demographic factors like age, sex, and ethnicity on sleep architecture and disorder severity remains underexplored. This study investigates sex, age, and ethnicity-based differences in sleep parameters and severity of apnea-hypopnea index (AHI) and PLMI.
Methods: This retrospective analysis utilized polysomnography data from 711 adults (mean age 56.9 ± 17.2 years, 53% female). Participants were stratified by age (18–40, 41–50, 51–60, 61–70, and >70 years), sex, and ethnicity. Ethnic groups included White, Black, Hispanic, Asian, and Other. All the polysomnographic parameters were analyzed. Pearson correlation coefficients were calculated to examine the relationship between age and adjusted sleep parameters Logistic regression models adjusted for AHI and PLMI to evaluate demographic influences on sleep outcomes.
Results: Women exhibited shorter Rem Latency (-4,981 ± 4,823 ms vs. -3,724 ± 5,014 ms; $p = 0.004$) and higher WASO (-2,802 ± 2,569 ms vs. -1,953 ± 2,434 ms; $p = 0.010$) compared to men, particularly in the 41–60 age group. Age was positively correlated with WASO ($r = 0.16$; $p < 0.001$) and negatively with Sleep efficiency ($r = -0.25$; $p < 0.001$) and TST ($r = -0.26$; $p < 0.001$). Ethnic differences were notable: The mean AHI (Apnea-Hypopnea Index) varied by ethnicity, with the highest observed in Blacks (mean AHI = 23.20, SD = 27.80), followed by Hispanics (mean AHI = 20.02, SD = 25.11), while Whites had a mean AHI of 14.80 (SD = 17.71). PLMI (Periodic Limb Movement Index) was highest among Whites (mean PLMI = 22.28, SD = 30.80)

and Asians (mean PLMI = 18.11, SD = 36.48), while Blacks had the lowest mean PLMI (mean PLMI = 11.69, SD = 14.09).
Conclusion: Sex and ethnicity significantly influence RL, WASO, and PLMI, while age predicts SE and TST declines. OSA severity was worse in Blacks and Hispanics, while PLMI was worse in whites. These findings emphasize the need for tailored clinical approaches addressing demographic-specific sleep disparities.
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0955
IDENTIFYING SOCIOECONOMIC, BEHAVIORAL, AND HEALTH PROFILES AND THEIR ASSOCIATION WITH SLEEP HEALTH DISPARITIES: A CLUSTERED ANALYTIC APPROACH

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Introduction: Sleep health is influenced by socioeconomic, behavioral, and health factors, yet limited research has explored how distinct subgroups based on shared characteristics are associated with sleep health outcomes. This study aimed to identify and explore clusters of individuals based on socioeconomic, behavioral, and health profiles and examine sleep health disparities across clusters.
Methods: NHANES 2017-2018 (N=5,811) data were analyzed using K-means clustering to classify participants into subgroups based on socioeconomic, behavioral, and health factors. Variables included income-to-poverty ratio, education, marital status, household size, food insecurity, smoking and alcohol consumption, BMI, and depression. Variables were standardized, and K-means clustering was performed with a maximum of three clusters. Sleep health was assessed across five dimensions—regularity, timing, duration, satisfaction, and alertness—and summarized into a composite score (0–5), with scores ≥3 classified as "good" sleep health. Weighted logistic regression models examined associations between cluster membership and sleep health, adjusting for age, gender, and race/ethnicity.
Results: The mean age was 47.2 years (SE=0.6), with 51.7% female. Three clusters were identified: cluster 1 (23.6%), the "disadvantaged and high health risk" group, had lower income, education, larger households, and higher food insecurity; this group also had higher BMI, depression, and were more likely to smoke and drink. Cluster 2 (58.4%), the "moderately advantaged and healthier" group, had higher education, moderate income, household sizes, lower depression, a more moderate BMI, and fewer smokers and drinkers. Cluster 3 (17.9%), the "advantaged and low health risk" group, had higher income, education, smaller households, and lower food insecurity; this group also had lower BMI, minimal depression, and were least likely to smoke or drink. Compared to cluster 2 (ref. group), cluster 1 had 74% higher odds of poor sleep health (95% CI: 1.53, 1.97; p< 0.0001), while cluster 3 had 80% higher odds (95% CI: 1.34, 2.34; p=0.0004).
Conclusion: This study identified subgroups with distinct socioeconomic, behavioral, and health profiles linked to sleep health. Interestingly, the more advantaged cluster had worse sleep health than the moderately advantaged cluster. Future research should replicate these findings with longitudinal data to explore causal relationships.
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0956
SUBJECTIVE VS OBJECTIVE SLEEP MEASURES AMONG OLDER ADULTS WITH TRAUMATIC BRAIN INJURY

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Introduction: Traumatic brain injury (TBI) is a common fall-related injury among older adults that increases risk for sleep complaints. Subjective and objective sleep measures ensure a comprehensive account of sleep, yet there is limited data on the concordance between subjective and objective measurements of sleep in this population. The purpose of this study was to compare subjective and objective measures of sleep in older adults with TBI.
Methods: Adults aged 65 and older treated for TBI within 72 hours of injury at a single trauma center who provided informed consent were included. Assessments were conducted starting at 2-weeks post injury. Subjective sleep was assessed via a standardized sleep diary completed daily for one week. Objective sleep was assessed via actigraphy (Phillips Actiwatch Spectrum Plus®), with participants wearing the device on their non-dominant hand for one week. This study focused on study participants with complete subjective and objective data at the 2-week assessment. We compared subjective and objective mean values of total sleep time (TST), sleep efficiency (SE), time to bed (TTB), wake time (WT), wake after sleep onset (WASO), and sleep onset latency (SOL) and tested differences between groups using Student's t-tests.
Results: Participants included 46 older adults (74.5 [SD 7.9] years). Subjective and objective measures of TST differed significantly (subjective TST mean 7.7 hrs. (SD 1.6) vs. objective TST mean 6.7 hrs. (SD 1.8), p <.01). The measure of SE also differed significantly (subjective SE mean 84.7% (SD 10.8) vs. objective SE mean 73.9% (SD 17.2), p <.001). There was no statistically significant difference for TTB, WT, SOL, or WASO.
Conclusion: Among older adults with TBI, significant subjective-objective discrepancies were observed based on self-report sleep diaries and actigraphy over one week. Notably participants reported less TST and lower SE than what was observed via actigraphy. These findings support consensus recommendations for multimethod assessments of sleep among individuals with TBI.
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0957
INFLAMMATION, NEURODEGENERATION, AND SLEEP IN AGING: A STUDY IN COGNITIVELY HEALTHY OLDER ADULTS

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Introduction: A lower Ab42/40 ratio has been linked with shorter sleep duration and disrupted NonREM stage 3 sleep (N3), but

it is unclear how it relates to sleep efficiency (SE). The association of inflammatory markers and sleep, having relied on actigraphy or single-night EEG, is also mixed. Interleukin 6 (IL-6) is increased with decreased N3, increased wake after sleep onset (WASO), and daytime sleepiness. In men, IL-6 is lower with higher total sleep time. In women, IL-6 is lower with fewer nighttime arousals, and TNF-α is lower with more N3 sleep. Using multi-night frontal EEG, we hypothesize that a) lower Ab42/40 ratio is associated with poorer sleep efficiency, and b) increased IL-6 is linked to less N3 in men and more WASO in women.
Methods: 23 cognitively unimpaired older males (M=76.2, SD=5.8 yrs) and 26 females (M=73.6, SD=5.6 yrs) used multi-night frontal EEG sleep-monitoring devices (Zeo, Inc; ABM, Inc) and had quantified plasma IL-6, TNF-α, and Ab42/40. Data were analyzed with Pearson correlations, partial correlations, and ANOVAs where appropriate using SPSS.
Results: Lower Ab42/40 was associated with lower SE (R2=0.483, beta=.586, t=2.190, p=.05, n=15) and increased WASO (R2=0.520, beta=-.546, t=-2.121, p=.06, n=15). In males, higher levels of plasma IL-6 and TNF-α were linked to less time in N3 (IL-6: r=-4.23, p=0.045; TNF-α: r=-3.8, p=0.07). Higher plasma IL-6 was also associated with increased nighttime awakenings in males (r=0.411, p=0.05). We did not identify any significant relationships in women.
Conclusion: Our findings suggest that a lower Ab42/40 ratio is associated with decreased sleep efficiency and increased wake after sleep onset in cognitively unimpaired older adults. Additionally, elevated IL-6 levels were associated with reduced N3 sleep and more nighttime arousals in males but not females. While no sex differences were observed in the relationship between Ab42/40 and sleep, this data highlights the potential role of inflammation, particularly IL-6, in modulating sleep architecture and cognitive function in older adults. These results underscore the need for further investigation into the sex-specific mechanisms underlying sleep disturbances and their impact on aging and neurodegeneration.
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COMPARING THE MMSE AND SMARTPHONE-BASED ECOLOGICAL MOMENTARY COGNITIVE TESTING OF COGNITIVE FUNCTION IN RELATION TO SLEEP IN PERSONS WITH DEMENTIA

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Introduction: Poor sleep is linked to cognitive decline in older adults, particularly in people living with dementia (PLWD). As dementia progresses, sleep quality often worsens, underscoring the need for ongoing monitoring of both sleep and cognitive function. This study examined the associations between cognitive function (assessed both at a single time point and daily) and sleep in PLWD.
Methods: Seventy-three PLWD participated in ecological momentary cognitive testing (EMCT) via web links sent to their caregivers' smartphones three times/day over seven days, using the NeuroUX platform (Quick Tap 1 [QT1], Quick Tap 2 [QT2], or Matching Pairs [MP]). Baseline data were analyzed as part of an ongoing clinical trial (NCT05452031) testing a dyadic sleep intervention for PLWD and their caregivers. PLWD also completed the Mini-Mental State Examination [MMSE]. Sleep was assessed via daily ecological momentary assessment [EMA] diaries, completed by caregivers. Cognitive measures included median total scores [TS], median reaction times [RT], intra-individual variability [SD], and within-day variability for the three EMCTs, along with total MMSE scores. Sleep quality was assessed using a daily "good sleep" variable across seven days, indicating no difficulty falling or staying asleep (1=good sleep, 0=poor sleep). Pearson correlation analyses were performed.
Results: Of the 73 PLWD, 66 had at least one valid EMCT during the seven days and 43 had valid data for all seven days. The mean MMSE score was 15.05 (SD 8.92), and the mean "good sleep" score was 0.59 (SD 0.37). A lower SD of the median RT across all days was significantly associated with better sleep (r=-0.25, p=0.047), while other metrics (median TS, median RT) were not related to sleep. The association between cognitive performance and sleep was stronger in the evening than in the morning or afternoon, although the difference was not statistically significant. MMSE scores were not significantly correlated with sleep.
Conclusion: Daily variability in cognitive performance on the QT1 EMCT is significantly associated with subjective sleep quality, while MMSE scores are not. By leveraging smartphone-based cognitive assessments, caregivers and healthcare providers can gain real-time insights into the relationship between sleep quality and fluctuations in cognitive performance.
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0959

ASSOCIATION BETWEEN INFLAMMATORY MARKERS AND SLEEP QUALITY IN FAMILY CAREGIVERS OF PEOPLE LIVING WITH DEMENTIA

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Introduction: Family caregivers of adults with dementia often report poor sleep quality due to the demands of caregiving. Poor sleep, due to shorter sleep duration and/or disturbed sleep, has been linked to inflammatory processes. Previous research has identified elevated levels of C-reactive protein (CRP), tumor necrosis factor alpha (TNF-□), and interleukin-6 (IL-6) as significant markers of poor sleep. Additionally, interleukin-10 (IL-10) and interferon-gamma (IFN-□) are involved in inflammatory processes that may impact sleep but have not been evaluated in caregivers. This pilot study aimed to examine the relationship between sleep quality and inflammatory markers in family caregivers of people living with dementia (PLWD).
Methods: Data were collected from 18 caregivers enrolled in a dyadic behavioral sleep study involving PLWD and their family caregivers (NCT05102565). Plasma samples from caregivers

were analyzed for inflammatory markers, including CRP, IL-6, IL-10, TNF-□, and IFN-□. The Pittsburgh Sleep Quality Index (PSQI) global score was used to assess sleep quality. Spearman correlations coefficients (□) were calculated, with a significance threshold of $p < 0.20$, given the pilot nature of the study.
Results: Among the 18 caregivers, the mean PSQI score was 6.6□ 3.6. IL-6 showed a slight positive correlation with the PSQI score (□□ =0.18, p=0.025). Both IL-10 and IFN-□ were significantly associated with PSQI global scores (□□ =0.28, p=0.03 for IL-10 and □ □ =0.27, p=0.001 for IFN-□). CRP levels showed a minimum positive correlation with the PSQI score (□=0.07, p=0.19). A slight negative correlation was observed between PSQI scores and TNF-□ □ levels (□=-0.10, p< 0.01).
Conclusion: In this pilot study, higher PSQI scores were associated with elevated levels of IL-6, IL-10, IFN-□, and CRP levels, suggesting a link between poor sleep quality and increased immune and inflammatory marker levers in caregivers. The negative correlation observed between PSQI and TNF-□ is contrary to what is noted in literature reviews; however, this is due to the small sample size. Larger studies are needed to confirm these findings and further explore the health implications of poor sleep among caregivers of PLWD.
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0960

AGE-RELATED PATTERNS IN SLEEP DURATION ACROSS THE ADULT LIFESPAN IN THE U.S.: INSIGHTS FROM A LARGE-SCALE STUDY USING WEARABLE TECHNOLOGY

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Introduction: Sleep duration is known to evolve as we age, yet large-scale studies characterizing this across the lifespan are limited and are often reliant upon self-report data, which can be biased by a number of factors (e.g., social desirability, research participation). We leveraged wearable technology to collect information on sleep duration at the population level to assess sleep duration and variability across adulthood.
Methods: Data was analyzed from 274,128 adults (ages 20–69 years) in the U.S. who wore a consumer wearable device (Samsung Galaxy Watch). The longest continuous nighttime sleep period(18:00 to 6:00) was used for analyses, with data filtered to only include those with at least 20 weekdays and 8 weekends of tracked sleep over the past 3 months. Descriptive statistics examined sleep duration and variability, while t-tests compared differences across age groups (by decade) and between weekday/weekend sleep (social jetlag).
Results: Adult sleep durations across the lifespan were: 20-29 years ($\bar{x}$=7hours 42minutes, SD=47 minutes), 30-39 years($\bar{x}$=7hours 35minutes, SD = 49minutes), 40-49 years($\bar{x}$=7hours 32 minutes, SD =51minutes), 50-59 years($\bar{x}$=7 hours 34 minutes, SD = 52minutes), and 60-69 years ($\bar{x}$=7hours 45minutes, SD=56minutes). During weekdays, 40-49 years recorded the shortest average sleep duration ($\bar{x}$=7hours 33 minutes, SD=50.75), compared to 60-69 years ($\bar{x}$=7hours 45minutes, SD=56.36, p< 0.001). Social jetlag was observed across all age groups, with those between 40-49 years exhibiting the greatest difference between weekday vs. weekend sleep (Δ=34 minutes more on weekends), while those between 60-69 years experienced the smallest difference (Δ=20minutes more on weekends). Similarly, sleep variability, measured by the standard deviation of sleep duration, was highest in the 40-49 age group and lowest in the 60-69 group, suggesting middle-aged adults have more irregular sleep patterns due to work and family obligations.
Conclusion: These findings provide data describing typical sleep durations across the lifespan. In contrast to common clinical guidance, older adults appear not to sleep less than younger adults. Adults between 40-49 years are likely to face challenges with insufficient sleep during the weekdays, possibly reflecting the considerable work and childrearing responsibilities of this age group.
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0961

INVESTIGATING THE CORRESPONDENCE BETWEEN SELF-REPORTED AND SMART-BED SLEEP HEALTH THROUGH NOVEL FOUR-DIMENSIONAL GRAPHICAL MODELING TECHNIQUES

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Introduction: The self-reported Ru-SATED questionnaire measures overall subjective sleep health. Although psychometrically valid, the extent to which it corresponds to objective sleep health is unknown. Our particular interest is in the objectively-measured sleep Amount, Regularity, and Timing (ART), which are most directly amenable to objective measurement and behavioral intervention. We used novel modeling and graphical methods to investigate how self-reported multidimensional sleep health relates to the ART of sleep, as measured with a smart-bed.
Methods: The analytic sample included N=2,625 Sleep Number®bed users who completed the Ru-SATED 4.0 scale, which measures multidimensional sleep health in the past month. Participants had 7-28 days of smart-bed data in the previous month (Mean[SD] age = 52.0[16.1], 55.3% female, 79.2% White, 5.8% Black). From the smart-bed data, we computed the average duration of restful sleep (Amount), standard deviation (SD) of sleep midpoint (Regularity), and average sleep midpoint (Timing). We extended Response Surface Modeling principles to explore how complex combinations of smart-bed ART data related to Ru-SATED. Novel graphical techniques were used to illustrate this four-dimensional relationship.
Results: The ART of smart-bed data explained 10% of the variance in Ru-SATED scores. The highest Ru-SATED scores (i.e., best subjective sleep health) were observed in those with the combination of longer objective restful time (≥5 hours), low midpoint variability (< 1 hour SD), and a midpoint between 1:00-5:00AM (i.e., all but the most extreme early/late midpoint). The lowest Ru-SATED scores (i.e., worst sleep health) were observed in those with the combination of high midpoint variability (> 3 hours SD) and either long/late (>5 hours, > 5:00AM) or short/early sleep (< 5 hours, < 12:00AM).

Conclusion: The smart-bed-measured Amount, Regularity and Timing of sleep corresponded to self-reported Ru-SATED scores, further establishing the validity of Ru-SATED. Ru-SATED was associated with the combination of objective sleep measures, rather than any single measure, and was effectively visualized using innovative four-dimensional graphic techniques. This further validates the conceptualization of sleep health as a multidimensional construct and may assist with presenting clinically relevant information regarding patient sleep health patterns and goals.

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0962

AGE, SLEEP AND INFLAMMATION: A CORRELATIONAL STUDY

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Introduction: This correlational study explores the relationship between sleep and inflammation in aged individuals. Cytokines are involved in various central nervous system processes, including wakefulness, appetite, mood regulation, sexual behaviors, and thermoregulation. Sleep disorders commonly associated with aging, such as insomnia, circadian disruptions, sleep apnea, and periodic leg movements, might have significant biological impacts on the inflammatory system and immune functions. Aging is also associated with increased levels of some inflammatory markers.

Methods: 77 individuals (women: 51, men: 26) aged 60–87 years (mean age 69.8 ± 6.1 years) were recruited from the community. None were using psychoactive drugs. Participants underwent three nights of polysomnographic sleep recording in the laboratory: the first night served for adaptation and sleep disorder assessment, while nights two and three were for experimentation. A 19-channel EEG montage was used with additional sensors for eye movements, muscle activity, respiration, and leg movements. Fasting, resting venous blood was drawn in the morning upon awakening for further measurement of cytokine receptors IL-1α, IL-1β, IL-1RA, IL-6, IL-8, IL-10, TNFα and sTNFR1 in serum (Milliplex). Questionnaires assessed health (SF-36), sleep quality (PSQI), anxiety (BAI), and depressive symptoms (BDI, POMS).

Results: Periodic Leg Movement during Sleep (PLMS) was correlated to four inflammation markers (IL10 (.361), IL6 (.307), IL1B (.264) IL1A (.227)), the most of any other sleep variables, clearly indicating that PLMS is associated with a prolonged state of inflammation. sTNFR1 was the biomarker most associated with other variables (Micro-arousal (-.375), AHI (Apnea Hypopnea Index:.278), #Arousal (-.261), Stage1 (-.238), POMS (.401)). The first three variables are sleep disrupters and Stage1 augments when there is less of deeper sleep states, it seems counterintuitive that they would consistently negatively correlate with an anti-inflammatory marker. AHI was further correlated with IL1RA (.277).

Conclusion: Correlations are modest but many and significant, pointing toward a definite role of sleep in inflammatory processes. The signaling relevance of biomarkers, being pro, anti or both, depending on circumstances, remains ambiguous.

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0963

INSOMNIA SYMPTOMS AND PHYSICAL FUNCTION IN OLDER VETERANS DURING AND AFTER VA REHABILITATION: A FEASIBILITY STUDY

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Introduction: Older adults admitted to subacute rehabilitation are at a critical window in the recovery of physical function, yet older Veterans are susceptible to sleep difficulties which may impact this recovery. This study aimed to determine the feasibility of evaluating sleep and physical function in older Veterans at admission, discharge, and 1-month post-discharge from subacute rehabilitation using patient-reported, actigraphy, and performance-based measures.

Methods: Veterans aged 60+ were approached within 1 week of admission to VA Boston's subacute rehabilitation. Each participant completed the Insomnia Severity Index(ISI)(clinically meaningful difference[CMD]=6), the Activity Measure for Post-Acute Care(AM-PAC)(CMD=4), and two performance measures (gait speed; chair stands) at admission, discharge, and 1-month follow-up. All participants completed wrist-worn ActiGraph GT3X+ accelerometer for 1 week at admission. Descriptive and frequency analyses were used to identify completion rates and preliminary descriptive data at three time points.

Results: Thirty-six Veterans were approached for participation; 20 refused with 8 declining due to concerns about wearing the actigraph and 5 declining due rehabilitation demands. Sixteen participants(Mean age=75±6.4years; 100%male; 94%White) completed actigraphy and all self-reported measures at admission; of these, 14(88%) completed measures at discharge and 12(75%) at 1-month post-discharge. Most Veterans(88%) were unable to complete gait speed or chair stands at all time points due to functional difficulties during admission and/or could not be assessed face-to-face due to travel difficulties post-discharge. Veterans were lost to follow-up due to rehospitalization(n=3) or patient death(n=1). For the 12 Veterans with complete data, AM-PAC scores improved from admission(Mean=49.9±8.1) to discharge(Mean=54.2±6.1), with minimal changes post-discharge (Mean=53.2±10.8)(overall 41.6% met/exceeded CMD=+4). Conversely, ISI scores improved from admission (Mean=10.8±7.3) to discharge (Mean=6.2±5.8)(25% met/exceeded CMD=-6) but worsened again 1-month post-discharge (Mean=10.6±7.4)(33.3% met/exceeded CMD=+6).

Conclusion: It is feasible to assess insomnia and physical function through self-reported measures in older Veterans during and after subacute rehabilitation. Performance and actigraphy-based measures were less feasible/barriers to participation in this environment given recovery demands, lower functional status, and face-to-face difficulties post-discharge. Veterans may benefit from targeted behavioral sleep interventions during this transitional period and such interventions may confer additional benefits regarding daytime function.

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0964

HOW AGE SHAPES THE NIGHT: A CROSS-SECTIONAL DIVE INTO SLEEP ARCHITECTURE

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Introduction: Delta (N3) or slow-wave sleep, essential for restorative processes, is believed to decline with age, potentially impacting sleep quality and cognition. Previous studies on this relationship have shown inconsistent results. We performed a cross-sectional analysis to examine age-related changes in sleep architecture across adult age groups.
Methods: Baseline adult PSG studies performed between July 1 and December 7, 2024, at Memorial Hermann Texas Medical Center, were reviewed. We excluded titration studies due to their potential impact on sleep architecture. Total sleep time (TST) and sleep stage distribution, with a focus on N3, were analyzed across three age groups: Group 1 (18–30 years) Group 2 (31–60 years), and Group 3 (>60 years), using ANOVA and linear regression analysis (95% confidence intervals when applicable).
Results: A total of 159 studies were reviewed. The average ages for Group 1 (12 subjects), Group 2 (82 subjects), and Group 3 (65 subjects) were 23.8 ± 4, 47.7 ± 8.2, and 68.8 ± 6.8 years, respectively. The TST was lowest in Group 3 (246 minutes, $p < 0.05$), as was the sleep efficiency (63%, $p = 0.0003$). Sleep latencies did not differ between groups. When comparing the sleep stages (percentage means), only stage N1 was statistically different (longest in Group 3, $p = 0.0008$) representing 15.8% of TST. In addition to demonstrating an increase in N1 with age ($R^2 = 3.3\%$, $p = 0.02$), linear regression analyses also demonstrated a decrease in N3 with age ($R^2 = 2.5\%$, $p = 0.046$). The respiratory disturbance index (RDI) using AASM V.3 criteria, increased across the groups (18.5, 23.7, 36.9 events/hour respectively, $p = 0.002$).
Conclusion: This study demonstrates age-related changes in sleep architecture, which include reduced TST, lower sleep efficiency, a higher proportion of N1 and decreased total N3 sleep with age. The observed increase in RDI is consistent with our current understanding of the relationship between age and obstructive sleep apnea. These alterations in sleep patterns may have far-reaching consequences. Larger population studies investigating the impact of such sleep architectural changes on cognitive functioning, memory consolidation, and overall health in adults are needed.
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0965

PERCEPTIONS OF SLEEP AND PHYSICAL ABILITIES IN OLDER VETERANS DURING VA SUBACUTE REHABILITATION: PRELIMINARY FINDINGS FROM A FEASIBILITY STUDY

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Introduction: Poor sleep raises the risk for physical functioning difficulties and safety concerns, such as falls, in older adult populations. However, there is insufficient literature on sleep in older Veterans receiving care in VA inpatient rehabilitation settings during and after hospitalization. Furthermore, we do not sufficiently understand Veterans' perceptions of the importance of their sleep and physical abilities during this recovery process. The present analysis assessed older Veterans' perceptions of sleep, physical ability, and interest in pursuing non-pharmacological sleep interventions after completing their treatment at a VA subacute rehabilitation unit.
Methods: Veterans aged 60+ were approached ≤1 week prior to discharge from VA Boston's subacute rehabilitation. Veterans completed a brief semi-structured interview. Using frequency analyses, we determined how many Veterans believed their sleep and physical abilities were important to their recovery, believed their sleep impacts their physical abilities, how many were interested in non-pharmacological sleep interventions, when this intervention should occur, and how many believed this sleep intervention should include physical activities.
Results: Fourteen Veterans (Mean age=75.4±6.6 years; 100% male; 93% White) completed the brief semi-structured interviews prior to discharge. All Veterans (100%) reported that their sleep and physical abilities were important to their overall recovery and that their sleep impacts their physical abilities. Most (71%) expressed interest in a non-pharmacological intervention to help them sleep. Veterans shared that the intervention should occur during (50%), after (7.1%) or both during and after (29%) subacute rehabilitation. The majority (71%) reported that physical activity should be incorporated into the sleep intervention.
Conclusion: This analysis highlighted Veterans' perception regarding the importance of their sleep and physical functioning, particularly as it relates to their physical recovery process. This data also demonstrates a high level of Veteran interest in receiving non-pharmacological sleep interventions to promote their recovery. A natural next step would be to develop and study an intervention to support Veterans' sleep and physical abilities during and/or after their discharge from subacute rehabilitation.
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0966

SLEEP, CIRCADIAN RHYTHMS, AND COGNITIVE FRAILTY IN OLDER CHINESE IMMIGRANTS: PROTOCOL FOR AN OBSERVATIONAL STUDY

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Introduction: Immigrant workers are integral members of the American society. While efforts have been made to support their health needs, the challenge of caring for their aging parents has

often been overlooked. These aging parents, whose lives are closely tied to their adult children, are referred to as the 'zeroth generation' immigrants. Compared with first-generation immigrants, these 'zeroth generation' immigrants may experience even higher rates of sleep and circadian rhythm disturbances, due to factors linked to immigration and acculturation. This observational study aims to examine the relationships of sleep and circadian rhythms with frailty and cognition among older Chinese immigrants in the US.

Methods: We plan to recruit Chinese immigrants aged ≥65 years old to complete a series of tests and questionnaires. Specifically, we will assess participants' general cognitive abilities (Mini-Mental State Exam), episodic memory (word list recall, story recall task), working memory (digit span test), and executive function (Trail making task, Stroop test). Grip strength and walking speed will be tested to assess frailty. Participants will also wear an actigraphy device and complete sleep diaries for 10 consecutive days. Questionnaires will collect demographic information, lifestyle, chronotype, living conditions, language experience, education and employment history, immigration and travel history, medical history and medication use, frailty, sleep quality, sleepiness, migration-acculturative stress, depressive symptoms, and subjective cognitive decline.

Results: We anticipate enrolling 200 participants, balanced by immigration generation and sex, in the first phase of the study. We anticipate that the zeroth-generation participants experience poorer sleep and circadian health, including lower sleep quality, shorter sleep duration, increased daytime sleepiness, and greater rest-activity rhythm disturbances, as well as higher frailty prevalence and worse cognitive performance than their first-generation immigrant peers. Additionally, we expect that heightened acculturative stress mediates the associations between sleep and circadian health, with frailty and cognition, particularly in the zeroth-generation immigrants.

Conclusion: This study will provide new insights into the sleep and circadian health challenges faced by the zeroth-generation Chinese immigrants and their impact on frailty and cognitive aging. Findings will inform interventions and policies to promote health equity, addressing the specific needs of this vulnerable demographic.

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0967

A RANDOMIZED, TRIPLE-BLIND, PLACEBO CONTROLLED TRIAL INVESTIGATING A STANDARDIZED CORN LEAF EXTRACT ON SLEEP IN HEALTHY ADULTS WITH SLEEP DIFFICULTIES

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Introduction: Difficulties falling and/or staying asleep affects over one quarter of American adults. Current management strategies include prescription sleep aids; however, long-term use is associated with adverse effects and natural alternatives may provide safer and more effective relief. UP165, a standardized corn leaf extract (CLE), has shown to bind melatonin receptors, increase melatonin synthesis and increase total sleep time (TST) and deep sleep in rodents and in a pilot clinical trial. Therefore, this study investigated the safety and efficacy of CLE on sleep quality in a healthy population.

Methods: This clinical trial enrolled 80 healthy adults (18-65 years; n=40/group) with difficulties falling and/or staying asleep. Participants were assigned to CLE or placebo for 28 days. Following a 7-day run-in period, objective (actigraphy with electroencephalogram) and subjective (Pittsburgh Sleep Quality Index; PSQI) sleep measures, were assessed at baseline (Day 0), and Days 14 and 28, with safety assessed at screening and Day 28.

Results: At Day 14, there was an increase in rapid eye movement (REM) (6.4 vs. -3.2 min; p=0.042) and decrease in awake duration (-17.9 vs. 17.0 min; p=0.021) for participants supplemented with CLE compared to those on placebo. At Day 28, there were increases in TST (35.2 vs. -16.9 min), REM (8.3 vs. -4.4 min) and light sleep time (30.8 vs. -12.4 min) for the CLE group compared to the placebo group ($p < 0.05$). Compared to placebo, participants supplemented with CLE demonstrated significantly shorter sleep onset latency and less sleep fragmentation by Day 14. CLE improved sleep efficiency and increased sleep maintenance on both Days 14 and 28. The PSQI sleep latency score decreased from baseline at Days 14 and 28 for the CLE group whereas the Placebo group decreased at Day 28 only ($p < 0.05$). Post-hoc analysis supported these findings with a significant increase of 35.7 min in non-REM sleep at Day 28 for participants supplemented with CLE compared to a decrease of 10.6 min for those on placebo. Supplementation with CLE was safe and well tolerated.

Conclusion: The current study suggests supplementation with CLE may improve sleep parameters in a healthy population with sleep difficulties.

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0968

SLEEP HEALTH COMPOSITE SCORE FOR QUALITY, DURATION, AND EFFICIENCY CORRELATED WITH BIOMARKER HOMA-IR AND COGNITIVE DECLINE IN MIDDLE-AGED ADULTS

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Introduction: Biomarker studies have evidenced the relationship between sleep, cognitive function, and dementia. Along with traditional biomarkers such as phosphorylated tau and amyloid beta, metabolic function markers such as the homeostasis model assessment of insulin resistance (HOMA-IR) have been associated with sleep and cognitive function.

Methods: A cross-sectional analysis of the Midlife in the United States Survey (MIDUS) using the MIDUS 2 Biomarker Project (204-2009) cohort with data from 1255 respondents. The project included biological assessments and subjective measures of sleep and cognitive function. We used a Random Forest Regression and linear regression models to predict HOMA-IR association with sleep and cognitive function. HOMA-IR was tested with a fasting blood draw. Sleep Health components were calculated with the Pittsburgh Sleep Quality Index (satisfaction/quality), daytime dysfunction (alertness), timing (usual bedtime), efficiency (habitual sleep efficiency), and duration (sleep duration). Cognitive function with the Mood and Symptom Questionnaire (MASQ) Cognition control.

Results: Participants were middle-aged (mean 57.32) female (56.8%) recruited from three sites. The random forest regression

model (RFRM) accuracy explains 23% variability of HOMA-IR (R-squared= 0.23, mean square error=12.32). The importance of each predictor was assessed using % Mean Decrease in Accuracy (%IncMSE) with a higher value indicating a higher impact of the covariate on model accuracy.) Sleep efficiency (6.52%IncMSE), Sleep duration (5.28%IncMSE), and Sleep quality (3.21%IncMSE) were the most important covariates. Sleep quality had a significant negative correlation with HOMA-IR ($p< 0.001$) and Cognitive Control ($p=0.04$) in linear regression model.
Conclusion: Poor scores in sleep health components efficiency, duration, and quality significantly predicted the biomarker HOMA-IR in a sample of middle-aged adults. Poor sleep quality correlated with worse HOMA-IR levels and lower cognitive control. Future studies should investigate the interplay between insulin resistance, sleep health, and cognitive impairment.
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0969

NEIGHBORHOOD DEPRIVATION AND SLEEP HEALTH AMONG MIDDLE-AGED PRIMARY CARE PATIENTS

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Introduction: Poor sleep health, including short sleep duration, is linked to adverse health outcomes. While studies have investigated individual determinants of sleep health disparities, the role of structural determinants such as neighborhood deprivation is less explored, especially in middle-aged adults. The objective of this study was to examine the relationship between neighborhood deprivation and self-reported sleep health among middle-aged primary care patients.
Methods: This interim analysis of the Health Literacy and Cognitive Function among Middle-Aged Adults (MidCog) study included English-speaking adults aged 35-64 recruited from an academic general internal medicine practice and 7 federally qualified health centers in the Chicagoland area. Neighborhood deprivation was assessed using the 2021 Area Deprivation Index (ADI) linked to census blocks, categorized into terciles, with the highest tercile indicating the greatest deprivation. Multidimensional sleep health was measured using the RU-SATED questionnaire, while short sleep duration (< 6 hours) was derived from the Ultra-short Munich ChronoType Questionnaire. We examined the associations of neighborhood deprivation with sleep health and short sleep duration using univariate and multivariable regression models, adjusting for a priori covariates of age, sex, number of chronic conditions, and depressive symptoms (defined as PROMIS Depression T-score > 55).
Results: A total of 709 participants were included in the analysis (mean age 52.3 ± 8.1; 62% female; 45% non-Hispanic White, 38% non-Hispanic Black, 8% Hispanic; 55% with ≥ 2 chronic conditions). The median sleep health score was 8 (IQR: 6-10), and 7.5% of participants reported short sleep duration. Compared to the least deprived neighborhoods, living in more deprived neighborhoods was significantly associated with poorer sleep health (high ADI: aβ [95% CI] = -1.52 [-2.01, -1.02], $p< 0.001$; moderate ADI: aβ [95% CI] = -0.74 [-1.22, -0.26], $p=0.002$) and higher risk of short sleep (high ADI: adjusted relative risk (aRR) [95% CI] = 3.44 [1.37, 8.62], $p=0.008$; moderate ADI: aRR [95% CI] = 3.85 [1.60, 9.26], $p=0.003$), after adjusting for covariates.
Conclusion: In this sample of middle-aged primary care patients, neighborhood deprivation was associated with poorer sleep health and insufficient sleep duration, which may contribute to neighborhood-level inequities in long-term health outcomes.
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0970

RACE AND SEX-SPECIFIC ASSOCIATIONS OF EXCESSIVE DAYTIME SLEEPINESS AND SUBJECTIVE COGNITIVE DECLINE IN A SAMPLE OF COMMUNITY-DWELLING OLDER-ADULTS

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Introduction: Excessive daytime sleepiness (EDS) may serve as an early and potentially reversible risk factor for cognitive decline. Subjective cognitive decline (SCD) is a self-perceived decrease in cognitive abilities without any measurable evidence of objective cognitive impairment. SCD is associated with Alzheimer's disease (AD) biomarkers. We examined the association between EDS and SCD in a diverse sample of community dwelling older adults stratified by sex and race.
Methods: Cross-sectional analysis of data from 186 community-dwelling healthy older-adults (n = 103 whites, n = 83 blacks) participating in various NYU studies on sleep, aging and memory. EDS and SCD were characterized using the Epworth Sleepiness Scale (ESS) and Cognitive Change Index (CCI) questionnaire, respectively. AD biomarkers were assessed in plasma and included ptau181, and aβ42. Linear mixed effects models controlling for age, sex, race, aβ42, and ptau181, examined a main association of ESS with CCI values. Interactions between ESS*race, and ESS*sex on CCI were also examined.
Results: Participants were on average 72.7±6.5y of age, 68.8% female, 44.6% Black/African American, had 16.6±2.2y of education, had an ESS of 4.2±3.7) (score range: 0 – 24; ≥11 is suggestive of EDS), and 407.0±85.6 minutes of total seep time. Mean (SD) for CCI was 27.8 (8.69) [no complaints 20 and maximum complaints 100). In adjusted main effect models, ESS, Sex and Race were independently associated with CCI β[95% CI};β[ESS] =1.17 [-0.69-1.27], $p < 0.001$); β[Sex] =6.24 [-6.34 – 3.64], $p < 0.01$), and β[Race] =-3.64 [-0.22 – 0.20], $p < 0.05$), respectively. Males and Whites were more likely to report subjective cognitive concerns relative to females and Black/African Americans, respectively. Race by ESS interaction with CCI was significant, β [Race*ESS] = -1.37 [-0.08-0.14], $p <.05$). Blacks with lower ESS values were less likely to report subjective memory concerns. We found no sex by ESS interactions.
Conclusion: In this non-sleepy, cognitively healthy diverse sample of community dwelling older adults, EDS scores were associated with SCD. Race and sex-specific associations were also observed, thus suggesting that EDS scores may represent an early marker of cognitive decline and useful for examining racial and sex differences in early onset AD risk
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0971

FOOD INSECURITY AND SLEEP AMONG COLLEGE STUDENTS IN A PUBLIC UNIVERSITY SYSTEM

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Introduction: Recent studies have documented alarmingly high levels of food insecurity (FI) among college students, with FI being associated with insufficient sleep. College campuses have quickly responded by establishing campus food pantries. It is unknown whether food pantries can improve sleep while experiencing food insecurity.
Methods: Online survey data were collected from a cross-sectional sample of 1,599 college students who used Basic Needs Centers in the 10-campus UC system. Students were asked to report their number of visits to a food pantry in the past month, and to rate their sleep sufficiency (never to always). Demographic characteristics were obtained from institutional data. Using a multiple variable regression, we examined food insecurity and campus food pantry use (at least 1/mo) in relation to sleep sufficiency controlling for demographic factors.
Results: Students on average were 23.44 years old (SD= 35.67), and 70% female. Almost one third (28%) had "enough sleep to feel rested" in the last 3 months. Of students who used the CFP, 20% used it 1-3 times in the last month, and 29% used at least 4 times. Preliminary results show that food insecurity was related to obtaining less sufficient sleep (β= -18.1, $p < 0.001$).
Conclusion: Food insecurity was associated with obtaining insufficient sleep among students attending a state university system, whereas CFP use showed no association. These findings highlight the critical need address to food insecurity as a factor that may hinder sufficient sleep.
Support (if any): Funded by the Center for Economic Justice at UC Santa Cruz

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0972

PREDICTED AGE FROM SLEEP AND ACTIGRAPHY FEATURES: INSIGHTS FROM MACHINE LEARNING REGRESSION

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Introduction: Advanced wearable technologies allow non-invasive ambulatory monitoring of physiological outputs/functions, including movement, sleep, and heart rate, all of which are changing with aging. The goal of this study is to test whether these ambulatory physiological measures can be integrated to better predict age using machine learning.
Methods: We analyzed the datasets of 22 healthy male adults between 20-40 years old (chronological age) in the Multilevel Monitoring of Activity and Sleep in Healthy People (MMASH) database. Using movement, sleep, and heart rate features derived from an accelerometer, inclinometer, and PPG sensors. A Lasso regression model was used to predict chronological age. The model was trained on standardized features over 1,000 bootstrap iterations (each sampling 90% of the data for training with replacement) to provide robust chronological age estimates in test sets.
Results: The Lasso regression model achieved high performance in predicting age ($p < 0.001$) with an averaged R-squared value of 0.502 that is compared to the values achieved using brain activity data (fMRI) in large, diverse populations. The most important features that predicted age include (1) vector movement derived from raw acceleration data expressed in Newton-meter, (2) sleep efficiency (percentage of sleep time on total sleep in bed), (3) mean heart rate, (4) maximum heart rate across the 24 h, and (5) time duration of standing.
Conclusion: This study demonstrates the effectiveness of machine learning regression in predicting age using ambulatory data from wearables. The performance should be validated in larger populations across a wider age range and in females.
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0973

COMMON INADEQUATE SLEEP HEALTH BEHAVIORS AND ITS IMPACT ON INSOMNIA SYMPTOMS IN A NON-CLINICAL POPULATION IN KOREA

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Introduction: This study examined the sleep hygiene status and inadequate sleep health behaviors in a non-clinical population in Korea, using the Korean Sleep Hygiene Practice Scale (SHPS-K) to investigate common inadequate sleep behaviors in different age groups and sex.
Methods: We recruited non-clinical adults (aged 18-65) without a history of neurologic, psychiatric, or medical disorders and diagnosed sleep disorders. An online survey was done using the SHPS-K, Pittsburgh Sleep Quality Index (PSQI-K), Insomnia Severity Index (ISI-K), and Epworth Sleepiness Scale (KESS). 484 participants were enrolled (242 women, mean age of 43.8 □ 12.77 years). The detailed answers for each item of the SHPS-K were analyzed between age groups, sex, and groups with and without insomnia symptoms (ISIS-K □ 15). Using receiver operating characteristic analysis in different age groups, we also determined the cutoff values that could identify poor sleepers with insomnia symptoms (PSQI-K > 5 and ISI-K □ 15).
Results: The average total SHPS-K score was 71.2, with no sex difference. Mean ISI-K, PSQI-K, and KESS were not different between sex and age groups. The older participants had lower SHPS-K than the younger groups, with a significant trend for ages ($p < 0.001$). This trend was significant in both men and women. The most frequent inadequate sleep hygiene behaviors were doing irrelevant activities in bed, lack of regular exercise, sleep-in on weekends, staying in bed after waking up in the morning, lack of exposure to light during the day, and inconsistent bedtime. Men had poorer eating and drinking behaviors and complained of noise or light more than women. Women had poorer sleep scheduling and timing behaviors than men. Young adults with insomnia symptoms showed the highest SHPS-K than other age groups with insomnia ($p < 0.001$).

Conclusion: This study showed that sleep-disturbing behaviors were different between age groups and sex. The group with insomnia symptoms showed worse sleep hygiene practices. Furthermore, young adults had significantly worse sleep hygiene than middle-aged or older adults. Sleep hygiene education could contribute differentially to improving sleep quality in non-clinical populations.
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0974

MULTIDIMENSIONAL SLEEP HEALTH PROFILES BASED ON RU-SATED SCORES REPLICATE ACROSS TWO INDEPENDENT SAMPLES

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Introduction: Multidimensional sleep health patterns relate to general health and functioning. We developed the Ru-SATED 4.0 Multidimensional Sleep Health (MDSH) Scale, a self-reported measure of individuals' Regularity, Satisfaction, Alertness, Timing, Efficiency, and Duration of sleep over the past month. In the present study, we applied clustering techniques in two separate samples to uncover subgroups of participants with similar MDSH profiles.
Methods: The Ru-SATED 4.0 Scale was completed by participants recruited via: (1) YouGov.com (n=1,998; age=18-95y; Mage=49.6±17.2y; 53.1% women; 66.1% White, 10.7% Black, 11.9% Latinx, 7.5% Multiple racial/ethnic identities), and (2) the Sleep Science Panel from the Sleep Number Corporation (n=2,830; age=19-90y; Mage=52.8±16.5y; 54.6% women; 79.3% White, 6.2% Black, 4.0% Latinx, 5.9% Multiple racial/ethnic identities). Each Ru-SATED dimension was dichotomized into "good" (scores of "often" or "always") and "poor" (scores of "never," "rarely," or "sometimes"). Latent class analysis was used to identify subgroups with similar MDSH patterns in each sample. Secondary sleep measures related to duration, timing, and efficiency were calculated from the Pittsburgh Sleep Quality Index self-report questionnaire among YouGov participants and objective bed data from the past 7-28 days among Sleep Science Panel participants, and used in analyses to compare classes.
Results: In both the YouGov and Sleep Science Panel datasets, a 4-class model fit the data best, revealing the following classes: (1) "Great sleep across dimensions," (2) "Poor sleep across dimensions," (3) "Short, irregular, yet satisfying sleep," and (4) "Low sleep efficiency, low satisfaction." Membership in each class ranged from 10%–41% among YouGov participants and 21%–31% among Sleep Science Panel participants. Post-hoc ANOVAs confirmed significant differences among the 4 groups on secondary measures of sleep duration, timing, and efficiency in both samples (ps< 0.01).
Conclusion: These findings support distinct underlying groups based on Ru-SATED self-reported MDSH patterns, which were replicated across two independent samples of adults in the U.S, and confirmed by self-report and objective sleep data. Future research is warranted to understand how these sleep health profiles relate to other aspects of health and may support efforts to increase access to personalized, high-quality sleep medicine.
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0975

EXPLORING THE FREQUENCY AND IMPACT OF OBSTRUCTIVE SLEEP APNEA ON QUALITY OF LIFE IN CHILDREN WITH CYSTIC FIBROSIS: A PROSPECTIVE OBSERVATIONAL STUDY

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Introduction:: Obstructive sleep, a disorder characterized by recurrent episodes of partial or complete upper airway obstruction during sleep, has been associated with poor quality of life (QoL) among other detrimental sequelae. Cystic fibrosis (CF) is a chronic, life-limiting genetic condition that affects multiple organ systems including the respiratory and gastrointestinal system. Emerging data suggest OSA is common among children with CF however, the impact of comorbid OSA on their QoL is still unknown.
Methods: In this single-center, prospective observational study, children aged 2-8 years with CF and /or their caregivers were asked to complete a validated OSA screening tool and two disease-specific QoL measures
Results: Forty-two children with CF participated in our study. The mean age of the participants was 8.8 years with a standard deviation of 4.34. There was a slight male predominance at 52%. 12% of our participants were non-White and 6.4 % identified as Hispanic. 30.8% of the participants had public insurance. 50% of the participants were on highly effective modulator therapy (HEMT). 80.95% of our participants had a normal BMI and 11% were overweight/obese (overweight >/= 85%, obese >/=95%). Lung function was normal, on average, in our participants. 15% of the participants were found to be at high-risk sleep for OSA (proportion of positive responses >=0.33 on Pediatric Sleep Questionnaire-Sleep Disordered Breathing Disorder ScaleThe participants generally reported good quality of life (QoL), with an average score of 30.2 on the OSA-18. However, the average scaled score on the CF Questionnaire-Revised (CFQ-R) was 78.7, placing their QoL within the moderate range (scores between 60 and 80). Among those at high risk for OSA, the mean CFQ-R score was 75.1 and the mean OSA-18 was 50.6. The correlation coefficient between PSQ-SRBD and OSA-18 was 0.586 with a P value of 0.001 and that between PSQ-SRBD and CFQ-R was 0.130 with a P value of 0.51.
Conclusion: There appears to be an increased frequency of OSA symptoms among children with CF as compared to the general population. Having symptoms seems to adversely affect QoL in these patients. Larger studies are needed to further explore this relationship.
Support (if any):

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0976

SLEEP-RELATED BREATHING DISORDERS IN SURGICALLY CORRECTED SINGLE VENTRICLE CONGENITAL HEART DISEASE PATIENTS

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Introduction: Sleep-related breathing disorders (SRBD) are increasingly recognized as significant comorbidities in pediatric patients with single ventricle congenital heart disease (SVCHD) who have undergone surgical correction. The impact of SRBD in these patients remains poorly understood. This study investigates the prevalence of SRBD in patients who have undergone the Fontan procedure.
Methods: We conducted a retrospective chart review of 54 pediatric patients with SVCHD who had undergone the Fontan procedure and had polysomnography (PSG) between 2000 and 2024. Data was abstracted from patients' most recent PSGs and included demographic characteristics, apnea-hypopnea indices (oAHI and CAI), end-tidal CO2 (ETCO2), and oxygen saturation metrics.
Results: The cohort's mean age at the time of PSG was 7.4 years ±4.8, with 67% male. 29/54 patients (54%) had OSA. 18/54 PSGs were performed pre- Fontan; 5 of which had PSG post Fontan. 36 patients (67%) had PSG post-Fontan only. Pre-Fontan cohort had 7 mild OSA, 1 moderate OSA and 1 severe OSA. Post-Fontan cohort including those who had pre-Fontan PSG had 17 mild OSA, 5 moderate OSA and 3 severe OSA. There was improvement in oAHI in 3/5 patients who had pre and post Fontan PSG. 2/54 patients had CSA (CAI ≥ 5/hr.) and none met criteria for hypoventilation (ETCO2 >50 mmHg for >25% of total sleep time). The average oxygen saturation (SpO2) was 89% ± 6.8.; average SpO2 nadir was 80.8% ± 7.9. SpO2 nadir of < 87% was seen in 61% of patients.
Conclusion: There was a high prevalence of SRBD in pediatric patients with SVCHD patients' post-surgical correction. Most patients demonstrated mild OSA. Our data suggest that early screening for SRBD in this population is essential.
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0977

UNDERSTANDING CEREBRAL HEMODYNAMICS IN PEDIATRIC OBSTRUCTIVE SLEEP APNEA WITH NEAR-INFRARED SPECTROSCOPY

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Introduction: Pediatric obstructive sleep apnea (POSA) is concerning due to its links with cardiovascular, metabolic, and developmental health risks. While polysomnography (PSG) is the gold standard for diagnosing POSA, traditional OSA markers, like the apnea-hypopnea index (AHI), are not tailored to pediatric populations and do not fully address the impact of OSA on brain health. Understanding the effects of POSA on the brain is crucial for identifying potential neurocognitive impairments and long-term consequences. Near-infrared spectroscopy (NIRS) techniques can provide cerebral hemodynamics non-invasively by using light to probe tissue oxygenation. Cerebral hemodynamic oscillations, linked to autoregulatory mechanisms such as vasomotion and the glymphatic system, could enhance our understanding of POSA's cerebral effects.
Methods: We assessed the feasibility of measuring cerebral hemodynamics with a smartphone-compatible NIRS device in 60 pediatric patients (ages 3-12) with normal and affected sleep. Participants underwent a routine PSG sleep study with NIRS probes placed on the forehead and forearm. We calculated and compared metrics including respiratory rate (RR), heart rate (HR), and area under the curve (AUC) for very-low (VLFO) and low-frequency oscillations (LFO) across patients with different apnea severities from the NIRS data.
Results: NIRS-derived values of HR and RR were representative of PSG-measured values (r = 0.916 ± 0.05). Increased

severity of sleep apnea, as measured by AHI, was associated with stronger LFOs and VLFOs (r = 0.187, p=0.28; r =.35, p=0.038). These frequency ranges are known to be linked with compensatory mechanisms for vasomotion and autoregulation of cerebral blood flow. Higher AHI scores correlated with a more pronounced presence of these oscillations, suggesting that disrupted sleep patterns in pediatric obstructive sleep apnea may impact cerebral hemodynamics.
Conclusion: This study demonstrates the feasibility of assessing cerebral hemodynamics with a portable, smartphone-compatible NIRS in pediatric sleep disorder patients, offering insights into the cerebral effects of pediatric obstructive sleep apnea. These findings suggest that NIRS could be a valuable, accessible adjunct for investigating the physiological impacts of sleep apnea in children, with potential for wider clinical application.
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0978
ADHD AND VIGILANT ATTENTION AMONG SLEEP-DISORDERED BREATHING CHILDREN

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Introduction: This study aimed to investigate the associations between vigilant attention and ADHD symptom and emotional and behavioral characteristics among children at high risk for sleep-disordered breathing (SDB).
Methods: Data were collected from 808 children (61.6% boys) identified as being at high risk for (SDB based on parent-reported symptoms, including snoring, apnea, or struggling to breathe during sleep. A type-3 portable sleep monitor was used to measure the oxygen desaturation index (ODI). ADHD symptoms, including inattention and hyperactivity-impulsivity, were assessed using the ADHD Rating Scale-IV. Emotional and behavioral characteristics were evaluated using parent-reported questionnaires. Vigilant attention was measured using a 10-minute Psychomotor Vigilance Test (PVT), focusing on response speed, lapses, and false starts. Generalized linear models were employed to analyze the relationships between ADHD symptoms, emotional and behavioral characteristics, and PVT metrics, adjusting for covariates such as grade, BMI z-score, ODI, hay fever, nasal congestion, and sleep duration.
Results: Among boys, inattention was significantly associated with slower response speed (β = -0.02, p = 0.01), increased lapses (β = 0.03, p = 0.02), and more false starts (β = 0.01, p = 0.02). Hyperactivity-impulsivity was linked to increased lapses (β = 0.024, p = 0.02) and more false starts (β = 0.02, p < 0.001). For girls, inattention was associated with increased lapses (β = 0.04, p = 0.01), while hyperactivity-impulsivity was linked to a higher number of false starts (β = 0.04, p < 0.01). Emotional and behavioral characteristics, such as situational anxiety, being easily frightened, and restlessness, were associated with slower response speed (β = -0.22, p < 0.01; β = -0.15, p = 0.02; β = -0.16, p = 0.03) and increased lapses (β = 0.01, p < 0.01; β = 0.18, p = 0.02; β = 0.48, p = 0.02) in boys. For girls, deliberation was linked to faster response speed (β = 0.28, p < 0.01) and fewer false starts (β = -0.05, p = 0.01).
Conclusion: The findings highlight sex differences in how ADHD symptoms and emotional-behavioral characteristics relate to vigilant attention in children at risk for SDB, emphasizing the need for sex-specific approaches in assessment and management.
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0979
SLEEP-DISORDERED BREATHING IN CHILDREN AND ADOLESCENTS WITH NOCTURNAL ENURESIS

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Introduction: Nocturnal enuresis (NE) is a common pediatric condition. Previous studies have shown the association between OSA and NE. The underlying mechanism may be related to disruptions of sleep and increased sympathetic activation which may impair arousal from sleep. However, it is unclear whether primary or secondary NE is more likely to be associated with OSA. Therefore, this study aimed to investigate this issue.
Methods: We conducted a retrospective study of pediatric patients with NE who were referred to our sleep center and underwent diagnostic study at Cincinnati Children's Hospital from January 2005 to September 2024. Patients were divided by NE type and age group (< 12 and ≥12 years old). Exclusion criteria included tracheostomy, ventilator dependence, and neurogenic bladder. OSA was defined by obstructive AHI >1.5/hr. Statistical comparisons between primary and secondary NE were performed by Chi-square for categorical variables and by Mann-Whitney test for continuous variables.
Results: 138 patients, aged 4-20 years old, met criteria for entry into analysis; 64.1% had primary NE, 35.9% had secondary NE. There was no difference in the age between primary[P] and secondary[S] NE (10.4±3.7 yo [P] vs 9.5±3.6 yo [S]; P=NS). For prevalence of OSA, there were no differences in the prevalence of OSA (61.9%[P] vs 60.0%[S]; P=NS) and percentage of mild, moderate and severe OSA between the two groups. For PSG parameters, there were no differences in the sleep efficiency, percentage of sleep stages (N1, N2, N3, REM), AHI or obstructive AHI (6.5±19.2/hr[P] vs 4.6±8.7/hr[S]; P=NS) between primary and secondary NE. Sub-group analysis of children (< 12) and adolescents (≥12) revealed no significant differences in the prevalence of OSA and PSG parameters in either age group.
Conclusion: Our study shows a high prevalence of OSA in our cohort of patients with NE who were referred to pediatric sleep clinics. Interestingly, there were no significant differences in the prevalence and severity of OSA between primary and secondary NE in both children and adolescents. These findings emphasize the need for comprehensive screening of OSA in both primary and secondary NE. Further studies are needed to assess the impact of OSA treatment on outcomes in children with NE.
Support (if any):

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0980
DISCREPANCIES IN CAREGIVER-REPORTED AND LABORATORY-ASSESSED EARLY CHILDHOOD SLEEP PROBLEMS

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Introduction: Sleep disordered breathing (SDB) and insufficient sleep are common in early childhood and linked to neurobehavioral functioning, highlighting the importance of screening for these sleep problems. However, few studies have examined variation in multi-method evaluations of these concerns. This study compared caregiver-reported symptoms of child SDB and sleep duration to subsequent polysomnography (PSG) and actigraphy.
Methods: Data from 95 3-5-year-olds (43% boys, 49% Black, 51% Non-Latine White; 96% maternal caregiver) were drawn from a larger study. Caregivers reported on symptoms of child SDB using the Pediatric Sleep Questionnaire (PSQ) and on insufficient sleep using the Brief Child Sleep Questionnaire (BCSQ). Preschoolers were initially categorized into 4 groups based on measure cut-offs and sleep duration guidelines: (A) SDB only (PSQ score □0.33 clinical cut-off, total 24-hour sleep duration >=10 hours); (B) insufficient sleep only (PSQ < 0.33, total sleep duration < 10 hours); (C) both SDB and insufficient sleep (PSQ □0.33, total sleep duration < 10 hours); (D) no sleep problems. Children then completed PSG scored according to diagnostic guidelines and # nights/weeks of actigraphy scored using validated procedures with daily sleep diaries.
Results: Based on initial caregiver-report, 29 (31%) preschoolers had SDB only (A); 10 (11%) had insufficient sleep only (B); 13 (14%) had both SDB and insufficient sleep (C); and 43 (45%) had no sleep problems (D). After PSG/actigraphy, 62% were reassigned from their initial caregiver-reported group. Twenty-one percent were reassigned based on PSG results only, 27% reassigned based on actigraphy only, and 14% reassigned based on both actigraphy and PSG. Initially, based on caregiver-report, the largest group (45%) were the no sleep problem group (D). However, after PSG and actigraphy, the no sleep problem group (D) only reflected 21% of the sample. Importantly, after PSG and actigraphy, the group reflecting co-occurring SDB and insufficient sleep (C) increased from 14% to 38% of the sample.
Conclusion: Early childhood sleep-disordered breathing and insufficient sleep may be underrecognized when based on caregiver report compared to more objective measures. Additional multi-method studies with early childhood samples may be needed to re-evaluate caregiver report-based clinical cutoffs for sleep issues in young children.
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0981

IT RUNS IN THE FAMILY: A REVIEW OF OBSTRUCTIVE SLEEP APNEA IN PEDIATRICS' AND THE PREVALENCE OF SUCH IN BIOLOGICAL FAMILY

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Introduction: While previous studies have established a familial link to obstructive sleep apnea (OSA), prevalence of family members using positive airway pressure (PAP) for OSA among children who also require PAP is unclear. This study explored the relationship between children requiring PAP and family members who also utilize PAP, as well as the association of obesity.
Methods: Caregivers of children utilizing PAP therapy were invited to complete a family history questionnaire. Adopted children or those with unknown familial history were excluded. Statistical analysis assessed the relationship between children with OSA on PAP therapy and familial PAP usage. The correlation of PAP use, BMI, and self-reported weight status of relatives were also explored.
Results: These are limited results. We are conducting further analysis on the data to examine OSA in other family members and explore correlations of PAP use and obesity across groups. Data from 200 children with OSA were analyzed. The majority were male (63.5%) and 45.5% identified as White, non-Hispanic. The mean age was 10.4 years (SD=5.4). The mean BMI percentile was 89.2 (SD=21.3), and the median apnea-hypopnea index was 17.7 per hour (IQR: 10.7-36.5). Average PAP adherence (> 4 hours/night) in this group of children was 55.9% (SD = 33.3). Of the 200 children, 57 (28.5%) indicated that the father had OSA and 42 (21.0%) reported the mother had OSA. Additionally, 17 (8.5%) children had a sibling with OSA. Parental PAP adherence (>4hours/night) was 55.9% in fathers and 70.3% in mothers. Self-reported parental weight indicated that 30.0% of fathers and 40.5% of mothers were extremely overweight. Most parents reported nightly PAP use.
Conclusion: Based on very limited analyses, we conclude that a significant number of children with OSA have a parent with OSA. A large number of parents of children with OSA report being extremely overweight. While children wear PAP about half of the time, fathers and mothers reported slightly higher adherence rates. We are in the process of continuing further analyses to provide a clearer understanding of familial patterns of OSA and PAP usage.
Support (if any):

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0982

ASSOCIATIONS BETWEEN BEDROOM DUST ALLERGEN EXPOSURES AND SLEEP SYMPTOMS IN SCHOOL-AGE CHILDREN

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Introduction: Exposure to allergens has been shown to trigger inflammatory pathways contributing to sleep-disordered breathing (SBD) and fragmented sleep, specifically in children with atopic diseases. However, little is known about the relationship between indoor allergen exposure and sleep symptoms in children in the general population, or how several inflammatory-related health factors, such as asthma, allergic rhinitis, or obesity, contribute to this relationship. We investigated the associations between high indoor allergen concentrations, sleep quality dimensions, and SDB in children ages 6-12 years old living in predominantly low-income neighborhoods.
Methods: Bedroom dust aeroallergens were collected in participants' bedrooms. Outcomes were caregiver-reported sleep-related daytime impairment and sleep disturbance (pediatric PROMIS instruments), symptoms of SDB (AHI/ODI), and actigraphy based short sleep (< 8 hours) duration and poor sleep continuity (sleep fragmentation > 75th percentile). Logistic regression was used to examine associations between aeroallergens and sleep disturbances, adjusting age, sex, race, ethnicity, maternal education.
Results: The sample included 256 children (age 9.5 years; 41% Hispanic, 29% Black, 22% White, 8% Other; 43% female) with 27% reported maternal education attainment of a high school or less. 38% lived in disadvantaged neighborhoods (neighborhood Child Opportunity Index < 40). Mouse (Musm1), cat (Feld1), and dog (Canf1) allergens were detected in 81%, 72%, and 53% of households, respectively. Elevated mouse allergen exposure (>0.55 µg/g-75th percentile) was associated with a 2.6-fold (95%CI:1.34, 5.03) increased adjusted odds for sleep-related daytime impairment (PROMIS T-score > 55). This association persisted after adjustment for health factors (asthma, allergic rhinitis, obesity, and environmental tobacco smoke exposure), neighborhood disadvantage, and SDB. There was attenuation of this association with poor sleep consolidation and frequent awakenings. There were no associations with the other sleep outcomes or exposures.
Conclusion: Our results reveal that elevated mouse exposure was associated with increased sleep-related daytime impairment symptoms in children living in predominantly low-income neighborhoods. The mechanisms that link this association are not clear, however poor sleep quality explained some of this relationship. Strategies to reduce household exposure and improve air quality should be tested as approaches for reducing health disparities.
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0983

UNHEALTHY NEIGHBORHOOD CHARACTERISTICS AND OZONE EXPOSURE MAY INCREASE ADOLESCENT OSA

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Introduction: The impact of modifiable exposures at the neighborhood level on adolescent obstructive sleep apnea (OSA) is not well understood. Publicly available tools that quantify environmental exposures can be leveraged to study their influence on OSA. Hypothesis: adolescents with moderate-severe OSA undergoing polysomnography (PSG) more likely reside in neighborhoods with less healthy characteristics, based on the Healthy Places Index (HPI) criteria.
Methods: Retrospective review of 11 to 18 years olds who underwent PSG at Rady Children's Hospital (October 2016-April 2022). Exclusion criteria: craniofacial, chromosomal, and neuromuscular disorders. Age, sex, BMI percentile (BMIp) were obtained. Moderate-Severe OSA was defined as OAHI>5 events/hour. The HPI Percentiles (HPIp) is a tool developed by the Public Health Alliance of California that provides zip-code based data of social and environmental factors of health. Statistical analyses included chi-square, parametric, and non-parametric tests. Logistic regression was used to model the odds of moderate-severe OSA and relevant predictor variables (HPI, ozone, and PM 2.5).
Results: 1745 adolescents with a mean age of 14.1±2.1 years were included, 56.1% were males. 58.2% Hispanic, 24.1% Non-Hispanic(NH)-Whites, 4.3% NH-Asians/Pacific Islander, 4.2% NH-Blacks/African American, and 6.6% NH-Other. Adolescents with moderate-severe OSA had higher age (mean 14.42 [2.13] vs mean 13.98 [2.12], p-value< 0.05), higher proportion of male sex (67.7% vs 49.1%, p-value< 0.001), and higher BMIp (median 98.60 [94.35-99.40] vs median 93.40 [71.25-98.30], p-value< 0.05) compared to adolescents with no-to-mild OSA. Furthermore, adolescents with moderate-severe OSA reside in neighborhoods with lower HPIp (mean 0.42 [0.24] vs 0.48 [0.23], p-value< 0.05) and higher ozone percentiles (median 0.64 [0.47-0.70] vs 0.61 [0.44-0.68], p-value< 0.05) with greater proportion in the upper tertile of ozone levels (37.8% vs 30.5%, p-value< 0.05). On logistic regression analysis, each 1 percentile increment in HPI was associated with 1% decreased odds (OR:0.98,0.99) of mod-severe OSA, and residing in a zip-code in the upper tertile exposure to ozone was associated with 28% excess odds of moderate-severe OSA, after adjusting for age, sex, and BMIp.
Conclusion: In a sleep laboratory population, adolescents with severe-moderate OSA more likely resided in overall less healthy communities and with higher ozone exposures.
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0984

DECREASED CHILDHOOD OPPORTUNITY IS ASSOCIATED WITH HIGHER OSA SEVERITY AMONG ADOLESCENTS UNDERGOING POLYSOMNOGRAPHY

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Introduction: Adolescent Obstructive Sleep Apnea (OSA) and its relation to neighborhood childhood opportunity has not been explored. The Child Opportunity Index (COI) measures children's neighborhood-level conditions and resources. We hypothesize that Moderate-Severe OSA in adolescents undergoing polysomnography (PSG) is higher in those residing in neighborhoods with lower opportunity (COI).
Methods: Retrospective review of adolescents 11 to 18 years old who underwent PSG at Rady Children's Hospital between October 2016 and April 2022. Exclusion criteria: craniofacial and chromosomal anomalies, and neuromuscular disorders. Age, sex, body mass index (BMI) percentile were obtained.

Moderate-Severe OSA was defined as OAHI>5 events/hour. Statistical analyses included chi-square tests, two sample t tests and non-parametric tests. Logistic regression was used for analysis of Moderate-Severe OSA and relevant predictor variables (COI z-scores and its subsets: education (ED), health and environment (HE), social and economic (SE).
Results: 1745 adolescents were included. Adolescents with Moderate-Severe OSA were older compared to the No-Mild OSA group (14.4 vs 13.9, p-value < 0.001) and were a higher proportion of male sex (67.7% vs 32.3%, p-value < 0.001). The cumulative COI z-scores were lower in the Moderate-Severe OSA group compared to the No-to-Mild OSA group (-0.001 [0.02] vs 0.004 [0.02], p-value <.05). Those with moderate-severe OSA had a lower COI SE z-score (-0.03 [0.11] vs -0.004 [0.12], p-value <.05), lower COI HE z-score (0.022 vs 0.026, p-value <.001) and lower COI ED z-score (0.002 [0.06] vs 0.019 [0.07], p-value <.05) compared to the No-to-Mild OSA group. Logistic regression identified that each 0.01 z-score increase in COI global, COI-SE, COI-HE and COI-ED were associated with an OR=0.93(0.89, 0.98), OR=0.99(0.98, 0.99), OR=0.93(0.89, 0.98) and an OR=0.98(0.96, 0.99) of moderate-severe OSA, respectively, after adjusting for age, sex and BMI.
Conclusion: In a sleep laboratory adolescent population, we identified higher rates of Moderate-Severe OSA in those residing in neighborhoods with lower Child Opportunity Index scores, and across all three domains of the COI tool. Future studies should further identify drivers of increased OSA in the neighborhood levels.
Support (if any): The Southern California Center for Latino Health (NIMHD Grant 1P50MD017344)

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0985

CLINICAL PROFILE OF CHILDREN WITH VERY SEVERE OBSTRUCTIVE SLEEP APNEA

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Introduction: There is a dearth of literature on very severe obstructive sleep apnea (OSA) (apnea-hypopnea index [AHI] ≥ 75/h) in the pediatric population. We aim to describe the demographics, clinical presentation, and treatment outcomes of this cohort.
Methods: This IRB-approved retrospective cohort study involved a chart review of all pediatric patients who had an AHI ≥ 75/h on PSG performed between September 2014 and January 2024 at a single urban academic institution. Data on demographics, clinical features, and treatment outcomes were collected. Descriptive and correlation analyses were performed to characterize this cohort and explore the relationship between clinical variables and AHI, and treatment outcomes.
Results: The cohort included 32 children (mean age 11.8 years, 75% male, 46.9% African American, 31.3% Hispanic). Common comorbidities were obesity (90.6%, mean BMI 96.5th percentile), asthma (40.6%), and atopic disorders (28.1%). Only 6 were syndromic. Snoring was the most prevalent symptom (96.9%) followed by excessive daytime sleepiness and witnessed apnea (78.1% each). Most had high Mallampati scores of 3/4 (83.3%) and tonsillar hypertrophy 3/4 (62.5%), though 6 had absent tonsils. The mean AHI was 95.6/h (98.2/h supine, 79.4/h non-supine), oxygen nadir was 65.3%, and SpO2< 90% was for 67.1min. Seven had a central apnea index >5/h, 2 met criteria for sleep-related hypoventilation, and 8 had periodic limb movements of sleep index >5/h. Most clinical features were not associated with higher AHI or response to adenotonsillectomy. Fourteen received adenotonsillectomy, 3 CPAP, 8 both, and 7 no therapy due to lack of follow-up. Adenotonsillectomy improved PSG parameters with a mean AHI reduction of 73.3/h.
Conclusion: Our study demonstrates that the majority of children with very severe OSA were non-syndromic, mostly obese, and from ethnic minorities, suggesting the need for a proactive approach and lower threshold for OSA evaluation in this cohort. Clinical features have limited utility in predicting the severity of OSA in this extreme group. Lack of treatment due to loss to follow-up in such severe OSA cases highlights the need for closer follow-up. Further studies are needed to examine factors contributing to the disproportionate prevalence of severe OSA among ethnically minority children.
Support (if any):

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0986

ASSOCIATION WITH SEVERITY OBSTRUCTIVE APNEA (OSA) WITH ELEVATED BLOOD PRESSURE AMONGST A PEDIATRIC POPULATION

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Introduction: The prevalence of pediatric hypertension has risen from 1.1% in 2004 to 6% in 2019, driven largely by increasing childhood obesity. As obesity is a key risk factor for obstructive sleep apnea (OSA), we hypothesize that OSA in children is associated with elevated blood pressure in a pediatric sleep clinic population.
Methods: Retrospective chart review of pediatric patients who underwent polysomnography and evaluation at Rady Children's Hospital between January 2019 and December 2024. Demographic data included sex, age, BMI, ethnicity, and systolic (SBP) and diastolic (DBP) blood pressure percentiles(%). Polysomnography determined the obstructive apnea-hypopnea index (OAHI), with OSA severity classified as follows: no OSA (OAHI < 1/hour), mild OSA (OAHI 1–5/hour), moderate OSA (OAHI 5–10/hour), and severe OSA (OAHI >10/hour). Exclusion criteria included craniofacial, cardiac, pulmonary, and neuromuscular abnormalities. Blood pressure percentiles were calculated based on NHLBI pediatric blood pressure guidelines, with hypertension defined as SBP or DBP at or above the 95th percentile for age, sex, and height.
Results: 484pediatricsubjects(meanage:10.8±4.3years,37.6%female) were evaluated. Ethnicity distribution included 214(44.3%) non-Hispanicand261(53.9%)Hispanic.Mean±SDSBP%andDBP%byOSA severity were as follows: no OSA(n=45): 0.786±0.236/0.677±0.225; mild OSA(n=229): 0.792±0.232/0.700±0.214; moderate OSA(n=106): 0.801±0.208/0.725±0.222; and severe OSA(n=104): 0.893±0.151/0.772±0.222. SBP% was significantly higher in severe OSA compared to all other severities (p< 0.05), while DBP% was significantly higher in severe OSA compared to mild OSA (p< 0.05) and borderline compared to no OSA (p=0.07). Only SBP% significantly correlated with OAHI (p< 0.05). The OAHI trended higher in children with hypertensive BP measurements compared to those without (8.89±15.5 vs. 5.96±10.6, p=0.063). Multivariate regression

analysis, adjusted for age and BMI, revealed that OAHI was not significantly associated with either SBP% or DBP%.
Conclusion: The findings demonstrate that BP increases with OSA severity in a pediatric sleep clinic population. While the association between OAHI and BP was not independent of age and BMI, children with severe OSA are more likely to have elevated BP and a trend toward hypertension, emphasizing the need for targeted BP screening and management in children with greater OSA severity.
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0987

POLYSOMNOGRAPHY, COMORBIDITIES, AND PERIOPERATIVE COMPLICATIONS IN PEDIATRIC TONSILLECTOMY AND ADENOIDECTOMY

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Introduction: Obstructive sleep apnea (OSA) is the most common indication for adenotonsillectomy (T&A) in the pediatric population. Though polysomnography (PSG) is the gold standard for OSA diagnosis, the role PSG findings, patient comorbidities, and their interactions play in predicting perioperative events remains unclear. The aim of this study is to evaluate the correlation between preoperative PSG findings, patient comorbidities and specific perioperative events.
Methods: This was a single center retrospective study involving children under 18 years of age undergoing T&A. Bivariate correlation and one/two-way ANOVA analyses were conducted.
Results: A total of 207 patients were included, with a mean age of 6.32 years, 62.4% male, and 33.3% obese. Elevated AHI correlated with increased ICU time (r=0.310,p< 0.001) and prolonged return to PO intake (r=0.320,p< 0.001), with no significant association with time requiring supplemental O2 (r=0.156,p=0.058) or time requiring mechanical ventilation(r=0.104,p=0.156). Lower SaO2 nadir correlated with increased ICU time, supplemental O2 time, and prolonged return to PO intake (r=-0.322,-0.340,and -0.448, p< 0.001), but not time requiring mechanical ventilation (r=-0.14,p=0.864). ANOVA and descriptive statistics revealed prolonged return to PO intake was associated with the obese BMI class (F(3,140)=2.723,p=0.047), neuromuscular disorders (F(1,142)=7.629,p=0.007), and developmental delay (F(1,142)=7.200,p=0.008). Increased ICU time was associated with neuromuscular disorders (F(1,151)=7.221,p=0.008), cardiac risk factors i.e. structural heart disease (F(1,151)=10.307,p=0.002), and developmental delay (F(1,151)=8.245,p=0.005). Increased supplemental O2 time was associated with neuromuscular disorders (F(1,147)=14.887,p< 0.001), cardiac risk factors (F(1,147)=8.811,p=0.003) and developmental delay (F(1,147)=4.443,p=0.037). Increased time requiring mechanical ventilation was associated with the underweight BMI class (F(3,152)=8.026, p< 0.001). Two-way ANOVA showed elevated BMI class/cardiac risk factors produced a combined effect on time to PO intake (F=4.278,p=0.041), and neuromuscular disorders/cardiac risk factors produced a combined effect on supplemental O2 time (F=4.844,p=0.030).
Conclusion: Prolonged return to PO intake was significantly associated with elevated AHI, decreased SaO2 nadir, obese BMI class, neuromuscular disorders, and developmental delay. Increased time in the ICU was significantly associated with elevated AHI, decreased SaO2 nadir, neuromuscular disorders, developmental delay, and cardiac risk factors. Prolonged time requiring supplemental O2 was significantly associated with lower SaO2 nadir, neuromuscular disorders, developmental delay, and cardiac risk factors.
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0988

C-GASP SURVEY STUDY CORRELATES PEDIATRIC SLEEP / BEHAVIORAL DISORDERS WITH NARROW MAXILLARY TRANSVERSE 2ND PRIMARY INTER-MOLAR DISTANCE (BOGUE-INDEX)

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Introduction: There is growing evidence suggesting a relationship between childhood malocclusion compromising upper airway dynamics and poor sleep, daytime dysfunction, ADHD behaviors and daytime sleepiness. To date, literature is limited of studies supporting specific anatomic deficiencies (malocclusion phenotypes) in children as a contributing cause. Furthermore, screening tools that can be simply implemented on a large scale are lacking to identify those children at risk. The Children's Airway Screening Taskforce (CAST) sanctioned by the American Dental Association to address this issue developed the Children's General Airway Screening Protocol (C-GASP) which utilizes a 5 question survey as a frontline instrument for screening which is undergoing validation.
Methods: The 5 question C-GASP instrument addresses Air Pathway, Breathing Sounds, Sleep Activities, Morning Conditions and Daytime Function. Responses are entered digitally by guardians of sequential patients ages 2-12 presenting for routine dental / oral health care. Following completion of data entry, dental staff obtain specific oral metrics, which include a transverse measurement of the maxillary 2nd primary molar (A to J) distance known as the Bogue Index.
Results: To date 210 assessments have been completed. Of these 58 have C-GASP scores of 0 (normal group) and 152 have C-GASP Scores >0 (abnormal group), of which 31 has C-GASP Scores of 4 or 5. Only those with maxillary transverse molar (A to J) primary teeth measures available were included for this analysis. 36 normal Ave age 5.56 yrs (SD 2.5) 62% F, 21 abnormal w C-GASP >3, age 5.24 (SD 1.8) 38% F. T-Test between these groups demonstrated a t-statiscic:-2.99, p 0.0042.
Conclusion: These findings provide support that a narrow maxillary arch in children is associated with poor clinical conditions affecting sleep and daytime function. Observations described by E.A. Bogue, MD, DDS in the 1920's are now being supported by these findings. Further data acquisition is underway to provide validation of the C-GASP screening intake tool that can ultimately be implemented globally for screening children 2 to

12 to identify risk of OSA, allowing opportunity for corrective interventions.

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0989

IMPACT OF SICKLE CELL DISEASE MODIFYING THERAPIES ON PEDIATRIC SLEEP

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Introduction: Children with sickle cell disease (SCD) have a higher prevalence of sleep disturbances, adenotonsillar hypertrophy, and obstructive sleep apnea (OSA) than the general population. Disease-modifying therapies such as hydroxyurea, voxelotor, and crizanlizumab aim to prevent pain crisis and reduce complications of SCD. The impact of these disease modifying therapies on OSA and nocturnal hypoxemia remains unclear. We hypothesized that in children with SCD, those on disease modifying therapies will have higher nocturnal oxygen saturation, improved sleep quality, decreased prevalence and degree of OSA.

Methods: This was a retrospective chart review of 1125 polysomnogram (PSG) records from January 01, 2013 to July 31, 2023 from children with SCD aged 1-18 years at Children's Healthcare of Atlanta (n=701). Data including obstructive apnea-hypopnea index (OAHI), nocturnal oxygen desaturations, sleep efficiency and arousal index were collected. Demographic and clinical data collected included age, race, sex, SCD genotype, body mass index, medications for SCD, length of time on treatment, prior airway surgeries and number of annual hospitalizations for asthma, vaso-occlusive crisis, or acute chest syndrome.

Results: Hydroxyurea therapy was associated with higher NREM SpO2 (β = 1.43, p = 0.004) and REM SpO2 (β = 1.27, p = 0.01) compared to no therapy group in multivariable models. Despite this, children on hydroxyurea spent more time overall with SpO2 < 90% during sleep (3.07% vs. 1.69%, p = 0.01). Baseline SpO2 was significantly lower in the hydroxyurea group (96.21% vs. 96.79%, p = 0.006). AHI and other metrics, including sleep efficiency and arousal index, did not differ significantly between therapy groups. In longitudinal analyses, baseline SpO2 was persistently lower in the hydroxyurea group (p < 0.001), with greater percentage of sleep time spent with SaO2 < 90% (p = 0.03). There were no significant associations between hydroxyurea response groups and annual hospitalizations.

Conclusion: Patients on SCD disease-modifying therapies demonstrate higher oxygen saturation during REM and NREM sleep but persistent abnormalities including obstructive apneas, nocturnal oxygen desaturations, and decreased sleep efficiency. Underlying factors for persistent sleep abnormalities in children with SCD remain to be determined.

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0990

EFFECT OF SEMAGLUTIDE ON APNEA HYPOPNEA INDEX IN FEMALE ADOLESCENTS WITH POLYCYSTIC OVARY SYNDROME AND OBESITY

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Introduction: Polycystic ovary syndrome (PCOS) affects approximately 11% of female adolescents globally and is associated with obesity, obstructive sleep apnea (OSA), and long-term negative health consequences. Weight loss medications are emerging as a treatment for obesity and have been found to improve or resolve OSA in adults but this has not been evaluated in adolescents with PCOS. The aim of the current study was to examine change in apnea-hypopnea index (AHI) following semaglutide (SEMA) intervention compared to an intensive dietary control (DIET) in adolescents with PCOS and obesity.

Methods: Biological female adolescents ages 12-18 years with a diagnosis of PCOS and obesity, sedentary lifestyle (< 2h of moderate exercise per week), and BMI ≥90th percentile were randomized to 16 weeks of either 3/7 mg dosing of semaglutide or weekly counseling with a dietician. Assessments at baseline and post-treatment measured anthropometrics, insulin sensitivity (oral minimal model insulin sensitivity index; OMM Si), and AHI (WatchPAT). Student's t-test was applied to compare the change in AHI between intervention groups (SEMA v. DIET). Pearson correlations examined relationships between change in AHI, % weight loss, and OMM Si separately in each intervention group.

Results: A total of 55 participants were analyzed (SEMA N=38; DIET N=17). The mean age was 15.2±1.68 years, 6±10.90% Black, and 26±47.30% Hispanic. AHI was elevated at baseline across the sample (M=18.5±11.4). AHI decreased by -2.2±13.1 in the SEMA group and increased by 4.4±13.1 in the DIET group; however, this was not a statistically significant difference (p=>0.05). Change in AHI was not significantly correlated with percent weight loss or insulin sensitivity in either the SEMA or DIET groups (all p-value's >0.05).

Conclusion: In this sample of adolescents with PCOS and obesity, change in AHI was not statistically significant following weight loss intervention, however, those who had 4 months of SEMA showed a decrease in AHI while those in the dietary control condition increased AHI. Further research is needed in larger samples over longer study periods to examine the impact of weight loss medications on AHI in adolescents with PCOS and obesity.

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0991

SLEEP AND BREATHING: POSTSURGICAL OUTCOME IN CHILDREN WITH ACHONDROPLASIA

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Introduction: Achondroplasia is the most common bone dysplasia in humans, occurring in 1/20,000 live births. Most patients with achondroplasia have concomitant sleep apnea and foramen magnum stenosis. This study examines the characteristics of sleep-disordered breathing in children with achondroplasia and determines how adenotonsillectomy and foramen magnum decompression surgery affect clinical outcome.
Methods: This is a retrospective chart review of patients seen at New-York-Presbyterian Hospital/Weill Cornell Medical Center between January 2013 and October 2024 who had polysomnography performed. Demographic information, comorbidities, polysomnography data, and surgical outcomes were collected. The severity of obstructive sleep apnea (OSA) was defined based on obstructive apnea-hypopnea index (OAHI): 1-4.9 mild, 5-9.9 moderate, 10 and above severe. Results are presented as Median (Q1, Q3). Analysis of pre- and post-variables was performed using the Wilcoxon test.
Results: 22 individual patients underwent polysomnography. 55% were female. 19% White/Caucasian, 19% Latino/Hispanic, 14% Black/African American, 14% Asian American. 91% had foramen magnum stenosis, and 55% had symptoms of sleep disordered breathing. Median number of polysomnography performed per patient was 2 (1, 5). 33% had undergone decompression surgery prior to the sleep study. Age at first study was 14 months (4.8, 41.3). The study showed no OSA in 18%, mild OSA in 27%, moderate OSA in 14% and severe OSA in 41% of patients. OAHI was 5.4 (1.6, 15.2) and central apnea index 0.7 (0.4, 1.5). 8 patients had polysomnography done pre and post adenotonsillectomy. All had foramen magnum stenosis and 4 had prior decompression surgery. Adenoidectomy and/or tonsillectomy was done at the discretion of the surgeon. All 8 patients had severe OSA before surgery and 6 had severe and 2 moderate OSA after surgery (OAHI pre 47.0 (20.1, 77.4), post 14.2 (7.55, 77.35), p-value 0.8). Decompression status was not significant. Postoperatively all patients required positive airway pressure (PAP) for sleep, 1 tracheostomy and 4 revision surgery.
Conclusion: Children with achondroplasia present with a very high rate of obstructive sleep apnea. Despite adenotonsillectomy and decompression surgery there is residual moderate-severe OSA requiring PAP as well as further surgeries. We are hopeful that new therapies for achondroplasia will change that outcome.
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0992

TIME TO THERAPY INITIATION FOR SEVERE OBSTRUCTIVE SLEEP APNEA IN CHILDREN

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Introduction: Obstructive Sleep Apnea (OSA) is associated with neuro-cognitive, cardiovascular, and metabolic morbidity in children, with those with severe OSA being at a higher risk. Timely initiation of appropriate therapy is key to reducing morbidity from severe OSA. This Quality Improvement project's goal was to perform a baseline evaluation of the time to initial therapy initiation in children with severe OSA at our institution as a first step to address barriers to timely intervention.
Methods: A chart review was completed for all patients diagnosed with severe OSA at Nationwide Children's Hospital sleep laboratory from January-September 2023. Severe OSA was defined as an AHI of ≥ 10 or greater, and urgent intervention was defined as therapy initiation within 48 hours.
Results: 216 patients met inclusion criteria with 51 children age < 1 yr., 13 children age ≥1 to < 2 yrs., and 152 children age ≥2yrs. Urgent intervention was taken in 75% (n=38) of children age < 1 yr., 38% (n=5) of children age ≥1 to < 2 yrs., and 13% (n=20) of children age ≥2 yrs. Intervention was completed within 14 days in 84% (n=43) of children age < 1 yr., 46% (n=6) of children age ≥1 to < 2 yrs., and 24% (n=37) of children age ≥2 yrs. Oxygen supplementation was the initial intervention in 86.5% (n=44) of children age < 1 yr., 38.4% (n=5) of children age ≥1 to < 2 yrs., and 6.5% (n=10) of children age ≥2 yrs. Positive airway pressure therapy was the initial intervention in 0.2% (n=1) of children age < 1 yr., 23% (n=3) of children age ≥1to< 2 yrs., and 51.3% (n=78) of children age ≥2 yrs. Surgical intervention in patients without prior adenotonsillectomy was completed in 21.5% (n=11) of children age < 1yr., 53.8% (n=7) of children age ≥1 to < 2 yrs., and 67.5% (n=73) of children age ≥2 yrs.
Conclusion: A multidisciplinary collaborative approach is important in timely initiation of management in children with severe OSA. The time to intervention and type of intervention selected differed across age groups. Barriers to timely intervention will be addressed in future projects using quality improvement methodology.
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0993

TIMING OF NON-INVASIVE POSITIVE PRESSURE VENTILATION INITIATION IN CHILDREN WITH SLEEP DISORDERED BREATHING WHO ARE NON-ENGLISH SPEAKERS

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Introduction: Sleep-disordered breathing (SDB) affects 10-17% of children, and obstructive sleep apnea (OSA) occurs in 1-3%. The initiation of treatment in a timely manner is crucial to decrease the adverse outcomes of untreated SDB. Language and cultural differences might exacerbate health inequalities, which may contribute to delays in the diagnosis and management of OSA. This study aims to evaluate the time from the placement of non-invasive positive pressure ventilation (NIPPV) order in the electronic medical record to the initiation of treatment, and to compare if there is a time difference between English vs. Non-English speaker families.
Methods: A retrospective review was conducted on patients seen at the Pediatric Pulmonary and Sleep Clinic at Monroe Carell Jr. Children's Hospital at Vanderbilt, a national referral center for sleep disorders, from 2017 to 2024. We used non-parametric test (Mann Whitney U test) to evaluate for differences in time from order to NIPPV initiation between English and non-English speaker. In addition, a subset analysis was made of time from order to NIPPV initiation between severe and non-severe OSA. Severe OSA was defined using an obstructive apnea hypopnea index of ≥ 10/h.
Results: Complete data was available for 186 children, representing 50% of the total sample. The median time from order to NIPPV set up was 25.5 days (IQR 13 - 61.5) for the entire cohort. No significant difference was observed between English-speaking (24.5 days, IQR 12.8 - 50.3) and non-English-speaking families (28.5 days, IQR 13.8 - 69.0; P = 0.51). Similarly, time from order to NIPPV initiation did not differ significantly between children with severe OSA (23 days, IQR 12.0 - 40.5) and non-severe OSA (26 days, IQR 13.0 - 64.5; P = 0.34).

Conclusion: Our study found that at our institution, there is no significant differences in the time from order to NIPPV initiation based on language proficiency or OSA severity. Future direction is to expedite the initiation of NIPPV by identifying and addressing the challenges from the order placement to the start of NIPPV.
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0994

TIME TO FIRST POSITIVE AIRWAY PRESSURE FOLLOW UP VISIT IN CHILDREN WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: Positive airway pressure (PAP), a highly efficacious treatment for pediatric OSA, can be limited by adherence challenges. Patient education by respiratory therapists after PAP initiation have been shown to predict compliance with therapy. First few weeks after initiation have been identified as a critical timeframe to promote education and mitigate problems. The aim of this quality improvement project was to improve PAP patient initial follow up.
Methods: All children who were set up on PAP at Nationwide Children's hospital Sleep Center and followed up at Sleep clinic were included. Aim statement: The project will increase the % of new PAP patient seen within 60 days of therapy initiation from a baseline of 50% to a goal of 75% accomplish by Dec 30 th, 2024 and sustain for 1 year. Key Drivers: • Provider PAP clinic availability • Scheduler workflow • RT clinic staffing • Parent/Patient availability • Patient Compliance, therapy buy-in Interventions: • Provider template modification • Add on clinics for PAP patients • Scheduler/ RT meetings • Team chat group • RT schedule standardized at satellites • Follow up calls within 14 days of receiving machine
Results: A total of 132 patients were set up on PAP from Jan-October 2024. The baseline compliance of new PAP patient seen within 60 days of therapy initiation was 50% in Jan -June (N=64). July and August (N=35) compliance increased to 65%. Goal compliance was achieved in > 80% during September and October (N=33).
Conclusion: Our results indicate that process improvement in the pediatric sleep clinic using quality improvement methodology can be utilized to improve PAP patient follow up.
Support (if any):

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0995

ADHERENCE TO CPAP THERAPY IN CHILDREN: FINDINGS FROM A RESPIRATORY THERAPIST DRIVEN CPAP CLINIC

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Introduction: There is an increasing number of children needing continuous positive airway pressure (CPAP) therapy for obstructive sleep apnea (OSA) but the adherence to CPAP therapy remains less than 50% in children. Our sleep center implemented a respiratory therapist (RT) driven CPAP clinic that utilized an individualized approach to address specific barriers to CPAP adherence. In addition, we aimed to evaluate the facilitators and barriers to CPAP therapy in children in this clinic.
Methods: The RT driven CPAP clinic was implemented in January 2024, and the children were followed at 4-6 weeks intervals for at least one visit, then at set intervals based on their adherence to therapy. Our database included, number of clinic visits, adherence (>4 hours per night, 70% of the nights), demographics, polysomnographic data and barriers to therapy. The data was analyzed using descriptive statistics.
Results: 58 patients were seen in the clinic. 29/58 (50%) were adherent with CPAP therapy. The median age in both groups (adherent and non-adherent) was the same at 13 years of age (range: adherent 1 to 20 years; non-adherent 1 to 21 years), and median number of RT visits in both groups was 1 (range: adherent 1 to 4 visits, non-adherent 1 to 6 visits). The higher frequency of RT visits (average 1.8 vs. 1.5), male gender (75% vs. 60%), Hispanic race (70% vs. 50%), presence of comorbidities in addition to obesity (64% vs. 40%) was associated with adherence to CPAP therapy. The age and severity of OSA was not associated with improved adherence. Children with morbid obesity (37% vs 6.8%), and Asian and other races (37% vs. 10%) were associated with poor adherence. The commonly reported barriers to therapy were related to the interface and pressure discomfort.
Conclusion: We report 50% CPAP adherence in our RT driven CPAP clinic cohort. The frequent RT guided clinic appointments are not only feasible but also improved adherence in children using CPAP. To further improve adherence, we plan to expand our interfaces available for children in our clinic. In addition, barriers to therapy in morbidly obese children and Asian and other races need to be explored further.
Support (if any): Not applicable

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0996

AUTISM IN THE SLEEP CENTER: A LOOK AT PEDIATRIC AUTISTIC PATIENTS ON CPAP

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Introduction: For patients diagnosed with Autism Spectrum Disorder (ASD), tolerating positive airway pressure (PAP) can be challenging. Identifying comorbidities that may contribute to adherence difficulties can help tailor care for these individuals.
Methods: A retrospective chart review was conducted to identify subjects and placed into two research groups: subjects with ASD (sASD) and control subjects without ASD (control). Statistical analysis was performed to compare the adherence outcomes of groups. Furthermore, each group was analyzed for those subjects with attention deficit/hyperactivity disorder (ADHD).
Results: Mean ages for control group was 15.4 (SD=3.4) and 14.5 (SD=4.2) years with and without ADHD, respectively. Mean ages for sASD was 15.8 (SD=2.7) and 14.8 (SD=4.0) years with and without ADHD, respectively. Subjects were predominately male (78.3% and 67.3%; sASD and control, respectively). A two-factor ANCOVA was performed to determine if total adherence and > 4 hours per night adherence differed between sASD and control groups. Each group was further evaluated, looking at those with and without ADHD. Adjustment was made for age at first visit. Since multiple measures were collected on adherence data, values were averaged for analyses. The group (sASD vs. control) by ADHD diagnosis (yes or no) was significant. Adjusted means for total adherence were 74.9% and 63.1% for sASD with and without ADHD and 72.7% and 81.4% for controls with and without

ADHD, respectively. Total adherence differed significantly between sASD and controls without ADHD (p=.009). There was no significant difference in total adherence between sASD with ADHD, sASD without ADHD and controls with ADHD. The same findings existed for adherence > 4 hours per night. Adjusted means were 37.0% and 52.7% for sASD with and without ADHD and 45.6% and 61.7% for controls with and without ADHD, respectively.
Conclusion: In the absence of co-existing ADHD, PAP adherence was statistically worse in patients with ASD as compared to control patients. We can infer that comorbidities play a role in PAP adherence in children. Further statistical analysis on this data to assess other factors contributing to adherence rates such as specific behavioral and sensory issues are being performed and will be available.
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0997

ADHERENCE TO A POSITIVE AIRWAY PRESSURE TRIAL IN YOUTH WITH DOWN SYNDROME: A BASELINE DESCRIPTION

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Introduction: Down syndrome (DS) is the leading genetic cause of intellectual impairment and is often associated with obstructive sleep apnea (OSA). OSA frequently persists in this population despite adenotonsillectomy. Therefore, positive airway pressure (PAP) is commonly prescribed treatment of OSA in youth with DS, and often managed by medical providers, nurses and respiratory therapists (RT) with limited psychological support available. While children with DS encounter similar PAP implementation challenges as their typically developing peers, their neurodevelopmental differences can create additional barriers that may deter both caregivers and healthcare providers from pursuing PAP.
Methods: This multicenter randomized-controlled trial evaluates whether the addition of psychological support improves PAP treatment outcomes compared to standard care (STD: physician, nurse, RT). Both groups participate in four structured telehealth visits over 6 months, with neurobehavioral and quality of life assessments conducted at baseline, 6, and 12 months. The intervention group receives supplemental behavioral assessment, personalized implementation strategies, and supportive follow-up calls. PAP adherence is the primary outcome to determine the effectiveness of psychological support in treatment success. Other baseline outcome measures include the parent-reported Pediatric Quality of Life Inventory Physical Score (PedsQLPhy), PedsQL Psychosocial Score (PedsQLPsy), and the NIH Toolbox 9 Hole Pegboard Dexterity Test (PDT).
Results: Twenty-six individuals have been randomized (male, N=14; White, N=19; Black, N=4; Asian, N= 2; Other, N=1; Hispanic, N=3). Mean±SD age is 11.8±3.6 years with a BMIz of 1.2±0.9 (BMI percentile=80.8±21.5). Baseline obstructive apnea hypopnea index is 16.1±12.6 events/hour and Epworth Sleepiness scores are 6.3±5.1. Baseline outcome scores were PedsQLPhy (68.6±18.5), PedsQLPsy (65.2±13.2), and PDT (Dominant Hand=48.5±23.2 seconds; Nondominant Hand=53.2±27.8 seconds). All participants successfully completed the Pegboard task. All participants completed titration polysomnogram except one in the STD who was unable to tolerate it.
Conclusion: This ongoing trial will provide important insights into whether behavioral psychology support improves PAP adherence in youth with DS. Baseline data demonstrate moderate-to-severe OSA, normal DS quality of life scores, and impaired fine motor dexterity, though participants successfully completed all study procedures. These findings highlight both the significant clinical burden in this population and the feasibility of conducting complex interventional trials.
Support (if any): National Heart Lung and Blood Institute (R33HL151253).

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0998

OSA ENDOTYPES AND ATOMOXETINE-OXYBUTYNIN TREATMENT RESPONSE IN CHILDREN WITH DOWN SYNDROME

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Introduction: Obstructive sleep apnea (OSA) is highly prevalent in children with Down syndrome (DS) and current OSA treatments have limited effectiveness. Positive airway pressure therapy is poorly tolerated and adenotonsillectomy is not curative for most children with DS. In our recent trial, the combination of atomoxetine plus oxybutynin (ato-oxy) reduced OSA severity by 51% in children with DS, with considerable variability in responses to treatment. Here we evaluated the potential utility of OSA endotyping, where physiologic characteristics are extracted from clinical polysomnography, to predict ato-oxy treatment response in children with DS.
Methods: A randomized, double-blind, crossover pilot trial examined the short-term efficacy of ato-oxy in 15 children aged 6 to 17 years with DS and OSA. Participants received 4 weeks of low dose (0.5 mg/kg atomoxetine and 5 mg oxybutynin) as well as 4 weeks of high dose (1.2 mg/kg atomoxetine and 5 mg oxybutynin) in random order. Endotype characteristics including collapsibility (per Vpassive), muscle compensation, loop gain and arousal threshold were extracted from baseline polysomnography. Primary mixed model analysis evaluated the association between baseline collapsibility and ato-oxy response (% reduction in apnea-hypopnea index [AHI]), adjusting for baseline AHI and dose; secondary analyses examined the remaining endotypic characteristics, and further adjustment for BMI percentile.
Results: Twelve participants had available data for analysis. Milder collapsibility was associated with a greater treatment response with a 26% greater reduction in AHI per standard deviation reduction in collapsibility (95% confidence interval: [11, 41] %, p=0.002). Greater muscle compensation was associated with a weaker treatment response (−23% [−44, −3], p=0.028), but the association was partially attenuated with additional adjustment for collapsibility (−12%). Arousal threshold and loop gain were not significant predictors. The association with collapsibility was not attenuated with adjustment for BMI (+34 [19, 48] %).
Conclusion: In our early-phase trial, milder airway collapsibility and weaker muscle compensation were predictors of a greater ato-oxy treatment response in children with DS which may help identify individuals with DS and OSA more likely to benefit from muscle stimulation targeted therapies in future trials.

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0999

STANDARDIZING POLICIES AND PROCEDURES FOR HYPOGLOSSAL NERVE IMPLANTATION IN PEDIATRIC TRISOMY 21 PATIENTS: A TERTIARY CARE CENTER'S EXPERIENCE

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Introduction: Implantation of the hypoglossal nerve stimulator (HGNS) is recognized as an effective treatment for persistent obstructive sleep apnea (OSA) in children with trisomy 21, particularly in cases where positive airway pressure (PAP) therapy is ineffective or not tolerated. Standardized protocols for HGNS implantation and management in pediatric patients have not been well established or published. Standardized protocols can prevent inconsistent outcomes, decrease procedural risks, and increase accessibility to treatment. This gap in systematic protocols has identified the need for well-defined policies and procedures that streamline workflow processes to ensure adequate patient access, enhance perioperative management, and improve long-term follow up care.
Methods: Texas Children's Hospital Sleep Center developed and has successfully implemented a comprehensive care pathway, which was supported by a multidisciplinary team of providers to standardize their HGNS program. In this paper, we summarize our multidisciplinary approach and outline the current sleep clinic and laboratory protocols utilized to evaluate, treat and manage children prior to and after HGNS implantation.
Results: Within a 6-month period, our sleep center successfully treated four children with trisomy 21 using this approach. Standard written protocols were outlined and presented to staff and faculty. Faculty were part of online training and simulation procedures. In addition, ongoing partnership was established with the device manufacturer to train clinical staff and edit protocols.
Conclusion: By standardizing these processes, healthcare systems can consider adopting such protocols to help ensure consistency in practice, improve patient outcomes, and promote evidence-based advancements in pediatric OSA management. Furthermore, a standardized framework can potentially enable multicenter research collaborations while facilitating robust comparisons of outcomes and fostering continuous improvements in care delivery. Furthermore, a standardized framework can potentially enable multicenter research collaborations while facilitating robust comparisons of outcomes and fostering continuous improvements in care delivery.
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1000

IMPLEMENTATION OUTCOMES OF A SLEEP CLINICAL DECISION SUPPORT TOOL IN PRIMARY CARE

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Introduction: Childhood sleep disordered breathing (SDB) is highly prevalent and associated with poor neurobehavioral outcomes, underscoring the importance of early identification. However, most outpatient settings, including primary care, lack feasible tools to identify SDB symptoms and support referrals for further evaluation. This pilot study evaluated the initial adoption, reach, acceptability, and initial effectiveness of an electronic health record (EHR)-based primary care clinical decision support (CDS) tool for the management of abnormal SDB screening results.
Methods: The CDS was iteratively developed and deployed in all well child visits at 4 primary care sites from 06/2022-06/2023. Those with reported habitual snoring (≥3 nights/week) received 2-3 age-based questions about labored breathing/gasping, mouth breathing, and bed-wetting, drawn from validated SDB measures. A best practice alert (BPA) appeared when ≥1 of the additional questions were endorsed, with a prompt to refer to specialty care (sleep or otolaryngology) for further assessment, in line with pediatric guidelines. Retrospective electronic health record data were drawn to examine outcomes during the implementation year. Chi-squared tests examined BPA activation and referrals. Primary care clinicians rated CDS acceptability using the System Usability Scale.
Results: A total of 49,125 unique children (6 months-18 years, 51% boys, 51% African American/Black, 5% Asian, 5% Hispanic/Latine, 31% White) were screened for SDB in >90% of well visits, reflecting high adoption. Thirteen percent (n=6257) endorsed habitual snoring. Of the habitually snoring children, the BPA fired for 60% (n=3748) who had ≥1 additional SDB symptom endorsed (i.e., reach). BPA activation was significantly associated with specialty care referrals (p = <.001), with 41% (1524/3748) of snoring children with ≥1 additional symptom referred to specialty care. Of 19 clinician respondents, 68% agreed/strongly agreed to feeling satisfied with the CDS, while 84% agreed/strongly agreed that it was easy to use and helped initiate discussions with families.
Conclusion: Findings indicate high reach and adoption of CDS for SDB in primary care, with evidence of good acceptability and preliminary effectiveness in supporting specialty care referrals for symptomatic children. Further research is warranted to evaluate the long-term impact of the CDS on patient outcomes and healthcare efficiency.
Support (if any): Children's Hospital of Philadelphia Chair's Initiative Round 8 (AAW)

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1001

IMPACT OF PATIENT ACTIVATION ON PEDIATRIC OSA DETECTION AND MANAGEMENT IN PRIMARY CARE

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Introduction: Pediatric OSA is often undetected, partly due to gaps in parental awareness of OSA. Automatic OSA screening traditionally involves primary care provider (PCP) alerts but does not inform parents of their child's OSA risk. Health activation messaging can activate parents to raise concerns with medical providers; however, this approach has not been examined in pediatric

OSA. The study aimed to examine: 1) parental response to a pediatric OSA health activation message and 2) the impact of that response on OSA evaluation and action at a subsequent PCP visit.
Methods: In eight primary care clinics parents responded to OSA screening items in the patient portal. For children who screened positive, their parents viewed a health activation message that: 1) communicated the child's positive screen, 2) provided education, and 3) encouraged discussion at the scheduled PCP visit. PCPs also received an EHR alert about OSA risk. Data were extracted from EHR reports and PCP encounters. Activation was assessed by parental response to an item asking if they plan to discuss OSA with their child's PCP. OSA evaluation was assessed via documentation of OSA symptoms in the provider note.
Results: Of parents who viewed the message (n=148; children 2-13 years; M=7.4 years; SD = 2.8; 58.1% male), 45.9% indicated their plan to speak to their child's provider at a subsequent visit about OSA (high activation), 17.6% did not plan to do so (low activation), and 36.5% were unsure. Children whose parents had high (vs. low) activation tended to have more OSA symptoms (M=2.9, SD=1.4 vs. M=1.5, SD=0.7; F(1,93)=23.9, p<.01). Children of patients with high activation (vs. low) were also more likely to receive an OSA evaluation (75.0% vs. 54.0%; X2=3.9, p<.05) and follow up action (e.g., polysomnography or ENT referral; 61.8% vs. 23.0%; X2=11.3; p<.01).
Conclusion: Children of parents who are activated about their child's OSA risk are more likely receive OSA evaluation and action. Health communication messaging is likely to be a promising strategy to improve primary care pediatric OSA detection, but further research is needed to optimize parent activation.
Support (if any): National Heart, Lung, and Blood Institute of the National Institutes of Health; K23HL150299

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1002
PRACTICE TRENDS IN PEDIATRIC HOME SLEEP TEST UTILIZATION

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Introduction: The current AASM position on home sleep apnea testing (HSAT) states it is "not recommended for the diagnosis of obstructive sleep apnea in children". Potential underestimation of severity and unreliable data collection are cited as possible issues. However, as awareness of pediatric OSA increases, there has been an uptick in the development and research of HSAT use in children. A recent systematic review identified 62 studies, 66.7% of which demonstrated high diagnostic reliability for OSA when using Type III HSAT in children. Our aim is to describe the utilization of this technology within our institution.
Methods: A retrospective search of our electronic medical record (EMR) was conducted for patients who were ordered an HSAT between 1/1/2022 and 11/30/2024. The query yielded 194 pediatric HSAT orders of which 82 were completed (43%).
Results: Of the 82 completed pediatric HSATs, patient ages ranged from 2.7 to 21 years (average 13.8). Patients spent an average of 28 days from order date to HSAT completion, compared to 68 days for an in lab study. Average recording time was 9.8 hours. Two studies (2%) had < 3 hours of recording. Two nights of recording were obtained for 17% (14) of patients, with no statistically significant differences between nights in AHI, SpO2 nadir and hours recorded. No OSA was found in 29% of patients (23), mild in 35% (29), moderate in 13% (12) and severe in 22% (18).
Conclusion: Utilization of pediatric home sleep testing in our institution demonstrated feasibility across a range of ages, with valuable clinical data derived from most studies. Moderate and severe sleep apnea were noted in nearly half of the HSATs, offering an expedited, less invasive path to treatment. The significant number of uncompleted orders highlights demand and barriers to completion. While further studies are needed to continue evaluating HSAT reliability in children, our findings demonstrate that home sleep testing can be a strong diagnostic tool in the work up of significant pediatric OSA.
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1003
A PILOT STUDY OF THE SLEEPIMAGE HOME SLEEP APNEA TEST COMPARED TO POLYSOMNOGRAPHY IN CHILDREN 2 TO 6 YEARS OF AGE

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Introduction: The SleepImage is an HSAT device (sHSAT) that uses photoplethysmography and oxygen saturation data to generate an apnea hypopnea index (AHI). This sHSAT has been FDA cleared as a software-as-a-medical-device for use in children 2 years and older for diagnosing obstructive sleep apnea (OSA). To our knowledge this sHSAT has not been tested on children concurrent with the gold standard polysomnography (PSG).
Methods: This study evaluated 50 children 2-6 years of age with tonsillar hypertrophy and OSA symptoms with sHSAT during simultaneous in-lab PSG. Aims were to determine the technical feasibility of using sHSAT in this population and to compare sHSAT results to PSG. The primary endpoint was AHI by sHSAT compared to AHI by PSG and presence of OSA. Sensitivity analysis was performed for presence or absence of OSA diagnosis based on sHSAT versus PSG. Bland-Altman and concordance correlation calculations were used for comparisons.
Results: 50 patients, median age 4 (IQR 3-5), met criteria; 39 completed PSG and HSAT. The sensitivity with sHSAT for OSA prevalence based on proprietary categorization was 94.1%, specificity 22.7%, LR+ 1.22, and LR- 0.26, with PSG OSA prevalence of 43.6%. There was a 9% sHSAT total failure rate, and the device frequently fell off, resulting in TST difference of -226.9 ±182.8 min between sHSAT and PSG. PSG was trimmed to include only segments where HSAT was confirmed to be on before comparisons. Concordance correlation coefficient between sAHI and AHI-PSG was 0.52. The Bland-Altman analysis comparing sAHI and PSG AHI revealed a mean difference of 0.73 (95% confidence limits: -3.47 to 4.93). Considering only obstructive events, the Bland-Altman the sAHI vs the AHI-PSG shows a mean difference of 1.52 (95%CI -5.40 to 8.44).
Conclusion: This pilot study demonstrated challenges with feasibility in using the sHSAT in this age group given likelihood of technical difficulties leading to absent or truncated data. When compared with PSG, sHSAT demonstrated a high false-positive rate for diagnosis of OSA, particularly concerning if guiding surgical management. This topic is of considerable importance to the practice of pediatric sleep medicine; further investigation of technological advances in this area is imperative.
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1004

COUNTING SHEEP AT HOME: ADVANCING PEDIATRIC SLEEP APNEA TESTING

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Introduction: In-laboratory polysomnography (PSG) is currently the standard clinical test for evaluating obstructive sleep apnea (OSA) in children, but barriers including cost, accessibility, and discomfort highlight the critical need for alternative testing modalities such as home sleep apnea testing (HSAT) in pediatrics. Level II HSAT with electroencephalogram (EEG) may be more accurate for the diagnosis of OSA in children but requires a technologist to set up the equipment compared with Level III HSAT without EEG. We aimed to compare the accuracy of Level II HSAT versus Level III HSAT for the diagnosis of pediatric OSA.
Methods: Children aged 2 through 17-years-old completed Level II HSAT as part of a larger study comparing HSAT with PSG. Level II HSAT was scored using AASM pediatric scoring rules. EEG was removed from the montage and HSAT studies were re-scored as Level III studies by investigators blinded to the Level II scoring. An obstructive apnea hypopnea index (OAHI) of 2 events/hour was the threshold used for a diagnosis of OSA. Level II and Level III HSAT OAHI were compared using sign rank test, Spearman's rank correlation, and Lin's test of concordance.
Results: Fifteen participants, including 10 (67%) females were included. Median (range) age was 6.0 (Range: 2.9, 17.1) years. Level III HSAT OAHI was 1.0 (0.2, 9.2), and Level II HSAT OAHI, was 1.8 (Range: 0.3, 23), p = 0.15. By Level III HSAT, obstructive hypopnea index was 0.3 (0, 1.6), and Level II HSAT was 1.2 (0.1, 13), p= 0.002. Six (0.4) participants had a diagnosis of OSA by Level II HSAT and 2 (0.13) by Level III HSAT (p=0.09). There was a moderate correlation between Level II HSAT and Level III HSAT (Spearman r=0.61, p=0.02) but poor concordance (concordance correlation coefficient=0.5).
Conclusion: In this pediatric pilot study, there was a moderate correlation between Level II and Level III HSAT OAHI, but poor concordance. Removal of HSAT EEG resulted in significantly less obstructive hypopneas and underestimation of OSA. These findings suggest a potential difference between the two testing methods for detecting pediatric OSA, but future studies comparing HSAT to PSG with larger cohorts are needed.
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1005

SLEEP DISORDERED BREATHING IN TERM INFANTS: PHENOTYPE AND DIAGNOSTIC DATA

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Introduction: Sleep-disordered breathing (SDB) is common in neonates and infants. Unfortunately, most of the data in this population is focused on high-risk infants. Little data exists on whether term, otherwise healthy, infants should follow the same diagnostic and treatment standards that are currently in place for high-risk infants.
Methods: A retrospective review of medical records and PSG data in term infants 0-12 months of age presenting symptoms suggestive of SDB, who underwent diagnostic Polysomnography (PSG) between 2017 to 2023.
Results: Fifteen subjects were enrolled. The majority (80%) were male and 40% were of non-White race. Snoring was the most common symptom at presentation, followed by stridor, noisy breathing, and BRUE (brief resolved unexplained events), respectively. The average age sleep study conducted was 7.4 months. The diagnosis of moderate-severe obstructive sleep apnea (OSA) defined as an obstructive apnea-hypopnea index (oAHI) ≥ 5/hour, was present in 73% of subjects. The mean oAHI was 17.9/hr. Central sleep apnea was identified in 6 subjects with a mean central apnea index (CAI) of 3.3/hr. The mean total sleep time was 396 minutes, and the arousal index was 15.1 events/hr. Sleep efficiency was 78.5% across the cohort. Ten infants were diagnosed with moderate-severe OSA and underwent airway evaluation; four were diagnosed with laryngomalacia, followed by other abnormalities such as piriform aperture stenosis, adenoidal hypertrophy, and type I cleft. Three had a normal evaluation. Six subjects were diagnosed with reflux. The therapeutic interventions in this cohort varied from observation, oxygen, and high-flow nasal cannula support to surgical management (adenotonsillectomy and supraglottoplasty). Out of the group of ten subjects, (70%), had a follow-up PSG, which showed resolution of SDB by 2-3 years of age in the majority of the cohort; two infants demonstrated improvement of severe OSA by 1 year of age following interventions, and only one showed persistence of severe OSA after adenoidectomy.
Conclusion: Moderate to severe OSA was the most prevalent disorder in this cohort. This study highlights the heterogeneity in interventions and outcomes among infants diagnosed with SDB. These findings also suggest the need for further research to improve diagnostic accuracy and treatment guidelines for term infants with SDB.
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1006

RESPIRATORY CYCLE-RELATED EEG CHANGES (RCREC) OBSERVED DURING SLEEP OF NEONATES WITH MYELOMENINGOCELE

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Introduction: Respiratory Cycle-Related EEG Changes (RCREC) measured during the sleep of children and adults may represent subtle cortical microarousals exacerbated by labored breathing in obstructive sleep apnea. However, the existence of RCREC has not been investigated previously in newborns.
Methods: Nine North American Fetal Therapy Network centers collaborated in a prospective polysomnographic study (at ≥32

weeks postmenstrual age) of sleep among 171 neonates (gestational age at birth 30-41 weeks) with myelomeningocele in neonatal intensive care units. The RCREC for NREM and REM sleep were computed (AJRCCM 2005;171:652-8) for the entire night in 5 frequency ranges -- delta 2-4 Hz, theta 4-8 Hz, alpha 8-12 Hz, sigma 12-15 Hz, and beta 15-18 Hz) -- using C3-M2 EEG and the nasal-oral thermocouple signal. The RCREC were compared to gestational age at birth, and the apnea-hypopnea index (AHI).
Results: Statistically-significant RCREC (ANOVA, p< 0.01) appeared in at least some frequency ranges in most neonates during NREM sleep (delta n=170, theta 164, alpha 159, sigma 160, beta 164), and during REM sleep (delta 170, theta 163, alpha 147, sigma 161, beta 163). In NREM sleep, the RCREC varied inversely with gestational age (delta: Spearman rho=-0.16, p=0.03; theta: rho=-0.34, p=< 0.0001; alpha: rho=-0.45, p=< 0.0001; sigma: rho=-0.23, p=0.003; beta: rho=-0.21, p=0.007). Theta and alpha RCREC increased with AHI (rho=0.18, p=0.02, and rho=0.25, p=0.001, respectively). In REM sleep, RCREC also varied inversely with gestational age (delta: rho=-0.24, p=0.001; theta: rho=-0.20, p=0.009; alpha: rho=-0.28, p=0.0002; sigma: rho=-0.22, p=0.004; beta: rho=-0.18, p=0.02). Only alpha RCREC varied with AHI during active sleep (rho=0.18, p=0.02).
Conclusion: These data demonstrate RCREC in neonates for the first time. As in older individuals, only limited associations appear with AHI. Moreover, the synchronization between EEG power and the respiratory cycle increases, on average, with lower gestational age at birth. Although these data are specific to infants with myelomeningocele, we have also found RCREC in preterm newborns without MMC (unpublished observations). Previous findings in children and adults that RCREC may predict daytime sleepiness, as well or better than standard polysomnographic measures (Sleep 2006;29:495-503), suggest that infant RCREC merits additional study.
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1007

DISCORDANCE BETWEEN SYMPTOM SEVERITY AND POLYSOMNOGRAPHIC FINDINGS IN CHILDREN WITH CEREBRAL PALSY

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Introduction: Children with cerebral palsy or other complex neurologic disorders frequently demonstrate symptoms of severe upper airway obstruction yet not all are diagnosed with severe obstructive sleep apnea (OSA). The goal of this study was to determine whether there was discordance between symptom severity and polysomnographic findings in children with cerebral palsy who had mild to moderate OSA.
Methods: A retrospective review was undertaken of baseline polysomnograms performed in children with cerebral palsy between 2008-2023 who had clinical concern for severe airway obstruction. Children were included in the analysis if the AHI was less than 10. Median and inter-quartile range (IQR) were reported for non-normally distributed data, and mean and standard deviation (SD) were reported for normally distributed data.
Results: A total of 47 children aged 2-19 years were included in the analysis. Over half (55%) had a seizure disorder. Median AHI was 2.3 (IQR: 2.9), median oxygen nadir was 89% (IQR: 6) and median time < 90% oxygenation was 0% (IQR: 3.4). Children had frequent hospital admissions for respiratory complications with a mean of 80 days (SD 89) spent in hospital, the majority of which (86%) were in the intensive care unit and often intubated. The mean duration of intubation was 37 days (SD 42). To correct upper airway obstruction children often underwent multiple surgical procedures, with a mean of 2.5 surgeries per child. Overall, 17% of children required a tracheostomy and four children (8.5% of the sample) died.
Conclusion: In children with clinical evidence of severe upper airway obstruction, polysomnographic results did not reflect the clinical concern. We strongly recommend multidisciplinary evaluation of children with cerebral palsy and astute clinical judgement with recognition of the need for continued care or observation if there is discordance between symptoms of airway obstruction, yet a reassuring polysomnogram.
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1008

POLYSOMNOGRAPHIC CHARACTERISTICS IN CHILDREN WITH DUCHENNE MUSCULAR DYSTROPHY (DMD) COMPARED TO NORMAL CHILDREN

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Introduction: Children with Duchenne Muscular Dystrophy (DMD) are prone to develop sleep disordered breathing due to various risk factors. The aim of this study is to assess the polysomnographic characteristics in children with DMD compared to age, gender, and AHI controlled matched children without DMD.
Methods: This was a single-center retrospective study involving children with confirmed DMD who underwent overnight polysomnography (PSG). OSA severity was categorized by obstructive apnea-hypopnea index (OAHI) as normal (< 1 event/hr), mild (1–4.9 events/h), moderate (5–9.9 events/h), or severe (≥ 10 events/h).
Results: The DMD group included 12 children, and the control group included 9 children. The gender, mean age and BMI of the DMD and control groups were 91.7% male, 11.25 years, and 21.13 versus 88.9% male, 12.11 years and 23.71 respectively. In the DMD group, functional statuses were: 8.3% late ambulatory, 66.7% early non-ambulatory, and 25% late non-ambulatory. Severe OSA was identified in 50% of the DMD group, and in 57.1% of the control group. There were no differences between the median total sleep time, sleep stages and arousal indices. Similarly, there were no differences in the median OAHI, central apnea index, mean oxygen saturation and carbon dioxide level between the groups. However, the mean heart rates were significantly higher in DMD group [86.29 (16.72) vs 68.59 (10.65) p= 0.012]. 58.3%, and 8.3% of DMD children were treated with prednisolone, deflazacort, respectively, and 25% were not receiving steroids. DMD children receiving steroids had a lower mean CO2 in REM sleep than those who were not [43 (39.00-43.00 vs 47(46.50-47.50) p=0.048]. Eleven DMD children received ACE inhibitor preventative therapy for delaying the progression of cardiomyopathy. 3 children received PAP therapy.
Conclusion: Half of the children with DMD had severe OSA. There were no significant differences between most of the PSG parameters between the groups except higher heart rate was noted in DMD. REM carbon dioxide level was lower in DMD children who were receiving steroids.
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POLYSOMNOGRAPHIC CHARACTERISTICS IN CHILDREN WITH SPINAL MUSCULAR ATROPHY COMPARED TO NORMAL CHILDREN

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Introduction: Children with Spinal Muscular Atrophy (SMA) are prone to develop sleep disordered breathing due to various risk factors. The aim of this study is to assess the polysomnographic characteristics in children with SMA compared to age, gender, and AHI controlled matched children without SMA.
Methods: This was a single-center retrospective study involving children with confirmed SMA who underwent overnight polysomnography (PSG). OSA severity was categorized by obstructive apnea-hypopnea index (OAHI) as normal (< 1 event/hr), mild (1–4.9 events/h), moderate (5–9.9 events/h), or severe (≥ 10 events/h).
Results: The SMA group included 15 children who had available PSG (out of total 29 children with SMA), and the control group included 12 matched children. The gender, mean age and median BMI of the SMA and control groups were 66.7% female, 2 years, and 16.9 versus 66.7% female, 4 years and 16.7 respectively. In the SMA group, copy numbers 2, 3 and 4 were 46.7%, 26.7%, and 20% respectively. Functional statuses were: 5 non-sitters, 1 sitter, 4 standards, and 5 walkers. OSA was identified in 60% of SMA group and in 88% of the control group. There was no difference in median total sleep time, mean sleep efficiency, REM sleep, and median arousal index between the groups. However, the SMA group spent less time in stage 3 sleep [100.38 (38.69) vs 131.13 (37.08) p = 0.047], non-REM [270.67 (83.89) vs 343.95 (50.16) p= 0.013] and left position [0.00 [0.00 vs 88.20 p = 0.003]. There was no significant difference in apnea hypopnea index, obstructive apnea-hypopnea index (OAHI), central apnea index (CAI), and oxygen saturations; however, the mean Non-REM CO2 was lower [39.40 (2.38) vs 42.58 (2.39) p = 0.011] and the mean heart rate was higher [104.98 (16.06) vs 86.15 (20.53) p = 0.013] in the SMA group. SMA subjects were being treated with Nusinersen, Onasemnogene, and Risdiplam 60%, 26.7%, and 26.7% respectively during baseline PSG. 3 SMA children were initiated on PAP therapy.
Conclusion: More than half of the SMA children had OSA. Children with SMA spent less time in Non-REM and left side position, and had higher heart rates compared to the matched children.
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EXAMINING 200LB (91KG) WEIGHT AS INDICATION FOR INITIATION OF SPLIT NIGHT POLYSOMNOGRAPHY IN PEDIATRIC PATIENTS

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Introduction: Obstructive Sleep Apnea (OSA) is an evolving area of study in pediatrics. OSA affects nearly half a million children in the United States and polysomnography is recommended to differentiate primary snoring (PS) from OSA. Cardinal Glennon Children's Hospital in St. Louis is equipped to complete both diagnostic and split night studies. Protocols are in place to guide technicians in their management of patients. Continuous positive airway pressure (CPAP) can be initiated in studies ordered as a "split night study" as opposed to a diagnostic study. One of the parameters in place is the use of 200lb weight as a marker to initiate CPAP if an apnea hypopnea index of 15/hr is noted during the study. The advantages of completing a split study are that patients do not have to undergo the duress of a sleep study twice, CPAP can be initiated in a timely manner, and healthcare costs can be mitigated by performing one study instead of two. The weight cut off of 200lbs was chosen based on provider experience, and we have not examined the effectiveness of this parameter. This study aims to evaluate the sensitivity and specificity of this weight parameter and adjust our limit based on our results.
Methods: We will analyze data for a two month period to determine if eligible patients require CPAP during their split study. We will also evaluate all of the sleep studies done at this time. We will then examine how many patients not meeting the 200lb parameter end up needing a CPAP titration study. Then, based on the sensitivity and specificity data from our 200lb parameter, we can adjust our protocol as needed.
Results: Data will be collected starting December 2024 and will continue until Feb 1 2025. Results pending on this data collection.
Conclusion: This study is important for establishing a data driven protocol to effectively capture pediatric patients who would benefit from CPAP for OSA. If we can accurately tailor our protocol, we can help our patients receive beneficial CPAP treatment in a more timely and cost-efficient manner.
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1011

COMPARISON OF MRI-BASED DYNAMIC 4D AIRWAY MEASUREMENTS AND DISE RESULTS IN PEDIATRIC PATIENTS WITH PERSISTENT OSA

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Introduction: Obstructive sleep apnea (OSA) is persistent in approximately 40% of pediatric patients following adenotonsillectomy (AT), often leading to secondary surgical interventions. Magnetic resonance imaging (MRI) and drug induced sleep endoscopy (DISE) are crucial for secondary surgical planning, although it is unclear whether these diagnostic modalities agree regarding location and severity of airway obstruction. Comparing measurements from dynamic airway models reconstructed from MRI with DISE results provides insight into how these modalities may contrast and complement one another in identifying surgical targets for persistent OSA.
Methods: DISE and MRI of the upper airway (under ketamine/dexmedetomidine-induced sedation) were performed on 33 pediatric subjects (aged 3-18 yr, mean=9.56) with persistent OSA after AT. Dynamic airway models were created by segmenting static MR images and registering cine-MR images throughout a breath cycle. Spatiotemporal minimal measurements of dynamics, or cross-sectional area (CSA) ratios, size (minimum CSA, normalized by cricoid CSA), and shape (ratio of diameters) were calculated from the airway model every 1mm and 1ms. DISE

findings were scored based on obstruction pattern and severity. Airway measurements were compared (unpaired t-test, 95% CI) between DISE severity scores within each region.
Results: Subjects with adenoid hypertrophy on DISE exhibit eccentric airway shape on airway reconstruction of the nasopharynx (P=0.013), but neither airway CSA nor dynamics are different from subjects without adenoid hypertrophy. A trend of eccentric airway shape in the nasopharynx (P=0.052) is also found in subjects with velum collapse, with no differences in CSA or dynamics of the airway. The CSA of the airway in the oropharynx is smaller in subjects with complete tongue base collapse (P=0.04); however, there are no differences in shape or dynamics.
Conclusion: DISE scores and airway shape on airway models agree at the adenoids and velum. Collapse visualized on DISE is associated with decreased size on airway models at the tongue base. Airway dynamics are similar between DISE scores at the velum and tongue base. The partial agreement between DISE scores and airway model measurements indicates each technique may be sensitive to different patterns of airway obstruction. Future studies should investigate the association between the results of multimodal airway evaluation and surgical outcomes.
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1012

WAKING UP PEDIATRICIANS TO OBSTRUCTIVE SLEEP APNEA SCREENING

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Introduction: Childhood obstructive sleep apnea (OSA) affects approximately 1.2% to 5.7% of children with many experiencing delays in diagnosis and treatment. This is multifactorial, including providers' lack of utilization of validated OSA screening tools, such as the Pediatric Sleep Questionnaire (PSQ). Residency offers an ideal opportunity to introduce such tools, as learners can integrate them into their practice early on.
Methods: This mixed-methods quality improvement project used a resident targeted educational program to increase OSA awareness, review screening guidelines, and discuss next steps for children with positive PSQ results. Following the lecture, an anonymous survey assessed attendees' prior knowledge of the PSQ, confidence in ordering sleep studies, anticipated use of the PSQ, and perceived barriers. To address identified barriers, PSQ screening forms were placed in each clinic room to increase accessibility for providers. An electronic medical record (EMR) query was used to gauge our interventions' efficacy in increasing PSQ usage.
Results: Through an anonymous post lecture survey, 87.5% of attendees responded that they screen for routine snoring during their well-child checks at most or every visit. However, 100% of residents had never used the PSQ screening before. At 62.5%, most respondents anticipated using the PSQ when indicated at most or every visit. Most encouragingly, 100% of respondents reported feeling "more confident" regarding indications for ordering polysomnography or pediatric sleep medicine referral. The initial two weeks post-lecture saw no increase in PSQ usage among residents, but the data collection will be ongoing until June 2025.
Conclusion: This study aimed to increase PSQ utilization in one pediatric outpatient clinic through a resident-led lecture on OSA screening and improved accessibility to PSQ forms in the clinic. While initial PSQ utilization was low, residents expressed increased confidence in diagnosing OSA and planned to implement the tool moving forward. The most frequent barriers identified were time and accessibility to forms, prompting a secondary intervention to improve form access. By increasing the PSQ utilization, we hypothesize that we will identify more children with undiagnosed OSA and get them to indicated care sooner, as well as better characterize key factors predictive of OSA in this clinic's population.
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1013

PRACTICE PATTERNS IN PEDIATRIC PSG UTILIZATION PRE-AND-POST OPERATIVELY

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Introduction: Tonsillectomy is a common procedure in the United States with 289,000 pediatric ambulatory procedures completed annually. Since 2002, multiple professional organizations published guidelines recommending the use of Polysomnography (PSG) in young children prior to adenotonsillectomy. In cases of moderate to severe obstructive sleep apnea syndrome (OSAS) or in patients with high-risk comorbidities, a post-operative PSG is recommended also. Despite these guidelines, adherence remains low with 22% of American Society of Pediatric Otolaryngology (ASPO) members stating they order PSGs "always" or "most of the time" for children under 3 years of age. Previous clinical studies showed overall pre-surgical PSG compliance at 30% with rates climbing to 51-57% for children with high-risk comorbid conditions.
Methods: In this retrospective chart review, an electronic medical record (EMR) query for patients under 2 years old who underwent an adenoidectomy, tonsillectomy, or adenotonsillectomy from 1/1/2020 to 10/31/2024 was performed. The query included if a PSG was completed and basic PSG metrics. The query yielded a convenience sample of 424 children.
Results: Of the 424 children, 137 had pre-operative OSA diagnosis with 76% (103) obtaining a PSG within a year prior to surgical intervention and 61% (63) showing moderate or severe sleep apnea. Adherence to the recommendations varied yearly, ranging from 65-91%. ENT Practice variation was seen with compliance ranging from 27-100%. Post operative PSG completion for patients with at least moderate OSAS (AHI or REM AHI > 10/hr.) was 24% (15) with rates varying yearly from 0-40%. ENT Practice variation was seen with compliance ranging from 0-60%.
Conclusion: The pre-operative PSG completion rate compared to previous studies is encouraging, however, the low post-operative PSG rate highlights the need for closer partnerships with parents and physicians. As there is no expert consensus on the AHI defining severe OSAS, sleep clinicians should partner closely with their ENT colleagues in establishing practice patterns centered around expedient, quality care and patient safety. Dedicated continuous quality assurance and improvement programs measuring adherence to practice guidelines are needed. EMR tools for physicians, and educational electronic messaging for parents could aid in increasing post-operative PSG rates.
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1014

SLEEP HEALTH PHENOTYPES IN EARLY CHILDHOOD: ASSOCIATIONS WITH CAREGIVER SLEEP-RELATED FACTORS

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Introduction: Although sleep health is recognized as multidimensional, most studies focus on individual dimensions, overlooking the diversity in sleep patterns. Developing comprehensive sleep health phenotypes that reflect early childhood variability could enable personalized sleep goals and targeted interventions. Such phenotypes should incorporate subjective and objective sleep dimensions, account for developmental changes, and consider the role of caregivers in shaping sleep habits. This study aimed to identify distinct sleep phenotypes in early childhood and explore their associations with caregiver sleep-related factors.

Methods: We conducted a cross-sectional observational study of primary caregivers of toddlers aged 12–30 months recruited from a database of families using baby video monitors to track their children's sleep. Sleep phenotypes were identified using k-means clustering based on parental self-reported sleep data (BISQ-R) and objective sleep data via autovideosomnography (M=11.22; SD=2.82). Caregiver knowledge, attitudes, self-efficacy, and beliefs about sleep were assessed with a 19-item survey, and their associations with sleep phenotypes were analyzed. Descriptive analyses, including ANOVA, were performed using RStudio version 4.2.1.

Results: Among 1,036 participants (77.9% mothers; 78% non-Hispanic White; 78.3% aged 30–39 years), three distinct sleep phenotypes were identified: Group 1 (16%): late bedtime, short sleep duration, irregular bedtimes, and high parental perception; Group 2 (39%): recommended bedtime, acceptable sleep duration, somewhat consistent bedtime, and suboptimal parental perception; and Group 3 (46%): early bedtime, long sleep duration, consistent bedtime, and high parental perception. Parental knowledge, attitudes, self-efficacy, and beliefs differed significantly among groups, with Group 3 scoring highest across all domains. Post-hoc analyses revealed that Group 3 parents had significantly higher sleep knowledge compared to Group 1 ($p=0.001$) and Group 2 ($p=0.003$). Parental attitudes were significantly better in Group 3 than Group 1 ($p=0.02$). Self-efficacy was lowest in Group 1 compared to Group 2 ($p=0.04$) and Group 3 ($p< 0.001$). Parental beliefs differed significantly across all groups ($p's=< 0.03$) with Group 1 scoring lowest.

Conclusion: This study identified three distinct toddler sleep patterns and highlighted significant links between caregiver cognitive and behavioral factors and early childhood sleep phenotypes. These findings may guide tailored interventions to improve early sleep health and mitigate potential long-term physical and socioemotional consequences.

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1015

UNDERSTANDING CONTRIBUTORS TO EARLY CHILDHOOD SLEEP INTERVENTION RESPONSE: A MIXED METHODS STUDY

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Introduction: This mixed-methods study sought to identify contributors to caregiver-reported child sleep improvements after receiving Sleep Well!, a behavioral sleep intervention for 1-5-year-olds, by examining (1) quantitative data from intervention sessions and (2) qualitative caregiver perceptions at post-intervention.

Methods: Forty-six caregiver-child dyads (caregivers: 96% mothers, 64% non-Latine Black, 40%≦high school education; children: 40% girls, 67% non-Latine Black) randomized to Sleep Well! completed a 3-session telehealth intervention. Interventionists completed fidelity forms to indicate session content implemented (intervention components, suggested strategies, handouts, homework) and rated family engagement using a Likert scale item. Forty-two caregivers also completed post-intervention ratings of child sleep problems (Brief Child Sleep Questionnaire item, primary trial outcome) and semi-structured qualitative interviews, coded using thematic analysis. Child sleep improvements were dichotomized into "resolved sleep problem" versus "small to severe problem." Quantitative analyses (chi-square and t-tests) assessed relationships between session content, interventionist-rated engagement, and sleep problem resolution, while qualitative themes were stratified by sleep problem resolution status.

Results: A total of 64% (n=27) of dyads reported post-intervention sleep problem resolution. Intervention components, suggested strategies, handouts, and homework were not associated with sleep problem resolution. There was a moderate ($d=0.69$) difference in reporting of a resolved sleep problem based on interventionist-rated engagement, with higher engagement ratings for caregivers reporting a resolved sleep problem, although this did not reach statistical significance, $p=.10$. Furthermore, qualitative themes of strong intervention-related acceptability, cultural humility, and positive feedback did not differ according to whether the caregiver quantitatively reported a resolved child sleep problem. However, caregivers reporting a resolved child sleep problem qualitatively reported feeling well-equipped with tools from the intervention to manage child sleep, whereas those with an unresolved child sleep problem qualitatively expressed less confidence managing child sleep, citing their child's behavior as a challenge to sleep improvements.

Conclusion: Although caregivers reporting an unresolved child sleep problem after Sleep Well! participation qualitatively expressed positive intervention feedback, they also described less confidence in sleep strategies and more challenging child behaviors. Additional research is needed to develop more personalized strategies to address caregiver-reported challenging child behaviors, confidence in intervention strategies, and intervention engagement.
Support (if any): K23HD094905 (AAW)

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1016

THE POWER DOWN: A NEW SENSORY-BASED BEDTIME INTERVENTION FOR CHILDREN WITH ADHD

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Introduction: It is well known that children with attention deficit hyperactivity disorder (ADHD) have an elevated risk for poor sleep health. Sensory over-responsivity is also common for children with ADHD potentially impacting the ability for children to transition to sleep. Current interventions do not incorporate sensory-specific theories to decrease hyperarousal level at bedtime to support sleep health. This pilot study trials a novel sensory-based intervention targeting bedtime cognitive and physiological hyperarousal.
Methods: Children (6-13 yrs) with ADHD and their caregivers are being recruited to participant in a 3-week pilot intervention trial (total goal n=30). Biophysiological measures of arousal (e.g. electrodermal activity, physical activity) and sleep (actigraphy) are captured using the Empatica EmbracePlus and daily sleep and emotion diaries are completed. Caregivers complete a manualized gentle pressure massage and mindfulness protocol called the "Power Down". Intervention feasibility and acceptability are measured through qualitative interviews and questionnaires. Preliminary efficacy is measured through change in sleep and bedtime arousal measures at the end of the intervention trial (2 weeks long) compared to a 1-week baseline.
Results: Recruitment is on-going. Currently, one participant has completed the three-week study (8 years old, male) and one is half-way through the study (11 years old, male). Both participants and their caregivers identified transitioning to sleep as the primary difficulty related to sleep health. Both participant's caregivers reported that the Power Down intervention was acceptable, appropriate, and feasible after initial training (all agree to completely agree, 5-pt Likert scale). Data collection from the wearable device was feasible, with participants wearing the device for 22/25 days and 13/14 days of data collection. The Power Down was completed 12/13 and 7/9 days by the caregiver at the time of preliminary analysis. Preliminary efficacy will be examined upon completion of each participant's participation and will be updated at the time of the conference.
Conclusion: The Power Down has successfully been implemented with our first participants. As recruitment continues, interim data analysis will be conducted to examine continued acceptability, feasibility, and preliminary efficacy of the intervention.
Support (if any): The Klingenstein Third Generation Foundation Fellowship (PI: Hartman)

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1017

FEASIBILITY AND ACCEPTABILITY OF SHEETS: A NEW DIGITAL INTERVENTION FOR ENHANCING SLEEP REGULARITY IN ADOLESCENTS

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Introduction: Adolescence is associated with irregular sleep patterns, which in turn increases risk of onset and maintenance of internalizing symptoms (e.g., anxiety) and externalizing behaviors (e.g., risk-taking). Behavioral sleep interventions targeting sleep regularity that are optimized for real-world practice settings and widespread dissemination are needed to support psychiatric wellness during this critical development period. The objective of the current study was to evaluate the feasibility and acceptability of Sustainable Habits for Encouraging Even Teen Sleep (SHEETS), a novel six-week digital intervention designed to target sleep regularity as a mechanism to support psychiatric health in adolescents.
Methods: Adolescents aged 12-14 (target N=50) were recruited from primary care clinics and community advertisements. Participants were randomized to receive 6 weeks of either the SHEETS intervention app (targeting sleep regularity) or an active control intervention app (targeting general health behaviors). Both apps included similar graphics, activities (e.g., videos, quizzes), and gaming/incentive structures. Both groups received a Garmin activity tracker, which communicated real-time feedback about either sleep regularity (SHEETS) or physical activity (control) via the app. Feasibility and acceptability metrics included retention rate, engagement with app content (number of activities completed/assigned), and participant report of intervention satisfaction.
Results: Of 54 adolescents randomized (45% female, 44% minoritized race/ethnicity), 50 completed their assigned digital intervention (retention rate, 93%), meeting the target enrollment goal. In both interventions, there were 25 completers of 27 assigned. On average, participants completed 80% (median: 91%) of the app activities for SHEETS and 85% (median: 94%) of the active control. Engagement did not differ between interventions ($t(49)=.77$, $p=.45$). The majority of participants rated the SHEETS intervention app as easy to use (88%), visually appealing (76%), and reported satisfaction with the Garmin device (88%); results were similar for the active control.
Conclusion: SHEETS is a new digital intervention that aims to support psychiatric health in adolescents by enhancing sleep regularity. Both SHEETS and the active control app were associated with high engagement and satisfaction, suggesting digital sleep interventions are feasible and acceptable for use with adolescents. Future analyses will assess the effectiveness of SHEETS compared to active control on improving sleep regularity and psychiatric health in adolescents.
Support (if any): R34-MH-128440

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1018

SOCIAL DETERMINANTS OF HEALTH PREDICTING ADHERENCE TO IN-HOME SLEEP EXTENSION IN ADOLESCENTS WITH HABITUALLY INSUFFICIENT SLEEP

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Introduction: Adolescents are at risk for insufficient sleep and late bedtimes due to biological, environmental, and social determinants of health (SDoH) factors. Insufficient sleep is associated with negative outcomes, including risk for obesity and mental health problems. Behavioral interventions may improve sleep health in adolescents, but factors that contribute to adherence are unknown. This study examined SDoH and other individual factors hypothesized to impact adherence to an in-home behavioral sleep extension manipulation in adolescents with habitually insufficient sleep.
Methods: Fifty-four adolescents (M=16.0±1.3y) with ≤7h sleep on school days completed a randomized crossover study of one week each of typical sleep (TS; usual school schedule) and sleep extension (EXT; ≥1h additional time in bed) in counterbalanced order. Sleep duration and timing were assessed with wrist-worn actigraphy. Participants completed baseline questionnaires of mood (PROMIS Depression & Anxiety) and sleep quality (Adolescent Sleep-Wake Scale, ASWS). SDoH data included age, BMI percentile, race/ethnicity, and the Child Opportunity Index (COI),a measure of social vulnerability. Linear mixed models were fit to predict sleep duration and bedtime based on the above factors, adjusting for condition, randomization, and period.
Results: During EXT compared to TS, participants increased sleep duration on average by 1.2h (TS 5.7±0.8h, EXT 6.9±0.8h) and advanced bedtime by 1.3h (TS 00:24±1.1h; EXT 23:06±1.1h). Lower COI, indicating living in lower opportunity neighborhoods, was associated with later bedtime (0.11h per 10-unit increase in COI; p=0.042), independent of sleep condition. Race/ethnicity was significantly associated with bedtime and sleep duration, such that sleep duration was lower by an average of 0.58 h for non-Hispanic non-White participants (p=0.013), independent of sleep condition. Poorer baseline sleep quality was associated with greater improvement in sleep duration during EXT (0.55h increase per 1-unit increase in sleep quality; p=0.045). No significant associations were found for age, mood, or BMI.
Conclusion: Among adolescents with habitually insufficient sleep, SDoH risk factors were associated with poorer sleep. Further research is needed to understand specific barriers to sleep health in adolescents living in lower opportunity neighborhoods and from historically minoritized backgrounds, and to tailor sleep interventions to address these unique needs.
Support (if any): K23DK117021; R03DK131225; 2K12HD057022; UM1TR004399

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1019

AUTISM SPECTRUM MEALTIME BEHAVIOR: LINKS TO TRYPTOPHAN INDEX AND SLEEP PATTERNS IN CHILDREN AGED 3–6 YEARS

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Introduction: Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by two main domains: (1) social communication and interaction, and (2) restricted, repetitive patterns of behavior, interests, or activities. Parents and caregivers of children with ASD have reported problematic mealtime behaviors; however, it is unclear which of these behaviors impact sleep. Additionally, a higher intake of tryptophan at breakfast may promote serotonin synthesis in children. This study aimed to investigate the association between mealtime behaviors and sleep behaviors in children aged 3-6 years.
Methods: A total of 283 children aged 3-6 years were included in the study. Mealtime behaviors were assessed using the Autism Spectrum Disorder Mealtime Behavior Questionnaire (ASD-MBQ), focusing on selective eating, clumsiness/manners, interest and concentration on eating, oral motor function, and overeating. Data on wake-up time, bedtime, total sleep duration, and midpoint of sleep were collected. The Tryptophan index (Trp-index) at breakfast was calculated as the amount of tryptophan per meal, based on the tryptophan content per 100 g of food and a standard portion size per meal.
Results: Compared to the non-selective eating group (n=121), the selective eating group (n=162) exhibited later wake-up times (6:44 ± 0:28 vs. 6:52 ± 0:32; P = 0.043), later bedtimes (21:15 ± 0:37 vs. 21:33 ± 0:33; P < 0.001), later midpoints of sleep (2:00 ± 0:27 vs. 2:13 ± 0:31; P< 0.001), shorter total sleep duration (9.5 ± 0.6 vs. 9.3 ± 0.7 hours; P = 0.021), and a lower Trp-Index (285 ± 167 vs. 234 ± 149; P = 0.007). However, there were no significant differences between the groups in age, sex, or breakfast frequency per week. Additionally, three other mealtime behaviors—interest and concentration on eating, oral motor function, and overeating—did not appear to influence sleep behavior.
Conclusion: We identified mealtime behaviors associated with sleep patterns and tryptophan intake at breakfast. This information can help healthcare professionals educate families about problematic mealtime and sleep behaviors in preschool children.
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1020

SLEEP PROBLEMS AND AUTISTIC BEHAVIORS IN CHILDREN WITH DOWN SYNDROME OR AUTISM SPECTRUM DISORDER

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Introduction: Over two-thirds of children with Down Syndrome (DS) have obstructive sleep apnea and behavioral sleep problems are also common. About 20% of children with DS have co-morbid autism spectrum disorder (ASD). Autistic behaviors may contribute to behavioral sleep problems in DS, but this is understudied. We (1) compared sleep problems by diagnostic group (DS or ASD), and (2) described the association between autistic behaviors and sleep problems across the full sample.
Methods: This is a secondary analysis of data collected for a convergent mixed methods study on family management of mealtime and bedtime. Caregivers of children (4-10y) with DS or ASD were recruited from an urban children's hospital. Caregivers completed the Children's Sleep Habits Questionnaire (CSHQ) to assess sleep and the Social Responsiveness Scale-2 (SRS-2) to evaluate autistic behaviors. CSHQ scores were compared between groups using Mann Whitney U tests. Separate multiple linear regression models were fitted to assess the influence of SRS-2 domains on CSHQ scores, adjusting for DS diagnosis, age, and gender.
Results: Of N=85 participants, 29 had a child with DS and 56 ASD. Overall, 88.5% of the DS group and 84.3% of the ASD group had sleep problems (CSHQ score ≥ 41). There were no significant differences in total CSHQ scores between groups (p > 0.05). In the DS only group, 48.3% had elevated SRS-2 scores. In adjusted analysis, greater restricted and repetitive behaviors (adjusted mean

difference [95% CI] = 0.685 [0.178, 1.191], p =.009) and younger age (adjusted mean difference [95% CI] = -1.224 [-2.304, -0.143], p =.027) were associated with higher CSHQ scores, indicating greater parental concern about sleep problems.
Conclusion: Autistic behaviors were common in the DS group, even without an ASD diagnosis. Restrictive and repetitive behaviors, in particular, predicted the severity of sleep problems across the full sample. Future work should examine associations between autistic behaviors and sleep characteristics in a larger cohort of children with DS.
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1021
DO CHILDREN LIVING WITH A CHRONIC DISEASE HAVE MORE DISTURBED SLEEP THAN THEIR HEALTHY PEERS?

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Introduction: Living with a chronic disease (LCD) may impact sleep in children. We aimed to compare sleep in children LCD and healthy controls.
Methods: Design: Prospective study. Children and adolescents aged 6–17 years old answered the Sleep Screening Questionnaire Children and Adolescents (SSQ–CA) twice. They wore actigraphy (AG) for seven nights and at-home polysomnography (PSG) for one night. Statistics: Unpaired two-sampled t-tests.
Results: We included 65 LCD and 63 healthy age-matched children. Compared to the healthy controls the 6–12-year-olds LCD had shorter total sleep time (TST): AG:16.1 min, [95% CI -0.3; 32.6], SSQ–CA: 19.9 min [-0.7–40.5], later chronotype and chronotype score: AG: 00:25, [-00:07; 00:57] and significantly longer objectively measured sleep latency. Except for a higher sleep and feeling safe subscale score, no major differences in either SSQ-CA or AG measures were seen between the adolescent groups (13–17–year–olds). An inverse correlation between TST and glycated hemoglobin (HbA1c) (AG: r=-0.49, SSQ: r=-0.4) was shown in children with type 1 diabetes, and an inverse correlation between TST and monthly headache attacks (AG: r=-0.79) in children with tension-type headache.
Conclusion: Children LCD present more sleep disturbances than healthy controls, especially in the 6–12-year-olds. Sleep evaluation should be considered as part of the clinical evaluation.
Support (if any):

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1022
SLEEP HEALTH IN CHILDREN AND ADOLESCENTS WITH SICKLE CELL DISEASE

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Introduction: Youth with sickle cell disease (SCD) are at increased risk for respiratory and non-respiratory sleep impairment. Poor sleep is associated with vaso-occlusive crisis (VOC) and poor health-related quality of life (HRQL). We examined relationships between indicators of sleep health and healthcare utilization (HCU) for VOC and explored subjective and objective measures of sleep utilizing sleep diary and actigraphy in youth with SCD compared to healthy controls.
Methods: Cross-sectional 2-year study of youth ages 8-17 years with SCD (any genotype) and matched, healthy controls. Participants completed validated sleep questionnaires and Pediatric Quality of Life Inventory (PedsQL). Both populations completed 2-week sleep diary and actigraphy. Data was collected on HCU for VOC. Area deprivation index (ADI) for neighborhood rankings were calculated.
Results: 50 youth with SCD (60% female, Mean age=12.7 years, 66% HbSS) and 37 controls (57% female, Mean age=13.1 years) participated. Groups did not differ in anthropometrics. No statistically significant differences in the following in SCD and non-SCD groups: PROMIS SD or SRI scores, Child or Adolescent Sleep Hygiene Scores, and Epworth Sleepiness Scale. 38% of youth with SCD had scores indicating increased daytime sleepiness and screened higher risk for sleep disordered breathing (SDB) on PSQ. 32% of the youth with SCD had positive PSQ. SCD was associated with worse HRQL. 51% of youth with SCD had HCU for VOC. No significant association identified between HCU for VOC and sleep. ADI was significantly increased in children with SCD for both state, and national deciles. ADI did not correlate with measures of sleep health. No difference in actigraphy and sleep diaries between the cohorts. Correlative statistics between actigraphy and sleep diary, demonstrated moderate correlation between sleep duration and sleep time but poor correlation between sleep latency and sleep efficiency.
Conclusion: Youth with SCD in their baseline state of health reported comparable sleep to controls but had worse HRQL and higher ADI. Youth with SCD had significantly increased risk for SDB compared to controls. Indices of sleep health were not associated with HCU for VOC among youth with SCD. Sleep diary and actigraphy measures of sleep were similar in both populations
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1023
SLEEP AMONG ADOLESCENTS EXPERIENCING SUBTHRESHOLD PAIN

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Introduction: Increased pain is associated with worse sleep among adults, but scant studies have examined this connection in adolescents. Specifically, no studies have examined sleep in adolescents experiencing subthreshold pain or how sleep differs among adolescents experiencing different pain levels. This study fills that gap.
Methods: Adolescents (N=400, Mage=15.23, 50%-female) experiencing pain in the past 3 months reported their average sleep onset latency (SOL) and total sleep time (TST) over the past month and average pain intensity over the past week (1-100

scale) as part of an online data collection. They also completed the Insomnia Severity Index (ISI). Pain responses were divided into four categories: no pain (0-29), subthreshold pain (30-49), moderate pain (50-69), and severe pain (70-100). SPSS One-way ANOVAs evaluated the effect of pain group on sleep (SOL, TST, ISI). Follow-up t-tests clarified significant group differences.
Results: A one-way ANOVA revealed a significant difference in SOL among the groups (F(3, 196)=3.68, p=.013). The subthreshold pain group reported higher SOL (M=75.29+\-52.59) than the no pain group (M=48.22+\-51.21, p=.007), the moderate pain group (M=50.33+\-41.22, p=.006), and the severe pain group (M=52.17+\-42.14, p=.044). A one-way ANOVA revealed a significant difference in ISI among the groups (F(3, 196)=4.78, p=.003). The no pain group reported lower ISI (M=10.27+\-6.24) than the subthreshold pain group (M=13.41+\-6.07, p=.009), the moderate pain group (M=13.45+\-6.19, p=.016), and the severe pain group (M=14.77+\-6.05, p=.002). There were no other significant differences among the groups for SOL or ISI. There was no significant difference in TST between the two groups (F(3, 196)=2.10, p=.101).
Conclusion: These results suggest that adolescents experiencing pain are at risk for sleep problems, particularly those who reported subthreshold pain levels. Thus, adolescents with pain and poor sleep may benefit from behavioral sleep interventions, even if they are only experiencing subthreshold pain. We encourage longitudinal and experimental research methodologies to further explore sleep characteristics among adolescents experiencing subthreshold pain.
Support (if any): TRIUMPH University of Missouri (McCrae, PI)

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1024

PREVALENCE OF SLEEP CONCERNS AND SLEEP HYPNOTIC USE IN CHILDREN WITH RARE NEUROGENETIC CONDITIONS

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Introduction: Sleep disturbances are common in the pediatric population and contribute to significant stress on both the child and their care providers. Sleep has been linked to early brain development and learning, and poor sleep has been shown to contribute to behavioral problems and attention concerns. While some sleep disturbances are known to be associated with specific genetic conditions, their overall prevalence in children with rare neurogenetic conditions remains to be quantified.
Methods: Retrospective chart review was performed of all new patient consultations at a pediatric neurogenomics clinic in a sixth month period. Charts were queried for sleep concern based on prevalence of the following criteria: previous or current evaluation for sleep disordered breathing, spontaneous patient or caregiver complaint of sleep disturbance, or prescription for sleep hypnotic medication.
Results: Of the fifty nine pediatric patients seen for new consultations 33.9% were identified as having sleep concerns. Most prevalent concern was insomnia, though sleep apnea, excessive daytime sleepiness, and parasomnias were also identified. Some caregivers and patients identified multiple concerns. Of the seventeen patients with insomnia concerns identified, seven were already prescribed medication for sleep hypnotic benefit. It was noted in all of these patients insomnia was identified as a persistent concern. Sleep hypnotics utilized included clonidine, trazodone, guanfacine, and clobazam (utilized concurrently for insomnia and seizures in a single patient.) Melatonin and cannabidiol were frequently self-reported by caregivers who obtained them as over the counter supplements, but were not included in these analyses.
Conclusion: Children with rare genetic conditions, including those without a specific sleep disorder associated, should be screened for sleep disturbances and treated as appropriate. Polysomnography should be utilized if there are symptoms of sleep disordered breathing, particularly in conditions associated with hypotonia or airway malformation. In cases of insomnia consideration should be given for behavioral sleep interventions and, if clinically indicated, pharmacotherapy in conjunction with these interventions. These findings have led to our clinic adding screening for sleep disturbance as a standard assessment at all appointments to optimize care. Further research is needed in regards to pharmacotherapy in these conditions, particularly medications that may have cross-utilization for other symptoms, limiting polypharmacy.
Support (if any):

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1025

DAILY ASSOCIATIONS BETWEEN SLEEP AND OPPOSITIONAL BEHAVIORS IN CHILDREN WITH OPPOSITIONAL DEFIANT DISORDER

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Introduction: There is a strong relationship between increased oppositional behavioral problems and worse sleep among children with Oppositional Defiant Disorder (ODD). Indeed, approximately 50% of the children diagnosed with ODD also have sleep problems. However, no studies examined the daily relationship between oppositional behaviors and sleep in a sample of school-aged children with ODD and insomnia. This study fills that gap.
Methods: Parents of children with ODD and insomnia (N=8, Mage=9.62, 75% male) completed 14 days of daily sleep and behavior diaries for their children. Sleep variables included sleep onset latency-SOL, wake after sleep onset-WASO, and total sleep time-TST. Behavior variables included whether a parent-child argument occurred and whether the child yelled that day. Multilevel models (Rv4.2.2) examined daily associations between child sleep and behavior, controlling for child age and gender.
Results: Daily child argumentative behavior was associated with increased child WASO later that night (B=5.00, SE=2.38, p=.039). Daily child yelling had a trending association with increased child WASO later that night (B=5.17, SE=2.90, p=.079). Daily argumentative behavior was not associated with daily child SOL (p=.335) or TST (p =.570). Daily child yelling was not associated with daily child SOL (p=.695) or TST (p=.544).
Conclusion: Analyses suggest a relationship between daily child behavior and disrupted sleep (WASO). Given that parents in this study reported on their child's sleep, future studies should utilize objective sleep measures as well as longitudinal/multi-method

studies to determine causality. Future studies should examine whether poor sleep the previous night impacts child behavior the following night. In addition, the current study's results suggest that the efficacy of child sleep interventions might benefit from also targeting child behavior if the child has a history of oppositional behaviors.

Support (if any): American Academy of Sleep Medicine (Stearns, PI)

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1026

DIFFERENCES IN INTERNALIZING SYMPTOMS ACROSS LATENT TRAJECTORY CLASSES OF CHILD SLEEP ANXIETY

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Introduction: Previous studies suggest that emotional distress in children from family relationships is associated with declines in both objective sleep indicators and subjective sleep quality. Even after accounting for factors such as school-related anxiety and anxiety sensitivity, there is a close connection between sleep difficulties and internalizing symptoms in children. This study explores longitudinal trajectories of sleep anxiety and examines internalizing symptoms across different sleep anxiety trajectories.
Methods: This study conducted secondary analysis based on a large-scale prospective cohort study in South Korea. Data was collected annually from 2015 (Time1) to 2021 (Time7), with survey responses from children's primary caregivers. At Time1, the average age of the children (n = 381) was 3.3 ± 0.9 years (50.3% girls). Children's sleep anxiety was assessed using a subscale of the Children's Sleep Habits Questionnaire (CSHQ), and internalizing symptoms were measured using the total internalizing score from the Child Behavior Checklist (CBCL). Time1 internalizing scores captured early broad tendencies. Latent class growth analysis (LCGA) was conducted to identify sleep anxiety trajectories from Time1 to 7. Welch's ANOVA examined differences in Time1 internalizing scores among different trajectory groups.
Results: LCGA identified a 4-class quadratic model as the optimal solution. Class1 exhibited high sleep anxiety throughout all time points, while Class2 showed low sleep anxiety with a continuous downward trend. Class3 displayed low sleep anxiety at Time1, which increased over time, while Class4 showed high sleep anxiety that decreased significantly. Welch's ANOVA revealed significant differences in internalizing scores across latent classes ($p < .05$). Post hoc tests showed that Class4 had significantly higher internalizing scores than Class1 and 2 but no difference with Class3. Participants in Class4 exhibited the most severe internalizing problems (e.g., anxiety, depression, somatization).
Conclusion: These findings indicate that children's longitudinal sleep anxiety trajectories are closely linked to early, broad internalizing symptoms. Specifically, our results suggest that early internalizing symptoms may predict later sleep anxiety trajectories, with children exhibiting higher internalizing scores at earlier time points displaying more severe sleep anxiety patterns over time.
Support (if any): This research was supported by a grant of the R&D project, funded by the National Center for Mental Health (grant number: MHER22B03).

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1027

ASSOCIATION OF BEDTIME RESISTANCE AND SLEEP OUTCOMES IN TODDLERS

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Introduction: Bedtime resistance is commonly reported. However, little is known about the nature of bedtime resistance throughout toddlerhood and its association with sleep. Thus, the aims of this study are to 1) examine the prevalence of bedtime resistance in toddlers, and 2) determine associations between bedtime resistance, sleep parameters, and maternal perceptions of toddler sleep.
Methods: 318 mothers of toddlers (12-36 mos; M =23.1 mos) completed the Brief Infant Sleep Questionnaire–Revised (BISQ-R) and questions about bedtime resistance.
Results: Overall, 61.3% (n=195) indicated that their toddler exhibited resistance, fighting, and/or stalling at bedtime (bedtime resisters; BR), on an average 4.42 nights/week. BRs had later bedtimes (8:41pm vs 8:15pm), took longer to fall asleep (41.44 vs. 21.02mins), had more frequent (1.32 vs. 0.85) and longer night awakenings (31.23 vs. 17.32mins), and reduced longest stretch of sleep (7.53 vs. 8.76hrs) than those who did not resist bedtime, $p<.001$. BRs also had shorter total nighttime sleep (9.38 vs. 10.10 hrs) and total sleep per 24h (11.45 vs. 12.20hrs), $p<.001$. However, there were no differences in waketime, $p > .05$. In addition, BRs were less likely to have a consistent bedtime routine (5+ nights/week) (88.6% vs. 77.4%; $p=.012$). Mothers of BRs were more likely to perceive their toddler's sleep to be a problem (54.4% vs. 19.5%; $p<.001$) and bedtime to be difficult (48.7% vs. 3.3%; $p=.009$). Further, they were less likely to report that their child slept well during the night (59.5% vs. 84.6%; $p<.001$) and were less confident in managing their toddler's evening sleep (70.8% vs. 96.7%; $p<.001$). Similarly, bedtime resistance was associated with a higher likelihood of nap problems (35.0% vs. 10.8%; $p<.001$).
Conclusion: Approximately two-thirds of mothers report their toddlers exhibit bedtime resistance, which is associated with later bedtimes, decreased implementation of a consistent bedtime routine, prolonged sleep onset, worse sleep consolidation, and a higher likelihood of perceived sleep and nap problems. Interestingly, not all mothers who reported bedtime resistance perceived their toddler's sleep to be problematic. Thus, assessment and management of behavioral issues at bedtime is important and may result in improved sleep health.
Support (if any): Kenvue Brands LLC, a subsidiary of Kenvue Inc., Summit, NJ, USA

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1028

SEX AND SCREEN TIME MODERATES THE RELATIONSHIP BETWEEN CAFFEINE INTAKE AND SLEEP DURATION AMONGST US ADOLESCENTS

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Introduction: Approximately 72% of high school students do not get enough sleep (8-10 hours) on school nights. Insufficient

sleep is associated with obesity, diabetes, injuries, poor mental health, and problems with attention and behavior among adolescents. The reasons for sleep loss differs by sex. Screen time and daily caffeine intake has been found to be associated with sleep disturbance and daytime sleepiness. The American Academy of Pediatrics recommends that adolescents aged 12 – 17 should limit their caffeine intake to less than 100mg per day. However, the relationship between caffeine and sleep duration may be moderated by sex and excessive computer screen time.
Methods: Data on 640 adolescents (ages 16–17 years, 53% female) from the National Health and Nutrition Examination Survey conducted between 2015–2018. Screen time was determined by self-reported computer use during leisure time (≥2 (excessive) vs. < 2 hours/day). Excessive caffeine intake was assessed using 2-day dietary recall and categorized as number of days (0, 1, or 2 days) with >100mg. Self-reported sleep duration ranged 3 to 14 hours per school night. Linear regression for complex survey data was used to analyze the data. The fully conditional specification method was used to handle missing data.
Results: While excessive caffeine was positively associated with sleep duration, the strength of the relationship varied by sex (p=0.018) and excessive computer use (p=0.020), respectively. Specifically, females who consumed excessive caffeine for 1 or 2 days reported 0.57 hours (SE=0.24), and 0.59 hours (SE=0.25) longer average sleep duration, respectively. Furthermore, among adolescents with excessive computer/screen time, those who consumed excessive caffeine for 1 day and 2 days reported 0.51 (SE=0.19) and 0.86 hours (SE=0.25) longer sleep duration, respectively. No difference in the caffeine-sleep duration association was found amongst males and those reporting < 2 hours of screen time. The longer sleep duration was due mainly to later wake-up time as bedtime were similar.
Conclusion: Sex and excessive screen time moderates the association between excessive caffeine intake and sleep duration. Longer self-reported sleep duration may not indicate restful sleep as caffeine has been shown to disrupt sleep and affect circadian rhythm.
Support (if any): none.

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1029
LONGITUDINAL LINKAGES AMONG NEIGHBORHOOD QUALITY, SLEEP QUALITY, AND ADOLESCENT DEPRESSIVE SYMPTOMS

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Introduction: During adolescence, girls become disproportionately vulnerable to depression, while also undergoing marked changes in sleep. Although sleep and mood are robustly linked, environmental factors like neighborhood quality can impact both sleep and mood. This study examined linkages among neighborhood quality, sleep quality, and depressive symptoms longitudinally in a cohort of adolescent girls.
Methods: This study leverages data from the Transitions in Adolescent Girls (TAG) study, a prospective longitudinal examination of biological and psychosocial changes in adolescence. Wave 1 included N=174 adolescents, aged 10.0-13.0 years at enrollment (4.7% African American/Black, 10.3% Hispanic/Latine, 4.2% Native American or Native Alaskan, 65.7% White, 4.7% Asian, 0.5% Native Hawaiian or Pacific Islander, 6.6% Multiracial, 2.3% Other; 10.1% non-cisgender-identifying, 46.8% sexual minority identifying). Neighborhood quality was measured using the Child Opportunity Index 3.0 (COI), with scores (range= 1-100) reported by Census tract and normed at the state level, with higher scores reflecting better neighborhood quality. Wave 1 scores ranged from 5-91 (M=43.36; SD=26.77). At each wave, depressive symptoms were assessed using the Center for Epidemiological Studies Depression Scale for Children. Sleep was assessed using the Pittsburgh Sleep Quality Index, which has been validated in adolescent samples and reflects global sleep quality. We used linear regression to examine whether wave 1 neighborhood quality and wave 3 sleep quality were associated with depressive symptoms at wave 4, controlling for depressive symptoms at wave 3.
Results: Girls living in higher quality neighborhoods (i.e., higher wave 1 COI scores) subsequently experienced less severe depressive symptoms compared to those living in neighborhoods of poorer quality (b =.002, p =.055). When looking at the interaction between neighborhood quality and wave 3 sleep quality, those with the poorest quality sleep experienced significantly elevated depressive symptoms in wave 4, regardless of neighborhood quality. Further, those living in neighborhoods with the lowest COI scores experienced significantly greater depressive symptoms, regardless of sleep quality.
Conclusion: Initial findings suggest that neighborhood and sleep quality are independently and longitudinally associated with greater adolescent depressive symptoms. Future work will examine the impacts of neighborhood and sleep quality on the emergence and worsening of depressive symptoms over multiple study waves.
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1030
ACCEPTABILITY OF INFANT BEHAVIORAL SLEEP INTERVENTION BY BLACK MOTHERS OF INFANTS

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Introduction: Infant Behavioral Sleep Intervention (BSI) is highly effective with demonstrated benefits to infant and family sleep and functioning. However, a survey study suggested lower acceptability of extinction-based approaches by Black mothers of infants. Factors contributing to lower acceptability have not yet been identified. One objective of the Sleep Guidance in Black Families with Infant Children (SLUMBER) study was to examine acceptability of infant BSI in Black families and identify factors impacting acceptability.
Methods: Black mothers (n=20; 60% with a college degree) with an infant birth-9 months (M=4.2 months; 70% male) recruited through social media participated in semi-structured virtual interviews. Interview transcripts were analyzed with NVivo software using a grounded theory thematic descriptive approach.
Results: Acceptability of extinction-based infant BSI varied, with 45% (n=9) of mothers highly supportive, 25% (n=5) with moderate/mixed support, and 30% (n=6) not supportive. Most

mothers (n=11, 55%) perceived infant BSI as well-aligned with their cultural and/or personal values. Of those mothers who were not supportive, 33% (n=2) were fundamentally against BSI, whereas 67% (n=4) felt it was acceptable but not a good fit for them personally. The most common facilitator was perceived benefit of infants learning to self-soothe, which almost all (n=18; 90%) noted as a desired goal, followed by benefits to infant and/or parental sleep (n=5; 25%). Common identified barriers included fear that the baby would feel abandoned (n=16; 80%), difficulty tolerating their infant crying (n=13; 65%), and the possibility that crying could indicate a problem (n=8; 40%). For those mothers reporting mixed acceptability, facilitating factors for engaging in infant BSI included: potential benefits to the infant's current and future sleep; older infant age; assurance that the infant was not hungry; and option to check and provide comfort during the process.
Conclusion: Infant BSI is broadly acceptable to most Black mothers of infants, although concerns for negative impacts on the infant and parental tolerance of crying were identified as potential barriers. Study findings have implications for developing culturally appropriate infant BSI interventions for Black families.
Support (if any): Center for Injury Research and Policy at Nationwide Children's Hospital through Grant Number R49CE003074 from the Centers for Disease Control and Prevention.

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1031
ADAPTING A COMMUNITY-ENGAGED SLEEP INTERVENTION FOR SCHOOL-AGE CHILDREN WITH AUTISM SPECTRUM DISORDER

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Introduction: Up to 78% of children with autism spectrum disorder (ASD) have sleep disturbance. In ASD, shorter sleep duration < 7 hours and lower sleep efficiency < 85% are associated with disruptive behavior, anxiety and increased parental stress. The purpose of this study is to collect qualitative data for the eventual adaptation of a modification of the Youth version of the Transdiagnostic Sleep and Circadian Intervention (TranS-C) to improve sleep health dimensions (B-SATED: behaviors, satisfaction, alertness, timing, efficiency, duration) in children with ASD.
Methods: A qualitative descriptive approach was used to collect data with a purposive sample of parents of children with ASD age 6-12 years with moderate or greater sleep disturbance. Children with a moderate to severe sleep apnea diagnosis were excluded. Parents completed a 1-hour, think-aloud Zoom interview. A semi-structured guide was used to collect information on the intervention format and delivery as well as sleep barriers and facilitators. Interviews were audio-recorded, transcribed verbatim, and analyzed using deductive content analysis and inductive identification of emergent themes via Dedoose version 9.0.17.
Results: Twelve parents (91.7% Female; mean age= 42.4 + 7.01 years) of children with ASD (58.3% Female, mean age= 9.5 + 2.06) completed the interviews. All parents expressed interest in the intervention and preferred Zoom for all sessions. Three parents (25%) stated their child would participate, five (41.7%) expressed willingness to try, and four (33.3%) said their child would not participate, citing reasons such as limited communication and hyperactivity. Parents provided recommendations to increase child engagement in sessions (e.g., preferred characters, artistic components). Parents identified facilitators of good sleep (consistent routine, physical activity, turning screens off before bed) and barriers of good sleep (co-sleeping, loud noises, sickness, multiple sleep locations, and anxiety).
Conclusion: Our preliminary results suggest that the TranS-C-Youth-Autism intervention is appropriate for parents of children with ASD. Our team is among the first to include experts from diverse multidisciplinary backgrounds and parents of children with ASD in the intervention adaptation process. We strongly believe that the modified intervention will be useful to parents of children with ASD due to our innovative community-engaged approach.
Support (if any): Case Western Reserve University Frances Payne Bolton School of Nursing

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1032
SLEEP REGULARITY TO ADVANCE ADOLESCENT HEALTH EQUITY: CONTEXTUAL PATHWAYS AND COMMUNITY VOICES

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Introduction: Sleep is integral to health, and we know disparities exist with regard to sleep health. Sleep irregularity, etiologically distinct from sleep duration, is more common among adolescents with minoritized race and ethnic identities, and is associated with poor cardiometabolic and psychiatric health. The objective of this qualitative study was to identify facilitators and barriers to sleep regularity and targets to enhance adolescent sleep interventions, taking account of youth lived experiences.
Methods: This study, a university-community partnership, consisted of 10 semi-structured focus group interviews (FGIs) (N=60), sampling three key groups: (1) adolescents self-identifying as African American, Black, and/or Hispanic, ages 12-14, (2) their caregivers, and (3) community stakeholders, including educators, youth advocates, and clergy. FGI question development was guided by a socioecological framework with community member consultation. FGIs were conducted in English and Spanish, and occurred onsite at a youth-serving organization (n=4) or via Zoom in collaboration with local schools (n=6). Thematic analysis was used to identify key themes across contextual levels pertinent for sleep regularity.
Results: Dominant themes representing challenges to establishing and prioritizing regular sleep routines included increasing academic requirements translating into late nights or all-nighters, the seeming impossibility of balancing academics and extracurricular and work-related activities, and the ubiquitous presence of nighttime technology use. Factors situated at the intersection of household and school also emerged as significant barriers to sleep regularity, including mismatches between school start and end times and caregiver work schedules, which resulted in youth

spending extended hours in before- and after-school care arrangements. Relevant targets for structural interventions centered on mitigating adversity experiences, including violence exposure and the impact of educational and social policies yielding feelings and incidents of marginalization, hopelessness, anxiety, rumination and hypervigilance. Such interventions should also advocate for systems that increase access to mental health supports as facilitators of youth self-value, safety, emotional regulation and sleep.
Conclusion: Youth, caregivers, and community advocates identified key themes representing multiple mechanisms by which context influences sleep regularity. Interventions integrating supports across socioecological levels are critical to the development of culturally-relevant and community-engaged advances for adolescent sleep regularity.
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1033
EFFECTS OF AN INTEGRATED SLEEP AND CIRCADIAN INTERVENTION ON REWARD SENSITIVITY AND IMPULSIVITY METRICS IN ADOLESCENTS WITH DELAYED SLEEP TIMING

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Introduction: Developmental delays in sleep coupled with early school start times lead to insufficient and misaligned sleep during adolescence. Short sleep and circadian misalignment can negatively impact reward sensitivity and impulsivity processes implicated in substance use behaviors. We tested whether an integrated sleep/circadian intervention advanced and extended sleep and modified reward sensitivity and impulsivity. We also determined if advanced sleep/circadian timing were associated with changes in reward and/or impulsivity.
Methods: Following an 8-day baseline period, 74 high school juniors and seniors (ages 16-19, 64% female sex at birth) were randomized to a 2-week sleep/circadian manipulation (n=38) or a sleep monitoring control (n=36). The manipulation included stable wake times, increased morning light (Re-Timers), decreased evening light (blue-blocking glasses), and advanced weeknight bedtimes. Circadian phase was measured using salivary dim light melatonin onset (4 pg/ml). Actigraphy-assessed sleep was measured continuously. Reward and impulsivity metrics were captured using self-report (Behavioral Activation Scale [BAS]; UPPS-P Impulsivity Scale) and behavioral tasks (Balloon Analogue Risk Task [BART], Cued Go/No-Go Task [CGNG]). Substance use was assessed using a Timeline Followback Interview. Multilevel models compared sleep, circadian, and reward-related changes between conditions across time, and tested associations between sleep/circadian and reward-related changes controlling for sex at birth.
Results: At baseline, 18% of participants reported cannabis and 35% in alcohol use during the past 3-months. The sleep/circadian manipulation advanced circadian phase by ~48-minutes (B=-0.58; p< 0.001), extended weeknight sleep by ~43-minutes (B=0.81; p=0.004), and prevented an increase in behavioral reward activation (BART: B=-0.40; p=0.048) compared to the control condition. Increased weeknight sleep was associated with decreased lack of perseverance (UPPS-P: B=-0.16; p=0.037) and increased reward responsiveness (BAS: B=0.26; p=0.027).
Conclusion: A 2-week integrated sleep/circadian intervention advanced and extended sleep for adolescents with delayed sleep timing who may be at risk for engaging in substance use behaviors. Despite relatively low rates of substance use in the current sample, our findings support the hypothesis that changes in sleep behaviors relate to changes in reward sensitivity and impulsivity. Longer-term interventions may be necessary to test if sleep and circadian changes can be maintained and whether changes in reward sensitivity and impulsivity reduce future substance use.
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1034
REVISED CUTOFF SCORE FOR THE CHILDREN'S SLEEP HABITS QUESTIONNAIRE IN TODDLERS AND PRESCHOOL CHILDREN WITH EPILEPSY

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Introduction: Sleep disturbances are a significant concern for children with epilepsy, affecting over 70% of this sample. The Children's Sleep Habits Questionnaire (CSHQ) is widely used to screen for sleep problems in children. However, its standard cutoff score of 41 is designed for general Western pediatric samples aged 4–10 years. It may not fully capture the unique sleep challenges faced by toddlers and preschool-age children with epilepsy in Taiwan. Previous research has emphasized revising the CSHQ for younger children and specific cultural contexts. For example, co-sleeping is common among young children and Asian samples and may not necessarily indicate sleep disturbances. This study aimed to identify a revised CSHQ cutoff score for toddlers and preschool-age children with epilepsy, incorporating objective actigraphy measurements to improve the accuracy of detecting sleep disturbances in this sample.
Methods: This study included 141 toddlers and preschool-age children with epilepsy (mean age: 3.79 ± 1.29 years). Sleep assessments were conducted using the CSHQ and actigraphy. Actigraphy-defined sleep disturbances were determined using established objective criteria: wake after sleep onset (WASO) > 50 minutes, sleep efficiency < 85%, and sleep latency > 45 minutes. Receiver operating characteristic (ROC) curve analysis was performed to determine the optimal CSHQ cutoff score. Chi-square tests were used to assess the association between actigraphy-defined sleep disturbances and CSHQ cutoff scores.
Results: ROC curve analysis revealed an optimal CSHQ cutoff score of 48.5, which maximized both sensitivity (85%) and specificity (82%) for detecting significant sleep disturbances in this sample. The CSHQ standard cutoff score of 41 showed no significant association with actigraphy-defined sleep disturbances ($\chi 2$ =0.98, p=0.32). However, the revised cutoff score of 48.5 demonstrated a significant association with actigraphy-defined sleep disturbances ($\chi 2$ =5.24, p=0.02).
Conclusion: The findings of this study suggest that adjusting the CSHQ cutoff to 48.5 improves its accuracy in detecting sleep disturbances in toddlers and preschool-age children with epilepsy. This revised cutoff score enhances the alignment between the CSHQ and objective actigraphy measures, offering a more reliable screening tool for sleep problems in this sample.
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1035

CLAIMS-BASED PEDIATRIC INSOMNIA DIAGNOSIS, MANAGEMENT, AND INSURANCE-RELATED DISPARITIES

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Introduction: Insomnia impacts 10-30% of children and adolescents. While cognitive-behavioral therapy is the evidence-based treatment for insomnia, there are few providers and low rates of outpatient diagnosis, which may limit access. Research suggests that children in lower-income homes and neighborhoods experience greater insomnia symptoms compared to those in higher-income settings, but few studies have examined disparities in care. Additionally, although there are no FDA-approved pediatric insomnia medications in the US, little is known about outpatient prescribing beyond clinician surveys. This study used claims data to characterize pediatric insomnia incidence and management, including disparities in care.

Methods: We used 2017 IBM® MarketScan® insurance claims (n=12,394,902) to identify 0-17-year-olds with (a) a new insomnia diagnosis (i.e., no diagnosis in the prior year,) and (b) 1-year post-diagnosis and prescription data, to examine follow-up care. Multivariate logistic regression with covariates (age, sex, and prior/concurrent chronic medical, neurodevelopmental, or behavioral health disorders) examined disparities in insomnia management by commercial versus Medicaid coverage.

Results: The overall incidence of new insomnia diagnosis was 0.47% (n=58,269). Of those with 1-year post-diagnosis and prescription data (n=35,506, 53.4% boys), most (52.6%) were adolescents and 66.3% were Medicaid-insured. While 37.9% of these youth had a behavioral health visit and 20.3% had a psychological assessment during the 1-year post-diagnosis, 14.8% received no treatment, and 5.7% received pharmacologic care only, without any office visits, including primary care or other specialties. Alpha agonists (30.0%) and antidepressants (14.5%) were most prescribed. Compared to those with commercial insurance, Medicaid-insured children had lower odds of behavioral health visits (Odds ratio [OR]=0.66, p<.001) and higher odds of receiving pharmacologic care (OR=1.69, p<.001) in the year post-diagnosis, even when covarying for co-occurring medical, neurodevelopmental, and behavioral health conditions. Medicaid-insured children were only slightly less likely than commercially insured children to have had a psychological assessment (OR=0.93, p<.01).

Conclusion: The incidence of insomnia was exceptionally low (< 1%) compared to epidemiologic research. Findings also suggest insurance-related disparities, with limited behavioral health follow-up in Medicaid-insured versus commercially insured youth, yet increased likelihood of receiving pharmacological management. Findings highlight the need to standardize evidence-based and equitable pediatric insomnia diagnosis and management.

Support (if any): Children's Hospital of Philadelphia (AAW)

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1036

SCORING ACTIGRAPHY WITH AND WITHOUT SLEEP DIARIES: A COMPARISON OF HIERARCHICAL PROCEDURES AMONG CHILDREN WITH SLEEP PROBLEMS

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Introduction: Actigraphy is a widely used approach for measuring sleep, but there is a lack of consensus regarding determination of the rest interval (i.e., "time in bed"). Methods often employ a hierarchy of inputs from multiple data sources. Examples include a procedure developed by Patel and colleagues (2015), event marker > sleep diary > light > activity ("original approach"), and a modified procedure (Kubala et al., 2019), event marker > light > sleep diary > activity ("modified approach"). Yet, sleep diaries are burdensome to complete and vulnerable to inaccuracies (e.g., due to recall bias), particularly when completed by parents/caregivers. Here, we compared these hierarchical procedures, with and without the inclusion of sleep diaries, to assess rest interval length among youth with elevated rates of sleep problems.

Methods: N=25 children adopted from foster care (68% female), ages 7 to 14 years (M=9.68, SD=2.63), recruited as part of a larger study. All scored in the clinical range on a parent-report measure of sleep problems. Here, 7 nights of actigraphy (Actiwatch Spectrum, Philips Respironics) and sleep diary data per participant were analyzed.

Results: A two-way repeated measures ANOVA was used to determine the effect of scoring method on rest interval length across 7 nights. The mean rest interval length (hours) across all participants and nights for each scoring approach was as follows: original approach with sleep diary, M=9.77±1.51; original approach without sleep diary, M=9.72±1.46; modified approach with sleep diary, M=9.78±1.48; and modified approach without sleep diary, M=9.72±1.46. There was no statistically significant interaction between scoring method and night, F(4.957, 118.974) = 0.339, p=.887; therefore, main effects were examined. Surprisingly, there was no statistically significant difference in rest interval length between scoring methods, F(1.090, 26.159) = 2.799, p =.104. Rest interval length also did not significantly differ between nights, F(3.607, 86.561) = 1.395, p=.245.

Conclusion: We found that the inclusion versus exclusion of sleep diary data did not result in significant differences in rest interval length for either scoring approach. The extent to which use of parent-reported sleep diaries improves actigraphy-based assessment of sleep among populations of children with high rates of sleep problems warrants further study.

Support (if any):

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1037

ASSESSING THE EFFECT OF THE COVID-19 PANDEMIC ON SLEEP PATTERNS IN CHILDREN USING POLYSOMNOGRAPHY

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Introduction: The COVID-19 pandemic, lockdown, quarantines, virtual classrooms, and work-from-home policies during this pandemic have had a significant impact on the sleep patterns of children and caregivers. Multiple international studies have revealed the pandemic has caused increased sleep latency, sleep disruption, increased use of sleep aides, and worsening of previously diagnosed sleep disorders. To our knowledge, no studies have objectively recorded the impact of a global pandemic on children via review of the polysomnogram (PSG) to date. This study aimed to quantify the impact of a global pandemic on sleep patterns within the pediatric population via polysomnographic review.
Methods: A retrospective case-control study enrolled 6-12-year-old children, excluding those with mild-severe obstructive sleep apnea. Conducted at a single academic center.
Results: Ninety-nine children underwent PSG during the pre-pandemic period in 2019, and 85 children underwent PSG during the COVID-19 pandemic. The PSG studies analyzed sleep parameters such as sleep efficiency, sleep latency, total sleep time, REM latency, total REM time, REM AHI, and arousal index. Data analysis was done with SPSS version 26. Estimates were adjusted ANCOVA. There was a statistically significant reduction in Sleep Efficiency ($P < 0.0001$), an increase in Sleep Latency ($P < 0.029$), and a reduction in % REM Sleep and total REM time ($P < 0.001$).
Conclusion: The data showed a statistically significant decline in pediatric sleep efficiency and sleep quality associated with the pandemic, specifically increased sleep latency and decreased total REM sleep. This data validates the published reports, with subjective data gathered through surveys and online questionnaires. This could significantly impact the maintenance of sleep health in children during periods of stress such as the COVID-19 pandemic.
Support (if any):

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1038

PREVALENCE OF RESTLESS LEG SYNDROME IN CHILDREN WITH CYSTIC FIBROSIS

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Introduction: Restless leg syndrome (RLS) is a sleep disorder affecting 2-4% of school-aged children and adolescents with iron deficiency being implicated in its pathogenesis. Patients with cystic fibrosis (CF) are at risk for iron deficiency and prior studies show up to 11% of adults with CF have RLS. There is a paucity of research addressing RLS in children with CF. The objective of this study is to investigate the prevalence of RLS in children with CF and to examine the relationship between the severity of RLS symptoms and iron status.
Methods: This was a single-center, prospective, observational study recruiting children and adolescents with CF aged 10-18 years seen in outpatient clinic from December 2023 to December 2024. Patient and Parent screening questionnaires for RLS using International Restless Legs Syndrome Study Group (IRLS) pediatric criteria were administered to consented families. The RLS severity scale was completed in patients with positive screening questionnaires. A chart review was performed to collect clinical information on subjects' nutritional, respiratory, and iron status (using red cell distribution width (RDW) as a surrogate for this).
Results: Seventy-six patients consented to participate in the study. Of these, 46 were female, with a mean age of 14.2 + 2.5 years and a mean body mass index of 21 + 3.4 kg/m2. Five patients tested positive for definite RLS, resulting in a prevalence rate of 6.6% in CF patients. According to the IRLS severity scale, one case was classified as mild, three as moderate and one as severe. RDW ranged from 11.6% to 17.8% and RLS prevalence was 10.5% in the highest RDW quartile and 5.2% in the lowest RDW quartile.
Conclusion: This is the first report of RLS prevalence in children with CF using IRLS pediatric criteria. This study highlights the need for further research examining the relationship between iron levels, as measured by ferritin, and the severity of RLS in this population. Such studies are crucial to establishing a reliable understanding of how iron status may influence the development and severity of RLS in children with CF and could inform more targeted interventions or treatments.
Support (if any):

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1039

A GOOD NIGHT'S SLEEP? THE ASSOCIATION BETWEEN NEURODEVELOPMENTAL DISORDERS AND RESTLESS SLEEP DISORDER

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Introduction: Sleep disorders are prevalent in children and are associated with behavioral and neurocognitive impacts when left untreated. A recently identified sleep-related movement disorder, restless sleep disorder (RSD), is characterized by frequent body movements during sleep resulting in daytime impairment. RSD is diagnosed based on clinical symptoms as well as objective evidence of restless sleep on an overnight polysomnogram and improves with iron supplementation. Despite the frequent comorbidity of sleep disruption among children with neurodevelopmental disorders, there is a paucity of data assessing the association between RSD and neurodevelopmental disorders. Thus, we sought to evaluate the association between RSD and neurodevelopmental disorders in children.
Methods: This is an interim analysis of a retrospective study of children aged 6-18 years old who completed a baseline diagnostic polysomnogram at British Columbia Children's Hospital between December 2023 – May 2024. Polysomnogram data was evaluated for large muscle movements according to the International Restless Legs Syndrome Study Group standards. Neurodevelopmental disorders were classified according to the DSM-5.
Results: There were 150 children (median age = 11 years, females = 57/154 (38.0%) and 57/150 (38.0%) had a neurodevelopmental disorder. In total, there were 23/150 (15.3%) children with RSD, 48/150 (32.0%) with moderate or severe obstructive sleep apnea, and 2/150 (1.3%) with restless legs syndrome. Of the children with neurodevelopmental disorders, 5/57 (8.8%) had RSD whereas 18/93 (19.4%) children without a neurodevelopmental disorder were found to have RSD ($p = 0.081$). Children with a neurodevelopmental disorder were more likely to receive iron supplementation (18% of

children with neurodevelopmental disorders vs 3.9% of children without neurodevelopmental disorders; p=0.012), which may confound the results.
Conclusion: In this interim analysis, we did not find an association between neurodevelopmental disorders and RSD. However, children with neurodevelopmental disorders were more likely to receive iron supplementation, which may confound our results. Data collection is ongoing to better elucidate this relationship. Ultimately, the results of this study will examine the association between neurodevelopmental disorders and RSD to inform the need for the routine assessment of RSD in children with neurodevelopmental disorders.
Support (if any): We thank the BC Children's Hospital Research Institute for providing funding.

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1040
SCORING LARGE MUSCLE MOVEMENTS IN PEDIATRIC SLEEP STUDIES: AN EDUCATIONAL MODULE FOR SLEEP TECHNOLOGISTS

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Introduction: Restless Sleep Disorder (RSD) has recently been recognized as a distinct sleep disorder, with Large Muscle Movement (LMM) scoring being a crucial component of its diagnostic criteria. This project aimed to develop and implement an online educational module to enhance the knowledge and skills of sleep technologists to accurately score LMMs.
Methods: We constructed an online learning module that included training on the identification and scoring of LMMs in pediatric sleep studies. The module consisted of a 10-question pre-assessment, the educational content (which explained the background of RSD diagnosis, the role of LMMs in diagnostic criteria, and current scoring rules), a repeat of the 10 questions for post-assessment, and a feedback section regarding the module and LMM scoring in general.
Results: Preliminary results indicate a significant improvement in the accuracy and consistency of LMM scoring among sleep technologists who completed the module. The average post-module assessment scores showed a marked increase compared to pre-module scores, with total scores on the 10-question learning assessment increasing from 63.3+/-20.6% pre-module to 90.0+/- 8.9% post-module (p=0.017). Eighty percent of technologists agreed or strongly agreed with the statement that "As a result of taking this course I am confident I can recognize the clinical characteristics, symptoms, and diagnostic criteria of RSD." Similarly, 60% agreed or strongly agreed with the state that "As a result of taking this course, I am confident I can accurately apply scoring guidelines for LMM events in sleep studies." Feedback from technologists regarding the module itself, as well as questions and suggestions regarding LMM scoring in general, provided valuable information for potential future revisions of scoring rules.
Conclusion: An online educational module significantly improved the knowledge and ability of sleep technologists to score LMMs accurately, thereby aiding in the diagnosis of RSD. This initiative highlights the importance of continuous education and training in maintaining high standards of care in pediatric sleep studies.
Support (if any): None.

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1041
PARENTAL SLEEP KNOWLEDGE AND TODDLER SLEEP: ASSOCIATIONS WITH CULTURAL VALUES AND ACCULTURATION AMONG MEXICAN AMERICAN FAMILIES

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Introduction: Cultural values and acculturation strongly influence parenting behavior, yet few studies have considered how they may influence toddler sleep. This study characterized parental sleep knowledge, values, acculturation, and bedtime among toddlers from Mexican American families.
Methods: 158 parents (156 mothers; 19-45 years; mean education 12.3±3.0 years) of Mexican American toddlers (62% boys; 12-16 months) completed surveys in Spanish (54.4%) or English. Toddlers wore an actigraph for 7 days/nights to estimate average bedtime. Participants were asked about Mexican American cultural values of respect (V-Resp, 8 items, range 1-5, higher score indicating stronger endorsement), acculturation to non-Hispanic U.S. culture (6 items, range 1-4, ≥2.5=high acculturation), and sleep knowledge (10 True/False items; range 1-10).
Results: Parents averaged 7.5 + 1.7 correct on the sleep knowledge measure, with the most common incorrect responses for the items "children who do not get enough sleep are more likely to be overweight" (SK-OV, 50.7% incorrect) and "children only need a bedtime routine if they have trouble falling asleep" (SK-BR, 41.8% incorrect). More parents that incorrectly answered SK-OV (vs. correct) had high acculturation scores (72.7% vs. 27.3%, X2=4.0, p=.046). More parents that incorrectly answered SK-BR (vs. correct) had low acculturation scores (57.6% vs. 42.4%, X2=24.3, p=<.001). Parents that incorrectly answered SK-BR and SK-OV had higher V-Resp scores (SK-BR: $\bar{x}$=4.0 vs. 3.7, F=10.2, p=.002; SK-OV: $\bar{x}$=4.0 vs. 3.7, F=11.3, p=.001). Toddlers of parents that incorrectly answered SK-BR and SK-OV had significantly later bedtimes (22 min, p=.033; and 24 min, p=.021 respectively). In a stepwise regression controlling for parental age and education, V-Resp was significantly associated with later toddler bedtime (R2=.211, β=.364, p=.002).
Conclusion: High acculturation and Mexican American cultural values of respect were associated with parent sleep knowledge and toddler bedtime in Mexican American families. The measure used to assess cultural values focuses on intergenerational behaviors and the influence of elder wisdom, suggesting perhaps parental knowledge and toddler sleep routines are based on what has been learned from family vs. health professionals. Understanding cultural values and acculturative differences is crucial for personalizing sleep education and addressing common misconceptions about toddler sleep health for Mexican American families in both clinical and community settings.
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1042

PARENTING PRACTICES REGARDING SCREEN USE AT BEDTIME AND ITS RELATIONSHIP WITH TODDLER SLEEP IN MEXICAN AMERICAN FAMILIES

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Introduction: Screen use around bedtime starts for many children in early childhood despite recommendations to restrict such use. Evidence is currently lacking on the relationship of parenting practices regarding sleep and screens with objectively measured toddler sleep. Such findings could inform the design of culturally-relevant interventions promoting healthy screen use and sleep in toddlers. The objective of this study was to evaluate whether maternal parenting practices regarding sleep and screens are associated with toddler sleep in Mexican American families.
Methods: Mexican American families with toddlers were recruited from a safety-net health system. Mothers completed orally administered surveys that included items on parenting practices regarding screen use and sleep: (1) the frequency of having their toddler use a screen device to help their child fall asleep and (2) the frequency of allowing their toddler to use a screen device before bedtime. Responses to each item were dichotomized (never/ever). Toddler average bedtime, sleep-onset time, and duration were measured with 7 days/nights of actigraphy. Data were analyzed using t-tests to evaluate the relationship between each parenting practice and sleep outcomes.
Results: 384 mother-toddler dyads participated. Mothers were on average 31.4 years old (SD=6.0), 85% were partnered, and mean education level was 11.6 years (SD=2.5). Toddlers were on average 21.2 months old (SD=3.1) and about half were boys (49%). Mothers who reported ever using screens to help their toddler fall asleep, versus those who reported never, had toddlers with significantly later average bedtime (24 minutes, p<.01), later average sleep-onset time (24 minutes, p<.01), and shorter average sleep duration (18 minutes, p< 0.03). There were no differences in toddler sleep (average bedtime, sleep onset-time, and sleep duration) in those with mothers who reported ever versus never allowing toddler screen use before bed.
Conclusion: Parental use of screens to help a toddler fall asleep is associated with toddler sleep, including later bedtimes and shorter sleep durations, whereas the general practice of allowing screen use before bed was not associated with toddler sleep. Parental use of screens as a behavioral tool to help their toddler fall asleep may create a sleep onset association that negatively impacts child sleep.
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1043

MEDICAL CLOWNS IMPROVE SLEEP AND SHORTEN HOSPITALIZATION DURATION IN HOSPITALIZED CHILDREN

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Introduction: Intervention by medical clowns has been shown to reduce stress and anxiety, which in turn may affect sleep. It is well established that sleep is important for recovery from injury and illnesses. Thus, we sought to examine the ability of medical clowns to positively impact children's sleep and health during hospitalization.
Methods: The study is an observational matching (case-control) interventional study which took place at the department of pediatrics in Carmel Medical Center. Forty-two hospitalized children ages 2-17 were included in two equal groups of intervention or control. Children in the control group were recruited based on matching of the chief complaint, medical diagnosis and age of the children in the intervention group in a 1:1 matching. Sleep was objectively evaluated for two consecutive nights using actigraphy, and subjectively utilizing sleep questionnaires. Hospitalization duration and demographics were also monitored. The study group had an encounter with a medical clown (15-30min) before bedtime on either the first or the second hospitalization night, while the control group was not exposed to a medical clowns at all.
Results: Study (clown) and control groups (n=21 in each) were comparable in age and clinical characteristics. The study group had a significantly delayed wake-up time compared to the control group (06:59±46min vs. 07:26±42min, p< 0.05) (mean difference of 27min). Sleep period time was significantly longer in the study versus the control group (570±76 vs. 500±66.1min, p< 0.05), a total mean increase of 70 minutes. Sleep efficiency was significantly higher in the study group (92.3±4.6% vs. 87.9±8.7%, p< 0.05). Within the clown group, when comparing nights with and without a medical clown, total sleep time was on average 54 minutes longer on the night of the intervention (518±74min vs. 464±59min, p< 0.01), and the wake after sleep onset (WASO) significantly shorter (42±25min vs. 66±58, p< 0.05), mean difference of 24min). Regarding general medical outcomes, hospital stay was significantly shorter in the clown group vs. control (104±42h vs. 128±42h, p< 0.05).
Conclusion: An encounter with a medical clown before bedtime in hospitalized children improves sleep and shortens hospital stay.
Support (if any): Supported by a non restricted grant ATIDIM from Carmel Medical Center

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1044

A PRELIMINARY EVALUATION OF THE EFFECTS OF HIGHLY EFFECTIVE MODULATOR THERAPY ON SLEEP IN PRESCHOOL CHILDREN WITH CYSTIC FIBROSIS

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Introduction: Sleep is critical to health and development in pediatrics. More than one quarter of healthy children experience sleep disturbances, and chronic illnesses such as Cystic Fibrosis (CF) can exacerbate sleep difficulties. Pediatric CF has been associated with snoring, impaired sleep quality, and daytime sleepiness. Polysomnogram findings include shorter sleep times, frequent arousals and reduced REM. CF Transmembrane Regulator (CFTR) modulator medications have revolutionized CF care; however, as these therapies and potential adverse effects are fully evaluated, it is critical to assess sleep health. We hypothesized that pediatric CF patients on Elexacaftor/Tezacaftor/Ivacaftor (ETI) therapy will have stable or improved sleep.

Methods: This IRB approved, prospective study was conducted at Nemours Children's Hospital, Delaware. Ten ETI-eligible patients aged 2-5 years were enrolled and parents/guardians completed surveys at three office visits. Parents/guardians completed the Brief Infant Sleep Questionnaire (BISQ-R) and a 25-item investigator-designed questionnaire reviewing medical symptoms during sleep. Exclusion criteria included English as a second language.
Results: The 10 patients (5 male) had an average age of 4.2 years. To date, 0/10 children reported baseline nocturnal respiratory symptoms and 0/10 parents/guardians felt a CF diagnosis affected sleep. During a pulmonary exacerbation, 3/10 patients reported nighttime awakenings and a negative impact on sleep quality compared to 2/9 at visit 2. BISQ-R results showed 10/10 children had a consistent bedtime routine at least 5 nights a week. Patients slept an avg 7.5 hours at visit 1 with 6/10 patients having at least one nighttime awakening. At visit 2, patients slept an avg 9.5 hours and no change in nocturnal awakenings. One patient reported longer sleep latency and a later bedtime at visit 2. Two parents reported bedtime was more challenging at visit 2 compared to visit 1. Official BISQ-R scoring is pending at this time but will be available for conference.
Conclusion: Sleep evaluation in this cohort of preschoolers with CF and ETI initiation shows a healthy baseline and improvement in sleep measures. Limitations include a small sample size and additional confounders may be natural changes in sleep due to patient age. Data suggests evaluation of sleep may be helpful for preschoolers on ETI therapy.
Support (if any):

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1045

POLYSOMNOGRAPHIC DATA IN CHILDREN WITH CYSTIC FIBROSIS ON HIGHLY EFFECTIVE MODULATOR THERAPY

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Introduction: Sleep disorders are highly prevalent among people with chronic disease. Cystic fibrosis (CF) is a chronic, life-limiting, multisystem genetic disease that is the most common single-gene disorder among Caucasians worldwide. Highly effective modulator therapies (HEMTs), by targeting the defective protein in CF, have led to dramatic improvements in sinopulmonary disease, nutritional status, quality of life, and life-expectancy. However, the impact of HEMTs on sleep is still unknown.
Methods: A single-center retrospective analysis of polysomnographic data from 2012-2023 in children with CF on HEMTs.
Results: Polysomnographic (PSG) data were available in 34 children with CF. Mean age of the participants was 10.7±4.8 years. Fifty-three percent were female. Five participants (15%) were of non-White race and 9 participants (26%) identified as Hispanic. Lung function was normal, on average, and the mean body mass index percentile (BMI) was 65.7±28.9%tile. Average duration of HEMT use was 2.1±1.4 years. Sleep complaints were common: snoring in 67%, daytime sleepiness in 38%, insomnia in 41%, and restless sleep in 69%. Participants also had several comorbidities: attention-deficit hyperactivity disorder (ADHD) in 26%, anxiety/depression in 18%, enuresis in 26%, diabetes in 12%, dependence on nighttime feeds in 12%, and iron deficiency (ferritin< 30ng/mL) in 63%. Obstructive sleep apnea (OSA), defined as an obstructive apnea-hypopnea index (oAHI)≥1/hour, was present in 71% of participants and 18% had moderate-severe OSA (oAHI≥5/hour). Duration of HEMT use was linked to presence of moderate OSA (p=0.02) but not insomnia (p=0.2) or restless sleep (p=0.1). OSA was associated with snoring (p=0.005) but not any other sleep complaint or comorbid condition. Presence of ADHD was associated with more insomnia symptoms (p=0.02) and dependence on nighttime feeds was associated with restless sleep (p=0.02). Twenty-four percent of participants had tonsillar hypertrophy and 29% had enlarged adenoids, but, neither were associated with increased risk for OSA (p=0.3).
Conclusion: Sleep complaints are common among children with CF even in the post-HEMT era. Frequency of OSA continues to be high among children on HEMTs despite improvements in sinopulmonary disease. Children with CF, including those on HEMTs, should be routinely screened for the presence of sleep disorders.
Support (if any):

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1046

PREVALENCE & TREATMENT OF SLEEP PROBLEMS IN PEDIATRIC BRAIN CANCER

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Introduction: Survivors of pediatric brain tumor may experience excessive daytime sleepiness (EDS), as well as other sleep problems due to tumor location and its treatment. Despite this, there are little to no findings on the prevalence and treatment of sleep problems, including EDS. The aim of this study is to document the prevalence of and treatment for sleep problems within this population.
Methods: Retrospective chart review was conducted for individuals diagnosed with pediatric brain tumors with documented sleep issues at one hospital system within the last 15 years. Fatigue was included as it was used interchangeably with daytime sleepiness in the medical record.
Results: Sixty-six charts were available for review. Of those, 28 had a benign tumor, and therefore, chart review was not completed. Of the remaining 38, concerns with fatigue or sleep were present in 74% (n = 28). Sleep concerns included Insomnia (21%), Hypersomnia due to a Medical Condition (3.5%), and Obstructive Sleep Apnea (3.5%). The vast majority, however, fell into the "Other" category (68%), including descriptions of sleep problems (e.g., daytime sleepiness, trouble falling or staying asleep) with no formal sleep disorder diagnosis. Sleep Medicine was consulted for 17% of cases, with the average time from cancer diagnosis to first mention of sleep problems being 5 years, 5 months. The average length of time from cancer diagnosis to assessment by Sleep Medicine was 10.5 years. For those with sleep issues on cancer treatment, 46% did not receive targeted sleep recommendations. When recommendations were provided, 18% included medication for sleep issues and 7% Physical therapy/exercise. Psychology was consulted for 61% of cases; however, sleep concerns were never listed as the reason for the referral.
Conclusion: Sleep concerns were common (74%) in pediatric brain tumor. However, there was a 5-year gap between

identification of problems and referral to Sleep Medicine. Most youth did not receive recommendations to improve their sleep while they were receiving cancer treatment. Further, while Psychology was a part of the care team for most cases (61%) they were not referred to in order to address sleep concerns.
Support (if any): This study is supported by the Kentucky Pediatric Cancer Research Trust Fund.

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1047

CHILDREN AND ADOLESCENTS WITH GUT-BRAIN DISORDERS HAVE WORSE SLEEP APNEA INDICES, SLEEP AROUSALS, AND PERIODIC LIMB MOVEMENTS THAN HEALTHY CHILDREN

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Introduction: Children with disorders of gut-brain interaction (DGBI) often report poor sleep. However, the presence of sleep disorders and polysomnography (PSG) characteristics have not been previously described. Thus, we aimed to compare PSG changes in children with DGBI compared to healthy controls and describe sleep disorders seen in DGBI patients.
Methods: In a retrospective review, patients aged 7-19 years who met Rome IV criteria for DGBI without organic GI or systemic conditions were studied. Demographic data, GI and sleep symptoms, and diagnoses were collected, with PSG metrics obtained within one year of the GI clinic visit. PSG metrics were compared to a control group of healthy children aged 4-18 years from a sleep research repository. The analyzed metrics included total sleep time, sleep efficiency after onset, sleep stages (REM, NREM1, NREM2, NREM3, REM cycles, and latency), sleep apnea-hypopnea index (AHI), obstructive-apnea-hypopnea index (OAHI), arousal index and arousal episodes, and periodic limb movement index (PLMS-I). Linear regression analyses were conducted to examine differences between groups, adjusting for age, race, and BMI.
Results: In a study of 102 children with DGBI, 66% were females, 88% Caucasian, 30% having irritable bowel syndrome, 29% functional abdominal pain, 21% functional dyspepsia, 13% functional constipation, and 5% cyclic vomiting. The mean age was 13.9 years ± 3.3, and mean BMI was 26.4 ± 7.6. In contrast, 203 controls had a mean age of 10.7 years ± 2.6, a mean BMI of 22 ± 6.7, with 57% females and 64% Caucasian. DGBI patients had lower sleep efficiency ($p=0.002$), NREM3 ($p< 0.0001$), REM sleep ($p=0.05$), shorter REM latency ($p=0.002$), and REM cycles ($p=0.002$). They had higher apnea (OAHI $p< 0.0001$), arousal index, arousal episodes, and periodic limb movements. Significant differences remained after controlling for age, BMI, and race ($p<=0.05$). Common sleep complaints included snoring, sleep onset issues, and excessive daytime sleepiness, with diagnoses of obstructive sleep apnea, primary snoring, and insomnia.
Conclusion: Children with DGBI often have obstructive sleep apnea, primary snoring, insomnia, with less slow wave sleep and more apnea, arousal episodes, and limb movements. A thorough investigation and treatment of sleep disorders may improve outcomes for pediatric DGBI.
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1048

IMPACT OF NOCTURNAL HYPOXEMIA IN SICKLE CELL DISEASE ON SLEEP ARCHITECTURE

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Introduction: Youth with Sickle Cell Disease (SCD) are at increased risk for sleep related issues both respiratory and non-respiratory. N3 and REM sleep are essential for overall functioning, academic performance, learning and hormonal and immune regulation. Reduction in N3 sleep could play a role in preexisting inflammation and have an additional effect on pain in this population. We evaluated sleep architecture in children with SCD, in those with nocturnal hypoxemia (NH) compared to those without NH.
Methods: IRB-approved exploratory retrospective chart review on 75 children with SCD (ages 2–20 years; mean age 10 ± 4.7 years), referred for an overnight polysomnogram (PSG). Data collected included demographics, hematologic parameters, medication history, and PSG parameters.
Results: Our cohort was equally male (37) and female (38) and 97% being Black/African American. Mean BMI z-score was 0.773. Participants were grouped by NH status (NH: n=7; non-NH: n=68) and by obstructive sleep apnea (OSA) diagnosis (OSA: n=43; non-OSA: n=32). NH was defined as presence of oxygen saturation below 90% for more than 5% of the total sleep duration. Diagnosis of OSA was based on interpretation of sleep certified physician. NH was significantly associated with SS genotype (85.7%, $p=0.005$) and increased markers of hemolysis including lower hemoglobin, higher reticulocyte count and higher bilirubin level. Oxygen saturation nadir was significantly lower in NH group (mean 80.3, SD 6.7) compared to the non-NH group (M 88.7, SD 7.5) No statistically significant difference in N1, N2 or REM sleep, however there was significant reduction of N3 sleep among NH group (21.3%, SD=8.3) compared to the non-NH group (32.8%, SD=16; $p=0.009$). OSA was not associated with an increased prevalence of NH or changes in sleep architecture. There was significantly increased periodic limb movements in the non-NH group compared to the NH group.
Conclusion: In youth with SCD, NH was associated with SS genotype and increased markers of hemolysis and anemia. Among children with SCD, we found reduced N3 sleep in those with NH compared to those without NH. These findings highlight the importance of screening for NH and the need for interventions to optimize sleep to improve health outcomes for children with SCD.
Support (if any):

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1049

CHARACTERIZING THE COMPLEXITY OF REM SLEEP ACROSS PEDIATRIC DEVELOPMENT: A NOVEL METRIC APPROACH

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Introduction: Rapid eye movement (REM) sleep plays a critical role in neurodevelopment, yet current measures lack the sensitivity to capture age-specific REM dynamics that reflect evolving neural architecture. Chaos analytics involves analyzing complex, nonlinear, and dynamic systems where traditional methods may fail to capture the underlying patterns. Recurrence Analyses is one primary method of visualizing and quantifying this alternating complex pattern of "chaos" and "order" that recur. We established Multilevel Heterogeneous Recurrence Analysis (MHRA) to increase specificity and quantification of complex EEG patterns. MHRA offers a flexible framework for uncovering dynamic brain characteristics across multiple scales. With recurrence-based approach using chaos-driven metrics, we described age-specific REM sleep micro- and macrostructural features in pediatric populations.
Methods: REM sleep data from children and adolescents aged 6–18 years were analyzed using MHRA. For microstructural analysis, electroencephalogram (EEG) signals were extracted from REM epochs, normalized, and analyzed to quantify dynamic properties within each epoch. For macrostructural analysis, sleep stages (Wake, N1, N2, N3, REM) were segmented into 30-second epochs, producing symbolic sequences to represent stage transitions throughout the night. MHRA was applied to visualize dynamic recurrence patterns using Heterogeneous Recurrence Plots and Fractal Maps. Machine learning techniques were integrated to identify age-specific features across the micro- and macrostructural levels.
Results: Principal Component Analysis was performed to identify and explore age-related variations in REM EEG micro- and macrostructural features across pediatric age groups. The analysis revealed that the extracted REM micro- and macrostructural dynamics exhibited clear and distinct age-related patterns among children and adolescents aged 6 to 18 years. These findings demonstrate that the proposed methods successfully captured age-specific neurodevelopmental signatures, reflecting the evolving characteristics of REM sleep across developmental stages.
Conclusion: Our findings suggest that both micro- and macrostructures of REM sleep contain distinct developmental signatures across different age groups. This methodology offers promise as a diagnostic tool for detecting atypical neurodevelopment early in life, potentially enabling earlier therapeutic interventions and improved outcomes for children with developmental concerns.
Support (if any):

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1050

VALIDATING MOTRPAC SLEEP HIGH DENSITY EEG DATA COLLECTION IN CHILDREN AND ADOLESCENTS

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Introduction: Adolescence is marked by profound changes in sleep-wake physiology, driven by recognized neurodevelopmental shifts impacting macro- and micro-architecture of the electroencephalogram (EEG) during sleep. Ensuring reliable and high-quality data is critical for studying these developmental processes, particularly in multicenter settings. In this ancillary study to the Molecular Transducers of Physical Activity Consortium (MoTrPAC), we aimed to assess the reliability and data quality of sleep EEG by evaluating consistency and concordance in data collected across two sites, using identical platforms.
Methods: 113 participants (Mage=14.5±2.5 years, 55% Female) completed the Pediatric MoTrPAC study and underwent standard overnight polysomnography (PSG) with high-density EEG (hdEEG; 128 channels) at two sleep laboratory sites: UCI Sleep Laboratory (n=66) or the Research Center for Exercise Medicine and Sleep (RCEMS/PERC; n=47). Both sites used the same equipment and protocols (Natus Neurology equipment, Waveguard original EEG cap, and Natus SleepWorks software). All recordings were scored by a boarded sleep medicine physician, using 30-second epochs. EEG data underwent preprocessing, artifact rejection, and segmentation into concatenated NREM epochs. Spectral power was calculated for frequency bands using a multitaper approach. Threshold-free cluster enhancement (TFCE) was used for multiple comparisons correction across topography.
Results: Total sleep time and time spent in each sleep stage did not differ between sites. Similarly, we observed no site-based differences in absolute or relative spectral power across all frequency bands. Consistent with prior work, age-related decreases in absolute power were observed at both sites for slow wave activity, slow oscillations, delta, theta, sigma, and beta frequency bands (all $p < 0.05$, TFCE corrected). Conversely, relative power in higher frequency bands including sigma, beta, and gamma increased with age (all $p < 0.05$, TFCE corrected). These patterns were observed at both sites with no significant differences between sites.
Conclusion: This study demonstrates the reliability of PSG with hdEEG data collected at two sites using identical platforms. The findings align with previous studies showing age-related changes in spectral power, reflecting neurodevelopmental processes. These results validate the use of PSG with hdEEG for multicenter studies and support combining data across sites for future analyses advancing our understanding of sleep neurophysiology in adolescence.
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1051

BRAIN LACTATE CONCENTRATIONS AFTER ADOLESCENT CONCUSSION ARE ASSOCIATED WITH SLEEP EFFICIENCY

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Introduction: Lactate, a metabolic byproduct of neuronal activity, is cleared during sleep and considered a surrogate marker of glymphatic system activity. Following a concussion, brain lactate levels may rise because of increased demand for energy to restore cellular homeostasis. Clearance of lactate is increased during sleep, and as such is considered a surrogate marker of glymphatic system activity. Sleep may be disrupted following concussion, and poor sleep after concussion is associated with greater symptomatology and longer recovery, potentially due to altered glymphatic clearance. Whether post-concussion sleep

efficiency is related to lactate concentrations is unknown. The purpose of our study was to evaluate the association between sleep efficiency and brain lactate in adolescents with concussion.
Methods: Using magnetic resonance spectroscopy (MRSpect) we assessed brain lactate concentration in the anterior cingulate gyrus (ACG) and posterior cingulate gyrus (PCG) in adolescents within 21 days of concussion. Scans were performed at 3T (Skyra, Siemens, Erlangen, Germany) using PRESS localization: TR=2000, TE=30ms, voxel size=20x20x20mm3, number of averages=128. Sleep efficiency was self-reported using the Pittsburgh Sleep Quality Index (PSQI) from date of injury through date of assessment and calculated as the average time asleep divided by the average time in bed (%). Separate linear regression models were constructed to determine the independent associations between sleep efficiency and lactate concentrations in the ACG and PCG, while controlling for biological sex.
Results: 27 adolescents with a concussion (15.8±1.27 years; 51% female; 11.8±4.19 days since injury) were included in analysis. After concussion, mean sleep efficiency was 88.2±12.8%, and mean lactate concentrations in the ACG and PCG were 0.74±0.24 mmol and 0.81±0.31mmol, respectively. After controlling for biological sex, worse (lower) sleep efficiency was associated with significantly higher lactate concentrations in the ACG (β= -20.71 p=0.05, 95%CI:-41.7-0.33), but no association was observed in the PCG (β=-3.17, p=0.71, 95%CI:-21.0-14.68).
Conclusion: Our results suggest that higher lactate concentrations may be associated with worse sleep efficiency, and may reflect poor glymphatic system function. Higher lactate levels may be part of an adaptive response to the brain's increased energy demands following concussion.
Support (if any): Funding sources- Tai Foundation, Eunice Kennedy Shriver National Institute of Child Health and Human Development (R01HD108133)

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1052

COMPARISON OF OBJECTIVE AND SUBJECTIVE SLEEP DATA IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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Introduction: Sleep disturbances affect up to 80% of children with autism spectrum disorder (ASD). Previous studies have used either subjective surveys and/or objective data (actigraphy) to characterize sleep disturbances. In this study, we aim to elucidate the congruence between subjective and objective measures of sleep in ASD.
Methods: Children aged 6-11 years were enrolled in an ongoing study to assess sleep and neurobehavior. Sleep was assessed objectively using actigraphy and subjectively using a 2-week sleep diary and the Children's Sleep Habits Questionnaire (CHSQ). The primary outcomes of interest were total sleep time (TST) and number of awakenings (NOA).
Results: Data from 24 typically developed children (TD) (age:8±1.7 years) and 16 with ASD (8.7±1.6 years) were included. Actigraphy was well tolerated, with no difference in days collected (ASD:11.7±2.4 days; TD:11.1±3.0, p=0.492). Actigraphy revealed that children with ASD had reduced TST (478 vs 503 minutes, p=0.027) but no significant difference in NOA. CSHQ showed no significant difference in NOA but did show differences among groups in reported TST (ASD:551 vs TD:598 minutes, p=0.044) and total CSHQ scores (ASD:49 vs TD:39, p< 0.001), with higher scores indicating greater sleep disturbances in children with ASD. Subjective reporting from sleep diary showed no differences between groups in TST or average NOA. In children with ASD, actigraphy measured TST correlated weakly with CSHQ data (r=0.496, p=0.051) and did not correlate with sleep diary (r=0.334, p=0.206) data. For NOA, actigraphy showed no correlation with either sleep diary (r=–0.063, p=0.816) or CSHQ (r=–0.368, p=0.178) data. Interestingly, in TD participants, there was a strong correlation between actigraphy TST and TST reported on sleep diary data (r=0.524, p=0.010).
Conclusion: Objective measures like actigraphy effectively differentiated TST patterns between children with ASD and TD, aligning with differences observed in total CSHQ scores. However, among children with ASD, we found limited agreement between CSHQ, sleep diaries and actigraphy in estimating TST and NOA. These findings highlight the importance of incorporating both subjective and objective measures for a comprehensive assessment of sleep in autism.
Support (if any): DOD-W81XWH-22-1-0220, NIH-R01MH107802

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1053

TRAJECTORY OF SLEEP PATTERNS ACROSS ADOLESCENCE IN AUTISTIC AND NEUROTYPICAL YOUTH

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Introduction: Changes in sleep-wake patterns during adolescence often manifest as later bedtimes, which is attributable to biological and hormonal maturation signaling pubertal onset along with behavioral factors (e.g., high homework loads, evening texting, less stringent enforcement of bedtimes by parents). Sleep patterns can impact waking cognitive function, such as daytime sleepiness. While sleep-wake patterns in typically developing (TD) adolescents have been well characterized, there are sparse data on these patterns in autistic adolescents.
Methods: Sleep data were collected annually at four time points as part of a 4-year longitudinal study on pubertal development and stress. Changes in self-reported weekday bedtime across pubertal status (Tanner stages 1-5) was compared between participants who are typically developing and those with autism, using mixed effects models adjusted for sex, melatonin use, and diagnosis by puberty interaction. A repeated measures longitudinal proportional odds model was used to model reported daytime sleepiness using the same independent variables. Puberty was fit nonlinearly in both models using splines with 3 degrees of freedom (df).
Results: The total sample consisted of 244 participants, 140 with autism and 104 who were TD. There was evidence for a difference between autistic and TD participants in the change in weekday bedtime across pubertal stages (diagnosis by puberty interaction, x2=24.27, df=3, p< 0.001). At time 1 (ages 10-13 years), bedtime was comparable in the autism and TD participants. As Tanner stage progressed, the TD participants had later bedtimes compared to those with autism. Moreover, there was a

significant diagnosis by puberty in daytime sleepiness (x2=18.11, df=2, p< 0.001) characterized by TD adolescents endorsing greater daytime sleepiness at later pubertal stages than autistic adolescents.
Conclusion: Autistic and TD adolescents exhibit differences in weekday bedtime and daytime sleepiness with pubertal development. These differences may be related to hormonal differences or behavioral factors in these populations and warrant further study.
Support (if any): National Institute of Mental Health (MH111599 PI: Corbett) with core support from the National Center for Advancing Translational Sciences (CTSA UL1 TR000445).

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1054
SLEEP DISRUPTION, IMMUNE BALANCE AND ASTHMA STATUS IN URBAN CHILDREN WITH ASTHMA

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Introduction: Children with asthma living in urban settings are at risk for disrupted sleep due to nocturnal asthma symptoms, environmental triggers, and/or urban stressors. Altered immune function is central to sleep disruption and diminished asthma control and may reflect short- or long-term changes in children's asthma status. This study examines changes in immune balance and asthma resulting from a lab-based, experimental sleep disruption protocol in a sample of urban children with asthma.
Methods: Data are derived from a study examining the effects of experimentally disrupted sleep on immune balance and lung function in urban children with persistent asthma. Twenty-four children (8-10 years-old; 50% Black, 46% Latino, 4% "other") completed a baseline night of uninterrupted sleep, followed by a disruption night, during which they were awoken for 2 minutes between 20-minute intervals of uninterrupted sleep. Children followed their typical sleep schedule (≥9.5 hours' time in bed) for 6 days with a monitored lead-in before the protocol. Morning immune biomarker assessments followed baseline and disruption nights.
Results: The arousal protocol resulted in disrupted sleep, as indicated by changes in the sleep fragmentation index from baseline (M=3.9, SD= 1.8) to disruption (M=5.1, SD= 1.6; t=-7.07, p<.001). Results from immune balance data (Th1/Th2 cytokine ratios) indicate selective alterations in the immune response following sleep disruption including a significant within-person decrease between baseline and disruption in the IFNG/IL5 ratio, t=2.19, p=.04, which could support increased eosinophil levels resulting from sleep fragmentation. There was a significant within-person increase in the IFNG/ILI3 ratio from baseline to disruption, t=-2.64, p=.02, suggesting no acute effects on airway mucus production. There was no change in the IFNG/IL-4 ratio suggesting no major effect of IgE levels reflecting changes in acute obstruction, t=-1.21, p=.26.
Conclusion: Urban children with persistent asthma are vulnerable to sleep disruption, which may adversely impact daily functioning and worsen nocturnal asthma, potentially producing greater sleep disruption and creating a clinically negative feedback spiral. Results indicate that even a single night of disrupted sleep may trigger an eosinophilic inflammatory response that could lead to negative changes in asthma control.
Support (if any): NHLBI# K24HL130451 (Koinis Mitchell, PI); NHLBI R01HL142058 (Koinis Mitchell and Carskadon); NIGMS 5P20GM139743 (Carskadon)

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1055
SLEEP PATTERNS AND ADIPOSITY IN CHILDREN WITH OVERWEIGHT AND OBESITY

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Introduction: Overweight and obesity affect approximately 340 million children and adolescents aged 5-19 years worldwide. If left untreated, these conditions often persist into adulthood, increasing the likelihood of long-term health complications. Although sleep plays a critical role in weight regulation, much of the existing research has focused primarily on the relationship between short sleep duration and childhood obesity, leaving other dimensions of sleep less explored. This study examines how four aspects of sleep—timing, quality, quantity, and variability—are related to adiposity outcomes in school-age children with overweight and obesity.
Methods: A total of 246 children aged 6 to 9 years with overweight or obesity were recruited from 10 public elementary schools in Taipei, Taiwan. Each child's sleep was measured using wrist-worn actigraphy over seven consecutive days. Body mass index (BMI), BMI-for-age z-scores, and body fat percentage were calculated based on weight, height, and skinfold thickness following standard protocols. Relationships between sleep variables and adiposity measures were examined using bivariate and multiple linear regression analyses.
Results: Bivariate analysis revealed that later sleep onset was associated with higher body fat percentage (p =.01), shorter sleep duration was linked with increased BMI and body fat percentage (p <.05), and greater variability in sleep duration was correlated with elevated BMI, BMI-for-age z-scores, and body fat percentage (all p <.05). In the multiple linear regression analysis, variability in sleep duration emerged as the only significant predictor of body fat percentage (b = 2.36; 95% CI: 0.28–4.43; p =.02).
Conclusion: These findings suggest that improving sleep consistency may be a key strategy in weight management interventions for children with overweight or obesity. Future randomized controlled trials are warranted to assess whether maintaining regular sleep patterns can positively impact adiposity in this population.
Support (if any): This study was supported by the Ministry of Science and Technology (MOST), Taiwan (MOST 107 - 2314 - B - 002 - 025 - MY3).

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1056
DAYTIME NAPPING AND NIGHTTIME SLEEP IN CHILDREN WITH EPILEPSY: A SECONDARY ANALYSIS

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Introduction: Children with epilepsy have a higher prevalence of sleep disturbances compared to their healthy peers. Although younger children naturally engage in more frequent daytime napping than older children due to developmental sleep needs, napping has also been shown to influence nighttime sleep. However, research on the relationship between napping and nighttime sleep in children with epilepsy remains limited.
Methods: This secondary analysis utilized data from a previous study on sleep in children with epilepsy conducted in Taiwan between 2015 and 2018. The sample included 141 children with epilepsy, aged from 1.5 to 6 years. Caregivers provided demographic information, epilepsy diaries and sleep diaries. Children wore actigraphy monitors for 7 days. Children were categorized based on their napping patterns into regular nappers (n=115) who napped ≥ 6 days and irregular nappers (n=26) who napped < 6 days over the monitoring period. The regular nappers were further classified as early nappers (n=73) whose naps ended before 5 p.m. and late nappers (n=42) whose naps extended beyond 5 p.m.
Results: The mean number of naps per day was 1.02 ± 0.45. Younger children exhibited more frequent napping (3.59 vs. 4.65 years, $p < 0.001$) and later nap timing (3.27 vs. 3.78 years, $p < 0.05$). Regular nappers had longer total daily sleep durations than irregular nappers (561 vs. 531 minutes, $p < 0.05$), with no significant differences in nighttime sleep between the groups. Early nappers experienced fewer total daily seizures (0.13 vs. 0.69 times, $p < 0.05$) and daytime seizures (0.05 vs. 0.48 times, $p < 0.05$) compared to late nappers, while nighttime sleep duration remained similar between the groups.
Conclusion: Regular napping is associated with longer total sleep duration in young children with epilepsy without affecting nighttime sleep, while early nap is associated with fewer daily and daytime seizures. These findings suggest that incorporating regular and early napping into daily routines may improve sleep and potentially reduce seizure frequency. Further research is needed to confirm these findings and explore the long-term effects of regular napping in this population.
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1057
SLEEP AND DEPRESSION IN ADOLESCENTS WITH PERSISTENT POST CONCUSSIVE SYMPTOMS

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Introduction: 30% of concussed patients show persistent post concussive symptoms (PPCS), which can lead to social/academic deficits. To better understand the role of sleep in PPCS in adolescents, we acquired daytime sleep EEG (nap) in adolescents with PPCS and age-matched controls, paired to a neurocognitive battery and self-reported measures of sleep, anxiety, and depression.
Methods: Adolescents (13–18 years old) were recruited into a healthy control group (n=23, 12 females) or an injury group (n=37, 27 females). Injury group included those presenting with PPCS (30 days to 1-year post-injury), with average 122 days between injury and testing. Participants completed the Pittsburgh Sleep Quality Index (PSQI), the Revised Children's Anxiety and Depression Scale (RCADS), and the Weschler Intelligence Scale for Children/Weschler Adult Intelligence Scale processing speed index (PSI). They underwent a 1.5-hour nap with 24-channel electroencephalogram acquisition. Sleep technicians scored sleep architecture according to American Academy of Sleep Medicine guidelines. We compared sleep architecture, PSQI, RCADS depression/anxiety, and PSI scores between groups using independent sample t-tests. We explored interactions between PSQI and RCADS-depression, and between PSQI and PSI, with Pearson's correlations. We compared PSQI in participants with increased depression scores (RCADS-depression ≥ 65) versus all other participants, using independent samples t-tests.
Results: Time spent in each sleep stage was similar between groups. Injury group had significantly worse scores in PSQI ($p< 0.01$), RCADS-depression ($p=.023$), and PSI ($p=0.011$). No significant differences were found in RCADS-anxiety ($p=0.053$). PSQI positively correlated with RCADS-depression scores considering all participants combined ($r =.738$, $p=<.01$), only controls ($r =.721$, $p<.01$) and only injury group ($r =.716$, $p<.01$). PSI and PSQI showed positive correlation trending significance ($r=-.260$, $p=.143$).
Conclusion: We found deficits in sleep quality, depression symptomatology, and executive functioning in adolescents with PPCS compared to controls, with no differences in anxiety or nap architecture. Correlation between subjective sleep quality and depression scores warrants further study. Future analyses will explore potential differences in sleep oscillations on the recorded EEG between adolescents with PPCS and controls.
Support (if any): Data acquisition was supported by NCH Neurology Internal Pilot Grant to SR and PM, 2020-2024.

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1058
SLEEP DISTURBANCE ON INPATIENT POLYSOMNOGRAPHY IN PEDIATRIC PATIENTS WITH ACUTE STAGE OF ANTI–N-METHYL-D-ASPARTATE (NMDA) RECEPTOR ENCEPHALITIS

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Introduction: Anti-N-methyl-D-aspartate (NMDA) receptor encephalitis is an antibody mediated autoimmune encephalitis with significant neurologic and psychiatric symptoms. Sleep disturbance is often present during the acute phase of the initial presentation and persist over one year after disease onset. There is limited literature detailing polysomnographic findings in patients with this condition in the acute or recovery phases, with no reports on pediatric patients.
Methods: Retrospective chart and polysomnographic data review was performed on three pediatric patients who presented to our center with acute encephalopathy. All patients were diagnosed during hospitalization with laboratory confirmed anti-NMDA receptor encephalitis and underwent polysomnography during this initial presentation.
Results: Patient 1, a 16-month-old female, was noted on polysomnography to have significantly decreased sleep efficiency (34%) with prolonged sleep latency and wake after sleep onset. She was also noted to have sleep apnea with an apnea hypopnea index (AHI) of 4/hour, with REM association. Patient 2, an 18-month-old female, was appreciated to have decreased REM latency with normal sleep latency and sleep efficiency (95%.)

Patient 3, a five-year-old male, was also noted to have decreased REM latency with normal sleep latency. His sleep efficiency was decreased at 66.5%, though diagnostic assessment was limited to 58 minutes, as patient was appreciated to have severe sleep apnea with an obstructive apnea hypopnea index (OAHI) of 53.1/hour, and central apnea index (CAI) of 7.3/hour leading to subsequent conversion to bilevel titration by protocol.
Conclusion: Sleep disturbance in children with anti-NMDA receptor encephalitis is multifactorial, and currently not part of the core diagnostic criteria. All three patients demonstrated differing concerns on objective polysomnographic data. As seen in our patients, obstructive and central sleep apnea may be present and should be appropriately treated to minimize cardiopulmonary stress and maximize sleep benefits including during the acute presentation. Abnormalities in sleep architecture were also noted in all patients. Further studies are indicated to determine if sleep disturbances may be a prognosticating factor associated with severity of disease or relapse risk.
Support (if any):

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1059
OBJECTIVE SLEEP, INTERNALIZING SYMPTOMS, AND EMOTION REGULATION IN ADOLESCENTS: FINDINGS FROM THE ABCD STUDY

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Introduction: Poor sleep health and emotional dysregulation are key health determinants linked to public health issues, yet their impact on adolescent mental health is underexplored. Additionally, studies assessing sleep health in adolescents rely mostly on self-reports, lacking objective data. Using data from the Adolescent Brain Cognitive Development (ABCD) study, we investigated associations between objectively measured sleep duration, night-to-night variability, and time of sleep onset with self-reported internalizing symptoms and emotional dysregulation.
Methods: Objective sleep data (Fitbit Charge 2) from the year 4 follow-up (release 5.0 of the ABCD data) was available for 1,370 adolescents (Mean age±SD: [14.09 ± 0.69 years], 51.84% female). Participants were classified as short vs. non-short sleepers (SS vs NS) based on the sample mean of ≤7.05 hours of sleep per night. Night-to-night variability in sleep duration was assessed using the standard deviation of weekday sleep duration, and the weekly average time of sleep onset was calculated. Reappraisal and suppression (ERQ-CA), reflecting different emotion regulation strategies, and internalizing symptoms (BPM-Y) were self-reported. Linear regression analyses examined associations between sleep, internalizing symptoms, and emotion regulation, including interactions with sex at year 4 follow-up. Covariates were current age, sex, race and ethnicity, and parental education.
Results: Our analysis revealed that participants who were short sleepers exhibited significantly higher mean internalizing symptoms compared to non-short sleepers (b=0.046, p=0.040). Participants experiencing greater night-to-night variability also showed higher mean internalizing symptoms (b=0.009, p=0.001). Interestingly, this effect was particularly pronounced among girls (variability by sex interaction: b=0.006, p=0.014). Moreover, we found that participants experiencing greater night-to-night variability in their sleep had higher mean suppression scores (b= 0.006, p= 0.003). Additionally, we found that those with later sleep onset times had higher mean internalizing symptoms (b=0.0001, p=0.048).
Conclusion: The relationship between sleep and mental health is not universal in adolescents and instead depends on factors such as the type of sleep disturbance, emotional dysregulation measurement, and sex. While internalizing symptoms were linked to multiple objective measures of sleep dysfunction, the relationship between emotion regulation was specific to night-to-night variability, emphasizing the need for tailored interventions that consider these nuanced dynamics.
Support (if any): Work supported by R25DA059073.

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1060
INFANT SLEEP AND PARENTING PRACTICES IN FIRST-GENERATION LATINX IMMIGRANTS

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Introduction: Previous studies have examined infant sleep in US Latinx populations, which include individuals who have come to the US recently, as well as those who have lived in the US for several generations. Parenting practices of first-generation immigrants may be more culturally influenced by their country of birth. This study aims to describe infant sleep patterns and parenting practices in first-generation US mothers born in Mexico and Central American countries.
Methods: Mothers of healthy infants (4-6 months) completed online questionnaires including the Brief Infant Sleep Questionnaire – Revised (BISQ-R), a demographic form, and a 24-hour recall diary for seven days/nights. Each were part of a larger study, Sleep and Health in the Home (SHH) Study, on infant sleep and culture in Black and Latinx families. Assessment measures were completed in Spanish.
Results: Fourteen participating mothers (21-39 years) were born in Mexico (35.7%) or one of six Central American countries (64.2%), living in a medium-sized US city. Most infants (78.6%) slept in a crib or co-sleeper attached to the parental bed, with only one mother reporting bedsharing. The most common sleep onset method was being held or rocked by an adult (57.1%), followed by in the room with an adult but without being held (35.7%), or in a room independently (5.3%). Average child bedtime ranged from 7:50pm to 12:22am (M=8:53PM). Typical nighttime sleep ranged from 8.3 to 13.8 hours, M(SD) = 10.8 (1.47) hours, with an average of 1.6 night wakings and 22.6 minutes (SD=21.7) awake during the night. Mothers did not perceive their child as having a sleep problem, with only one mother (7.1%) endorsing a "very small" problem. Maternal confidence was high, with 85.7% of mothers feeling "very sure" and 14.3% feeling "somewhat sure" they can manage their infant's sleep.
Conclusion: This is one of the first studies to examine infant sleep in first-generation US Latinx families. Mothers endorsed few problems and high confidence managing their infant's sleep.

Notably, the average bedtime was later than recommended and few mothers put their infant to sleep independently, suggesting potential sleep health intervention targets.
Support (if any): Indiana CTSI and NIH NCATS UL1TR002529

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1061
NAPS AMONG MEXICAN AMERICAN TODDLERS: PARENTAL BELIEFS AND TODDLER NAP DURATION, SLEEP LOCATION, AND SLEEP DURATION

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Introduction: Naps are important for early childhood development, yet few studies have considered parental beliefs about naps. This study characterizes parental beliefs about naps, and how nap beliefs relate to toddler nap duration, toddler bedsharing, and toddler sleep duration among Mexican American families.
Methods: 172 parents (170 mothers; 19-45 years; mean education 12.3 + 3.0 years; 87% room sharing, 41% bedsharing) of Mexican American toddlers (62% boys; 12-16 months) completed a 12-item nap belief measure in Spanish (55%) or English. Toddlers wore an actigraph for 7 days/nights to measure average nap, nighttime, and 24-hour sleep duration.
Results: Frequencies report on those who agreed/strongly agreed (vs. disagreed/strongly disagreed). Parents believed naps were important (100%), good for their child (99%), and an important part of the child's (99%) and parent's day (95%). Most parents believed naps affect the child's (77%) and parent's mood (52%), with almost half of parents wishing their child napped longer (47%) or fell asleep faster for naps (49%). Of the 73% of parents not wanting to change something about their child's nap, 53% wanted their child to nap longer and/or fall asleep faster. More parents with long napping toddlers (average nap >1 hour vs. < 1 hour) agreed the child's nap affected the parent's mood (57% vs. 38%, X2=4.5, p=.04), while more parents with short napping toddlers wished the child napped longer (60% vs. 38%, X2=6.3, p=.01). More parents of bedsharing toddlers (vs. sleeping in their own bed/crib) reported they wished their child napped longer (57% vs. 41%, X2=4.1, p=.04). Among parents who agreed naps affected the child's mood, toddler nighttime sleep duration was 20 minutes longer (t=2.35, p=.01) and toddler 24-hour sleep duration was 27 minutes longer (t=2.67, p=.005).
Conclusion: Findings from this ongoing study suggest that parents of Mexican American toddlers believe naps are important and affect both child and parent mood. The desire for longer naps in bedsharing parents may be related to the toddler needing parental presence to fall asleep. Longer nighttime and 24-hour sleep duration among toddlers whose parents believe naps impact the child's mood may suggest parents place an increased importance on sleep.
Support (if any): R01HL163859

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1062
MOTHERS' AND FATHERS' BELIEFS ABOUT BEDTIME SCREEN USE AND TODDLERS' SLEEP IN MEXICAN AMERICAN FAMILIES

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Introduction: Parental beliefs about sleep are associated with sleep-related parenting behaviors and child sleep. However, few studies have considered parental beliefs about bedtime screen use and their relationship with children's sleep, especially in early childhood. Further, most studies focus on mothers, despite the important role that fathers play in early child development. This study examined mothers' and fathers' beliefs about screen use at bedtime and toddler sleep in Mexican American families.
Methods: 42 mother-father dyads (mothers 21-43 years, education mean=13.0 years, sd=2.9; fathers 21-45 years; education mean=12.0 years, sd=2.8) of Mexican American toddlers (64.3% boys; 12-16 months) completed a measure regarding beliefs about bedtime screen use in Spanish (40.5%) or English. Toddlers wore an actigraph for 7 days/nights. T-tests compared bedtime and sleep duration between parents who agreed vs. disagreed with each belief. Due to the small sample size, meaningful effect sizes (Cohen's d) vs. p-values are reported.
Results: 12% of mothers and 19% of fathers agreed that using a screen device at bedtime helps toddlers relax, with toddlers whose mothers agreed (vs. disagreed) having later bedtimes (31 minutes, d=.46) and shorter sleep duration (24 minutes, d=.52). Among fathers who agreed (vs. disagreed), toddlers had later bedtimes (50 minutes, d=.77) and shorter sleep duration (18 minutes, d=.36). Approximately 43% of mothers and 41% of fathers agreed that watching a screen device at bedtime helps toddlers remain quiet. Among mothers who agreed (vs. disagreed), toddlers slept 19 minutes less (d=.38). Finally, 10% of mothers and 21% of fathers agreed that using a screen device at bedtime helps toddlers fall asleep, with toddlers whose fathers agreed (vs. disagreed) having shorter sleep duration (16 minutes, d=.32).
Conclusion: More fathers than mothers were positive about screen use at bedtime. Positive parental beliefs in both mothers and fathers were associated with clinically meaningful sleep differences, including later toddler bedtimes and shorter toddler sleep duration. It is important to identify both mother and father sleep-related screen beliefs when addressing toddler sleep in clinical and community settings. Data collection is ongoing in a large, longitudinal study of Mexican American families.
Support (if any): R01HL163859

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1063
PARENTS VS. CHILDCARE WORKERS: NAPPING BELIEFS ACROSS AGES 1 TO 5

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Introduction: Sleep beliefs are critical drivers of children's sleep practices; however, research has predominantly focused on nocturnal sleep. Little is known about beliefs surrounding napping, especially during the preschool years when children gradually transition from regular napping to its cessation. Since most preschoolers attend childcare, understanding how parents' and childcare workers' napping beliefs align or diverge can provide valuable insights into how these perspectives may influence children's sleep health. This study examined the differences in napping beliefs between parents and childcare workers, focusing on how they vary according to children's age.
Methods: An anonymous online survey was conducted in Quebec from June to December 2024. Participants included 925 parents of children aged 1-5 years and 1,069 childcare workers caring for preschoolers. Both groups completed an adapted version of the Nap Beliefs Scale, which assessed positive (favorable) and negative (unfavorable) beliefs about napping across four age brackets (1-2, 2-3, 3-4, 4-5 years). A MANOVA was performed to compare napping beliefs between parents and childcare workers across the four age categories, followed by univariate ANOVAs to examine group-specific differences in napping beliefs by age and belief type.
Results: Results showed a significant multivariate effect of Group on Napping belief scores (Pillai's Trace = 0.14, $F(8, 1985) = 41.05$, $p < .001$). Childcare workers had significantly more positive beliefs compared to parents for children aged 3-4 ($F(1, 1992) = 44.97$, $p < .001$) and 4-5 years ($F(1, 1992) = 112.59$, $p < .001$). In parallel, parents reported significantly higher negative beliefs than childcare workers for children aged 2-3 ($F(1, 1992) = 53.98$, $p < .001$), 3-4 ($F(1, 1992) = 176.25$, $p < .001$), and 4-5 years ($F(1, 1992) = 201.43$, $p < .001$).
Conclusion: Findings suggest that parents and childcare workers hold distinct beliefs about napping, particularly for older preschoolers. While childcare workers tend to view napping as beneficial across all ages, parents may perceive napping for older children more negatively than younger children. This highlights the importance of fostering dialogue and evidence-based education to bridge the gap between these viewpoints and promote sleep practices that support children's development needs.
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1064

LONGITUDINAL ASSOCIATION BETWEEN CO-SLEEPING AND SLEEP ANXIETY IN A 6-YEAR CHILD COHORT STUDY

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Introduction: The impact of co-sleeping on children and parents has been insufficiently explored in longitudinal research. Although previous studies have reported associations between co-sleeping and sleep problems, this study examines these relationships over a 6-year period using longitudinal data, especially in a country with high co-sleeping rates.
Methods: This study is based on a larger prospective child cohort study in South Korea. We used data from 2016 (Time 1) to 2021 (Time 6), and data was connected annually. The mean age of the children (n = 298) at baseline was 3.37 ± 0.87 years (50.00% girls). Sleep problems and sleeping arrangements were assessed using the Children's Sleep Habits Questionnaire (CSHQ). Children who were reported sleeping in the same bed with other family members more than twice a week were categorized as co-sleeping. An autoregressive cross-lagged model (ACLM) was used to examine the relationship between children's sleeping arrangements and sleep problems. Before conducting the ACLM, multiple imputations were performed to address missing data. Participants with missing data on co-sleeping variables or with more than 25% missing data were excluded.
Results: At Time 1, 94.97% of the children reported co-sleeping, with more than 70% of the sample co-sleeping at each time point. Sleep anxiety and co-sleeping showed a significant longitudinal relationship. Goodness-of-fit indices for the final model were adequate (CFI=0.940, TLI=0.934, RMSEA=0.080, and SRMR=0.086). All autoregressive paths between co-sleeping (ORs=1.29-4.71) and sleep anxiety (βs=0.61-0.79) were significant. From Time 2 to 4, high levels of sleep anxiety at the previous time point significantly increased the likelihood of co-sleeping at the subsequent time point (ORs=1.20-1.22). From Time 3 to 6, co-sleeping at the previous time point significantly predicted greater sleep anxiety at the next time point (βs=0.14-0.20).
Conclusion: Our findings indicate that co-sleeping was longitudinally associated with sleep anxiety. Specifically, while sleep anxiety may lead to co-sleeping during early childhood, the influence of co-sleeping on sleep anxiety appears to become more pronounced as children grow older.
Support (if any): This research was supported by a grant of the R&D project, funded by the National Center for Mental Health (grant number: MHER22B03).

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1065

UNCOVERING ETHNIC/RACIAL DISPARITIES IN PEDIATRIC SLEEP QUALITY: INSIGHTS FROM THE SAN DIEGO SLEEP SURVEY

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Introduction: Pediatric sleep questionnaires are essential tools for screening sleep disorders, especially where access to pediatric sleep specialists and laboratories is limited and often where underserved and minoritized populations receive care. Moreover, there is limited knowledge on the prevalence of sleep symptoms among representative race/ethnic pediatric groups in the U.S. To address this, we developed the San Diego Sleep Survey (SDSS) with the goal to assess a wide range of sleep symptoms within a clinical setting. This study aimed to identify potential differences in reported sleep symptoms between patient-reported ethnicities and racial groups.
Methods: Caregivers of patients referred to the Rady Children's Hospital Sleep Center in San Diego, California, completed the SDSS via the Epic® Electronic Medical Record (EMR) system. The SDSS is a 51-item questionnaire utilizing a 4-point Likert scale (Never, Sometimes, Usually, Do Not Know) to provide detailed insights into sleep difficulties. Five domain scores are used to evaluate pediatric sleep issues: insomnia, sleep-disordered breathing (SDB), parasomnias, sleep hygiene, and daytime symptoms (DS), with lower scores indicating better sleep health.

The survey is available in both English and Spanish, and demographics were extracted from the EMR.
Results: 1,362 patients completed the SDSS and PSQ from 2011 to 2021. The mean age was 8.174.62 years, and 554 (40.7%) were female. The cohort included 647 (47.5%) Hispanic, 558 (41.0%) Non-Hispanic White (NHW) patients, 85 (6.2%) Non-Hispanic Asian (NHA), and 72 (5.3%) Non-Hispanic Black (NHB). SDB scores were significantly lower among NHW children compared to Hispanic and NHB children ($p < 0.01$). In contrast, DS scores were significantly higher for NHW patients compared to Hispanic and NHB children. No differences in insomnia scores were observed across ethnic groups. Finally, sleep hygiene scores were significantly lower ($p < 0.05$) among NHW children compared to other groups.
Conclusion: The application of the SDSS in a large pediatric sleep clinic population revealed significant differences in reported sleep symptoms across children of various race/ethnicities. Although the sample included a smaller number of NHB children, the findings highlight substantial variations in symptom reporting by race/ethnicity, underscoring the impact of healthcare disparities on pediatric sleep health outcomes.
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1066

APPLICATION OF THE SAN DIEGO SLEEP SURVEY (SDSS) TO ASSESS POST-SURGICAL RESPONSE IN CHILDREN WITH SLEEP DISORDERS

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Introduction: Sleep questionnaires are commonly used to gather detailed information about sleep patterns and disturbances, aiding in the identification of sleep disorders. In children, these questionnaires serve as valuable screening tools, particularly in settings where access to pediatric sleep specialists and polysomnography is scarce. Since pediatric sleep-disordered breathing (SDB) is often managed surgically, we evaluated the utility of a pediatric sleep questionnaire in assessing surgical outcomes by comparing responses before and after surgery.
Methods: Caregivers of patients referred to Rady Children's Hospital, San Diego, California, completed the San Diego Sleep Survey (SDSS) through the Epic® Electronic Medical Record (EMR) system. The SDSS, a 51-item scale, utilized a 4-item Likert-type scale (Never, Sometimes, Usually, Do Not Know) to provide graded insights into sleep difficulties. Five domain scores were employed to assess pediatric sleep problems: insomnia, SDB, sleep disorder (e.g., parasomnia), sleep hygiene, and daytime symptoms (DS). Only patients who completed the survey before and after airway surgery (tonsillectomy, adenoidectomy, adenotonsillectomy, or lingual tonsillectomy) were included.
Results: 76 patients were identified from 6/2017-11/2021, with a mean±SD age of 7.34± 4.39 years, 42 females. Most were Hispanic (n=42) or non-Hispanic White (n=21). Surgeries included adenotonsillectomy (n=57), tonsillectomy (n=4), adenoidectomy (n=11), and lingual tonsillectomy (n=4). Comparison of pre- and post-surgical scores across the five domains of the SDSS revealed significant improvements in four domains: SDB score (pre: 21.42±6.58, post: 16.39±5.04; $p< 0.001$), insomnia score (pre: 14.72±3.74, post: 13.79±3.55; $p=0.003$), sleep disorder score (pre: 6.50±1.60, post: 5.76±1.92; $p< 0.001$), and DS score (pre: 25.04±7.62, post: 22.13±7.34; $p< 0.001$). No significant change was observed in the sleep hygiene score (pre: 9.18±2.31, post: 9.28±2.28; $p=0.663$). Comparison of survey responses between Hispanic and non-Hispanic children showed no significant differences across any of the domains.
Conclusion: The SDSS results demonstrate significant improvements in four out of five sleep domains following airway surgery for SDB in children, including the domain assessing behavioral sleep disturbances (Insomnia). These findings suggest that airway surgery in children not only alleviates symptoms directly related to SDB but also leads to broader improvements in overall sleep quality.
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1067

SLEEP DISPARITIES IN CANADIAN CHILDREN UNDER 18 YEARS: A SCOPING REVIEW

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Introduction: Insufficient sleep is prevalent in children and has many adverse health outcomes. Children facing health inequities (e.g., from a low socioeconomic background, or a racial/ethnic minority) have more sleep difficulties and are less likely to receive treatment. There is a lack of research investigating pediatric sleep and health inequities, particularly in Canada. Thus, the objective was to summarize the extant literature in this area.
Methods: A list of health inequities was developed following the Canadian Institute of Health Research EDI dimensions and in consultation with the Canadian Sleep Research Consortium. Four key electronic databases (PubMed, EMBASE, PsycInfo, CINAHL) were searched. Studies were included if they were 1) in English or French, 2) original studies (e.g., empirical data collected), 3) conducted in Canada, 4) with children under 18 years, 5) population-based studies, and 6) reported on sleep outcomes and health inequities.
Results: Three reviewers screened 15,448 abstracts and titles resulting in 357 articles full-text articles. After screening, 25 studies were included in this review, focusing on sleep in the context of low socioeconomic status (18 studies), gender/sex (17 studies), family composition/caretaking (9 studies), housing/neighbourhood characteristics (8 studies), race/ethnicity (8 studies), immigrants/refugees (3 studies), and language (1 study). No studies were found in the following categories: religious affiliation, cultural diversity, and sexual/gender minorities. Of note, no distinction was made between sex and gender in the literature. Much of the research has been done with Caucasian, adolescents and school-aged children, in Quebec or Ontario. Generally, it appears that sleep health and disordered sleep are negatively affected by low socioeconomic status, poor housing/neighbourhood conditions, and in non-Caucasian children. The findings are varied in terms of sex differences with most studies suggesting no differences (76%) and some suggesting differences between boys and girls with 67% of the literature suggesting that boys sleep better. There is no clear link between sleep disturbances and family composition and caretaking.
Conclusion: This is the first review to investigate the impact of health inequities on sleep in Canadian children. Identifying and

understanding this link will inform the modification and development of sleep interventions to better meet the needs of these diverse individuals.
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1068

PARENTING STRESS PARTIALLY MEDIATES THE RELATIONSHIP BETWEEN CHILD AND PARENTAL SLEEP QUALITY

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Introduction: Sleep is crucial for parents of young children, especially given its influence on parental sensitivity. Yet, parents' sleep has been shown to be influenced by child sleep disturbances, which remain common during toddlerhood and the preschool years. Furthermore, child sleep disturbances have been linked to parenting stress, which is in turn associated with parental sleep. Therefore, this study aimed to investigate the potential mediating effect of parenting stress on the association between child sleep disturbances and parental sleep quality.
Methods: Participants included 68 parents (91.2% mothers, age M = 34.07, SD = 5.37) of children aged between 29 and 72 months. Child sleep quality, parental sleep quality and parenting stress were measured using the Children's Sleep Habits Questionnaire, the Pittsburgh Sleep Quality Index and the short form of the Parenting Stress Index respectively. For all measures, higher scores represent more difficulties in the corresponding component (i.e., worse sleep and more stress). A multiple regression analysis was conducted to assess the mediating effect of parenting stress on the relationship between child and parent sleep quality, while controlling for parent age, education and ethnicity.
Results: The model with all predictors was significant F(5, 62)=7.76, p <.001 and explained 38.50% of the variance in parental sleep quality. Results suggest a significant indirect pathway from child sleep quality to parenting stress to parental sleep quality (b =.05, 95% CI [.005,.103]).
Conclusion: These results suggests that the relationship between child and parent sleep quality are partially explained by its effect on parenting stress. While child sleep quality remains the strongest predictor of parental sleep quality, parenting stress can partly explain how child sleep disturbances contribute to parental sleep quality by accentuating its influence. Therefore, parenting stress should be considered when adressing parent and child sleep.
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1069

THE ASSOCIATIONS BETWEEN INDOOR NITROGEN DIOXIDE (NO2) EXPOSURE AND ADVERSE PEDIATRIC SLEEP OUTCOMES

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Introduction: Emerging data implies air pollution contributes to pediatric sleep disparities. While most research has focused on particulate matter, the sleep health effect of nitrogen dioxide (NO2), another critical component of air pollution, has not been extensively studied. This study investigated the association between indoor NO2 exposure and adverse sleep outcomes in a pediatric sample.
Methods: Participants were children from predominantly low-income communities in Boston, Massachusetts. Indoor NO2 levels were measured by the Environmental Multipollutant Monitoring Assembly devices in participants' living areas for 7 days. The all-day 95th percentiles of indoor NO2 levels were averaged over the monitoring period. Elevated indoor NO2 was defined as ≥ 80th percentile of the average 95th percentile daily indoor NO2 measurements (≥69.48 ppb). Primary outcomes were short sleep duration and sleep-disordered breathing (SDB). Short sleep duration was defined as an averaged 7-day sleep duration < 8 hours measured by ActiGraph GT3X+. SDB was defined as ≥5 events/hour with >3% desaturation assessed by WatchPAT 200U or Nonin WristOx 3150 oximeter for one night. We assessed the associations through logistic regression primarily adjusted for age, sex, race and ethnicity, household income, neighborhood Child Opportunity Index, and seasonality. We further adjusted for physical activity, asthma, body mass index percentile, gas cooking stoves, outdoor NO2 levels, and indoor PM2.5 levels separately as sensitivity analyses.
Results: Our analytical sample included 242 subjects (43% female, 40% Hispanic, 26% Black, 21% White, and 9% Other) with a mean age of 9.5. The median of the average daily 95th percentile indoor NO2 was 41.1 ppb. Children with elevated indoor NO2 exposure had 2.87 times higher odds (95% CI: 1.26, 6.50) of short sleep duration than those with lower NO2 exposure. The association remained when additionally adjusted for other potential confounders. A positive but insignificant association between high indoor NO2 exposure and SDB was found (OR=1.38, 95%CI: 0.64, 2.95).
Conclusion: Children with elevated indoor NO2 exposure, which exceeded EPA's annual safety guideline (53 ppb), had greater odds of short sleep duration, even after adjustment for individual and neighborhood confounders. Interventions targeting indoor air quality may provide novel approaches for reducing pediatric sleep disparities.
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1070

IMPACT OF SLEEP APNEA, SHORT SLEEP, AND INSOMNIA SYMPTOMS ON BLOOD PRESSURE MATURATIONAL TRAJECTORIES

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Introduction: Sleep apnea, insomnia symptoms, and short sleep have all been associated with higher blood pressure (BP) levels in youth. However, it remains unknown whether these highly-prevalent sleep disorders have a long-term impact on the abnormal maturational trajectories of BP levels from childhood through early 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 BP measurements and polysomnography studies in childhood (5-12y), adolescence (12-19y), and young adulthood (20-30y) with a median follow-up time of 16y. Growth mixture models were used to classify the 698 individual trajectories of systolic (SBP) and diastolic (DBP) into three latent classes, respectively. Within each latent class, the longitudinal associations of sleep apnea, insomnia symptoms, and short sleep with SBP and DBP levels were tested, adjusting for sex, age, race/ethnicity, and body mass index.
Results: SBP showed three age-related latent classes: one quadratic (3% of subjects) and one linear (24.5% of subjects) with higher SBP levels (104.2 mmHg for class 1 and 106.2 mmHg for class 2), and one linear (72.5% of subjects) with lower SBP levels (96.6 mmHg) in childhood. Sleep apnea (P=0.03) and insomnia symptoms (P=0.04) were associated with higher SBP levels in the first latent class, while sleep apnea (P=0.04) and short sleep (P=0.007) were associated with higher SBP levels in the third latent class which had lower SBP levels in childhood. DBP showed three age-related latent classes: two quadratic (84% and 5.7% of subjects) and one linear (10.8% of subjects) with higher DBP levels (65.5 mmHg) in childhood. While insomnia symptoms did not significantly impact DBP latent classes, short sleep was associated with higher DBP levels in the first (P=0.01) and third (P=0.04) quadratic classes, and sleep apnea (P=0.03) in the third quadratic class (P=0.02).
Conclusion: Sleep apnea, insomnia symptoms, and short sleep not only increase BP levels acutely, but also impact the developmental trajectories of BP levels across the lifespan. Future studies should examine the synergistic effect of these three sleep disorders to identify phenotypes with the greatest impact on developmental BP trajectories.
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1071

SLEEP HEALTH, FATIGUE, AND PAIN OUTCOMES AFTER GENDER AFFIRMING SURGERY IN TRANSGENDER AND GENDER DIVERSE ADOLESCENTS AND YOUNG ADULTS

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Introduction: Trans/gender-diverse adolescents and young adults (AYAs) are at elevated risk for poor sleep health, driven by mental health challenges and minority stressors. Gender-affirming surgery (GAS) is an effective intervention that is associated with improved mental health and well-being. This secondary analysis examines the relationships between fatigue, sleep quality, sleep disturbances, and pain outcomes in trans/gender-diverse AYAs who underwent GAS.
Methods: Two longitudinal studies enrolled AYAs who underwent GAS and received an opioid prescription within 72 hours for postsurgical pain. Study 1 included 31 adolescents (14-18 years), and Study 2 included 36 young adults (18-25 years). Participants completed PROMIS measures of pain interference, pain intensity, and anxiety and the Adolescent Sleep-Wake Scale (Study 1) or PROMIS Sleep Disturbance (Study 2). Linear regressions examined sleep and fatigue variables as predictors of pain intensity and interference, unadjusted and adjusted for anxiety.
Results: The majority of participants were trans men/masculine/male (Study 1: 59.2%, Study 2: 56.8%) who underwent mastectomy/top surgery (Study 1: 60%, Study 2: 67%). In study 1, participants reported elevated past-week fatigue (M= 60.60 [9.22]) and average sleep quality (M=34.19 [8.65]). Fatigue was associated with pain interference in the unadjusted model (β=39, SE=.13, p=.007) but not after adjusting for anxiety (p =.061). In Study 2, participants reported elevated fatigue (M=61.52 [9.74]) and average sleep disturbance (M=56.57 [6.39]). Fatigue was associated with pain interference (β=0.23, SE= 0.07, p=.003) and remained significant after adjusting for anxiety (p=.004). Pain intensity was not associated with fatigue or sleep health in either study.
Conclusion: Fatigue was associated with pain interference in trans/gender-diverse young adults but not in adolescents, potentially reflecting differences in pain processing or coping mechanisms across age groups. Sleep disturbance and quality were not associated with pain outcomes. Other sleep dimensions (e.g., efficiency, timing) may demonstrate a stronger relationship, which should be studied using objective and subjective sleep measures.
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1072

IMPACT OF PEDIATRIC SLEEP PROBLEMS ON PARENTAL SLEEP QUALITY IN AMERICAN MILITARY FAMILIES

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Introduction: There is a high incidence of poor sleep quality in active-duty servicemembers. Deployment exposure is a commonly explored causal factor for poor sleep. However, more recent research highlights the importance of non-deployment factors, with one study reporting the "birth of child/adoption" as commonly contributing to poor sleep. This is consistent with previous research reporting parenthood as a significant factor in poor sleep quality, especially in parents of children with sleep problems. However, no previous research has considered the impact of pediatric sleep problems on parental sleep quality in American military families.

Methods: A chart review was completed for children (age 0-12) referred to a military sleep center. Chart review (N=34) included documentation of parental global Pittsburgh Sleep Quality Index (PSQI) scores, reported frequency of parental sleep disturbance attributed to the child's sleep problem, and active-duty status of the parent.

Results: Both active-duty and dependent-spouse parents reported poor sleep quality (M: 7.94 and 11.41 respectively), but dependent spouses had significantly worse global PSQI scores (p< 0.01). Both active-duty and dependent-spouse parents reported that their child's sleep problem disturbed their sleep, on average, 1-2 nights/week (M: 2.12 and 2.82 respectively). However, dependent spouses were significantly more likely to report 3+ nights/week (p< 0.01). To date, mean follow-up global PSQI scores for all parents showed significant improvement (p< 0.01), with a decrease by 6.3 points (M: baseline PSQI 11.75 and follow-up PSQI 5.5). Additionally, frequency of parental sleep disturbance attributed to the child's sleep problem significantly decreased to less than once a week (p=0.02).
Conclusion: The presence of pediatric sleep problems contributes to poor sleep quality for both active-duty and dependent-spouse parents. However, pediatric sleep problems may disproportionately affect dependent spouses. Additionally, parental sleep quality significantly improved upon treatment of the child's sleep problem. This suggests that targeting pediatric sleep disturbances may be an important component of addressing active-duty servicemember sleep quality. Limitations included small follow-up sample size (n=8) and inability to determine further demographic information of parents. Because sleep is an important component of military readiness, military leadership should consider further research into the impact of pediatric sleep disturbances on servicemember sleep quality.

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1073

TIGERCHAT: SLEEP HABITS IN SECOND AND THIRD GRADE STUDENTS IN A RURAL ELEMENTARY SCHOOL

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Introduction: There is increasing awareness of the importance of sleep for health and wellness in children, and the impact sleep habits make. However, many children and families are not reporting healthy sleep habits or adequate sleep. The purpose of this project is 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 for children K-6th grades. It focuses on 45-minute sessions addressing various health topics, including sleep. Data are collected after IRB approval. In fall of 2024, nursing students led small groups of students in a sleep educational module during their gym period. Before education began, 56 2nd and 3rd grade students filled out the Sleep Habits Questionnaire.
Results: To describe sleep patterns in this population, we analyzed frequencies, percentages, and correlations. The majority of students reported consistently following a bedtime routine (39.3%, n=22), always watching TV before bed (33.9%, n=19) or almost always (19.6%, n=11), and going to bed at the same time every night (always: 17.9%, n=10; almost always: 17.9%, n=10). Notably, a majority of 2nd and 3rd graders reported using a cell phone before bed (62.5%, n=35). There were significant correlations between phone use and TV watching before bed (p<.001, r=.603), and between gaming before bed and maintaining a consistent bedtime (p<.001, r=.484).
Conclusion: More education may be necessary in young children regarding the use of technology before bed. More information is needed for families and children on when screens should be turned off for the night. While the majority of children reported adhering to a bedtime routine, many of those routines incorporated screens.
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1074

A PRELIMINARY ANALYSIS OF THE ASSOCIATION BETWEEN SLEEP QUALITY AND BEHAVIOR FOLLOWING A CHILD SLEEP INTERVENTION

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Introduction: It is well-established that sleep is essential for children's physical, cognitive, and socioemotional development. Insufficient or poor-quality sleep has consistently been linked to behavioral difficulties in children. Interventions targeting parental sleep beliefs and practices may play a key role in improving both child sleep and related behavioral outcomes. This study aimed to examine whether improvements in children's sleep quality following a short sleep intervention predict changes in behavioral outcomes.
Methods: A total of 74 parent-child dyads with children aged 3 to 5 participated in a two-hour group intervention on children's sleep (2–4 families). While parents received the intervention, children engaged in sleep-related educational activities in another room. A short follow-up group session occurred two weeks later, attended only by the parents. Measures for this study were collected before the intervention (T1) and about two months later (T2). Parents completed various questionnaires, including the Children's Sleep Habits Questionnaire (CSHQ) and the Strengths and Difficulties Questionnaire (SDQ). A hierarchical linear regression was conducted to determine whether changes in sleep quality (CSHQ scores) predicted children's behavioral outcomes (SDQ scores) at T2. T1 behavioral difficulties and sleep quality were entered in the first block, while T2 sleep quality was added in the second block. The dependent variable was T2 behavioral difficulties.
Results: The first model was significant (F(2, 71) = 47.799, p <.001) and accounted for 57.4% of the variance. T1 behavioral difficulties predicted T2 behavioral difficulties (B =.682, p <.001), but T1 sleep quality was not a significant predictor (B =.133, p =.29). Adding T2 sleep quality explained an additional 3.1% of the variance (B =.355, p =.02). This change in R2 was significant (F(3, 70) = 35.644, p <.001), with the final model explaining 60.5% of the variance in T2 behavioral difficulties.
Conclusion: This study highlights the significant role of improving sleep quality in reducing behavioral difficulties in preschool-aged children. A short intervention targeting parental sleep beliefs and practices can effectively promote healthier sleep patterns and positive behavioral outcomes in young children.
Support (if any): This project was funded by the SSHRC.

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1075

FACTORS ASSOCIATED WITH THE USE OF SELF-HELP STRATEGIES FOR SLEEP IN CHILDREN AND ADOLESCENTS WITH EPILEPSY

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Introduction: Sleep problems are common in children and adolescents with epilepsy. Our previous analyses have shown that this population used a variety of self-help strategies to improve sleep. However, factors associated with the use of these self-help strategies have not been investigated. Exploring these factors is crucial for identifying the groups of children and adolescents most in need of intervention. This cross-sectional observational study aims to examine factors associated with the use of self-help strategies for sleep in children and adolescents with epilepsy.
Methods: A convenience sample of 251 children and adolescents with epilepsy aged 1-18 years and their parents or caregivers were recruited from a university-affiliated hospital in Northern Taiwan. Participants completed a socio-demographic form and 1-week diaries documenting their self-help strategies for sleep. Multivariate regression analyses were conducted to explore factors associated with the use of self-help strategies for sleep in children and adolescents with epilepsy.
Results: The mean age of children and adolescents with epilepsy was 6.1 ± 4.47 years, and 56.2% were male. A total of 177 (70.5%) parents reported using self-help strategies to help their children's sleep. The most commonly used self-help strategies were accompanying the child (46.6%) and relaxation techniques (25.1%). Multivariate analyses revealed that younger age (β = -.071, p <.01), having an employed mother (β = 0.371, p <.01), being an only child (β = 0.312, p <.01), and a higher frequency of seizures over the past 3 months (β =.284, p <.01) were significantly associated with greater strategy use.
Conclusion: This study shows that various demographic and clinical factors are associated with the use of self-help strategies for improving sleep in children and adolescents with epilepsy. Future studies should explore how these factors influence the choice and effectiveness of self-help strategies for sleep in this population.
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1076

RETROSPECTIVE EXAMINATION OF SLEEP TIMING AND OUTCOMES IN RECUPERATIVE ENVIRONMENTS (RESTORE)

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Introduction: Sleep is essential for the physical, cognitive, and emotional development of children and adolescents. In hospital settings, achieving restorative sleep is often disrupted by environmental factors, medication timing, and complex clinical presentations. This study investigates the impact of sleep medication timing and type on achieving sufficient sleep and examines its relationship with length of stay (LOS) in pediatric patients.
Methods: A retrospective analysis was conducted on 5,871 pediatric patients aged 3 to 17 years who received sleep aids during emergency department visits or inpatient stays at Cone Health between January 19, 2013, and August 11, 2024. Sufficient sleep was assessed based on American Academy of Sleep Medicine (AASM) guidelines for age-appropriate sleep durations. Statistical analyses, including independent t-tests and linear regression, were performed to evaluate the relationships among age, gender, medication timing, medication type, restorative sleep outcomes, and LOS.
Results: The study population had a mean age of 10.7 years, with teenagers (13–17 years) achieving the highest rate of sufficient sleep (92.4%), followed by children aged 6–12 years (70.0%) and 3–5 years (39.9%). Antihistamines, primarily diphenhydramine, were the most commonly prescribed sleep aids (83.8%), followed by benzodiazepines (10.1%). Patients achieving sufficient sleep had a significantly longer mean LOS (4.4 days) compared to those who did not (1.3 days, p < 0.001). Patients prescribed benzodiazepines or Z drugs experienced the longest LOS (14.2 days) compared to those receiving other medications (2.5 days, p < 0.001). Younger children were less likely to achieve restorative sleep, suggesting greater vulnerability to hospital environmental disruptions and suboptimal medication effects.
Conclusion: Restorative sleep is critical for pediatric recovery but remains difficult to achieve in hospital settings, especially for younger patients. Although sufficient sleep was associated with longer LOS, this likely reflects greater clinical complexity rather than the impact of sleep itself. Environmental adjustments, optimized medication timing, and evidence-based protocols—such as the use of melatonin for circadian rhythm regulation—are needed to promote high-quality sleep. Future research should stratify patients by condition type and medication indications to better understand the interplay between sleep and clinical outcomes. Incorporating sleep as a fundamental aspect of pediatric care can improve recovery and overall well-being.
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1077

RELATIVE EFFICACY OF SLEEP ALONE OR TOGETHER WITH TARGETED EATING AND ACTIVITY BEHAVIORS FOR PEDIATRIC WEIGHT REGULATION: A RANDOMIZED CLINICAL TRIAL

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Introduction: Sleep plays an important role in pediatric weight regulation. However, the few pediatric clinical trials that have been conducted have focused on large experimental changes in sleep with little attention to the clinical utility of enhancing sleep as a stand-alone or adjunct treatment for pediatric weight control. Thus, the present study assessed the relative efficacy of a behavioral intervention to enhance sleep alone versus together with targeted eating and activity behaviors on change in body mass index z-scores (BMIz).
Methods: Youth aged 6-11 years (y) who were reported to sleep 9.5 hours/night or less were enrolled between February 2018 and July 2022 and randomly assigned to: optimize sleep (OS; behavioral intervention to enhance nocturnal sleep) or optimize sleep plus (OSP; behavioral intervention to enhance sleep plus reduce sugar sweetened beverages, sweet and salty snack foods, television viewing, and increase physical activity). Interventions were delivered to parent-child dyads in-person/virtually and by phone across eight sessions. Assessments were completed at baseline, 6- (end of treatment/primary outcome) and 12-months. Parents reported demographic information; child height and weight were measured to calculate BMI and BMIz. Intent to treat analyses using regressions and multiple imputation (e.g., Covid pandemic increased missingness) controlled for the respective baseline

value of the outcome; those focused on BMI also controlled for child age and biological sex.
Results: Seventy-eight children (M[SD] age = 8.72y[1.40]; 47% female; 82% African American/Black; 13% Hispanic/Latino; 47% with overweight/obesity; M[SD] sleep period = 514[36] min) were randomized. No between-group differences on key demographics or BMIz/BMI were present at baseline. Children randomized to OSP had greater reductions in BMIz at 6 months (OS: 0.14[0.49] vs. OSP: -0.24[0.63], p = 0.035). Findings for BMI at 6 months were consistent but did not reach statistical significance (p = 0.059). By 12 months, BMI and BMIz did not differ by intervention.
Conclusion: Children randomized to enhance sleep duration together with specific eating and activity behaviors demonstrated clinically meaningful differences in BMIz at 6 months. Findings need to be considered in light of the Covid-19 pandemic and should be replicated in future studies.
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1078
ACCOUNTING FOR EARLY SCHOOL START TIMES: COMMUTE TIMES AND MODE OF TRANSPORTATION FOR U.S. TEENS

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Introduction: Long school commutes in combination with early school start times force adolescents to wake up at times that are misaligned with their biological clocks resulting in social jet lag, insufficient and poor-quality sleep with numerous negative consequences for health, safety, and school performance (Crowley et al., 2018; Pereira et al., 2014). Likewise, school districts tend to focus on transportation (e.g., use of school buses) as a barrier to setting developmentally appropriate school start times. However, few studies have examined and the relative role that buses play relative to other modes of school transportation (e.g., walking, driving, etc.) in school commutes on a national scale.
Methods: Data from the 2022 National Household Travel Survey (NHTS) was examined to identify school transportation trends. The sample consisted of 553 adolescents ages 11-18 years (51% ages 14-18), 44% female, 83% white, and 70% residing in urban/suburban area across different regions of the U.S (e.g., Northeast, Midwest, etc.). Commute times, start/end times, trip distance, and mode of transportation to school were examined.
Results: The most common mode of transportation was via car (car = 53.5%; school bus = 33.1%; public transportation = 2%; walk/bike = 11.8.%). Over half the sample (58.1%) left for school before 7:30am (M = 7:29 am, range = 5:40 – 10:50 am), and overall average commute times were just under 20 minutes (M = 19.2, SD = 23.5). However, youth who reported using public transportation had the longest commute times (M = 36.25, SD = 13.77).
Conclusion: These findings underscore the importance of considering how early adolescents need to leave home for school when establishing healthy school hours. Although school districts base school start times on yellow bus schedules, only about a third of the adolescents reported relying on school bus transportation. Furthermore, with many adolescents traveling by car to school early in the morning by car school districts are putting families and young drivers at risk for fall asleep at the wheel motor vehicle accidents.
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1079
SCHOOL START TIMES AND TRANSPORTATION POLICY: REVIEW OF STATE CODES REGARDING STUDENT TRANSPORTATION

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Introduction: Developmental changes and psychosocial pressures create a shift in sleep and wake times in adolescents, leading to social jetlag and widespread insufficient sleep for middle and high school students. Researchers, clinicians, educators, and parents/caregivers often advocate for later school start times (SSTs) to accommodate these changes. However, transportation is frequently cited as a barrier to delaying school hours to times recommended by sleep and health organizations (8:30 am or later). While federal law requires public schools to provide transportation for children who are unhoused or with individualized education plans, state regulations vary. This study focused on understanding US state regulations regarding school transportation policies to better inform researchers, clinicians, and policymakers.
Methods: Using legislative codes, a team of researchers examined all 50 US states' policies and regulations regarding mandated transportation, minimum distances students must live from their school, ride duration limits, pickup times, and state/local funding.
Results: Only 34 states mandate schools to provide any level of transportation to students (e.g., districts required to provide transportation when "reasonable and desirable"; only for non-city districts; or via vans in addition to school buses). Only 10 states limit trip duration for districts (range = 30 - 90 min). Over two-thirds (70%) of states include minimum distances students must live from school to qualify for provided transportation (range =.75 - 5 miles). Only 30 states have regulations mentioning at least partial state funding for school transportation.
Conclusion: Although school districts focus on school bus transportation as one of the major barriers to setting school hours that give middle and high school students opportunities for adequate and appropriately timed sleep, surprisingly few facilitate healthy hours by regulating ride duration, transportation type, and how early in the morning youth are allowed to travel to school. States following California and Florida's lead in facilitating healthy sleep for adolescents should consider travel start times, as well as commute times and distance, in future policies.
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1080
THE EFFECT OF EXTENDING TOTAL BEDTIME ON COGNITIVE PERFORMANCE AND DAYTIME SLEEPINESS IN HIGH SCHOOL STUDENTS

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Introduction: Scientists and public are very interested and worried about the negative effects of sleep deprivation on human life and cognition. Many studies showed evidence of negative outcomes on cognitive and physical health. The goal for this study is to evaluate the effect of sleep extension on cognitive tests and sleepiness in high school students over one month.

Methods: This study investigated students' cognitive performance using ZZTest; sleep activity tracker using Colm smart ring findings and daytime sleepiness with the effect of daily sleep extension. 30 healthy teenage students were asked to participate in a 4 week study: They maintained their habitual sleep-wake schedule for a one-week baseline period followed by a one-week sleep extension period, followed by a 2 week maintenance schedule. Testing was done at 0, 1 and 2 weeks. Activity tracker and sleepiness scales were done at 0, 1, 2, 3 and 4 weeks. Parental consents were obtained prior to participation in the study.
Results: 30 participants started the study. Only 15 participants had available data at the end of the 4 weeks. Mean bedtime (SD) / wake up (SD) time for the four weeks were as follows 22:40 (0.83) / 6:40 (0.89), second week 19:10 (8.2)/ 2nd 7:00 for the 3rd week 21:50 (2.78)/ 7:20 (1.12). Total subjective bedtime improved significantly between the 1st and the second week 56.97 (7.69) Vs. 60.28 (6.46) P=0.01. ESS scales improved between the first and the second week 6.20 (3.50) vs 4.44 (2.58). The ZZtest cognitive test significantly improved 4.88(3.19)vs 6.40 (1.08). Most participants maintained the extended sleep time during the 3 and 4th week, although this did not translate into significant improvement of ESS or ZZtest when comparing the 2nd week results with the 3rd and 4th week results.
Conclusion: Extending sleep time in teenage high school students improved cognitive tests and sleepiness. Most students maintained the extended sleep time over the remaining 2 weeks maintenance period when asked to keep the activity tracker and monitor their sleep.
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1081
EFFECTS OF TRANS-C INTERVENTION ON DIET AND PHYSICAL ACTIVITY IN ADOLESCENTS

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Introduction: Dietary intake and physical activity are two primary factors influencing the prevalence of chronic diseases such as obesity, diabetes, and cardiovascular disorders. However, achieving and maintaining improvements in these behaviors is challenging, particularly for adolescents. Preliminary research suggests that improving sleep may naturally increase healthy eating and activity behaviors. This study evaluated whether a sleep intervention (the Transdiagnostic Intervention for Sleep and Circadian Dysfunction; TranS-C) could indirectly positively influence dietary intake and physical activity outcomes in adolescents.
Methods: 31 adolescents (ages 14-18, all as self-identified night-owls) completed a six-week TranS-C sleep intervention. For one week before and after the intervention, participants wore a waist accelerometer (Actigraph GT3x+) for one week and completed two randomized dietary recalls (The Automated Self-Administered 24-Hour [ASA24] Dietary Assessment Tool) and completed a measure of food reward (The Power of Food Scale [PFS]). We conducted a series of paired sample t-tests to compare average caloric intake and macronutrient intake (grams of carbohydrates, fats, sugars, and proteins), average sedentary, light, and average moderate-to-vigorous physical activity, and the PFS total score from pre- to post-intervention.
Results: We observed a trend towards decreased sedentary activity following the intervention (p=.053; d =.426), with no changes in light activity (p=.779) or MVPA (p=.831). We did not observe changes in the PFS total score (p=.985) nor their caloric intake (p=.320) or macronutrient intake with the total protein (p=.283, d=.22), and carbohydrates (p=.975 d=.006) consumed. We did notice a trend towards decreasing fat levels (p=.05 d=.413) after the intervention.
Conclusion: Adolescents who undergo an intervention aimed to improve their sleep demonstrated slightly less sedentary activity following the intervention, even without directly intervening in improving physical health. However, no other changes in physical activity or dietary outcomes were noted. While we are uncertain whether dietary and physical activity behaviors would continue to improve following prolonged periods of improved sleep, these preliminary data suggest that sleep interventions alone may not be sufficient for improving adolescent dietary and physical activity behaviors.
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1082
PARENTAL EMOTIONAL REGULATION AND WELL-BEING FOLLOWING AN ADOLESCENT SLEEP INTERVENTION

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Introduction: Preliminary research suggests adolescents receiving the Transdiagnostic Intervention for Sleep and Circadian Dysfunction (TranS-C) show improved mental health following treatment; however, few studies investigate how sleep interventions for youth impact parents. This secondary analysis aimed to investigate parent outcomes resulting from their child's participation in a TranS-C intervention; we hypothesized that parent's anxiety, stress, and depression would decrease, emotional regulation abilities, parenting self-efficacy and overall subjective happiness would increase, and sleep quality would improve as a result of their child participating in the sleep intervention.
Methods: 31 adolescent participants (ages 14-18) with night-owl tendencies participated in a 6-week TranS-C intervention; 22 parents completed the following questionnaires before and immediately following the intervention: the short-form versions of the Depression Anxiety and Stress Scale (DASS-21) and Difficulties in Emotion Regulation Scale (DERS-18), Me as a Parent scale (MaaP), Pittsburgh Sleep Quality Index (PSQI), and the Subjective Happiness Scale (SHS). Paired sample t-tests were used to evaluate parent outcomes following the intervention.
Results: A significant decrease in the DERS-18 (reflecting greater emotional regulation abilities; p=0.028) was observed post-intervention, driven by change in the awareness of emotional response subscale (p=0.036). No significant changes observed following the intervention on DASS-21 (p=0.095), MaaP (p=0.231), PSQI (p=0.855), or SHS (p=0.866).
Conclusion: Adolescent Trans-C intervention improved parents' emotional regulation abilities, particularly awareness of their emotional responses. Other measures indicate parental depression and anxiety, parenting efficacy, sleep quality, and happiness were not affected as a result of their child's sleep intervention. Improved adolescent sleep patterns may reduce the emotional labor parents need to manage their child's sleep, allowing parents to use regulation skills in other areas.
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1083

MIXED-METHODS RESULTS OF INTERVIEWS WITH BLACK CAREGIVERS OF YOUNG CHILDREN DURING CHILD BEDTIME ROUTINES

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Introduction: Black children experience a disproportionate rate of sleep health disparities compared to other racial groups. Tailored interventions for Black families require information about context and fit of evidence-based interventions. We aimed to elucidate Black caregiver experiences during their child's bedtime routine.
Methods: Black caregivers of young children were interviewed in-person and virtually. Qualitative interviews focused on contextual factors in the home, household structure, environment and beliefs and values about parenting practices related to their child's sleep. Three adapted validated measures were completed on child routines, routine consistency, child temperament and parenting practices during bedtime. Statistical analysis included descriptive statistics and correlations with composite variable on child sleep, based on eligibility criteria of behavioral sleep problems. Participant interviews were analyzed using an implementation science rapid qualitative analysis approach.
Results: Thirty caregivers (1 grandma, 25 moms, 4 dads) participated. About 50% of whom identified as African-American, 14% Jamaican, 10% Haitian, and the remainder mixed multi-ethnic groups. Parents' age ranged from 31-55 and were 41 years old on average. Children's ages ranged from 3-8 years old and were 5 years old on average. Participants answered 56% of knowledge questions about child sleep accurately. About 82% of parents reported their child went to bed before 9pm, 55% reported dependent sleep (e.g. sharing a bed/room with a caregiver or sibling), 86% reported sleep onset (< 15 minutes), and 93% reported consistent waketime (>5 nights). Qualitative interviews provided clarifying insight on survey responses. For instance, some parents reported sleep dependency due to lack of space or personal choice. Sleep dependency may be a parental choice to comfort child during sleep due to changes in household structure (e.g. divorce) or personal values not to want to leave the child alone (e.g. night wakings/terrors). Bedtime resistance (p=0.003) and permissive parenting (p=0.004) was significantly correlated with later bedtimes. Daily living routines (p=0.019) and more bedtime routines (p< 0.001) were significantly correlated with adaptive behaviors and greater independent sleep respectively.
Conclusion: Qualitative data may be needed to fully understand parent experiences during their child's bedtime. A variety of tailored evidence-based strategies may be needed to optimize child sleep among Black families.
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1084

ACTIGRAPHY-BASED ASSESSMENT OF SLEEP HEALTH IN PEDIATRIC CRANIOPHARYNGIOMA PATIENTS

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Introduction: Treatment of craniopharyngioma, a rare brain tumor, may compromise sleep-regulating structures such as the suprachiasmatic nuclei and lateral hypothalamus. Patients commonly experience excessive sleep fragmentation, daytime sleepiness, and central disorders of hypersomnolence (CDH). This study objectively characterizes sleep health among pediatric craniopharyngioma patients by comparing nighttime actigraphy metrics to National Sleep Foundation age-based consensus guidelines for sleep duration (2014) and quality (2017).
Methods: Study participants were pediatric craniopharyngioma patients enrolled in an institutional phase II proton therapy trial. Participants wore actigraphy for at least 3 nights and parents completed sleep diary data. Variables included total time in bed, total sleep time (TST), sleep efficiency (SE), sleep onset latency (SOL), and wake after sleep onset (WASO). CDH were diagnosed by standard AASM guidelines. Differences between ages, pubertal status, CDH status, hypothalamic tumor involvement, and BMI z-score were examined.
Results: Data from 65 patients ages 1-19 years (mean = 8.95±4.55) were included, 67.7% white, 50.8% female. Mean overnight TST was inappropriately short among toddlers (7.11 hours) and preschoolers (7.96 hours). School-age children (7.86 hours) and teenagers (7.28 hours) also slept less than the minimum recommended duration for their age. SE was within appropriate ranges for all age groups except preschoolers (84.02%) regardless of sleep disorder status and school age children with narcolepsy (83.62%). SOL was longer than appropriate among preschoolers (39.45 minutes) and school-aged children (31.69 minutes) overall, and among school-aged (37.73 minutes) and teenage (31.46 minutes) patients with narcolepsy. Mean WASO durations were longer than recommended for all age groups in our sample (range 50.05-91.10 minutes).
Conclusion: Pediatric craniopharyngioma patients in our sample did not achieve recommended TST, SOL, or WASO durations in certain age groups. Preschoolers overall and school-age children with narcolepsy did not achieve recommended values by any metric assessed. Future studies including assessment of daytime sleep are warranted to further characterizing sleep health in pediatric craniopharyngioma.
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1085

COMPARISON AND VALIDATION OF OPEN SOURCE ACTIGRAPHY VERSUS POLYSOMNOGRAM IN A CLINICAL PEDIATRIC POPULATION

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Introduction: Obtaining sleep metrics assists clinicians in accurately diagnosing and treating sleep disorders. Actigraphy is commonly utilized to obtain sleep metrics by estimating sleep/wake through accelerometer-detected body movement. A limited number of studies compared these devices to gold-standard polysomnography (PSG) in pediatric populations, yet efforts to assess validity has gained interest in light of recent clinical device support discontinuation.
Methods: This study examines a clinical sample of children ages 6-16 undergoing a PSG who also underwent simultaneous GENEActiv wrist-worn accelerometer devices recording either at 85.7Hz or 100Hz. Open-source R package GGIR was used to derive sleep/wake classifications for actigraphy data. R Studio was used to synchronize accelerometer and PSG epochs (30 seconds) and calculate performance metrics (sensitivity, specificity, and accuracy). Paired T-tests assessed differences in performance metrics by use of a sleep log (SL) vs. no SL. Similarly, subgroup analyses assessed differences in metrics by sleep disorders (severe/moderate OSA, restless legs/periodic limb movements/other movement disorders), sex, age (≥13years vs. < 13 years).
Results: There were 56 children (mean age=10.5 years, 50% female). At 85.7Hz(n=27), actigraphy with SL had greater sensitivity ((90.9%+5.3% vs. 78.7 + 25.1%, p=0.009, greater accuracy 88.9%+4.5% vs. 79.4%+19.7%, p=0.013, but non-significant decreased specificity (72.8%+18.2% vs. 77.2%+24.7%, p=0.165) compared to actigraphy without SL. Similarly, at 100Hz (n=29), actigraphy with SL had greater sensitivity (86.8%+7.9% vs. 75.2%+25.1%, p=0.012) and accuracy (83.3%+9.0% vs 75.8%+20.0%, p=0.034) with decreased specificity (70.9%+27.4% vs. 77.8%+28.6%, p=0.004) compared to actigraphy without SL. Results remained largely consistent in sensitivity analyses when different disorder groups were removed from the analysis. Additional analyses revealed greater sensitivity among teens vs. younger children at 85.7Hz (93.2%+4.5% vs. 89.3%+5.3%, p =0.048) and 100Hz (92.3%+4.9% vs. 85.0%+8.0%, p=0.01), and lower specificity at 85Hz (61.6%+ 20.8% vs. 80.6%+11.5%, p=0.016). No sex differences were observed in test metrics.
Conclusion: At both 85.7Hz and 100Hz, SL use with actigraphy increased accuracy and sensitivity metrics, with a slight trade-off in specificity compared to no SL use. Results lend confidence to using actigraphy with a sleep log as a general estimate of sleep/wake patterns in pediatric populations.

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1086

EVALUATING A NEW SLEEP TESTING DEVICE FOR PEDIATRIC PATIENTS: A COMPARATIVE ANALYSIS OF TYPE 2 HST VS IN-LAB PSG

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Introduction: High-quality sleep is critical for children's and adolescents' development and health. Despite the high prevalence of sleep disorders in this population, few polysomnography devices have tested specifically for pediatric use. We evaluated the Dormotech device, a novel sleep monitoring system designed for both clinical and home-based sleep studies, against gold standard polysomnographic equipment.
Methods: Twenty-six children (mean age = 11.0 years, 50% female, mean body mass index 26.0 kg/m2) underwent simultaneous sleep studies with the novel device and gold-standard polysomnography in a sleep clinic. Data were manually scored following recommended guidelines. The primary outcome was apnea-hypopnea index (AHI) and its corresponding severity classification level (i.e. normal, mild, moderate, severe). Secondary endpoints included other standard polysomnography (PSG) parameters.
Results: The mean AHI measured by the novel device was 5.6 ± 15.3 events/h (mean ± standard deviation) while it was 5.2 ± 13.8 events/h from the gold standard PSG (p = 0.95, t-test). AHI severity classification showed excellent inter-test agreement (Cohen's kappa = 0.87). Secondary endpoints demonstrated high correlation between devices, with no statistically significant differences in simultaneously recorded sleep measurements. No adverse safety events were reported.
Conclusion: The novel device provides sleep study data comparable to conventional polysomnography in pediatric patients, offering clinically identical test interpretation in nearly all cases. Its design enables flexible usage in both clinical and home settings in this population, improving accessibility of sleep disorder diagnostics. These results, combined with previous adult studies, suggest the device's substantial equivalence to established, gold-standard PSG systems in usability, efficacy, and safety for a wide population of patients.

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1087

COMPARISON OF OBJECTIVE AND SUBJECTIVE MEASURES IN ASSESSING SLEEP PATTERNS OF PREMATURE INFANTS

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Introduction: Premature infants exhibit unique sleep patterns, making the assessment of their sleep particularly challenging. Actigraphy and the Brief Infant Sleep Questionnaire (BISQ) are commonly used tools to evaluate infant sleep, yet comparisons between these methods remain limited in this population. The objective of this study is to determine whether significant differences exist between sleep data obtained through actigraphy and BISQ reports in premature newborns.
Methods: This study included 34 premature newborns (≤32 weeks of gestation) who wore actigraphy devices for three consecutive weekdays, one month after discharge from the neonatal unit. Actigraphy variables were measured for a nighttime period from 7:00 PM to 7:00 AM, using the average of the three nights. Parents also completed multiple questionnaires, including the BISQ and sleep diaries to corroborate actigraphy data. Exploratory paired t-tests were conducted to examine differences in sleep duration, number of nocturnal awakenings, and wake after sleep onset (WASO) between actigraphy data and BISQ parental reports.
Results: Results showed significant differences for all variables. BISQ-reported sleep duration was significantly longer than actigraphy-measured sleep duration (excluding WASO), overestimating by 59.35 minutes ($t(33) = 2.71$, $p = .01$). When comparing BISQ sleep duration to actigraphy-measured total sleep time (including WASO), BISQ underestimated sleep duration by 122.06 minutes ($t(33) = -6.48$, $p < .001$). BISQ-reported number of awakenings was significantly lower compared to actigraphy, with a mean difference of 1.26 awakenings ($t(33) = -3.85$, $p < .001$). Similarly,

BISQ-reported WASO was, on average, 71.40 minutes shorter than actigraphy-measured WASO ($t(33) = -4.28$, $p < .001$).
Conclusion: These discrepancies between BISQ parental reports and actigraphy measures could reflect the subjective nature of parental reports, which provide a generalized overview of sleep, compared to the objective data that measure sleep on few specific nights. Our results suggest that the BISQ and actigraphy may not capture the same aspects of infant sleep, emphasizing the importance of selecting the appropriate tool based on the research or clinical objective. This is particularly relevant for premature infants, whose sleep tends to be more fragmented, making precise measurements essential for understanding their unique sleep patterns.
Support (if any): This study was funded by the SSHRC.

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1088

RELATIONSHIP BETWEEN PACIFIER USE AND INFANT SLEEP METRICS OBTAINED WITH AUTO-VIDEOSOMONOGRAPHY

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Introduction: Pacifiers are routinely utilized among infants worldwide, yet their potential influence on infant sleep remains underexplored. Existing research offers conflicting insights, with one large-scale study finding no differences in sleep outcomes between pacifier users (PU) and non-users (nPU); however, this study relied on parent-reported sleep metrics, which are subject to bias. Other studies have utilized objective polysomnography measures, but these have been limited by small sample sizes and only one night of data per child in an unfamiliar environment, restricting their generalizability. To address these gaps, this study leverages a large sample and objective sleep metrics obtained through autovideosomnography, providing a novel and robust approach to understanding the relationship between pacifier use and infant sleep.
Methods: Among Nanit users, we recruited 243 families of infants 4-7 months. We obtained the following sleep metrics for each infant via autovideosmonography (5-14 nights): nighttime sleep duration (NSD), nighttime awakenings (NA), parental visits (PV). Additionally, we obtained parental reports on NDS and NA with the BISQ-R. We ran linear regressions with sleep metrics as outcomes, use of pacifier based on parental report as predictor and infant's age as covariate.
Results: Forty-one percent of infants were PU. Compared to nPU, PU had more PV (β=1.4±0.3,p< 0.001). PU were also more likely to sleep in a bassinet, rather than in a crib, compared to nPU (PU 20% vs nPU 6%). However, no differences were found between the groups in NSD and NA both for objective and parent-report metrics. Moreover, there was no difference in age, proportion of infants who fell asleep on their own or being held/rocked, or with an adult in the room without being held/rocked.
Conclusion: This is the first study to analyze the relationship between pacifier use at night and objective infant sleep metrics. While results from parental reports show no differences, as described by previous literature, objective sleep metrics show more parental interventions for infants using pacifiers, despite having the same nighttime sleep duration and awakenings, and mostly similar sleep ecology and parental involvement at bedtime.
Support (if any):

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1089

EVALUATION OF AGE-APPROPRIATE SLEEP METRICS IN PEDIATRIC PATIENTS UNDERGOING OVERNIGHT POLYSOMNOGRAPHY AT GEISINGER

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Introduction: The American Academy of Sleep Medicine (AASM) recommends age-specific total sleep time (TST) and REM sleep percentages for optimal pediatric health. This study evaluates whether pediatric patients undergoing overnight polysomnography (PSG) at our Geisinger Sleep Lab achieve these recommended sleep metrics. Identifying deviations from guideline-based sleep parameters can inform targeted interventions to improve pediatric sleep outcomes.
Methods: The Geisinger Sleep Medicine database was queried for children ages 1-17 at the Geisinger South Wilkes-Barre lab between December 2023 and November 2024. TST, REM sleep percentage, and sleep onset time were extracted. Data were compared to the AASM consensus guidelines for recommended sleep durations and REM percentages for pediatric patients.
Results: The average TST ranged from 397 minutes (6.6 hours) at age 1 to 436 minutes (7.3 hours) at age 4, falling below AASM recommendations of 11-14 hours for children aged 1-2 years and 10-13 hours for ages 3-5 years. For ages 5-17, average TST varied from 431.7 minutes (7.2 hours) at age 5 to 412.7 minutes (6.9 hours) at age 9, consistently below the recommended 9-12 hours for ages 6-12 and 8-10 hours for teenagers. Average REM percentages ranged from 4.9% to 16.6%, lower than the expected 20-25%. Younger children achieved approximately 30-40 minutes more TST than older children. Sleep onset times ranged from 9:23 PM to 10:50 PM, later than recommended for these age groups.
Conclusion: Our findings suggest that most pediatric patients in our sleep lab do not achieve age-appropriate sleep metrics as defined by AASM guidelines, potentially underdiagnosing sleep-disordered breathing severity. Reduced TST and REM percentages likely reflect delayed sleep onset and circadian misalignment, exacerbated by inconsistent PSG start times. Contributing factors include late bedtimes, increased screen exposure, and inconsistent parental enforcement of sleep hygiene among older children. Stricter parental regulation of younger children's routines and stronger homeostatic drive may explain their relatively longer TST. Addressing environmental and scheduling factors could optimize sleep in this population and improve testing quality. Future studies should evaluate whether educating patients and parents and increasing sleep opportunities in the laboratory can enhance the characterization of sleep-disordered breathing.
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1090

ROUTINE SCREENING FOR EXCESSIVE DAYTIME SLEEPINESS IN PEDIATRIC BRAIN TUMOR

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Introduction: Youth with brain tumor may experience excessive daytime sleepiness (EDS) associated with central disorders of hypersomnolence (CDH).1 EDS impairs daily functioning, negatively affects mood and quality of life, and further exacerbates cognitive and academic difficulties associated with brain tumor.2 The aim of this study is to summarize findings from universal screening of these issues in pediatric brain tumor.
Methods: Youth receiving treatment or surveillance for pediatric brain tumor presenting to inpatient or outpatient settings were screened for symptoms of EDS using the Modified Epworth Sleepiness Scale (M-ESS) and the Pediatric Hypersomnolence Survey (PHS). A cut off score of 6 was utilized on the M-ESS.3 The PHS has not yet been used in pediatric cancer, therefore, it was trialed to determine level of agreement with other screening methods. The standard cut off score of 24 or 8 on the sleepiness subscale score was used. Elevated ratings were discussed with the primary oncologist, and a referral was made to Sleep Medicine if deemed necessary.
Results: Eighteen youth with brain tumor completed screening for sleep problems (61% Low Grade Astrocytoma, 83.3% White). A total of 38.9% (n=7) scored above the cut off on the M-ESS, indicating concern for EDS. On the PHS, a total of 16.6% (n = 3) scored above the cut off for Total score and the Sleepiness subscale, indicating concern for narcolepsy or hypersomnia. Three (16.6%) participants were referred to Sleep Medicine for further evaluation and three others (16.6%) were already established with Sleep Medicine at the time of screening.
Conclusion: EDS and CDH may be common in pediatric brain tumor.1,2 Screening measures led to increased referral to Sleep Medicine. Despite this, due to discrepancy between measures, further research is needed to determine the best screening methods to accurately determine the presence of EDS in pediatric brain tumor.
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1091

CHILDREN'S BEDTIME STORY BOOKS: POSITIVE AND NEGATIVE PRESENTATIONS OF SLEEP

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Introduction: The way sleep and bedtime are portrayed in children's books may influence the perceptions of sleep for both young children and their guardians, leading to potential mirroring of the behaviors and attitudes depicted in the stories. The goal of this mixed-method study was to examine the trends of depictions of sleep and bedtime in picture books for children.
Methods: Our team selected picture books about sleep intended for young children from local libraries using search terms "sleep" and "bedtime". Each book was coded using a structured abstract form by at least two team members for sleep portrayal, quantifying the pages of both positive and negative depictions and character attitudes. Disagreements were resolved by team consensus. Books were then examined for four thematic codes: bedtime routine, child character refusing to sleep, nurturing approach during bedtime, and positivity/relaxation to help transition to sleep. Nine books were selected based on their general attitude toward sleep and categorized into three attitudes: child has no difficulty sleeping and book emphasizes benefits of sleep, nurturing approach to child's sleep difficulties, and authoritative approach to child's sleep difficulties. The nine books were then analyzed qualitatively identifying common themes.
Results: A total of 50 picture books were examined across the four thematic codes. The majority of books (54%) offered characters exhibiting a nurturing approach to the bedtime process, exhibited through verbal and active affirmations. During the bedtime process, 58% of books contained a bedtime routine with 30% having relaxing activities to help the transition to sleep during the routine, such as reading books or cleaning up. However, 36% of books contained a child character who refused to go to bed/sleep, often containing imagery of frowning and crying while insisting "I am not sleepy!"
Conclusion: The data pool represents books with themes of sleep and bedtime commonly read to young children, but may not be a large enough sample for broad generalizations. Many books lack positive portrayals or evidence-based strategies, often missing a positive guardian attitude and showing poor bedtime behavior. Careful attention to sleep presentation may be important for positive effects on parent and child behaviors and attitudes.
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1092

A NARRATIVE REVIEW OF ARTIFICIAL INTELLIGENCE/MACHINE LEARNING METHODS IN PEDIATRIC SLEEP

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Introduction: Artificial Intelligence/Machine Learning (AI/ML) methods have risen in capability and application since 2012. In pediatric sleep health, these approaches have the potential to improve the surveillance and detection of pediatric sleep problems and disorders, automated scoring of polysomnography data, computational phenotyping, and clinical predictive algorithms. Sleep-related AI/ML innovations are endless and becoming increasingly prevalent in adult-focused sleep medicine and research. However, this review outlines the current AI/ML methods that have been deployed among pediatric sleep populations.
Methods: A review of the literature was conducted using PubMed, Embase, Web of Science, and Scopus to obtain articles related to AI/ML and pediatric sleep search terms. The criterion for article inclusion and full text review included: English language, published after the year 2012, and topically related to the application of an AI/ML method in pediatric sleep.
Results: This search yielded 3585 articles, which was narrowed to 1968 for screening after removing duplicates in Covidence. After applying screening criteria, 60 articles met the criteria for full-text review. AI/ML applications at the intersection of pediatric sleep include the following: predictive algorithms (e.g., obstructive sleep apnea detection, infant sleep, children with neurodevelopmental disabilities and comorbid sleep problems, adolescents with comorbid mental health conditions), automated sleep stage and duration scoring for pediatric polysomnography and actigraphy, and computational phenotyping in children with autism spectrum disorder. However, there is still need for leveraging studies leveraging feasible natural language processing approaches, healthcare-based detection tools, translational AI/ML methods that can be deployed as community-based solutions, and population-level surveillance of pediatric sleep.

Conclusion: This narrative review provides an overview of the existing AI/ML methodology that has been deployed in pediatric sleep, offers suggestions for future applications across age groups and settings, and an equity-based framework for designing future research that will further the intersecting fields of pediatric sleep and AI/ML. Despite the current progress that has been made in deploying AI/ML, design and implementation gaps remain among historically underserved sleep care populations. Future studies that center equity and population-level pediatric sleep health are crucial for innovative insights to be garnered.
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1093

UTILITY OF VIDEO EEG DURING OVERNIGHT POLYSOMNOGRAPHY: A SINGLE CENTER EXPERIENCE

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Introduction: Overnight attended polysomnography (PSG) is the recommended diagnostic test to diagnose sleep disordered breathing in children. But PSG is also often utilized to ascertain nocturnal events such as atypical parasomnias or seizures with additional video EEG (VEEG). In this VEEG PSG montage, eight EEG electrodes are added to standard PSG montage to capture and correlate EEG activity with motor events during sleep. The additional EEG data is interpreted by an epileptologist.
Methods: In this single center retrospective study, we reviewed clinical, PSG and VEEG data from seventy-one consecutive VEEG PSGs over the past 2 years.
Results: Age ranged from 1 to 16 years: median age being 6 years. VEEG PSG were ordered by different specialties (Sleep Medicine 35, Neurology 9, Developmental Medicine 5, Primary care 17, Genetics 3, Pulmonology 2). Indication for VEEG with PSG was mostly to ascertain nocturnal events such as parasomnia, movement disorders and rule out seizures. In our cohort, twenty-five children had moderate – severe OSA & three had periodic limb movement disorder. Only one out of fifty participants had an episode of confusional arousal during the VEEG PSG; no nocturnal events were observed in other studies. EEG abnormality noted in 17/50 VEEG PSGs. Seven children had diffuse slowing (diffuse encephalopathy). Bursts of sharp or spike waves with abnormal EEG activity noted in eleven patients.
Conclusion: VEEG PSG is a useful tool to ascertain events during sleep and helps differentiate between parasomnias, nocturnal seizures, and other motor activity. In our study, the VEEG PSG yield was low as only one patient had a parasomnia episode during the study. Seventeen patients demonstrated abnormal EEG during VEEG PSG, but this cohort already had underlying neurological disorders such as epilepsy or other developmental disorders. These patients had previously shown EEG abnormality on their routine EEGs. Though VEEG PSG could be an extremely valuable tool to distinguish and diagnose nocturnal events, it should be used sparingly in patients with high positive predictive value. VEEG PSG set up is labor intensive and reimbursements are routinely not submitted as there is no specific billing code for the additional montage
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1094

ASSOCIATIONS BETWEEN SLEEP HEALTH AND CHRONIC CONDITIONS: A CROSS-SECTIONAL STUDY OF NHANES 2017–2020

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Introduction: Influenced by a range of lifestyle choices, environmental exposures, technological advancements, and health-related conditions, sleep impairment has become a significant public health concern. Sleep is increasingly acknowledged as a core component of overall health. Prevalent among adult populations, sleep disturbances not only impose substantial economic burden, but also increase the risk of chronic diseases. This study aims to investigate the impact of dimensions of sleep health on the probability of having 5 key public health outcomes.
Methods: This study utilized data from 2 editions of the National Health and Nutrition Examination Surveys (NHANES) conducted in the United States between 2017 and March 2020, yielding a final sample size ranging from 7,361 to 7,373 participants. Sleep health was assessed considering 5 main domains: symptoms indicative of sleep breathing disorders, other sleep disorders symptoms, frequency of daytime sleepiness, weekly sleep regularity (social jetlag), and chronotype (determined by mid-sleep on free days adjusted for sleep debt on workdays - MSFsc). The primary outcomes evaluated were the likelihood of having cardiovascular, respiratory and thyroid diseases, stroke, and cancer. Binary logistic regression models were employed in the analysis of the data.
Results: The participants had a mean age of 49.9 years, with 51.2% identifying as women and a mean body mass index of 30.0kg/m². Respiratory disease was reported by 20.5% of participants, thyroid disease by 11.4%, cancer by 9.9%, cardiovascular disease by 8.5%, and stroke by 4.6%. Concerning sleep-related variables, 27.5% of participants reported difficulty sleeping, 47.4% experienced snoring, 12.3% had episodes of breathing cessation during sleep, and 25% presented symptoms of daytime sleepiness. The mean social jetlag was approximately 3 hours, with MSFsc occurring around 3:00 AM. Sleep difficulties were associated with a higher risk of all outcomes except stroke. Excessive daytime sleepiness was significantly related to increased risk of stroke, cardiovascular, respiratory, and thyroid diseases. A later chronotype was associated with a higher risk of thyroid, cardiovascular, and respiratory diseases.
Conclusion: Impaired sleep health, specifically marked by insomnia and sleep apnea symptoms, and later chronotype, was associated with increased risk of stroke, cardiovascular, respiratory, and thyroid diseases.
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1095

INCREASED RISK OF CARDIOMETABOLIC DISORDERS, INCLUDING HYPERTENSION, HYPERLIPIDEMIA, AND DIABETES, IN PATIENTS WITH NARCOLEPSY

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Introduction: Emerging evidence suggests narcolepsy is associated with cardiovascular disease (CVD) and major adverse cardiovascular events (MACE). However, its association with cardiometabolic disorders, which contribute to elevated CVD risks, remains poorly understood. In this study, we examined whether narcolepsy is associated with increased risk of cardiometabolic disorders (including hypertension, hyperlipidemia, and diabetes) as well as CVD and MACE.
Methods: This retrospective cohort study used data from the 2005-2021 MarketScan® Commercial and Medicare Supplemental databases. We identified persons with narcolepsy (PWN) defined as having ≥2 outpatient claims for either NT1 or NT2 narcolepsy subtypes based on ICD-9 and -10 codes. We employed propensity score (PS) matching (1 to up to 3 ratio) to identify a comparison group without narcolepsy and hypersomnolence. The index date was the date of the first narcolepsy diagnosis for the narcolepsy group and the corresponding encounter date for the matched comparison group (non-narcolepsy group). We excluded individuals with CVD, MACE, hypertension, hyperlipidemia, diabetes, and metabolic fatty liver disease during the year prior to the index date (baseline period). PS-matching balanced demographics, comorbidities and use of medications in the baseline period. We employed time-dependent Cox regression proportional hazards models to determine the association between narcolepsy and time to the incidence of outcomes of interest. We controlled for narcolepsy medication use at baseline (i.e., wake-promoting agents, stimulants, and oxybate) and time-varying post-index stimulant use.
Results: The final cohort included 22,293 PWN and 63,709 without narcolepsy/hypersomnolence. The mean age of the cohort was 35.5 (± 14.0) years, and 63.7% were female. Compared to those without narcolepsy, PWN had a significantly higher risk of developing CVD (adjusted hazard ratio [aHR]=1.97, 95% confidence interval [CI]=1.65-2.36) and MACE (aHR=2.18, 95% CI=1.68-2.83). PWN also had an increased risk for hypertension (aHR=1.44, 95% CI=1.34-1.54), hyperlipidemia (aHR=1.48, 95% CI=1.39-1.57), and diabetes (aHR=1.61, 95% CI=1.40-1.83) compared to those without narcolepsy.
Conclusion: Using a large representative US claims dataset, narcolepsy was associated with an increased risk of hypertension, hyperlipidemia, and diabetes, further providing compelling evidence that enhances our understanding of how narcolepsy is linked to CVD and MACE.
Support (if any): Sleep Research Society Foundation (23-FRA-001).

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1096

AGE- AND SEX-SPECIFIC RELATIONSHIP OF SLEEP APNEA-SPECIFIC HEART RATE RESPONSE AND ATRIAL FIBRILLATION INCIDENCE

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Introduction: Autonomic dysfunction (AD) is implicated in sleep apnea and atrial fibrillation (AF), however age- and sex-specific interactions are unclear. We hypothesize age- and sex-specific differences in sleep apnea-specific heart rate response (ΔHR), an AD biomarker, on AF susceptibility.
Methods: Cleveland Clinic patients (age≥18) who underwent polysomnography 1/2/2000-12/30/2017 were retrospectively examined. Cox proportional hazards models were constructed for time from sleep study to AF by diagnosis code. ΔHR (respiratory event-related electrocardiogram-based heart rate difference; signal processing via Python®) was adjusted for demographics, body mass index (BMI), tobacco use, cardiopulmonary disease, anti-arrhythmic medications, positive airway pressure, and minimum heart rate during events. Statistical analyses were conducted using R and SAS.
Results: The sample included n=23,419 patients (age 51[41-61] years, 51% male, 74% White, BMI 34[29-40] kg/m2, apnea hypopnea index 18.3[7.5-42.6]) over7±3-years. High vs. mid-range ΔHR was associated with 22% increased AF incidence (HR=1.22, 95%CI=1.09-1.35); low vs. mid-range was not. An interaction of ΔHR by sex (p=0.031) for low vs. mid-range ΔHR showed AF incidence was lower in males than females (HR=0.77, 95%CI=0.61-0.97). In sex-stratified models, high vs. mid-range ΔHR in females showed the highest AF incidence (HR=1.27, 95%CI=1.06-1.52), followed by low vs. mid-range in females (HR=1.22, 95%CI=1.03-1.45), high vs. mid-range in males (HR=1.18, 95%CI=1.03-1.35), and low vs. mid-range in males though non-significant (HR=0.93, 95%CI=0.79-1.09). An interaction of ΔHR by age (p< 0.001) showed older patients (age>51) had 51% increased AF incidence relative to younger patients for high vs. mid-range ΔHR (HR=1.51, 95%CI=1.18-1.94); among younger patients, low vs. mid-range ΔHR had 42% increased AF incidence (HR=1.42, 95%CI=1.08-1.86). A ΔHR by race interaction was non-significant (p=0.905).
Conclusion: A polysomnography-derived sleep apnea-specific AD biomarker was associated with AF with important age- and sex-specific interactions. There was a U-shaped trend in females and older patients, a positive linear trend in males, and a negative linear trend in younger patients. Younger females with low ΔHR had highest AF incidence. Findings suggest sleep apnea-specific AD plays a role in AF development, highlighting the need for tailored management of sleep apnea-related AF risk based on age and sex.
Support (if any): AASM Foundation Physician Scientist Training Grant, Cleveland Clinic Neuroscience Transformative Research Resource Development Award

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1097

A MULTI-OMICS STUDY OF THE ASSOCIATION BETWEEN INSOMNIA WITH OBJECTIVE SHORT SLEEP DURATION PHENOTYPE AND HIGH BLOOD PRESSURE

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Introduction: Insomnia with objective short sleep duration is associated with increased hypertension risk. We aimed to explore the mechanism underlying the association between objective short sleep duration and hypertension in patients with chronic insomnia disorder (CID) by multi-omics.
Methods: CID was defined according to International Classification of Sleep Disorders-3, and objective short sleep was based on the median value of total sleep time of the overall subjects during an overnight polysomnography. We used the mean values of measured nighttime and morning systolic (SBP) and diastolic blood pressure (DBP) for analysis. Serum metabolomics and fecal 16S rDNA amplicon sequencing were used to explore characteristic metabolites and analyze gut microbiota distribution, respectively.
Results: One hundred three patients with CID and 70 normal sleepers were included. We found 53 objective short sleep duration insomnia phenotype (ISSD)-related serum metabolites. Among the 53 ISSD-related serum metabolites, indoxyl sulfate was positively correlated with BP after adjusting for confounding factors (SBP: β=0.250, p=0.028; DBP: β=0.256, p=0.030) in ISSD. In addition, the level of serum indoxyl sulfate was significantly correlated with the genera Prevotella 9 (r=0.378, p=0.027), CAG-56 (r=-0.359, p=0.037), Ruminiclostridium 9 (r=-0.340, p=0.049) and Ruminococcus 2 (r=-0.356, p=0.039) in ISSD.
Conclusion: Our study suggests that the ISSD phenotype is associated with significant changes in serum metabolic profile, including high levels of indoxyl sulfate. The latter molecule correlates both with BP and gut microbiota in patients with the ISSD phenotype, suggesting that indoxyl sulfate may be the molecular path resulting in increased hypertension risk in this phenotype.
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1098

CHARACTERIZING ARRHYTHMIA BURDEN IN OBSTRUCTIVE AND CENTRAL SLEEP APNEA WITH A MULTI-DIAGNOSTIC MONITOR

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Introduction: Obstructive (OSA) and central sleep apnea (CSA) are associated with higher prevalence of atrial fibrillation and other arrhythmias. Arrhythmia detection is possible with in-lab polysomnography (PSG) but not with home sleep apnea tests (HSAT) that typically lack the electrocardiogram (ECG). SANSA (Huxley Medical, Inc.) is a chest-worn monitor with HSAT and Holter ECG capabilities to simultaneously detect OSA, CSA, and arrhythmias at home. This study used this monitor to characterize nocturnal arrhythmias in patients with OSA and CSA.
Methods: Data was analyzed from 151 subjects with suspected sleep disordered breathing who wore the chest monitor for a single night. The apnea-hypopnea index (AHI) and central AHI (cAHI) were calculated with the monitor's automated algorithm using a 3% oxygen desaturation threshold. A cardiac technician reviewed ECG recordings to identify presence of clinically significant arrhythmias including multi-focal or high burden premature ventricular complexes (PVCs), atrial or ventricular bi/tri/quadrigeminy, ventricular tachycardia, atrial fibrillation, second- or third-degree atrioventricular block, and sinus pauses.
Results: At least one clinically significant arrhythmia was observed in 32% (48/151) of all subjects, 26% (9/35) of those with AHI< 5, 34% (39/116) of those with AHI≥5, and 79% (11/14) of those with

cAHI≥5. Significant arrhythmias of supraventricular origin were observed in 9% of subjects with AHI≥5 and 36% with cAHI≥5 but were not observed in subjects with AHI< 5. Atrial fibrillation was observed in three subjects overall, all with AHI≥5 and one with cAHI≥5. Ventricular arrhythmias were observed in most subjects with significant arrhythmias. Medical histories demonstrated that only 21% of all detected arrhythmias had been previously diagnosed.

Conclusion: Patients with OSA and CSA experienced more nocturnal cardiac arrhythmias than those without. This work motivates additional investigation in larger populations to understand how simultaneous detection of sleep-disordered breathing and arrhythmias in the home environment could impact diagnosis, risk stratification, and outcomes.

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1099

SLEEP APNEA-SPECIFIC HYPOXIC BURDEN AS A PREDICTOR OF INCIDENT HEART FAILURE COMPARED TO TRADITIONAL MEASURES

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Introduction: Apnea hypopnea index (AHI) is the prevailing measure of obstructive sleep apnea (OSA) presence and severity. Despite numerous consequences, AHI calculation measures only frequency of respiratory events. Measures which characterize OSA mechanistically may have better prognostic ability. Sleep apnea-specific hypoxic burden (SAHB) has been associated with incident heart failure (HF) in men. We hypothesized that SAHB predicts incident HF and offers superior predictive performance than traditional measures in this larger cohort of men and women.

Methods: We retrospectively examined Cleveland Clinic patients (age≥18) who underwent polysomnography 2006-2017, excluding those with HF before or at the time of polysomnogram. Cox proportional hazards models of multiple-imputed datasets were constructed for incident HF by SAHB, AHI, and T90 in separate models adjusted for age, sex, race, body mass index, tobacco use, central sleep apnea, cardiovascular comorbidities, and positive airway pressure (time-varying). An interaction term was created between SAHB and sex. Non-nested partial likelihood ratio tests compared models.

Results: The sample included N=26,161 patients: age 51.1±14.1 years, 52% male, 75% White, 17% developed HF during follow-up (6.95 [5.12-8.93] years). A 1-SD increase in SAHB was associated with 5% higher HF incidence (HR=1.05, 95%CI=1.01-1.09); 1-SD increase in AHI was associated with 11% higher HF incidence (HR=1.11, 95%CI=1.07-1.16); 1-SD increase in T90 was associated with 19% higher HF incidence (HR=1.19, 95%CI=1.15-1.22). HF incidence in males with increasing SAHB was lower than in females (interaction p< 0.001). Both the AHI and T90 models fit better than the SAHB model (p=0.006, p< 0.001, respectively). Adding SAHB into the AHI or T90 models did not improve model fit (p=0.86, p=0.34, respectively).

Conclusion: In this clinical cohort of men and women, while SAHB, AHI, and T90 were independently associated with incident HF, SAHB did not enhance predictive value. Traditional measures demonstrated superior model fit compared to SAHB in predicting HF incidence, and inclusion of SAHB did not improve model performance. Next steps include adding left ventricular ejection fraction data to assess differences across HF subtypes. More research is needed to enrich the knowledge that guides development of these novel diagnostic options.

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1100

ENDOTHELIAL-DEPENDENT VASODILATION IS ASSOCIATED WITH SLEEP APNEA-SPECIFIC BLOOD PRESSURE VARIATIONS IN PATIENTS WITH SEVERE OSA

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Introduction: The exact mechanisms behind obstructive sleep apnea (OSA) event-triggered acute blood pressure (BP) variations are unclear. We aimed to assess the association between vascular function and event-triggered BP variation.

Methods: Brachial artery flow-mediated dilation (FMD) and nitroglycerine-induced vasodilation (NID) were measured to assess endothelial and smooth muscle function, respectively. Event-triggered BP variation parameters, including BP surges, nocturnal BP fluctuations (NBPFs), NBPF/apnea-hypopnea index (AHI), and BP peaks and valleys were collected. Comparisons between subgroups, stepwise multiple regression, and ordinal logistic regression analysis were used to explore factors associated with event-triggered BP variation.

Results: A total of 177 patients with severe OSA and without comorbidities were studied. In patients with normal endothelial function (FMD ≥ 10), NBPFs, NBPF/AHI, and BP surges were significantly associated with FMD (all $P < 0.05$). The relationships between nocturnal BP variations and vasodilation function were not significant in patients with impaired endothelial function (FMD < 10). However, sympathetic activity markers were independently associated with BP variations in both subgroups (all $P < 0.05$). In ordinal logistic regression analysis, severe nocturnal BP variation in the normal endothelial function group was associated with increased sympathetic activity and higher FMD and drowsiness. In the impaired endothelial function group, only elevated sympathetic tone was associated with an increased risk of high BP variation.

Conclusion: This study has discovered that sympathetic activity is independently associated with OSA event-triggered BP variations regardless of vasodilation function. In patients with normal endothelial function, a high sleep apnea-specific BP variation may be partly associated with endothelial-dependent dilation.

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1101

DEVELOPING A NOVEL MARKER OF SLEEP FRAGMENTATION FOR CARDIOMETABOLIC AND MORTALITY RISK PREDICTION

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Introduction: Sleep fragmentation, linked to increased risks of metabolic and cardiovascular diseases, is often measured using traditional metrics like WASO, SE, and ArI, which rely on arbitrary thresholds. While entropy-based methods (e.g., CE, WSE) offer deeper insights, they require complex EEG data and are unsuitable for long-term wearable monitoring. This study introduces Sleep Temporal Entropy (STE), an entropy-based biomarker, to quantify sleep fragmentation and explore its associations with cardiometabolic disorders and mortality, aiming to improve health risk prediction.

Methods: We analyzed data from two cohorts: the Shanghai Sleep Health Study Cohort (SSHSC, clinic-based) and the Sleep Heart Health Study (SHHS, community-based). Sleep fragmentation was quantified using traditional metrics (WASO, ArI) and entropy-based metrics, including the newly introduced STE, which measures both overall and stage-specific fragmentation using Shannon entropy. Machine learning models and Cox proportional hazards regression were used to predict cardiometabolic disorders and mortality outcomes, with SHAP values applied for post-hoc explanation.

Results: In the SSHSC, STE demonstrated superior predictive power for cardiometabolic disorders compared to traditional metrics. Using XGBoost as the primary model, SHAP analysis identified REM-stage STE as a key contributor, particularly for diabetes, with a SHAP importance score of 0.17. In the SHHS, XGBoost also achieved the highest ROC AUC for predicting all-cause mortality (0.836) and CVD mortality (0.838), with SHAP analysis identifying significant contributions from overall STE and stage-specific metrics, including REM and NREM STE. Survival analyses identified STE exhibited U-shaped associations with all-cause and CVD mortality. Participants in the lowest quintile (Q1) of REM STE had a 97% higher risk of all-cause mortality (hazard ratio [HR] = 1.97, 95% CI: 1.63–2.38) compared to the reference group (Q3), while the highest quintile (Q5) was associated with a 35% higher risk (HR = 1.35, 95% CI: 1.06–1.73). Similar patterns were observed for CVD mortality, where Q1 REM STE was associated with a threefold increase in risk (HR = 3.33, 95% CI: 2.19–5.06).

Conclusion: STE offers a refined method for assessing sleep fragmentation, with a U-shaped relationship to health outcomes, suggesting its potential as a valuable biomarker for predicting cardiometabolic risks and mortality.

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1102

CIRCADIAN RHYTHMICITY ACROSS THE 24-H BEHAVIORAL CYCLE IS ASSOCIATED WITH LOWER OUT-OF-OFFICE BLOOD PRESSURE OUTCOMES

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Introduction: Rest-activity rhythms (RARs) reflecting sleep-wake cycles, rest-activity patterns, and circadian influences are a measure of circadian rhythmicity in naturalistic settings. Robust RARs are associated with lower office blood pressure (BP) and hypertension risk, but there is limited data on their association with out-of-office BP. This study examined associations of RARs with home BP monitoring (HBPM) and 24-h ambulatory BP monitoring (ABPM) outcomes.

Methods: A community-based sample of 201 middle-aged to older adults was recruited across New York City (mean age(SD): 55±11y, 70% female, 26% Black, 22% Hispanic). Participants completed seven consecutive days of wrist actigraphy concurrent with HBPM and ABPM. Wrist actigraphy was used to estimate non-parametric RAR variables. Morning and evening BP were measured daily using HBPM for 7 days and used to estimate daily averages; mean 24-h, sleep, and wake BP were derived from 24-h ABPM. Linear regression models, adjusted for age, sex, education, and BP medications, examined associations of RARs with BP outcomes.

Results: Greater relative amplitude, indicating more robust RARs (greater circadian rhythmicity), was associated with lower 24-h SBP and DBP, wake SBP, sleep SBP and DBP, and lower mean home SBP and DBP (β ranges:-14mmHg to -37mmHg, $p< 0.01$). Higher most active 10-h period counts, reflecting greater waketime activity, were associated with lower levels of all ABPM and HBPM measurements, while higher least active 5-hour period timing, reflecting later sleep timing, was related to higher sleep SBP and DBP from ABPM ($p< 0.05$ for all). Greater interdaily stability, reflecting more day-to-day sleep-wake and rest-activity pattern regularity, was associated with lower 24-h and sleep SBP and DBP from ABPM and with lower evening SBP from HBPM (β ranges:-12mmHg to -27mmHg, $p< 0.05$). Greater intradaily variability, reflecting higher rhythm fragmentation and sleep inefficiency, was associated with higher levels of all ABPM and HBPM outcomes (β ranges: 6mmHg to 11mmHg, $p< 0.05$).

Conclusion: Greater circadian rhythmicity across the 24-h behavioral cycle is associated with lower out-of-office BP. The timing, regularity, and magnitude of RARs in the 24-h day and across days may represent an important target for optimizing BP, but findings warrant confirmation in larger longitudinal studies.

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1103

THE ROLE OF NOVEL POLYSOMNOGRAPHIC PARAMETERS IN PREDICTING BLOOD PRESSURE

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Introduction: Hypertension is linked to obstructive sleep apnea (OSA) through mechanisms such as heightened

sympathetic activation, sleep arousals, and intermittent hypoxia. Polysomnographic parameters, including the apnea-hypopnea index (AHI), periodic limb movement index, slow-wave sleep, and hypoxic burden, are associated with elevated blood pressure. This study aims to explore the association between novel polysomnographic parameters—oxygen desaturation rate (ODR), oxygen resaturation rate (ORR), and hypoxic burden (HL100)—and blood pressure.
Methods: This cross-sectional study included patients who underwent diagnostic polysomnography. Conventional and novel polysomnographic parameters were analyzed for their correlation with systolic (SBP) and diastolic blood pressure (DBP), measured within one year prior to polysomnography. Forward stepwise linear regression was used to identify predictors of SBP and DBP.
Results: A total of 1,505 patients with a mean age of 44 years were included. Hypertension prevalence was higher in patients with OSA (OSA+) compared to those without (OSA-): 61.4% vs. 42.6% ($p < 0.001$). SBP and DBP were also higher in OSA+ than in OSA- (129.5 vs. 122.7 mmHg, $p < 0.001$; 78.3 vs. 75.7 mmHg, $p < 0.001$). All polysomnographic parameters, except ODR, were significantly correlated with SBP and DBP. Stepwise regression identified AHI, ODI, and ORR as independent predictors of both SBP and DBP, with coefficients of 0.094 ($p = 0.014$), 0.118 ($p = 0.001$), and 821.2 ($p = 0.007$) for SBP, and 0.065 ($p = 0.010$), 0.074 ($p = 0.002$), and 577.6 ($p = 0.004$) for DBP, respectively. Baseline SpO_2 was an independent predictor of DBP only, with a coefficient of -35.4 ($p = 0.016$).
Conclusion: Our study identified novel parameters, including HL100 and ORR, as being associated with SBP and DBP. ORR, in particular, was an independent predictor of both SBP and DBP, alongside AHI and ODI. Higher ORR may increase reactive oxygen species, potentially contributing to elevated blood pressure. ORR is a novel parameter worth exploring further in the context of hypertension.

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1104

OBSTRUCTIVE SLEEP APNEA IS ASSOCIATED WITH A HIGHER INCIDENCE OF VENOUS THROMBOEMBOLISM AFTER TOTAL HIP ARTHROPLASTY

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Introduction: Obstructive sleep apnea (OSA) is a prevalent condition that is strongly associated with cardiovascular comorbidities and has been shown to predict poor outcomes in the post-surgical population. Assessing the independent effect of OSA can be challenging in a retrospective model without a large number of patients. We queried a very large, national dataset and utilized propensity matching to examine the independent association of OSA with venous thromboembolism (VTE) following total hip arthroplasty (THA).
Methods: We queried the TriNetX Research Network, an international electronic health record and claims-derived database of >140 million patients, primarily from the United States. We assessed patients who underwent Current Procedural Terminology-coded THA surgery between 7/1/2014 and 7/1/2024 for those with a preceding OSA diagnosis (and ≥2 ICD-10-CM code appearances overall). We then examined the 28-day post-surgical incidence of VTE and secondarily its constituents, pulmonary embolism (PE) and deep vein thrombosis (DVT), as well as cerebrovascular accident (CVA) and myocardial infarction (MI), in addition to collecting 19 demographic and comorbidity variables (as well as 7 body mass index sub-stratifications) with which in-platform propensity-matched analyses were conducted to assess the individual weight of OSA on the outcome variables.
Results: Of 191,094 patients who underwent THA (all in the US), 19,501 had a preceding OSA diagnosis, while 157,738 had no OSA diagnosis at any time point. Prior to propensity matching, the OSA cohort carried a significantly higher risk of all outcomes assessed (VTE RR 1.9, CI 1.8 – 2.1; PE RR 2.4, CI 2.0 – 2.8; DVT RR 1.7, CI 1.5 – 2.0; CVA RR 2.0, CI 1.7 – 2.4, and MI RR 2.0, CI 1.6 – 2.4, all $p< 0.001$) in the 28 days post-THA surgery. Following propensity matching, VTE remained significantly associated with OSA (RR 1.2, CI 1.1 – 1.4, $p = 0.007$), as did the secondary outcome of PE (RR 1.4, CI 1.1 – 1.7, $p=0.004$), while other secondary outcomes did not.
Conclusion: These findings further support the independent association of OSA with post-hip arthroplasty VTE, with increased rates persisting even after extensive propensity matching for associated comorbidities. Further investigation examining potential effect modification by treatment status is necessary.

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1105

SEX DIFFERENCES IN PRESENTING SYMPTOMS AND VASCULAR FUNCTION IN MODERATE-TO-SEVERE OSA

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Introduction: There are known sex differences in the clinical presentation of OSA. Women often present with atypical symptoms such as fatigue and insomnia, while men frequently report sleepiness. The existing evidence suggests that the presence of sleepiness in persons with OSA is associated with worse cardiometabolic outcomes. However, it is unclear if atypical symptoms may also be associated with adverse cardiovascular outcomes. Most of the available literature has focused on the association between health outcomes and sleepiness as determined by the Epworth-Sleepiness-Scale (ESS). The objective of the current analyses was to determine if atypical OSA symptoms such as fatigue, insomnia, and sleep quality are associated with vascular dysfunction, a marker of cardiovascular health, in persons with OSA, and if the association varies by sex.
Methods: Adults ages 55-75 years with newly diagnosed moderate or severe OSA (apnea hypopnea index (AHI)≥15 events/hr) on home-sleep-testing, and a hemoglobinA1c< 6.5% were enrolled. Exclusion criteria included the use hypoglycemic agents or medications for weight loss. Outcomes included the reactive hyperemic index (RHI) from Endopat®, a metric of vascular dysfunction, along with the following surveys: the ESS, Fatigue Severity Scale (FSS), Insomnia Severity Index (ISI), and the Pittsburgh Sleep Quality Index (PSQI). The median and interquartile range (IQR) were utilized to calculate a Mann-Whitney-U-test to compare each outcome for men and women.
Results: A total of 31 participants were included for the analysis - 19 women and 12 men. The median AHI for the whole group was 30.6 events/hr (IQR=24.0–44.7 events/hr), 26.6 events/

hr (IQR=24.3–40.9 events/hr) for women, and 39.1 events/hr (IQR=23.5-54.8 events/hr) for men (p=0.46 for gender differences). Clinical but no statistically significant differences were seen for ESS-scores between men and women: ESS=8.0 versus 11.0 (p=0.98). Compared to men, there was a trend towards increased fatigue in women, FSS=32.5 versus 43 (p=0.07). Women reported worse sleep quality, PSQI=7.6 versus 10.5 (p=< 0.01). No difference was noticed in insomnia-scores between men and women, ISI=12.5 versus 15 (p=0.14). Women were found to have lower RHI scores compared to men: 1.52 versus 1.68 (p=0.02).
Conclusion: Compared to men, women with moderate-to-severe OSA had worse fatigue, sleep quality, and vascular function.
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1106

IMPACT OF OBSTRUCTIVE SLEEP APNEA ON YOUNG-ONSET STROKE HOSPITALIZATIONS AND MODIFIABLE CARDIOVASCULAR RISK FACTORS: A NATIONWIDE ANALYSIS'

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Introduction: Obstructive Sleep Apnea (OSA) is known to have adverse cardiovascular effects in young patients. The study's objective was to evaluate how cardiovascular disease (CVD) risk factors predict young-onset stroke (YOS) in cohorts with and without OSA.
Methods: Using the National Inpatient Sample dataset (2016-2020) and relevant ICD-10 codes, we identified hospitalized patients with YOS (ages 18-44). We studied CVD risk factors (hypertension, diabetes, hyperlipidemia, smoking, obesity, peripheral vascular disease, and prior stroke) as predictors of YOS using multivariable logistic regression analysis in non-OSA and OSA cohorts. A p-value ≤ 0.05 was considered statistically significant.
Results: Of 262,850 young hospitalized adults with stroke, 14190 (5.4%) patients had OSA. Patients with OSA were more likely to be male (67.2% vs. 51%) and had higher rates of hypertension (33% vs. 17.2%), diabetes (13.7% vs. 7.3%), hyperlipidemia (47.7% vs. 24.5%), obesity (66.3% vs. 19.5%), prior myocardial infarction (5.1% vs. 2.6%), prior transient ischemic attack (12.1% vs. 8.9%), and smoking (19.7% vs. 16%). Unadjusted analysis revealed that OSA was associated with a lower risk of all-cause mortality (4.3% vs. 7.8%). The multivariable logistic regression analysis indicated that in patients with OSA, complicated hypertension (OR=2.94, 95% CI 2.39-3.61), hyperlipidemia (OR=2.38, 95% CI 2.05-2.76), and peripheral vascular disease (OR=3.28, 95% CI 2.47-4.35) significantly increased the risk of stroke. Interestingly, smoking (OR=0.73, 95% CI 0.61-0.87) and obesity (OR=0.73, 95% CI 0.63-0.85) were associated with a reduced risk of stroke in the OSA cohort (all p< 0.001)
Conclusion: Hypertension, hyperlipidemia, and peripheral vascular disease predict YOS in the OSA cohort. Despite having more comorbidities, the OSA cohort is associated with lower all-cause mortality. Future research should investigate the long-term outcomes of OSA on stroke recovery and develop tailored interventions to enhance healthcare for this population.
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1107

BURDEN OF OBSTRUCTIVE SLEEP APNEA IN HOSPITALIZED YOUNG ADULTS WITH OBESITY: ACUTE CORONARY SYNDROME AND IN-HOSPITAL OUTCOMES (NIS 2016–2020 STUDY)'

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Introduction: Obstructive sleep apnea (OSA) significantly impacts cardiovascular and metabolic disorders, especially in obese individuals. Prior studies mainly focused on older adults, leaving a gap in understanding acute coronary syndrome (ACS) risk in younger obese adults with OSA.
Methods: Using the National Inpatient Sample (2016–2020) and ICD-10 codes, hospitalizations in young obese patients were identified. Baseline demographics, comorbidities, and outcomes were compared between OSA+ and OSA- cohorts. Odds of ACS-related hospitalizations and in-hospital mortality were analyzed using multivariable regression.
Results: Among 70,950 ACS-related admissions in young obese adults, 12,145 (17.12%) had OSA. The OSA+ cohort had a median age of 40 and more males. They had higher rates of complicated hypertension (37.8% vs. 27.1%), diabetes (28.6% vs. 23.9%), hyperlipidemia (59. 2% vs. 55.7%), and prior myocardial infarction (13.8% vs. 11.2%). Regarding clinical outcomes, the OSA+ cohort has higher patients on CPAP (6.5% vs 1.6%) and respiratory failure (18.3% vs 12.4%). Unadjusted regression showed OSA increased ACS risk (OR = 1.81, 95% CI 1.73–1.89, p < 0.001). After adjusting for demographics, hospital characteristics, and comorbidities, OSA was linked to reduced ACS risk (OR = 0.72, 95% CI 0.68–0.76, p < 0.001). Adjusted models showed no significant effect on in-hospital mortality (OR = 1.20, 95% CI 0.90–1.59, p = 0.214).
Conclusion: OSA in young, obese adults is linked to higher comorbidity rates and ACS-related hospitalizations. Early detection and management are crucial to reducing ACS risk and improving outcomes.
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1108

NOCTURNAL HYPOXEMIA DUE TO SDB IS ASSOCIATED WITH POOR PULMONARY HEMODYNAMICS IN PATIENTS WITH CHRONIC THROMBOEMBOLIC PULMONARY DISEASE

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Introduction: Although a general association between nocturnal hypoxemia or sleep-disordered breathing (SDB) and pulmonary arterial hypertension (PAH) has been established, little is known about the unique pathophysiologic contributions of SDB and nocturnal hypoxemia to chronic thromboembolic pulmonary disease (CTEPD). We therefore chose to examine the associations of SDB and nocturnal hypoxemia with hemodynamic indices obtained via right heart catheterization (RHC) in hospitalized patients with CTEPD. We hypothesized that the severity of CTEPD would be associated with SDB and nocturnal hypoxemia severity.
Methods: Patients with CTEPD with or without PH who had undergone polysomnography (PSG) between July 2022 and March 2024 were enrolled. A nocturnal mean oxygen saturation by pulse oximetry (MeanSpO2) < 90% was defined as nocturnal hypoxemia, and a saturation less than 90% (T90) for more than 20% of the total sleep time indicated severe nocturnal hypoxemia. The relationships between right heart catheterization measurements and T90 or MeanSpO2 were calculated using multiple linear regression and logistic regression analyses.
Results: The prevalence of severe nocturnal hypoxemia in the entire cohort was 42.86%, and SDB (AHI≥15/h) affected 55.84% of patients and predominantly manifested as hypopnea. Nocturnal hypoxemia remained significantly associated with mPAP (T90: β=0.296, P=0.019; MeanSpO2: β=-0.333, P=0.009) and PVR (T90: β=0.294, P=0.021; MeanSpO2: β=-0.310, P=0.015) after adjusting for age, sex, BMI, AHI and diurnal PaO2. Receiver operating characteristic (ROC) curves for the detection of a mPAP≥25 mmHg, PVR>3 WU and WHO FC III-IV indicated that nocturnal hypoxemia parameters had moderate predictive value. (T90: AUCmPAP=0.698, AUCPVR=0.733, AUCWHO-FC=0.729; MeanSpO2: AUCmPAP=0.691, AUCPVR=0.731, AUCWHO-FC=0.707;)
Conclusion: SDB is highly prevalent in patients with CTEPH and CTEPD without PH predominantly manifested as hypopnea rather than apnea, and overweight was not a commonly reported characteristic. Independent of the severity of OSA, nocturnal hypoxemia is significantly correlated with hemodynamics in patients with CTEPD, and promoting sleep oximetry among patients with CTEPD is worthwhile.
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1109

IMPACT OF OBSTRUCTIVE SLEEP APNEA AND PULMONARY HYPERTENSION ON HOSPITAL RE-ADMISSION AND OVERALL SURVIVAL IN RURAL APPALACHIA POPULATION

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Introduction: Obstructive sleep apnea (OSA) is a highly prevalent comorbid condition and is present in 12-13% of patients with pulmonary hypertension (PH). However direct causality for pulmonary hypertension and its impact on long-term outcome in PH patients is not clearly established. This study aims to understand the prognostic impact of OHS and PH on hospital re-admission and survival in rural Appalachia.
Methods: We conducted a retrospective study including hospitalized patients undergoing evaluation for OSA from Nov 2019 to January 2024. The sample size was divided into two cohorts depending on presence of absence of OSA and each cohort was subclassified based on presence of absence of PH based on echocardiography. Baseline characteristics were summarized as mean (± standard deviation) for continuous variables and frequency/percentages for categorical variables. Hospital re-admission rates and survival were assessed using Kaplan-Meier (KM) survival curves and Cox proportional hazard ratios.
Results: We included a total of 573 patients (228 patients without OSA and 345 patients with OSA). In the OSA cohort, 195 patients had echocardiographic evidence of PH. In the non-OSA cohort, 103 patients had evidence of PH. Patients with PH in no OSA cohort had the highest risk of mortality (HR=1.95, 95%CI=1.19-3.20, p=0.008), whereas patients with OSA and PH did not significantly alter survival (HR=1.11, p=0.67). On KM curves, OSA and PH cohort had better survival (HR=0.58, p=0.01). Interestingly, body mass index (BMI) was associated with lower odds of hospital re-admission in rural Appalachia (HR-0.98,CI=0.98-0.99, p=0.002), adjusted for age, gender and BMI.
Conclusion: Our study identifies a paradox of better survival in patients with OSA and echocardiographic evidence of PH compared to patients with PH and no OSA in rural Appalachia. Furthermore, BMI had an inverse association with hospital re-admission rate. The reason for these findings remain unclear, however, we hypothesize, that an inpatient sleep medicine service, closer follow-up on discharge and monitoring of patients with OSA and PH may play a role and need to be studied in future studies.
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1110

CARDIAC ARREST AND MORTALITY IN OSA PATIENT WITH MORBID OBESITY

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Introduction: Obstructive sleep apnea (OSA) is a highly prevalent and fatal disorder characterized by intermittent upper airway obstruction during sleep. Obesity, on the other hand higher BMI (body mass index). Individuals with morbid obesity (BMI ≥40) often have aggravated cardiovascular outcomes, including a higher probability of cardiac arrest and death. Nevertheless, comparative long-standing data on cardiovascular arrest and mortality in OSA patients with mild to moderate obesity (BMI 30 to 39.9) vs. morbid obesity are limited. The purpose of this study is to assess the 5-year risk of cardiac arrest and all-cause mortality in OSA patients stratified by BMI: 30-39.9 (obesity) vs. ≥40 (morbid obesity).
Methods: A retrospective cohort study was conducted utilizing the TriNetX Global Health Research Network, evaluating de identified EHRs (electronic health records) from various healthcare organizations from January of 2000 to December of 2019 from United State Collaborative network. Eligible participants/patients were aged >18 years with confirmed sleep disorder (OSA) diagnosis. Patients with other sleep ailments were not included to isolate the OSA group. Two cohorts were defined.

patients with a BMI of 30–39.9 and those with a BMI ≥40. Propensity score matching was utilized to balance demographic and comorbidity variations. Patients were followed for five years to analyze cardiac arrest and all-cause mortality.
Results: During the five-year follow-up, the incidence of cardiac arrest was higher in the morbid obesity group (BMI ≥40) (n=143,169) compared to the group with the OSA and BMI of 30-39.9 (n=263,758), with a risk ratio of 1.554 (95% CI: 1.37-1.761). Similarly, all-cause mortality was increased in the OSA group with a BMI ≥40, with a RR of 1.614 (95% CI: 1.55-1.681).
Conclusion: OSA patients with morbid obesity (BMI ≥40) face a significantly increased risk of cardiac arrest and all-cause mortality compared to OSA patients with a BMI of 30-39.9. These findings highlight the critical need for targeted interventions and enhanced monitoring of cardiovascular risks in this high-risk population. Further prospective research is required to validate these findings and guide clinical practice.
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1111

RELATIONSHIP BETWEEN POSITIONAL OBSTRUCTIVE SLEEP APNEA AND EXCESSIVE DAYTIMESLEEPINESS IN PATIENTS WITH ATRIAL FIBRILLATION

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Introduction: Obstructive sleep apnea (OSA) is highly prevalent in patients with atrial fibrillation (AF). Prior studies have suggested that OSA-related excessive daytime sleepiness symptom (EDS) is less pronounced in patients with AF. Positional obstructive sleep apnea (POSA) is common, affecting nearly half of the patients with OSA, including patients with AF. However, symptomatic manifestation of OSA by POSA status is unknown. We investigated whether POSA affected the likelihood of EDS differently in patients with AF compared to those without AF.
Methods: We reviewed and included patients with and without (1:1 match) a history of AF who underwent clinically indicated in-lab sleep study at a single academic sleep center. Patients with OSA (apnea-hypopnea index [AHI] ≥ 5 events/hour), who achieved at least 30 minutes in both supine and non-supine positions were included. POSA was defined as OSA patients with a supine/non-supine AHI ratio ≥ 2. EDS was determined using an Epworth Sleepiness Scale score of 11 or higher. We performed multiple logistic regression separately for AF and non-AF groups to examine the relationship between POSA and EDS. Analyses were adjusted for age, sex, body mass index, AHI, total sleep time, and cardiovascular risk factors including hypertension and type 2 diabetes.
Results: Among 223 adult patients (mean age 62 ±14 years, 55% male, 51% with a history of AF [n = 114]) included, 55% were identified to have POSA. EDS was present in 43% of the entire group and 42% and 45% in the AF and non-AF subgroups, respectively. In patients with AF, POSA was associated with a lower likelihood of EDS (adjusted odds ratio [aOR]: 0.29; 95% confidence interval [CI]: 0.10-0.81). In contrast, no significant association was observed (aOR: 0.78; 95%CI: 0.31-2.00) in patients without AF.
Conclusion: We identified different symptomatic manifestation of POSA by AF status. OSA patients with AF and POSA were less likely to have EDS than OSA patients with AF and no POSA. Given that EDS is an important determinant of clinical decision making in OSA treatment and potentially a critical cardiovascular risk marker, consideration of POSA status may be useful in AF patients with a comorbid OSA.
Support (if any):

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1112

ASSOCIATION OF HIGH-RISK OSA WITH INCIDENT ATRIAL FIBRILLATION: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS

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Introduction: Obstructive sleep apnea (OSA) is associated with atrial fibrillation (AF), a significant cause of morbidity and mortality. However, this association varies by population characteristics and definitions of OSA and AF. This study examined whether "High-Risk" OSA, characterized by elevated OSA-related hypoxic burden (HB) or heart rate response (ΔHR), is linked to increased AF incidence.
Methods: The analysis used data from the Multi-Ethnic Study of Atherosclerosis (MESA), including polysomnography (2010-2013), and ascertainment of AF through 2018 (median follow-up time of 6.8 years). OSA-related HB was quantified as the cumulative area under the desaturation curve and ΔHR was defined as the increase in heart rate upon event termination. High-Risk OSA was defined by the presence of an apnea-hypopnea index (AHI) ≥15 events/h) with either a high ΔHR (highest tertile) or a high HB (highest tertile); Low-Risk OSA was defined as an ≥ 15 events/h and neither an elevated HB or ΔHR; and non-OSA was defined as an AHI< 15 events/h. AF was ascertained from hospitalization and outpatient diagnosis codes. Individuals with a history of AF or cardiovascular disease at the baseline were excluded. Cox regression models estimated the hazard ratios of incident AF for High- and Low-Risk OSA (vs. non-OSA), adjusting for age, sex, race, body-mass-index, diabetes, and hypertension.
Results: A total of 1,689 participants (54.6% female) were included, with a median [interquartile range] age of 66.0 [60.0-74.0] years, HB of 35.4 [18.0-69.5] %min/h, and ΔHR of 7.7 [5.9-9.9] bpm. During follow-up, AF was identified in 14.6% of the High-Risk OSA group (N = 680), 9.5% of the Low-Risk OSA group (N = 294), and 8.5% of the No-OSA group (N = 715). Compared to the non-OSA group, an increased hazard ratio (HR) for incident AF was found in High-Risk OSA (HR: 1.63 [95% CI: 1.16-2.30], P = 0.005) but not in Low-Risk OSA (HR: 1.05 [0.66-1.66], P = 0.8). Associations were weaker in subgroups defined by high HB (HR=1.21) or high ΔHR (HR=1.47).
Conclusion: OSA-related heart rate surge or severe hypoxemia may be useful for predicting which patients with OSA are at increased risk for incident AF.
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1113

UNRAVELING GUT MICROBIOTA LINK IN OBSTRUCTIVE SLEEP APNEA WITH CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION

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Introduction: Patients with chronic thromboembolic pulmonary hypertension (CTEPH) show a relatively high prevalence of obstructive sleep apnea (OSA). The association between OSA and CTEPH is of critical importance, as their coexistence significantly endangers health. The gut microbiota is known to play a central and decisive role in the progression of cardiopulmonary diseases. However, the specific alterations and underlying mechanisms in the context of OSA and CTEPH comorbidity remain largely obscure and urgently require in-depth exploration.
Methods: Participants were recruited from China-Japan Friendship Hospital and divided into three groups: healthy controls (Controls, n = 12), OSA (n = 12), and CTEPH + OSA (n = 12). Fecal samples were collected from participants to extract bacterial DNA for 16S rRNA sequencing. Meanwhile, clinical indices such as right heart catheterization parameters, blood gas analysis, inflammatory factors, and coagulation indices were collected.
Results: Compared to the Controls, the CTEPH + OSA group displayed a marked deterioration in mean pulmonary arterial pressure, significant aberrations in AHI, and a pronounced activation of inflammatory and coagulation cascades. Notably, the gut microbiota diversity was significantly diminished, accompanied by a distinct alteration in the Firmicutes/Bacteroidetes ratio. There was a notable depletion of specific beneficial bacteria and a concurrent increase in harmful taxa. Spearman correlation analysis demonstrated that the reduced abundance of Faecalibacterium was significantly negatively correlated with IH-related indicators like AHI and T90, and was positively correlated with the mean SpO2. ($P < 0.05$). Compared to the isolated OSA group, the CTEPH + OSA cohort exhibited unique and characteristic shifts in microbiota structure and functional prediction pathways. The abundance of Faecalibacterium, in particular, demonstrated a highly significant and close correlation with the severity of CTEPH, underpinning its potential as a crucial biomarker.
Conclusion: Gut microbiota dysregulation occurs in CTEPH patients with OSA, and IH may be involved. This affects the gut barrier and inflammatory response, providing new targets and ideas for improving the prognosis of CTEPH patients with OSA. Future larger sample studies and mechanism explorations are warranted.
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1114

THE ROLE OF TREM1 IN MEDIATING ATHEROSCLEROSIS INDUCED BY OSA: INSIGHTS INTO MECHANISMS AND THERAPEUTIC IMPLICATIONS

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Introduction: To investigate the role of TREM-1 in atherosclerosis (AS) development triggered by obstructive sleep apnea syndrome (OSAS) and understand the underlying mechanisms.
Methods: Mendelian randomization (MR) analysis was conducted using genome-wide association study (GWAS) summary data to assess the causal relationship between OSAS and AS (Finngen R10). Single-cell RNA sequencing (scRNA-seq) analysis was performed to examine the impact of OSAS on cellular transcriptional status in lung tissue (GSE145435) and peripheral blood (GSE214865) at the single-cell resolution. Additionally, single-cell transcriptional landscapes of aortic AS (GSE155512) were constructed to explore the involvement of macrophages in AS pathology. A chronic intermittent hypoxia (CIH) mouse model was established to evaluate atherosclerosis of aorta formation, polarization of macrophage, and expression level of TREM-1. In vitro experiments utilizing lentiviral RNA were conducted to silence TREM-1 and assess its effect on macrophage polarization.
Results: MR analysis demonstrated a significant association between OSAS and the progression of coronary AS ($P< 0.001$), as well as atherosclerosis in other arterial territories ($P=0.003$). ScRNA-seq analysis revealed that OSAS-induced hypoxia did not significantly alter the cellular composition of lung tissue ($P>0.05$), whilst OSAS patients exhibited enhanced immune activity of CD14+ monocytes in peripheral blood. Macrophage subpopulations in AS tissues of non-OSAS patients showed elevated immune crosstalk with smooth muscle cells, with relatively low TREM-1 expression. In contrast, CIH mice exhibited significantly increased AS plaque area, accompanied by upregulated TREM-1 expression ($P< 0.05$). Infiltrating macrophages in AS under CIH displayed a predominance of the M1 subpopulation. In vitro experiments using macrophages exposed to CIH showed elevated levels of IL-6, TNF-α, and TREM-1, as well as decreased IL-10 and VEGF ($P< 0.05$). Silencing TREM-1 significantly reduced TNF-α expression and increased IL-10 and VEGF expression ($P< 0.05$).
Conclusion: OSAS is genetically linked to aortic atherosclerosis. TREM-1 is involved in OSAS-related AS by influencing macrophage polarization towards M1 and may serve as a potential therapeutic target. OSAS can lead to more TREM-1+ monocytes in the blood, contributing to AS development. Targeting TREM-1 could be a promising approach for treating atherosclerosis.
Support (if any):

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1115

LOW CEREBRAL COMPLIANCE IN SEVERE SLEEP APNEA: IDENTIFYING AN INTRACRANIAL HYPERTENSIVE STATE THROUGH FULL-NIGHT NON-INVASIVE MONITORING

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Introduction: Cerebral compliance (CC) reflects the state of components within the cranial cavity: brain tissue, blood vessels, and cerebrospinal fluid. Changes in these components alter intracranial pressure (ICP). The non-invasive evaluation of P1, P2, and P3 via a CC monitoring device correlates strongly with traditional invasive methods. Sleep influences cerebral metabolism, modulating blood flow and likely CC across sleep stages. Investigating CC variation during normal sleep and obstructive sleep apnea syndrome (OSAS) could improve our understanding of both conditions and may provide valuable insights for the diagnosis and treatment of sleep disorders.

Methods: This pilot study included four patients and two healthy volunteers who underwent Type I polysomnography (PSG) with concurrent non-invasive CC monitoring. A sensor device evaluated curve morphology for systole (P1), intracerebral blood flow (P2), and aortic valve closure (P3). CC curves averaged cardiac beats while excluding artifacts, and the P2/P1 ratio was calculated for each minute of PSG. A ratio ≤1.0 was considered normal, 1.0–1.2 indicated risk of intracranial hypertension, and >1.2 suggested intracranial hypertension.
Results: Two participants without sleep complaints showed normal P2/P1 ratios: Wake: 0.82 ± 0.29; N1: 0.87 ± 0.37; N2: 0.85 ± 0.40; N3: 0.93 ± 0.30; REM: 0.75 ± 0.32. In two patients with moderate OSAS (AHI: 20.4 events/hour, REM AHI: 60.2 events/hour), P2/P1 ratios increased: Wake: 1.21 ± 0.18; N1: 1.30 ± 0.15; N2: 1.24 ± 0.18; N3: 1.16 ± 0.11; REM: 1.21 ± 0.21. In two patients with severe OSAS (AHI: 77.5 events/hour, no REM predominance), P2/P1 values were: Wake: 1.09 ± 0.29; N2: 1.05 ± 0.32; REM: 1.09 ± 0.27.
Conclusion: Preliminary findings suggest severe OSAS reduces CC during sleep, and REM-related OSAS similarly lowers CC. Increased cerebral stiffness may act as a protective mechanism, buffering steep blood flow variations caused by thoracic pressure fluctuations and sympathetic activation during apnea events. Further studies are needed to clarify this phenomenon.
Support (if any):

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1116

THE RESPIRATORY EVENT-RELATED DROP IN PULSE TRANSIT TIME PREDICTS LEFT VENTRICULAR MORPHOLOGY AND FUNCTION IN OBSTRUCTIVE SLEEP APNEA

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Introduction: Pulse transit time (PTT) is widely used to assess vascular compliance and elasticity. This study aimed to determine whether the respiratory event-related PTT response would identify subclinical Left ventricular (LV) remodeling and dysfunction in obstructive sleep apnea (OSA).
Methods: This retrospective study included OSA patients without pre-existing LV damage who underwent polysomnography between January 2014 and May 2017 at the Affiliated Huaian No.1 People's Hospital and The First Affiliated Hospital of Nanjing Medical University. LV measurements were assessed via echocardiography from December 2023 to May 2024. PTT measurements were validated using SOMNOscreen+ polysomnographic monitoring system. PTT drop magnitude refers to the difference between the initial value of the PTT decrease and the nadir triggered by apneas/hypopneas; PTT drop index is the number of drops per hour; PTT drop rate is the rate of decrease in PTT per second during the descending phase, and PTT area is the area above the waveform after respiratory events. Cox proportional hazard models estimated adjusted hazard ratios for incident LV damage, and receiver operating characteristic (ROC) curves assessed the predictive value.
Results: The sample included 517 individuals with a median (interquartile range) age of 53.0 (43.1-62.4) years and an AHI of 50.6 (32.6-65.5) events/hour. During a median follow-up of 8.3 (7.6-9.3) years, 112 patients (21.7%) had left ventricular hypertrophy (LVH), 249 (48.2%) had left ventricular diastolic dysfunction (LVDD), and none had LV systolic dysfunction. Individuals in the fourth quartile of PTT drop rate had a hazard ratio of 2.53 [95% (CI), 1.47-4.35] for LVH and 4.77 [95% CI, 3.15-7.21] for LVDD, respectively, compared to those in the first quartile. The results remained significant after adjusting for AHI and CVD. In contrast, no consistent associations were found with other PTT metrics, including drop magnitude, nadir, index, or area. In ROC curve analysis, PTT drop rate showed higher accuracy in predicting LVDD than compared to traditional polysomnography metrics.
Conclusion: Respiratory event-related PTT drop rate may be useful for predicting which patients with OSA are at increased risk for LV damage.
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1117

UNVEILING NOCTURNAL HYPERTENSION: THE ROLE OF PULSE TRANSIT TIME DERIVED BLOOD PRESSURE DURING POLYSOMNOGRAPHY

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Introduction: Obstructive sleep apnea (OSA) is associated with increased cardiovascular risk and high blood pressure. Effective blood pressure (BP) control is crucial to mitigating this risk; however, traditional office BP monitoring is unable to capture nocturnal hypertension and masked hypertension. Patients with OSA undergoing polysomnography may have their BP estimated using pulse transit time (PTT). Nevertheless, PTT-derived BP is underutilized. We aimed to compare and validate the diagnostic capability of PTT-derived BP against the standard 24-hour ambulatory BP monitoring (ABPM).
Methods: Adults referred for full-night polysomnography from suspected OSA were consecutively invited to participate. Participants underwent 24-hour ABPM on the following day. PTT-derived and ABPM-derived BP measurements were compared. Nocturnal hypertension was defined by average nighttime BP ≥ 120/70 mmHg assessed by ABPM or PTT. Participants without OSA (apnea-hypopnea index < 5/h), those who underwent positive airway pressure titration, people with conditions contributing to unreliable pulse transit time (e.g. atrial fibrillation), and inadequate ABPM were excluded.
Results: A total of 64 patients were included in the analysis, with a median age of 48 years (interquartile range 37 – 62), and 37.3% were male. Prior to polysomnography, 46.3% had been diagnosed with hypertension. 29.9%,38.8% and 26.9% had mild, moderate, and severe OSA, respectively. PTT-derived nighttime SBP and DBP were significantly higher than ABPM-derived nighttime SBP and DBP in moderate/severe OSA but not in mild OSA. PTT-derived BP demonstrated a sensitivity of 78% and specificity of 41% in identifying nocturnal hypertension detected by ABPM. Among the participants, ABPM identified elevated BP (average daytime BP≥130/80 and/or average nighttime BP≥ 120/70 mmHg) in 13 out of 36 individuals without a prior diagnosis (masked hypertension). PTT-derived nocturnal BP captured masked hypertension with a sensitivity of 76.9% and specificity of 43.5%.
Conclusion: PTT-derived BP during polysomnography was higher than APBM-derived BP in patients with moderate-severe OSA, while yielded a similar result in patients with mild OSA. The

detection of increased BP using PTT shows promise as a potential screening tool for identifying nocturnal and masked hypertension. Moreover, PTT-derived BP may have prognostic value in OSA.
Support (if any):

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1118

IMPACT OF CPAP ADHERENCE ON CARDIAC FUNCTION IN PATIENTS WITH HFPEF AND OSA: A REAL-WORLD STUDY

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Introduction: Obstructive Sleep Apnea (OSA) frequently coexists with Heart Failure with preserved Ejection Fraction (HFpEF), potentially exacerbating left ventricular (LV) dysfunction. Continuous Positive Airway Pressure (CPAP) therapy may improve LV diastolic function, but adherence is a common challenge. This study assessed CPAP compliance rates among HFpEF patients with OSA in a real-world setting and evaluated the impact on cardiac function based on adherence levels.
Methods: From 2007 to 2024, 47 patients with OSA (apnea-hypopnea index ≥ 5 events/hour) and HFpEF (LV ejection fraction ≥ 50%) were studied. Baseline polysomnography, sleep questionnaires, and echocardiography were performed. Patients were classified into "good adherence" (≥4 hours/night, n=27) and "poor adherence" (< 4 hours/night, n=20) groups based on national insurance standards for CPAP reimbursement. Cardiac function was reassessed after approximately 17 months.
Results: The study population (mean age 62.09 ± 12.7 years, 81% male) had a mean apnea-hypopnea index of 39.5 events/hour. Demographics and polysomnographic parameters were comparable between groups, except for a higher prevalence of type 2 diabetes mellitus in the poor adherence group (50% vs 18.5%, p=0.049). At follow-up, the good adherence group had a significant reduction in diastolic blood pressure (baseline 85.4 ± 8.1 mmHg to 81.2 ± 9.4 mmHg, p=0.029), with a non-significant trend toward improvement in LV mass index. No significant differences were observed in LV diastolic function parameters such as early diastolic mitral annular (e′) velocity, left atrial volume index, and right ventricular systolic pressure.
Conclusion: CPAP adherence was associated with reduction in diastolic blood pressure, suggesting potential improvement of afterload in HFpEF patients with OSA. Further studies are needed to explore long-term effects on cardiac remodeling.

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1119

RETROSPECTIVE ANALYSIS OF THE IMPACT OF MINERALOCORTICOID RECEPTOR ANTAGONISTS ON SLEEP DISORDERED BREATHING IN PATIENTS WITH SYSTOLIC HEART FAILURE

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Introduction: Sleep disordered breathing (SDB) is a common event in heart failure with reduced ejection fraction (HFrEF). It is often seen as a possible contributor of further worsening of heart failure. The implementation of advancing guideline-directed medical therapy (GDMT) is necessary in improving outcomes in patients with HFrEF. Since implementation of Mineralocorticoid receptor antagonists (MRA) to GDMT, it has led to mortality rate reduction in patients with HFrEF. However, the American College of Cardiology mainly recommends it in patients with ejection fraction (EF) of less than 40% based on present trials. This study aims to assess the impact MRA's regarding the development of SDB in this patient population.
Methods: TrinetX, an application which collects de-identified patient data, was used to perform this retrospective cohort study. 2 groups were formed, the first group composed of patients with HFrEF with ejection fraction (EF) of less than 40% on GDMT including MRA's. The second group comprised of similar characteristics except were on GDMT without MRA's. Age was set at 18 years and older, then propensity score matching was performed. The groups were compared assessing the risk, Risk differences (RD), P-values (p), risk ratio (RR), and confidence intervals (CI).
Results: The groups were studied over 3 years from initiation of their respective GDMT course. First, mortality occurrence was assessed with risks of 19.4% vs 20.804%, RD 1.403% p< 0.0001, RR 0.933(CI: 0.902, 0.965). Then the occurrence of central sleep apnea was assessed with risks of 0.582% vs 0.365%, RD 0.216% p 0.0003, RR 1.592 (CI: 1.238, 2.049). Finally, the development of obstructive sleep apnea was assessed with risks of 7.92% vs 6.137%, RD 1.783% p< 0.0001, RR1.291 (CI: 1.208, 1.379).
Conclusion: This study first confirms the already noted mortality benefit of MRA's in patients with HFrEF. However, it also notes an elevated risk of developing SDB in this at-risk patient population. Thus, providers should have reduced thresholds for evaluating SDB in this patient population. Furthermore, subsequent studies are required to elucidate the mechanism of this phenomenon.

Support (if any):

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1120

IMPACT OF POST-METABOLIC SURGERY WEIGHT LOSS ON RELATIONSHIP OF SLEEP DISORDERED BREATHING AND CARDIOVASCULAR EVENTS

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Introduction: Obstructive sleep apnea (OSA) and obesity hypoventilation syndrome (OHS) are known risk factors for major adverse cardiovascular events (MACE): coronary artery disease, cerebrovascular events, heart failure, atrial fibrillation, and all-cause mortality, however the impact of sleep disordered breathing (SDB) on MACE post-metabolic surgery remains understudied. We hypothesized that SDB is associated with MACE post-metabolic surgery, more so with less weight loss.
Methods: The dataset included patients who had polysomnograms (6/17/2011-7/3/2018) before metabolic surgery at Cleveland Clinic and body mass index (BMI) measures within 1 year before MACE or last follow-up, excluding patients with baseline MACE. Patients were classified by SDB: OSA+OHS, OSA only, OHS only, neither, with OSA defined as apnea hypopnea index≥15. Time-dependent BMI %change was calculated

pre-surgery to MACE or last follow-up and stratified into quartiles. An unadjusted Cox proportional hazards model generated hazard ratios with 95% confidence intervals for MACE by SDB group. A multivariable model was adjusted for BMI %change, age, sex, race, surgery type, and key comorbidities. An interaction term was created between BMI %change and 2-level SDB group (OSA or OHS vs. neither) due to low outcome rates.
Results: The sample (N=1,285, age 43.6±11.5 years, 16.5% male, 63.7% White, 64.2% Roux-en-Y surgery, and 32.9% sleeve gastrectomy) had median follow-up of 1.95 years (range:< 1-8.2 years). BMI quartiles were: Q1:>33.1%, Q2:>24.1%-33.1%, Q3:>15.6%-24.1%, Q4:≤15.6%. The unadjusted model revealed 2.42 times greater MACE incidence in patients with OSA+OHS (HR=2.42, 95%CI=1.02-5.76, p=0.006) vs. neither, attenuated with adjustment (p=0.43). BMI reduction had greater impact in those without SDB (HR=1.65, 95%CI=1.08-2.54, p=0.022) vs. those with SDB (HR=1.09, 95%CI=0.88-1.34, p=0.44; interaction p=0.048).
Conclusion: In this cohort undergoing metabolic surgery, SDB, particularly the combination of OSA and OHS, was associated with increased MACE incidence, but no longer after adjustment for demographics, comorbidities, and BMI change. More effective BMI reduction post-metabolic surgery had a stronger protective effect against MACE incidence in those without SDB, highlighting the potential moderating role of SDB in post-metabolic surgery cardiovascular risk. Findings underscore the importance of identifying and managing SDB in patients undergoing metabolic surgery to optimize long-term cardiovascular outcomes.
Support (if any): CCF Transformative Research Resource Neuroscience Award

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1121

POST-DISCHARGE TELEMEDICINE MOTIVATIONAL ENHANCEMENT IN ACUTE DECOMPENSATED HEART FAILURE AND OBSTRUCTIVE SLEEP APNEA RANDOMIZED CLINICAL TRIAL

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Introduction: Adherence to Positive Airway Pressure (PAP) in patients with Acute Decompensated Heart Failure (ADHF) and Obstructive Sleep Apnea (OSA) is associated with improved outcomes. However, follow-up with long-term PAP adherence poses a substantial challenge. We hypothesized that motivational enhancement (ME) via a telemedicine intensive approach improves PAP adherence post-discharge in hospitalized patients with ADHF and OSA.
Methods: Telemedicine Intensive Motivational Enhancement (TIME) (NCT04752462) is an ongoing randomized clinical trial designed to investigate telemedicine ME effect on post-discharge PAP adherence, rehospitalizations, and patient-reported outcomes (PRO, Epworth Sleepiness Scare [ESS], Frequency of Obstructive Sleep Apnea Symptoms Questionnaire [FOSQ] and Kansas City Cardiomyopathy Questionnaire [KCCQ-12]) compared to standard of care at 3 and 6 months in patients admitted with ADHF and in-hospital OSA diagnosis. We recruited 75 adult patients with ADHF and OSA (AHI≥5) who were randomly assigned to receive TIME (n=39) or regular care (n=36) and followed for 3 months. Since 3-month PAP adherence (minutes), and PROs were non-normally distributed, groups were compared unadjusted using the Wilcoxon rank sum test, and by linear models with a log-transformed outcome. Models were fit unadjusted and with adjustment for age, sex, race, and body mass index(BMI). All PRO models were adjusted for baseline PRO levels.
Results: Participants are predominantly men (60%), 38.7% of Black race, with BMI of 32.7[IQR:29.1,38.9], LVEF 37.0%[IQR:25.0,54.0], AHI:22.7[IQR:15.1,34.9], ESS:6[IQR:3,10], moderate level of daily impairment (FOSQ score of 15.7[IQR:13.0 - 19.0]) and poor health status at baseline (KCCQ-12 score25.5[IQR 13.5,52.1]). In unadjusted analysis at 3 months, nightly adherence was not significantly different in the TIME vs control group (128.5 [IQR7.0 -260.5] vs 61.5 [IQR5.5 -192.0], p=0.56). The quality of life (KCCQ-12 QoL) subscale was significantly higher in the TIME vs control group (75.0 [IQR50.0-87.5]vs37.5[IQR12.5-75.0], p=0.020), with a baseline adjusted mean increase of 92.5%(95%CI:0.9%-268%, p=0.047). In adjusted analysis, this difference persisted. No group differences were observed in the ESS and FOSQ scores.
Conclusion: TIME did not have significant effects on PAP adherence at 3 months. However, there was an improvement in HF-specific quality of life at 3 months
Support (if any): AASM Foundation

Abstract citation ID: zsaf090.1122

1122

ATRIAL FIBRILLATION BURDEN IN CENTRAL SLEEP APNEA PATIENTS TREATED WITH PHRENIC NERVE STIMULATOR

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Introduction: Phrenic Nerve stimulation (PNS) has been FDA-approved for the treatment of moderate-severe central sleep apnea (CSA). Whether PNS impacts the burden of persistent atrial fibrillation (AF) in unclear. The objective is to determine the impact of CSA treatment on AF burden
Methods: This study is a multicentric, retrospective chart review of PNS implants conducted between 2018 and 2024. A total of 21 patients with polysomnography (PSG)-confirmed moderate to severe CSA and predominant central apnea hypopnea Index (AHI) underwent PNS implantation with the remedē system (Respicardia Inc, Minnetonka, MN, USA). After 12 weeks of PNS activation, repeat PSG was schedule. Of this cohort, five patients had persistent atrial fibrillation with previously implanted cardiac devices. Quantification of AF burden was obtained from implanted device interrogation after PNS activation.
Results: In 8 patients (6 left phrenic and 2 right phrenic) with pre and post implant PSG testing, AHI was significantly reduced by PNS (51±27 vs 18±15, p =.015, 95% Confidence interval [8.81, 57.29]. In the 5 patients with persistent AF and concomitant cardiac devices, AF burden was significantly reduced by PNS implantation (pre-implant burden 100 %±0) than the AF burden post implant (60% ± 54.7).

Conclusion: Phrenic Nerve stimulation is effective in reducing the AHI in predominant CSA. There may be a potential benefit in decreasing the AF burden in patients with persistent AF that requires further study

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1123

RISK OF CARDIOMETABOLIC OUTCOMES IN INDIVIDUALS WITH TYPE 1 AND TYPE 2 NARCOLEPSY

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Introduction: Narcolepsy, a chronic neurological sleep disorder, has two subtypes: type 1 (NT1), characterized by cerebrospinal fluid (CSF) orexin deficiency, and type 2 (NT2), characterized by normal CSF orexin levels. Both subtypes share symptoms, such as excessive daytime sleepiness (EDS) and fragmented nocturnal sleep, but cataplexy is specific to NT1. Given orexin's role in autonomic regulation, NT1 is linked to cardiometabolic risks. However, data on cardiometabolic outcomes is limited for both subtypes. Therefore, we assessed the risks of diabetes, hypertension, and hyperlipidemia in patients with NT1 and NT2 compared to individuals without narcolepsy.

Methods: We conducted a retrospective cohort study using 2005-2021 MarketScan® Commercial and Medicare Supplemental databases. Patients newly diagnosed with narcolepsy (NT1 or NT2) with >2 outpatient claims were identified using International Classification of Diseases – Clinical Modification diagnosis codes (NT1 or NT2 group). A comparison cohort without narcolepsy and hypersomnia (non-narcolepsy group) was matched using propensity score (PS) matching (1:3 ratio) based on baseline demographics, comorbidities, and medication use. We excluded patients with any diagnosis of cardiovascular disease, hypertension, hyperlipidemia, diabetes, and metabolic-associated fatty liver disease during 1-year baseline period. After PS-matching, we used time-dependent Cox regression to compare risks of diabetes, hypertension, and hyperlipidemia between NT1 and non-narcolepsy groups and NT2 and non-narcolepsy groups. Models accounted for baseline use of wake-promoting agents, oxybate, stimulants, and time-varying stimulant use during follow-up period.

Results: The final cohort included 86,002 patients (18,309 with NT1, 3,760 with NT2, and 63,709 without narcolepsy). The adjusted model shows that NT1 was associated with higher risks for diabetes (adjusted hazard ratio [aHR] 2.21; 95% confidence interval [CI] 1.59-3.07), hypertension (aHR 1.43; 95% CI 1.18-1.73), and hyperlipidemia (aHR 1.74; 95% CI 1.48-2.04), compared to those without narcolepsy. Similarly, NT2 was associated with higher risks of diabetes (aHR 1.44; 95% CI 1.24-1.66), hypertension (aHR 1.39; 95% CI 1.29-1.51), and hyperlipidemia (aHR 1.43; 95% CI 1.33-1.53), compared to those without narcolepsy.

Conclusion: Using large U.S. claims data, patients with NT1 or NT2 showed increased risks for diabetes, hypertension, and hyperlipidemia compared to those without narcolepsy. EDS and sleep fragmentation may drive these risks.

Support (if any): Sleep Research Society Foundation (23-FRA-001)

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1124

INCREASED CARDIOMETABOLIC RISK IN NARCOLEPSY: EVIDENCE OF EARLY-LIFE ONSET

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Introduction: Emerging evidence links narcolepsy to major adverse cardiovascular events (MACE). While narcolepsy typically manifests early in life, it remains unclear whether cardiovascular disease (CVD) also develops early. We hypothesized that narcolepsy elevates the risk of cardiometabolic conditions from childhood into later life, potentially explaining the heightened MACE risk in persons with narcolepsy (PWN).

Methods: We conducted a retrospective cohort study using MarketScan® Commercial and Medicare Supplemental databases (2005-2021). PWN were identified by ≥2 outpatient claims for narcolepsy using International Classification of Diseases–Clinical Modification diagnosis codes. A control group of persons without narcolepsy/hypersomnolence was created using propensity score matching (1:3 ratio). Index date was the first narcolepsy diagnosis for PWN and corresponding encounter date for matched controls. Individuals with pre-existing CVD, MACE, hypertension, hyperlipidemia, diabetes, or metabolic fatty liver disease during the year prior to the index date (baseline period), to ensure balanced demographics, comorbidities, and baseline medication use between with and without narcolepsy groups. Cox regression models assessed the association between narcolepsy and time to incident hypertension, hyperlipidemia, and diabetes, adjusting for baseline and time-varying narcolepsy medication (i.e., wake-promoting agents, stimulants, and oxybate) use. Analyses were stratified by age groups (≤25[pediatric], 26–44[adults], 45–65[middle-aged], and >65yrs[older adults]).

Results: The cohort included 22,293 PWN and 63,709 without narcolepsy/hypersomnolence. Mean±SD age was 35.5±14.0 years (63.7% female). PWN had a significantly higher risk of hypertension (adjusted hazard ratio[aHR]:1.44, 95% Confidence Interval[CI]:1.34–1.54), hyperlipidemia (aHR:1.48, 95% CI:1.39–1.57), and diabetes (aHR:1.61, 95% CI:1.40–1.83) compared to those without narcolepsy. These outcomes were elevated across all age groups except older adults (>65yrs). Notably, in the pediatric cohort(< 25yrs), PWN showed nearly double the risk of hypertension (aHR:2.01, 95% CI:1.60–2.53), hyperlipidemia (aHR:1.84, 95% CI:1.53–2.23), and diabetes (aHR:2.37, 95% CI:1.66–3.37) compared to those without narcolepsy/hypersomnolence.

Conclusion: Using a large U.S. claims database, narcolepsy was associated with a significantly increased risk of hypertension, hyperlipidemia, and diabetes across all age groups, with strongest associations observed in younger individuals. Early onset of cardiometabolic risk factors indicate prolonged exposure, potentially increasing the likelihood of MACE later in life and possibly shifting their onset to earlier ages.

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1125

NON-DIPPING BLOOD PRESSURE IS ASSOCIATED WITH SLEEP TIMING IN HYPERTENSIVE ADULTS WITH INSOMNIA DISORDER

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Introduction: Blood pressure (BP) dipping during nocturnal sleep is characteristic of a normal circadian BP pattern. A blunted BP dipping pattern (< 10% dip in BP), however, is a cardiovascular disease (CVD) risk factor and is associated with sleep disturbance. Although numerous studies have examined the relationship between nocturnal BP dipping and sleep, most research has been conducted in healthy adult samples and employed self-report measures of sleep disturbance. In the SLEEPRIGHT Trial, we examined associations between BP dipping and variability in sleep timing in a sample of adults with untreated hypertension who also met diagnostic criteria for insomnia disorder.
Methods: Study participants met diagnostic criteria for insomnia disorder and had untreated hypertension, with an office systolic blood pressure (SBP) in the range 130-160 mmHg. BP dipping was assessed using 24-hour ambulatory blood pressure monitoring. Insomnia disorder diagnostic criteria (ICSD-3) were assessed using the Insomnia module of the Structured Clinical Interview for Sleep Disorders (SCISD), and sleep midpoint was ascertained from the Consensus Sleep Diary data. Patients with SBP>160 mm Hg, OSA, severe obesity, atrial fibrillation, congestive heart failure, and sleep and cardiovascular medications were excluded.
Results: Study participants (N=139; 43% male; 78% Caucasian) were 48 years of age (SD=8) with diary sleep midpoint of 4:09 am ± 25 minutes, and sleep duration of 6.57 ± 1.07 hours. In linear regression models adjusted for age, sex, race, body mass index, and daytime blood pressure, variability in sleep midpoint ($F=3.57$, $p=.002$) was significantly associated with SBP dipping, with those having more variable sleep timing exhibiting relatively blunted nocturnal BP dipping.
Conclusion: These observations extend previous research to those with hypertension and comorbid insomnia disorder. Interventions known to regularize sleep timing in those with insomnia disorder, such as Cognitive Behavioral Therapy for Insomnia, might also result in reduced CVD risk through normalized nocturnal BP dipping. Longitudinal findings from the ongoing SLEEPRIGTHT trial will shed light on this possibility.
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1126

LOWER SLEEP REGULARITY IS ASSOCIATED WITH FASTER TIME TO CLINICAL EVENT IN ADULTS WITH HEART FAILURE

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Introduction: Disturbances to sleep and the circadian timing system may contribute to morbidity and mortality, particularly in chronic conditions. For example, advancing sleep/wake rhythms to induce circadian disruption significantly reduces lifespans in cardiomyopathic animals; however, it is unclear if these findings extend to humans. Adults with heart failure (HF) often report sleep difficulties and day-to-day variations in sleep timing (e.g., sleep regularity), thus reflecting chronic circadian disruption and possibly increasing adverse event risk. Considering sleep regularity has been shown to be a greater predictor for mortality than sleep duration, we quantified the impact of sleep regularity on 6-month clinical event risk among adults with HF after a hospitalization for HF.
Methods: Data was collected from 32 participants (14 female) following a baseline hospitalization for acute decompensated HF. Sleep regularity index (SRI) was calculated from diary-determined sleep onset and offset collected over ~7-days. Participants were then classified into regular (SRI>87%) or irregular (SRI<= 87%) sleep groups at baseline. Differences between sleep groups were assessed using independent t-tests. Clinical event data (all-cause emergency room visit, hospitalization, and death) were collected through 6 months post-hospitalization. Kaplan-Meier time-to-event curves between sleep groups were generated and then compared using the Log-rank test. Hazard ratios (HR) and 95% confidence intervals (95%CI) were estimated by Cox regression model.
Results: There were no baseline differences between sleep groups (n=16 irregular and n=16 regular) in age (mean±SD, irregular vs. regular, respectively; 63.1±12.2y vs. 62.1±18.0y; p=0.85) or sleep duration (581±145min vs. 535±83min; p=0.27), but SRI was significantly lower in the irregular sleep group (79±7% vs. 92±3%; p< 0.01). Kaplan-Meier analysis showed significant delineation in "time to event" curves between sleep groups (p=0.01), with the irregular sleep group having a greater risk of an event (HR=2.7, 95%CI:1.1-6.6; p=0.02) compared to the regular sleep group.
Conclusion: Irregular sleep patterns after a HF hospitalization predicted worse 6-month clinical event risk among adults with HF; thus, sleep and circadian rhythm disruption may be one mechanistic contributor to poor health outcomes. Improving regularity in sleep patterns may be a potential interventional target to mitigate adverse health events in this population.
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1127

ACTIGRAPHY-BASED SLEEP IRREGULARITY MEASURES AND CARDIOMETABOLIC IMAGING BIOMARKERS USING PET/MRI: A DESCRIPTIVE ANALYSIS

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Introduction: There is mounting evidence that irregular sleep patterns are associated with impaired cardiometabolic health. However, few studies have explored this link independent of obstructive sleep apnea (OSA), an important confounder in this relationship. Here, we report a descriptive analysis of our study, investigating the link between irregular sleep, vascular inflammation, and abdominal adiposity in a cohort of patients without significant OSA.
Methods: We recruited adults from ambulatory clinics with ≥1 cardiovascular risk factor and without significant OSA

(Respiratory Disturbance Index ≤20). Sleep patterns were monitored for 10-14 days using actigraphy. Hybrid PET/MRI with 18F-fluorodeoxyglucose (FDG) radiotracer was conducted to characterize vascular inflammation of the carotid arteries and ascending aorta, and visceral and subcutaneous adipose tissue (VAT and SAT) volume and metabolic activity. Image analysis was performed using OsiriX. FDG-uptake was measured using standardized uptake values (SUVmean and SUVmax). Patients with standard deviations in sleep-onset timing >60 minutes were classified as irregular sleepers. We report descriptive baseline characteristics, sleep-wake patterns, and imaging metrics.

Results: 39 participants completed actigraphy and PET/MRI thus far. Baseline characteristics are noted in Table 1. Twelve (31%) participants met criteria for irregular sleep. Irregular sleepers had higher subjective symptoms of daytime sleepiness ($p< 0.05$), shorter sleep (TST 5.9 vs 6.9 hours, $p< 0.05$), and more irregular total sleep time (TST standard deviation 80.7 versus 54.5 min, $p< 0.01$). Participants with irregular sleep were also significantly younger in age ($p< 0.01$). There were no significant differences in adiposity measures or vascular inflammation between the two groups. In exploratory analysis, both age ($\beta=0.007$ $p=0.07$) and BMI ($\beta=0.034$, $p< 0.05$) were positively associated with carotid vascular inflammation.

Conclusion: In preliminary analysis, we found that irregular sleepers were younger in age, with a lower TST, and greater complaints of daytime sleepiness. There were no significant differences in vascular inflammation and abdominal adiposity measures between the two groups. Our results are limited by sample size. In this ongoing study, future analyses with a larger cohort and use of novel metrics for sleep regularity will allow us to better characterize its effects as a modifiable risk factor for cardiometabolic biomarkers, independent of OSA.

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1128

METABOLIC SYNDROME, SLEEP PATTERNS AND CHRONOTYPE IN A POPULATION OF YOUNG ADULTS: AN EPIDEMIOLOGICAL STUDY

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Introduction: Metabolic syndrome (MetS) is a set of interconnected and hereditary changes characterized by increased blood pressure levels, central obesity, insulin resistance, atherogenic dyslipidemia, risk of type 2 diabetes mellitus (DM2) and atherosclerotic and non-atherosclerotic cardiovascular diseases (CVD). In recent decades, changes in both eating habits and sleep patterns have contributed to an increase in MetS, and associated cardiometabolic diseases. Studies have revealed a connection between short sleep duration and metabolic function, with increased cortisol levels, reduced insulin sensitivity, altered appetite regulation, and reduced leptin levels, which can lead to weight gain, DM2 and cardiovascular diseases.

Methods: Data from the EPISONO 2007 study were analyzed. After exclusion criteria, the sample included 223 individuals aged between 20 and 39 years, and excluded those using psychoactive medications, with incomplete data or only having one or two risk factors for MetS. Participants completed questionnaires about sleep and chronotype. They underwent anthropometric assessments, measurement of blood pressure, blood glucose, total cholesterol and fractions, triglycerides, HOMA-IR, insulin, IL-6, C-reactive protein, ghrelin, leptin, aspartate aminotransferase (AST), alanine aminotransferase (ALT) and baseline polysomnography. Two groups were formed: a control group with 180 individuals without risk factors for MetS, and a metabolic syndrome (MetS) group with 43 individuals presenting three or more of the five diagnostic factors for MetS according to the National Cholesterol Education Program - Adult Treatment Panel III.

Results: The prevalence of MetS was lower compared to other Brazilian studies, being 9.2% in women and 8.6% in men. There was a significant correlation between MetS and altered sleep patterns, and a higher apnea-hypopnea index in men with Mets. No connection were found between MetS and chronotype.

Conclusion: MetS was associated with reduced sleep quality in young adults, regardless of gender, but not with chronotype. Additional studies are needed to explore the relationship between MetS and sleep quality in this age group.

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1129

LONGITUDINAL CHANGES IN SELF-REPORTED CHRONOTYPE AND RISK OF CHRONIC DISEASES: AN OUTCOME-WIDE STUDY IN UK BIOBANK

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Introduction: Self-reported chronotype assessed at a single time point has been associated with chronic disease outcomes. Chronotype, while partially shaped by genetic factors, may shift over time in response to environmental and biological changes or ageing. However, the extent to which chronotype changes occur and the impact of such changes on major chronic disease risk remains underexplored.

Methods: Our outcome-wide study included 51,632 UK Biobank participants who reported chronotype at two time points using a validated question from the Morningness-Eveningness Questionnaire; mean age at the second assessment (i.e., study baseline): 64 years. Chronotype changes were categorized into five levels: no change, small or large change towards morningness, and small or large change towards eveningness. Incidence of eight major chronic diseases was identified via validated algorithms integrating medical records, death registers, and self-reports. Cox proportional hazard models estimated hazard ratios (HR) for associations between chronotype change and incident disease risk, applying a Bonferroni correction.

Results: The two chronotype assessments, on average 7.4 years apart, showed relatively high stability (weighted kappa = 0.764), with 19% shifting towards morningness and 15% towards eveningness. The number of incident cases ranged from 138

for all-cause parkinsonism to 1,288 for cardiovascular disease (CVD) over a median follow-up of 5.0 years. Compared to participants with no change, those with a large change towards morningness had a 2.51-fold increased risk of all-cause dementia (95% CI: 1.15, 5.50), after adjusting for baseline chronotype, time intervals between chronotype measurements, sociodemographic factors, shift work, and lifestyle factors. By contrast, risks associated with a change towards eveningness was 3.37 (1.74, 6.51) for all-cause dementia, 2.27 (1.40, 3.68) for COPD and 1.23 (1.04, 1.46) for type 2 diabetes, versus no chronotype change. However, after Bonferroni correction, only the association between large changes and all-cause dementia remained significant (corrected global p-value: 0.0080). No associations were observed for CVD (stroke/myocardial infarction), asthma, or parkinsonism risks.
Conclusion: Large chronotype changes towards morningness or eveningness were associated with incident chronic disease risk, particularly dementia, in aging adults. These changes may reflect alterations in intrinsic circadian mechanisms and/or influences by environmental and behavioral factors.
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1130
WITHDRAWN

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1131

Targeted Light Exposure for Poor Sleep Following Acute Coronary Syndrome: A Pilot Randomized Trial

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Introduction: Sleep disturbance is common following acute coronary syndrome (ACS) and may contribute to worse prognosis. Short sleep duration following ACS is linked to increased risk of hospital readmission, and both short sleep and insomnia are prospectively associated with recurrent cardiovascular (CVD) events in patients. Sleep may therefore represent a modifiable behavioral target to improve prognosis in these patients. We describe the findings of a pilot randomized clinical trial (RCT) testing the feasibility of a circadian rhythm-based intervention to improve post-ACS sleep.
Methods: Fifteen post-ACS patients with insomnia symptoms and/or short sleep duration were randomized (2:1 allocation) to combined chronotherapy (CC) plus sleep hygiene education (SHE) or SHE alone control. CC consisted of a) bright light therapy (BLT) delivered by a wearable light visor for 30 minutes after awakening and b) short-wavelength light avoidance using blue-light blocking (BLB) glasses in the evening from 8:00pm to bedtime. The intervention was administered daily for 4 weeks. Primary outcomes were study completion, adherence to the treatment, and patient-rated intervention feasibility (Feasibility of Intervention Measure), acceptability (Acceptability of Intervention Measure), appropriateness (Intervention Appropriateness Measure) and usability (System Usability Scale). Secondary outcomes were insomnia symptoms (Insomnia Severity Index), sleep quality (Pittsburgh Sleep Quality Index), and self-reported sleep duration.
Results: Two patients in the CC group dropped before initiating study procedures. Completion of study procedures (i.e., completing all assessments at study endpoint) in the remaining patients was high in the CC and SHE control groups (88% and 100%, respectively). Self-reported adherence to CC (i.e., using BLT and BLB on ≥50% of days) was high (88% and 100%, respectively). The proportion of CC patients who perceived the intervention as feasible (71%) and usable (100%) was high, though fewer CC patients rated the intervention as acceptable (57%) and appropriate to improve sleep (29%). Improvements in insomnia symptoms and self-reported sleep quality and duration were seen in response to the CC intervention (71%).
Conclusion: Post-ACS patients with sleep disturbance had high adherence to this sleep-targeted chronotherapeutic intervention, and most viewed it as feasible and usable. This intervention should be tested in a larger RCT to determine efficacy to improve sleep.
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1132

SLEEP DURATION IN THE MONTH FOLLOWING ACUTE CORONARY SYNDROME AND RISK FOR MAJOR ADVERSE CARDIOVASCULAR EVENTS AND MORTALITY: A PROSPECTIVE 1-Y STUDY

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Introduction: Sleep disturbance is a risk factor for incident cardiovascular disease (CVD). Yet less is known about the prospective association between disturbed sleep and risk for recurrent cardiac events. We examined whether short sleep duration in the month following hospital evaluation for acute coronary syndrome (ACS) is associated with increased risk for major acute cardiovascular event (MACE) and/or all-cause mortality (ACM) over the following year.
Methods: Patients were enrolled in this prospective observational study after emergency department evaluation for ACS. Habitual sleep duration was assessed at 1 month after hospital discharge with the question: "During the past month, how many hours of actual sleep did you get at night?" A Cox proportional hazards model was used to assess the association between short sleep duration (< 7 hours) during the month following ACS hospital evaluation and MACE/ACM over the 12 months following hospital discharge. Covariates included age, sex, race/ethnicity, cardiac severity (GRACE-Risk score), comorbidities (Charlson Comorbidity Index), and ACS diagnosis status (confirmed ACS vs. rule-out). Because of the small number of participants with long sleep duration (>9 hours) and the potential association of long sleep with adverse outcomes, participants reporting >9 hours of sleep were excluded from analyses.
Results: The sample included 1,239 patients. Mean (SD) age was 60.6 (12.9) years and 49.6% were female. Mean sleep duration was 5.97 (1.64) hours, with 59.6% reporting sleep duration < 7 hours and 40.36% with sleep duration 7-9 hours. During the follow-up period, 5.2% experienced MACE/ACM. Short sleep duration (vs. not short) had a marginally significant association with 12-month MACE/ACM (HR=1.64; 95% CI: 0.94, 2.84) in covariate adjusted analyses. In sensitivity analysis defining short sleep as < 6 hours and comparing to sleep duration of 6-9 hours, the association of short sleep with 12-month MACE/ACM was statistically significant (HR=1.90; 95% CI: 1.15, 3.12).
Conclusion: Short sleep duration following ACS hospital evaluation is prevalent and is associated with increased risk of MACE/ACM within the following 12 months. Findings suggest that short sleep is an important modifiable behavioral factor to consider after ACS, and that targeting short sleep duration in cardiac patients may help reduce secondary cardiovascular risk.
Support (if any):

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1133

RACIAL AND ETHNIC AND SEX DIFFERENCES IN THE ASSOCIATION OF SLEEP DURATION AND ADVANCED CARDIOVASCULAR-KIDNEY-METABOLIC SYNDROME

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Introduction: Cardiovascular-Kidney-Metabolic Syndrome (CKM), a condition characterized by the comorbid occurrence of metabolic conditions, chronic kidney disease, and cardiovascular disease, can significantly increase the risk for early mortality. Sex, racial, and ethnic differences have been found, with men (compared to women) and Black individuals (compared to White individuals) being more likely to have advanced stage CKM (stages 3 and 4), suggesting the need to examine factors that may be contributing to advanced stage CKM. Poor sleep may be a determinant of CKM, given its link to cardiovascular, chronic kidney, and metabolic conditions independently. We examined associations of objective sleep duration and the occurrence of advanced-stage CKM, and whether the associations differed by sex and race and ethnicity.
Methods: We analyzed cross-sectional data from two cycles (2011-2012 & 2013-2014) of the NHANES study. Individuals were classified into five stages (0-4) of CKM. For the current analyses, individuals were further classified as having advanced CKM (stages 3-4) vs no advanced CKM (stages 0-2). Sleep duration was obtained via actigraphy across a nine day period and coded as short (< 7 hours), recommended (> 7 and < 9 hours), and long (> 9 hours) sleep. Sex and race and ethnicity stratified logistic regressions were fit to determine the association of sleep duration and CKM adjusting for sociodemographic factors, smoking, alcohol use, and depressive symptoms.
Results: The sample (n=4510; Mage = 48.9) was 50% female, 22% Latinx, 42% White, 21% Black, and 13% Asian. Approximately 37% had short sleep duration, 13% had long sleep duration, and 17% had advanced CKM. In fully adjusted models, long compared to recommended sleep duration was associated with an increased odds of advanced CKM for men (aOR: 1.84 CI: [1.05, 3.24]) and Latinx individuals (aOR: 4.64 CI:[2.07, 10.40]). Sleep duration was not associated with advanced CKM in women, or White, Black, or Asian individuals.
Conclusion: Long sleep duration was associated with higher odds of advanced stage CKM among men and Latinx individuals. While cross-sectional, findings may suggest that interventions to improve sleep may reduce the burden of CKM among these populations.

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1134

INDIVIDUAL AND CUMULATIVE EFFECTS OF SLEEP ON INCIDENT HEART FAILURE: THE REASONS FOR GEOGRAPHIC AND RACIAL DIFFERENCES IN STROKE (REGARDS) STUDY

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Introduction: Sleep disturbances are contributors to elevated cardiovascular disease event risk. However, research on the cumulative effects of multiple disturbances and the specific risk for heart failure (HF) is limited and lacks representation from diverse populations. We examined the individual and cumulative associations of sleep factors on incident HF among a racially and regionally diverse U.S. sample.
Methods: We utilized the REasons for Geographic and Racial Differences in Stroke (REGARDS) study. Self-reported sleep was assessed between 2013-2016 and incident HF was defined as HF hospitalizations or HF-related mortality through 12/31/2020 (based on clinician-adjudication). Cox proportional hazards models estimated hazard ratios (HRs) for individual (sleep duration, sleep efficiency, sleep mid-point, restless sleep, and sleep-disordered breathing [SDB]) and cumulative (count score of suboptimal factors; categories: 0, 1, 2, 3-5; higher scores indicate more disturbance) sleep factors, with progressive adjustment for sociodemographic (age, sex, race, education, income, geographic region), behavioral (smoking, alcohol, physical inactivity), and medical (diabetes, hypertension, obesity, atrial fibrillation, coronary heart disease, chronic kidney disease, stroke) confounders.
Results: Among 10,440 HF-free participants (mean age= 72.0 years, 55.2% female, 33.3% Black), 370 HF events occurred over median follow-up of 5.9 years. Individually, late sleep mid-point (>4:00AM) compared to intermediate (2-4:00AM; HR=1.52, 95%CI: 1.13–2.03), moderate/most-of-time restless sleep (compared to rarely/some-of-time; HR=1.31, 95%CI: 1.02-1.69), and SDB (compared to no SDB; HR=1.54, 95%CI: 1.02-2.34) were associated with incident HF, adjusting for sociodemographics. Late sleep mid-point remained significantly associated with incident HF after adjusting for behavioral (HR=1.40, 95%CI: 1.04-1.87) but not medical (HR=1.25, 95%CI: 0.93-1.68) confounders. No other individual models were significant. Cumulatively, sleep score 3-5 (compared to 0) was associated with incident HF, adjusting for sociodemographic (HR=1.59, 95%CI: 1.13-2.24) and behavioral (HR=1.51, 95%CI: 1.07-2.12) but not medical (HR=1.17, 95%CI: 0.83-1.66) confounders.
Conclusion: Though some sleep disturbances and greater cumulative sleep burden were associated with increased HF risk in sociodemographic-adjusted models, associations were largely explained by behavioral and medical factors. Further research is needed to clarify pathways linking sleep to HF risk and identify which populations may benefit from sleep-related interventions.

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1135

MULTIDIMENSIONAL SLEEP HEALTH IS ASSOCIATED WITH LOWER DIURNAL BLOOD PRESSURE PROFILES FROM OUT-OF-OFFICE BLOOD PRESSURE ASSESSMENT

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Introduction: Multidimensional sleep health (MDSH) is associated with lower hypertension risk, but evidence regarding its influence on out-of-office blood pressure (BP) is limited. This study evaluated associations of overall and individual MDSH metrics with ambulatory and home BP (ABPM and HBPM) among middle-aged to older adults in a free-living setting.
Methods: Participants were a community-based sample recruited across New York City (n=201, age:40-80y, 70% female, 26% Black, 22% Hispanic) who completed seven consecutive days of wrist actigraphy concurrent with HBPM and 24-h ABPM. An MDSH score was computed such that participants received a score of 1 for having sleep duration≥7h, sleep efficiency≥85%, sleep midpoint< 4AM, day-to-day sleep duration and timing variability< 60 minutes, very good/excellent self-reported sleep satisfaction, and high daytime alertness; otherwise, they received a score of 0. Components were summed to create an MDSH score (range: 0-6) dichotomized as suboptimal (0-4) and optimal (5-6). Average, morning, and evening systolic (SBP) and diastolic BP (DBP) were derived from HBPM. Mean 24-h, sleep, and wake SBP and DBP were derived from ABPM. Multivariable linear regression evaluated associations of MDSH with BP outcomes.
Results: Each 1-unit increase in the MDSH score was significantly associated with lower 24-h, wake, and sleep SBP and DBP from ABPM and lower average, morning, and evening SBP from HBPM. Optimal vs. suboptimal MSDH was associated with lower mean 24-hour (β=-7.1mmHg; p=0.007), wake (β=-5.70mmHg; p=0.032), and sleep SBP (β=-10.3mmHg; p=0.001) and with lower sleep DBP (β=-5.4mmHg; p=0.008). Optimal MDSH was also related to lower mean SBP and DBP (β=-6.0mmHg and -5.2mmHg; p< 0.01) and lower morning DBP (β=-4.2mmHg; p=0.02) and evening SBP and DBP (β=-8.6 and -6.0mmHg; p< 0.01) from HBPM. Among individual sleep metrics, higher sleep efficiency and regularity, sufficient sleep duration, and greater daytime alertness were significantly associated with more favorable ABPM and HBPM outcomes.
Conclusion: Overall MDSH was consistently associated with lower ecologic BP and more favorable diurnal BP profiles, but not all MDSH components were associated with out-of-office BP outcomes. Adopting an MDSH approach may be critical for optimizing diurnal BP profiles in ecologic settings. Population-based longitudinal studies are needed to confirm these findings.
Support (if any): NHLBI:HL148511; PI:Makarem.

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1136

IMPACT OF CONTEXTUAL AND PHYSIOLOGIC FACTORS ON ADOLESCENT MULTIDIMENSIONAL SLEEP HEALTH FOR CARDIOMETABOLIC HEALTH

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Introduction: Good sleep health is essential for optimal cardiometabolic health. However, contextual (schooling) and physiologic (sleep apnea) factors can negatively impact adolescent sleep health. The existing RegUlarity, Satisfaction, Alertness, Timing, Efficiency and Duration (RU-SATED) framework used to derive multidimensional sleep health (MSH) scores does not account for the contribution of these factors to sleep health. In the present study, we developed two MSH models to account for these factors and examined their associations with metabolic syndrome (MetS), an index of cardiometabolic health, and compared their performance to an unweighted MSH score.
Methods: We studied 341 adolescents (16.3±2.2 yr; 47% female; 22.9% racial/ethnic minority) from the Penn State Child Cohort who underwent 9-h, in-lab polysomnography (PSG) and 1-week, at-home actigraphy. Of them, 62% (n=212) were evaluated while in-school. Sex-and-age adjusted z-scores of central obesity, blood pressure, insulin resistance, triglycerides, and HDL were used to define MetS. Sleep apnea was measured using PSG via apnea/hypopnea index. We developed a weighted MSH score to account for being evaluated in-school vs. on-break on all sleep dimensions using coefficients from multivariable linear regression models. PSG-measured sleep apnea was added as a dimension to the weighted MSH score. We examined the associations between the unweighted and two weighted scores, independently, and MetS using linear regression models that adjusted for sex, age, race/ethnicity, and household income.
Results: A higher unweighted MSH score was not significantly associated with lower MetS (β=-0.17, p=0.23). Regression analyses supported divergent coefficients for RU-SATED dimensions; for example, b=0.31 for timing in-school vs. b=-0.37 for timing on-break. A higher weighted MSH score was significantly associated with lower MetS (β=-0.34, p< 0.05). After adding sleep apnea, the weighted MSH score showed an even stronger significant association with lower MetS (β=-0.71, p< 0.001).
Conclusion: An MSH score that accounts for both contextual (schooling) and physiologic (sleep apnea) factors is more strongly associated with cardiometabolic health than one informed by the traditional RU-SATED framework. This finding supports current advocacy efforts to adapt school schedules to adolescent development and the screening for physiologic sleep disorders.
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1137

SLEEP DIFFICULTIES AND OBJECTIVELY MEASURED CARDIOVASCULAR DISEASE RISK AMONG CANNABIS CONSUMERS: RESULTS FROM THE HERBAL HEART STUDY

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Introduction: Cannabis and poor sleep have independently been associated with cardiovascular disease (CVD) risk. This study examines the intersection of sleep, CVD, and cannabis among a cohort of 18-to-35-year-olds.
Methods: Data are from the Herbal Heart Study (N=200), a cohort examining cannabis use and objective measures of subclinical CVD. Cannabis was confirmed by urine. CVD risk was defined as >1 of the following: BMI>25 kg/m2, triglycerides >=150mg/dL, waist-to-hip-ratio (>0.9 male; >0.85 female), total cholesterol >=200mg/dL, LDL >=100mg/dL, BP (systolic >=130mmHg/diastolic >=85mmHg), HDL < 40 for male/<=50 female, VLDL >30mg/dL, and/or cholesterol/HDL ratio >4.5. Difficulty in falling or staying asleep was self-reported via the Medical History Questionnaire. A binary variable, "poor sleep," was created to represent >1 sleep difficulties. Chi-squared tests, Fisher's Exact tests, and multivariable logistic regression estimated the association between sleep variables and CVD risk.

Results: Majority (65.0%) of the sample (mean age: 25.2 years, SD=4.8) were female, 54.5% Hispanic/Latino, and 63.0% cannabis consumers (CB+). CVD risk was less frequent among those with difficulty falling asleep (63.6% vs 82.6%, p=0.01), staying asleep (70.7% vs 83.1%, p=0.02), and poor sleep (70.7% vs 83.1%, p< 0.05). Among CB+, those with difficulty falling asleep (64.5% vs. 82.1%, p=0.04) had lower CVD risk; no significant differences were observed among non-consumers. Demographic-adjusted regression found lower odds of CVD risk among participants with difficulty falling asleep (AOR: 0.35, 95% CI: 0.15-0.81), staying asleep (AOR: 0.26, 95% CI: 0.10-0.67), or poor sleep (AOR: 0.41, 95% CI: 0.20-0.91). CB+ with difficulty falling asleep (AOR: 0.30, 95% CI: 0.10-0.90) and staying asleep (AOR: 0.21, 95% CI: 0.10-0.74) had lower odds of CVD risk; there were no differences among non-consumers.
Conclusion: Self-reported difficulty falling/staying asleep is associated with less CVD risk among 18-to-35-year-old CB+, potentially reflecting behavioral or metabolic differences that warrant further investigation.
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1138
GENDER, INFLAMMATION, AND COGNITION AFFECT THE SLEEP TRAJECTORIES OF SUBARACHNOID HEMORRHAGE SURVIVORS

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Introduction: Sleep disturbance after subarachnoid hemorrhage (SAH) impacts recovery and rehabilitation. Longitudinal studies examining trajectories of sleep are needed to understand patients' experiences of sleep over time. We aimed to identify subgroups of SAH survivors based on distinct trajectories of sleep during the first 6 months post-SAH and determine whether they vary according to sociodemographic and clinical characteristics, inflammatory biomarkers (Toll-like receptor 4, Tumor Necrosis Factor-Alpha [TNF-α], Interleukin [IL]-1 beta, and IL-6), and symptoms-related characteristics (depression/anxiety, fatigue, sleep quality, and cognition).
Methods: We conducted a 6-month longitudinal study of 40 SAH survivors (average age: 56.9 years, 32.5% male). Multi-trajectory latent class growth analysis was used to identify salient patient groupings based on the trajectories of objective sleep parameters—sleep efficiency (SE), sleep onset latency (SOL), wake after sleep onset (WASO), and total sleep time (TST)—assessed using actigraphy at 2, 3, and 6 months. Sociodemographic, clinical, and symptom-related characteristics (at 2 months) and inflammatory biomarkers (at 2, 3, and 7 days and 2 months) were compared among trajectory groups using bivariate analyses. Statistical significance was set at $p < 0.1$.
Results: Two trajectory groups were identified: Group 1 (n = 24; "high SE/short SOL/short WASO/adequate TST") and Group 2 (n = 16; "low SE/long SOL/long WASO/insufficient TST"). The mean scores of all sleep parameters remained stable across all three time points (2, 3, and 6 months) in both groups, except for SOL, which significantly decreased in Group 2, but remained higher than that of Group 1. Individuals in Group 1 (vs. Group 2) were more likely to be female and had lower plasma levels of TNF-α and IL-6 at days 3 and 7 post-SAH, respectively. Individuals in Group 1 (vs. Group 2) performed better in the following cognitive domains: immediate memory, visuospatial/constructional ability, attention, and delayed memory tasks at 2 months.
Conclusion: Significant differences between the two trajectory groups were observed in gender proportion, TNF-α and IL-6 plasma levels, and cognitive domains. These findings may help healthcare providers identify patients at risk of developing sleep disturbances. Our study suggests inflammation as a plausible mechanism of sleep disturbances.
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1139
TEMPORAL TRENDS AND DISPARITIES IN SLEEP DISORDERS AND CARDIOVASCULAR DISEASE-RELATED MORTALITY IN THE UNITED STATES: A RETROSPECTIVE ANALYSIS

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Introduction: Epidemiological evidence suggests that sleep disorders (SD) are frequently comorbid with cardiovascular diseases (CVD) and have a bidirectional correlation. The increasing prevalence of sleep disorders worldwide is associated with an increase in CVD and its resultant mortality. The objective of our study is to evaluate temporal trends and disparities in sleep disorders and CVD-related mortality among adults in the United States from 1999 to 2020.
Methods: We analyzed the Centers for Disease Control and Prevention's Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) for death certificates (1999-2020) of adults ☐45 years, with SD and CVDs. Age-adjusted mortality rates (AAMR) per 100,000 and annual percent change (APC) were calculated through Joinpoint regression. We used ICD-10 codes to identify sleep disorders (G47) and CVD (I00-I99).
Results: Between 1999 and 2020, 174,649 deaths attributed to CVD and SD were reported in the US. The AAMR increased from 1999 to 2006 [APC=13.6* (95% CI: 11.7 to 16.9)], then rose gradually until 2018 [APC=7.04* (95% CI: 5.9 to 7.6)], with a steep rise from 2018 to 2020 [APC=15.5* (95% CI: 10.6 to 18.1)]. Men had higher AAMR than women (9.6 vs 4.3 respectively). African Americans had the highest AAMR (8.1) while Asians had the lowest (1.9). Geographically, the Midwest had the highest AAMR (8.1) while the Northeast (4.8) had the lowest, with small metropolitan areas (7.7) surpassing large metros (5.6). States above the 90th percentile were Oregon, Wyoming, Montana, Minnesota, and South Dakota.
Conclusion: CVD and SD-related mortality spiked over two decades, especially among African Americans, men, and residents of Midwestern and small metropolitan US. Targeted strategies are needed for prevention, early diagnosis, and CVD and SD burden reduction.
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1140

RISING MORTALITY DUE TO SLEEP DISORDERS IN DIABETIC ADULTS: A 22-YEAR RETROSPECTIVE ANALYSIS

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Introduction: There is a complex cause-effect relationship between sleep disorders and diabetes mellitus (DM), with an increased risk of DM in adults with sleeping disorders and patients with DM who have poor sleep quality, sleep duration, and obstructive sleep apnea. Despite this, the relation between sleep inequities and diabetes-related mortality among diverse demographic groups remains underexplored. This retrospective cross-sectional study examines the temporal trends and disparities in mortality due to sleep disorders and DM in the adult United States (US) population from 1999 to 2020.
Methods: We used death certificate data from the US CDC WONDER database of adults ≥25 years old with DM and sleep disorders. Age-adjusted mortality rates (AAMRs) per 1,000,000 population, annual percent change (APC), and average annual percent change (AAPC) were calculated through Joinpoint regression and stratified by gender, race, region, and age groups. We used ICD-10 codes for sleep disorders (G47) and DM (E10-E14).
Results: Between 1999 and 2020, a total of 80,842 deaths attributed to sleep disorders were reported among adults with DM with an overall AAMR of 16.67. The AAMR increased from 1999 to 2006 [APC = 17.94*(95% CI: 15.1 to 22.4)], followed by a steady rise until 2018 [APC = 6.02*(95% CI: 4.6 to 6.8)], and a sharp rise thereafter [APC = 17.3*(95% CI: 10.4 to 20.8)]. Men had double the AAMRs than women (23.2 vs 11.5 respectively) with AAPC of 11.35* vs 10.18* respectively. Non-Hispanic (NH) American Indians had the highest AAMRs (24.2) followed by NH Black (21.2), NH Whites (16.9), Hispanics (11.9), and NH Asians (5.5). Among different age groups, individuals aged 75-84 had the highest mortality rate (57.8) followed by the 65-74 years age group (50.1). Geographically, the Midwest had the highest AAMR (20.8), followed by the West (18.8), South (15.7), and Northeast (11.5). AAMRs were higher in rural areas (18.8) than urban areas (15.9).
Conclusion: Over the past two decades, the mortality from sleep disorders and DM among adults in the US has been on the rise, especially among males, who have double the mortality rates as compared to females, NH American Indians, and residents of rural and Midwestern regions.

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1141

DETECTING SLEEP APNEA DURING HOLTER MONITORING WITH A MULTI-DIAGNOSTIC DEVICE

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Introduction: Obstructive sleep apnea (OSA) affects nearly eighty percent of patients with atrial fibrillation (AF), but most remain undiagnosed. The need to efficiently diagnose and manage patients with AF and other arrhythmias is expected to grow as OSA is increasingly recognized as a key modifiable risk factor. Adding home sleep apnea testing capability to Holter ECG monitors that are already used to assess arrhythmias could facilitate OSA detection and treatment. SANSA (Huxley Medical, Inc.) is a multi-diagnostic chest-worn patch capable of recording ten physiological channels—including ECG, oximetry, and respiratory effort—and was previously validated for diagnosis of OSA against gold standard polysomnography. This study used the monitor to characterize the presence of OSA and arrhythmias in an electrophysiology cohort indicated for ambulatory cardiac monitoring.
Methods: Patients wore the monitor for twenty-four hours as part of an ongoing clinical investigation. The apnea-hypopnea index was calculated using the monitor's automated HSAT algorithm using the three percent (AHI-3%) and four percent (AHI-4%) desaturation threshold criteria. OSA prevalence was determined using an AHI cutoff of five events per hour. Expert cardiac technicians reviewed ECG records to identify AF and other common cardiac arrhythmias.
Results: Data from thirty subjects were available at the time of analysis (73% male, age 52±17 years, BMI 31±8 kg/m2, 70% White, 23% Black, 3% Asian, 10% non-Hispanic). Overall OSA prevalence was 67% using AHI-3% (20/30, 13.3±15.6 [mean ± standard deviation]) and 43% using AHI-4% (13/30, 8.0±12.7). Among subjects with a finding of OSA, 50% (10/20) were moderate and 10% (2/20) were severe using AHI-3%, and 31% (4/13) were moderate and 15% (2/13) were severe using AHI-4%. OSA was most common in subjects with AF (AHI-3%: 86% [6/7], AHI-4%: 57% [4/7]), bi/tri/quadrigeminy (AHI-3%: 90% [9/10], AHI-4%: 50% [5/10]), and ventricular tachycardia (AHI-3%: 100% [2/2], AHI-4%: 50% [1/2]). No subjects with a finding of OSA reported a prior OSA diagnosis.
Conclusion: These data highlight the opportunity for a multi-diagnostic monitor to efficiently detect undiagnosed or untreated OSA during routine Holter monitoring. Collaborating with cardiologists and electrophysiologists to offer streamlined referral pathways could expedite OSA detection and treatment.
Support (if any): Huxley Medical, Inc.

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1142

ESTIMATING INFLUENCE OF THE RUN-IN PERIOD ON STATISTICAL POWER IN A RANDOMIZED CLINICAL TRIAL OF OSA AND CPAP

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Introduction: A run-in period is sometimes used in randomized clinical trials to exclude non-adherent participants, yet its influence on adherence and statistical power remains underexplored in obstructive sleep apnea (OSA) trials with continuous positive airway pressure (CPAP) intervention. Using Sleep Apnea Stress Study (SASS, NCT00607893) data, we aimed to assess how excluding the run-in period affects key clinical outcomes.

Methods: We generated adherence models and estimated power considering scenarios with and without use of a run-in period. Without use of the run-in period, adherence for previously excluded patients was adjusted to 0-100% of the observed adherence post-randomization. Power estimates were based on two-sided t-tests with sample sizes reflecting randomized groups and the full potential sample, assuming inclusion of previously excluded participants.
Results: Post-randomization CPAP adherence among participants who completed the 2-week run-in period was 58%. Without the run-in, adherence for the previously excluded group post-randomization ranged from 47% (0% adjusted adherence) to 59% (100% assuming adherence equivalent to randomized participants). Power to detect a large standardized effect size(0.8) in clinical outcome biomarkers of soluble interleukin-6 receptor and augmentation index increased from 0.80 (with run-in and observed adherence) to 0.93 (without run-in and 100% adjusted adherence). Power for systolic blood pressure (SBP) detection rose from 0.34 (with run-in and observed adherence) to 0.47 (without run-in and 100% adjusted adherence). Without the run-in period, if sample size subsequently increased to include previously excluded participants, statistical power was enhanced, even if previously excluded participants maintained the same post-randomization adherence. If sample size was fixed, including previously excluded participants modestly improved power only when adherence approximated that of randomized participants. Under other adherence scenarios, power was diminished. Observed SBP differences were smaller than hypothesized, which may contribute to reduced power for SBP detection under these models.
Conclusion: Run-in period exclusion potentially enhances statistical power, particularly with larger sample size or high adherence among previously excluded participants. However, advantages diminish when adherence is lower among the excluded cohort. Findings underscore the need for careful consideration of anticipated adherence and sample size adjustments when integrating the run-in period in CPAP clinical trials in OSA.
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1143
INNOVATIONS IN TIME SERIES DATA INTEGRATION IN A POLYSOMNOGRAPHIC FOUNDATIONAL MODEL INFORMING RISK GROUPS

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Introduction: Despite the abundance of polysomnography (PSG) data, the limited summary metrics used in existing approaches may not provide the most informative insights for clinical decision-making. We hypothesized that a new data-driven clustering method using the entire multimodal raw PSG data could enable a precise risk stratification approach. We leveraged a new clinical data set to facilitate this data-driven approach and create a novel Foundation Model.
Methods: We utilized 10,000 PSGs conducted at the Cleveland (1/2012-12/2022) and custom artificial intelligence techniques that incorporate time-series data, to develop a Foundation Model from raw PSG data. We optimized this new model to classify sleep stages, respiratory events, and oxygen desaturations. Resulting embeddings were used to cluster patients into distinct risk groups with a k-means algorithm. Baseline characteristics were compared between risk groups using chi-square tests for categorical variables and Welch's ANOVA for continuous variables. Means and standard deviations are reported.
Results: Optimal stratification of embeddings was achieved with five clusters. Resulting risk groups (RG) had a graded increase in age, male predominance, cardiovascular risk factors, and sleep-disordered breathing(SDB) severity from RG1(n=3,357) to RG5(n=363). Males were more prevalent in RG4(n=1,144; 60.8%) and RG5(66.4%) and least in RG2(n=1,877; 37.6%). Body mass index was lowest in RG2(32.7±9.1kg/m2) and highest in RG5(35.4±10.4kg/m2). RG4 and RG5 were the oldest(58.6±16.1years) and RG2 the youngest(44.0±15.0years). RG1 had intermediate SDB with apnea hypopnea index (AHI:12.4±12.4), total sleep time (TST:328±61.1min), and risk (hypertension:59.8%,diabetes II:32.7%), and lowest cognitive impairment(14.1%). RG2 had the mildest SDB (AHI:5.4±6.4), longest TST (342±71.6min), and lowest cardiovascular risk (hypertension:47.5%,diabetes II:24.7%). RG3(n=2,867) had intermediate SDB and risk. RG4 had more abnormal PSG measures (AHI:22.7±13.2, TST:201±73.9min), more risk (hypertension:75.6%,diabetes II:65.2%), and highest major adverse cardiovascular events (43.6%) but lowest migraine (11.5%). RG5 had the most severe SDB (AHI:37.3±39.0), lowest TST (98.4±89.0min), and high risk (hypertension:77.4%,diabetes II:44.6%). All p-values were < 0.001.
Conclusion: We created a Polysomnographic Foundational Model to stratify patients into risk groups characterized by different comorbidities not completely explained by traditional measures. RG4 and RG5 exhibited more severe SDB and unique clinical characteristics that prompt future investigation and warrant more attention from healthcare providers.
Support (if any): IBM Discovery Accelerator, AIM Award, NIH 1R21HL170206-01

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1144
RELATIONSHIP BETWEEN SLEEP AND POSTOPERATIVE DELIRIUM IN CARDIAC SURGERIES: A SCOPING REVIEW

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Introduction: Perioperative sleep disturbance is a risk factor for postoperative delirium (POD). The two-fold aim of this study is to: evaluate the relationship between perioperative sleep disturbance and POD after cardiac surgeries (CS); and examine sleep recovery after cardiac surgeries in patients with and without POD.
Methods: We followed the Arksey and O'Malley framework for scoping review. Following the PRISMA statement and using keywords, we electronically searched five different electronical databases (PubMed, Cumulated Index to Nursing and

Allied Health Literature, Web of Science, Scopus, EMBASE). The search was conducted in July 2024 with no date limitation. Original English articles that assessed sleep and POD in patients who had CS were eligible.
Results: Of the 14 included studies (28.5% interventional), most studies were from Iran (29%) followed by China (29%) and the US (21%). Reports indicated that the incidence of POD ranged from 5.3% to 50%. Patients who developed POD during hospitalization had significantly higher postoperative self-reported sleep disturbances after 3 years. Also, POD patients had a significantly higher Pittsburg Sleep Quality index (>5) one year after surgery. Preoperatively, high apnea-hypopnea index, low sleep efficiency, short sleep duration, and a high non-rapid eye movement arousal index predicted POD, indicating patients with poor sleep quality and insomnia are more likely to develop POD after CS. Although dexmedetomidine (an anesthetic) did not improve sleep quality 30, 60, 90, and 180 days after surgery compared to a placebo, it did help prevent POD. However, melatonin (3 mg) improved sleep quality when compared to Oxazepam (10 mg) after surgery.
Conclusion: Poor sleep quality and insomnia are the most common perioperative sleep disturbances and risk factors for POD. Melatonin improved post-surgery (in hospital) sleep quality but had no impact on POD. In contrast, dexmedetomidine prevented POD but did not improve post-hospital discharge sleep quality. Patients may need at least one month to achieve preoperative sleep quality, which may not necessarily be classified as good-quality sleep. Therefore, full sleep recovery may take 3 to 6 months post-CS. More research on the effectiveness of non-pharmacological interventions targeting sleep improvement, such as earplugs and eye masks after surgery, is warranted.
Support (if any):

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1145

SLEEP QUALITY AND RESPIRATORY DISTURBANCE IN PATIENTS WITH CARDIOVASCULAR CONDITIONS AND TYPE 2 DIABETES MELLITUS

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Introduction: Increased likelihood of poor sleep and OSA have been associated with both cardiovascular conditions (CVC) and type 2 diabetes mellitus (T2DM). A CV-T2DM comorbidity may be associated with a greater risk for sleep and respiratory disturbances. In this study, polysomnographic (PSG) measures and Pittsburgh Sleep Quality Index (PSQI) were compared between 4 patient groups: CVC, T2DM, CVC-T2DM, and controls.
Methods: From 1678 consecutive diagnostic PSGs, patients were excluded with < 120 minutes of total sleep time (TST), history of shift work and significant psychiatric and medical conditions other than CVC and T2DM. This yielded 36 CVC patients (18 women, 7 white, M[age]=55.3±13.7, M[BMI]=33.3±8.6), 57 T2DM patients (37 women, 8 white, M[age]=57.7±11.9, M[BMI]=34.8±6.2), 10 CV-T2DM patients (4 women, 3 white, M[age]=63.5±14.5, M[BMI]=29.1±3.7), and 271 controls (151 women, 90 white, M[age]=49.3±15.1, M[BMI]=34.6±7.8). MANCOVA was used for between-group comparisons of TST, N1%, N3%, REM%, sleep latency, REM latency, sleep efficiency, wake after sleep onset, awakenings, arousal index, AHI, SpO290% nadir, time (minutes) below SpO290%, and PSQI. Covariates were sex, age and BMI.
Results: MANCOVA revealed significant group effects on PSQI (p=0.02) and, of all PSG variables, on time below SpO290% (p=0.05). LSD post-hoc comparisons with controls revealed higher PSQI in CVC patients (M[CVC]=10.4±4.6 vs. M[Controls]=8.4±3.4 (p=0.01), and longer time below SpO290% in CVC-T2DM patients (M[CVC-T2DM]=30.1±70.0 vs. M[Controls]=8.1±28.7 (p=0.04). No other between-group comparisons were significant. Mean group AHI and SpO290% nadir values were, respectively: AHI: M[CVC]=16.1±19.9, M[T2DM]=21.7±24.4, M[CVC-T2DM]=12.9±11.9, M[Controls]=15.8±20.5; SpO2% nadir: M[CVC]=83.5±11.1, M[T2DM]=82.9±10.2, M[CVC-T2DM]=83.0±9.6, M[Controls]=85.6±8.0.
Conclusion: PSG-defined sleep and respiratory disturbance variables were essentially the same in these small samples of CVC, T2DM and comorbid CVC-T2DM patients, and did not differ from controls, with one exception: CVC-T2DM patients spent more time with SpO2 below 90% relative to controls, suggesting the possibility of a cumulative effect of CVC-T2DM comorbidity on respiratory parameters. As PSQI was higher in the CVC group in comparison with controls, subjective sleep quality in these patients may relate to factors other than PSG variables.
Support (if any): none

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1146

OBESITY/OSA PHENOTYPES RELATIVE TO HYPERTENSION AND DIABETES: A CROSS-SECTIONAL STUDY IN A MEXICAN POPULATION

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Introduction: A strong association between obstructive sleep apnea (OSA) and obesity has been well documented, however, not all obese OSA patients show similar comorbidities. Two of the most common comorbidities shown by such patients are hypertension and diabetes. Hypertension accompanying OSA may reflect increased sympathetic nervous system activity, decreased baroreflex sensitivity, vascular endothelial dysfunction, and altered metabolism of salt and water, all of which have been demonstrated to accompany disordered breathing during sleep. In addition to OSA, other aspects of sleep architecture and disrupted chronobiology, including short duration sleep, sleep-related movement disorders (restless legs syndrome (RLS)/ periodic limb movements of sleep (PLMS), bruxism), and circadian rhythm disruption have been associated with prevalent and/or incident hypertension. The objective of this work was to explore/ examine whether visceral fat and sleep measures would differentiate patients with obesity and obstructive sleep apnea (OSA)/phenotypes. A secondary objective was to determine which sleep and metabolic variables predicted hypertension in obese patients.

Methods: An observational, cross-sectional study was conducted comparing three obesity/phenotypes: 1) Obesity/OSA without hypertension or diabetes; 2) Obesity/OSA with hypertension; 3) Obesity/OSA with hypertension and diabetes. Polysomnographic (PSG) measures of sleep and self-reported aspects of sleep together with novel measures of lipid and glucose metabolism (Metabolic Score for Visceral Fat (METS-VF), Metabolic Score for Insulin Resistance (METS-IR)) were compared between groups. Multiple regression models were used to determine which variables predicted group status.
Results: Patients with obesity/OSA and hypertension had a shorter total sleep time and a longer time of wakefulness after sleep initiation (WASO). These measures were associated with hypertensive group status using multiple regression models, which incorporated both visceral fat (METS-VF) and insulin resistance (METS-IR). Both lower total sleep time (TST) (OR=0.988, p=0.05) and higher METS-VF (OR=10.315, p=0.05) independently predicted hypertensive group status ($\chi 2$ =11.591, p=0.021; R2 = 0.218). No such associations were observed for METS-IR. Sleep measures did not differentiate the group that included diabetes.
Conclusion: Our data suggest that, in a Mexican population with marked obesity and severe sleep apnea, hypertension was related to sleep duration and continuity.
Support (if any): This work was supported by UNAM-PAPIIT 32-IN216919

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1147

SLEEP HEALTH AND DISABILITY AMONG ADULTS WITH INFLAMMATORY BOWEL DISEASE

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Introduction: The majority of adults with inflammatory bowel disease (IBD) experience disability which is not fully explained by disease activity. Up to 80% of adults with IBD experience poor sleep health, which is associated with disability in other populations; however, the relationship between disability and sleep health among patients with IBD is largely unexamined. The purpose of this study was to compare the sleep health characteristics of those with and without IBD-related disability.
Methods: We recruited adults (18 to 59 years old) with IBD from a single academic medical center from 2022 to 2024. We measured disease activity using the Manitoba IBD Index and sleep using the PROMIS Sleep Disturbance and PROMIS Sleep-Related Impairment scales, the Insomnia Severity Index, and 14 days of wrist-worn actigraphy (Phillips Spectrum Plus, Phillips Respironics). We asked participants how many days they missed or had at least 50% reduced productivity in paid work or household work or missed leisure activities in the last 3 months related to their IBD. Disability was defined as missing six or more day over three months. We conducted bivariate analyses and logistic regressions to study associations.
Results: Among 83 adults with IBD [mean age = 40.4 years (SD 10.7), 59 (71.1%) were female, 56 (71.1%) had Crohn's disease], and 49 (62.0%) had IBD-related disability. Patients with disability had more severe sleep disturbance (56.4 vs. 51.0, p <.001), sleep-related impairment (58.3 vs 50.3, p <.001), more severe insomnia (12.7 vs. 9.4, p =.029), and actigraph-measured higher wake after sleep onset (41.6 minutes vs. 34.0 minutes, p = 0.012) and lower sleep efficiency (85.1% vs. 87.9%, p = 0.032) compared to those without disability. After controlling for age and disease activity, sleep-related impairment (OR = 1.1, 95% CI 1.03, 1.15) was independently associated with disability.
Conclusion: Patients with IBD-related disability experience poor sleep health. Sleep related daytime impairment uniquely contributed to disability when controlling for disease activity. Sleep interventions need to be tested in adults with IBD to determine if they are effective at addressing disability in this population.
Support (if any): Mayo Clinic Bonner Fund

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1148

COMORBID NONRESTORATIVE SLEEP ACCELERATES MORTALITY IN COMMUNITY ADULTS WITH COMMON CHRONIC CONDITIONS

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Introduction: Nonrestorative sleep (NRS) is a subjective daytime symptom reflecting poor sleep quality. We recently demonstrated a longitudinal association between NRS and increased mortality in US community adults. NRS has been reported to co-occur with physical and mental conditions and to predict the development of common chronic conditions such as diabetes, hypertension, obesity, and depression. However, it remains unclear whether NRS comorbid with common chronic conditions accelerates mortality.
Methods: We analyzed data from the Multi-Ethnic Study of Atherosclerosis (MESA), a community-based cohort study in US. The analysis included data from 5,818 adults who provided self-reported sleep-related information during the follow-up period from 2005 to 2015. The sample was categorized into four groups based on the presence of NRS and specific conditions including diabetes, hypertension, obesity, and depression: (1) NRS-/chronic condition (CC)- (reference), (2) NRS+/CC-, (3) NRS-/CC+, and (4) NRS+/CC+. We compared the multivariable-adjusted hazard ratios for all-cause mortality among the four groups using Cox proportional hazards regression. We applied three different models to adjust for the known potential confounders including demographic, cardiovascular, and sleep-related variables. Furthermore, we examined the interaction between NRS and each condition by calculating the index of interaction (relative excess risk due to interaction; RERI).
Results: A total of 863 deaths (14.8%) were reported over a median (interquartile range) follow-up period of 9.4 (9.0–9.8) years. The NRS+/CC+ group had a higher mortality risk compared to the NRS-/CC- group for all conditions. Relative increases in hazard ratio of the NRS+/CC+ group compared to the NRS-/CC+ group varied across conditions: diabetes, +123%; hypertension, +33%; obesity, +85%; and depression, +62% in the fully adjusted model. Notably, the elevated mortality risk associated

with chronic conditions comorbid with NRS was independent of self-reported sleep duration and nocturnal insomnia symptoms. A significant interaction was observed between NRS and diabetes (RERI 0.98, 95% CI: 0.02–1.94).
Conclusion: Our findings suggest that NRS accelerates chronic condition-related mortality in community adults, independently of subjective sleep duration and insomnia symptoms. These results underscore the clinical and epidemiological importance of addressing NRS.
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1149
CO-MORBID INSOMNIA AND OBSTRUCTIVE SLEEP APNEA AUGMENTS CARDIAC AUTONOMIC BURDEN TO INCREASE ALL-CAUSE MORTALITY

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Introduction: Co-morbid insomnia and sleep apnea (COMISA) is associated with increased mortality. However, it remains unclear whether COMISA exerts cumulative deleterious impact on autonomic regulation to augment incidence of deaths compared to insomnia alone and OSA alone. This study aimed to evaluate an association of heart rate variability (HRV) as a marker of autonomic burden to all-cause mortality in patients with COMISA.
Methods: 5023 participants who underwent unattended polysomnography and completed sleep questionnaires on insomnia and daytime impairment from the Sleep Heart Health Study were included. The diagnosis of COMISA required the criteria for both insomnia (difficulties initiating sleep, maintaining sleep, and/or early morning awakenings on 16-30 times/month and daytime impairment) and sleep apnea (an apnea-hypopnea index [AHI]≥15 events/h) to be met. HRV measures were computed from a 5-min ECG segment extracted during wakefulness prior to sleep and sleep using linear methods, detrended fluctuation analysis, entropy, symbolic dynamics, deceleration capacity (DC) and acceleration capacity (AC). Analysis of covariance controlling for relevant covariates was used to compare differences in HRV characteristics among control, insomnia, OSA, and COMISA groups. Multivariable-adjusted Cox analysis and receiver operating characteristic analysis were conducted to estimate the associations between HRV metrics and all-cause mortality in COMISA subgroup.
Results: Of the 5255 participants, 2697 (51.6%) were controls without insomnia or OSA, 170 (3.3%) had only insomnia, 2221 (42.5%) had only OSA, and 137 (2.6%) had COMISA. 42 deaths occurred in COMISA (30.6%). By comparisons of HRV metrics among these 4 groups, patients with COMISA were associated with elevated autonomic burdens, showing decreased parasympathetic activity during wakefulness and sleep compared to controls. In the multivariable Cox model, DC was an independent predictor associated with all-cause mortality in COMISA during wakefulness (hazard ratio [HR], 0.91; 95%CI, 0.84-0.99; P=0.026) and sleep (HR, 0.86; 95%CI, 0.77- 0.96, P=0.007). DC demonstrated favorable performance in identifying mortality risk in COMISA during wakefuless (the area under the curve, AUC, 0.78) and sleep (AUC, 0.76).
Conclusion: COMISA predisposed HRV impairments to be related to increased all-cause mortality through decreased parasympathetic function. Further studies are warranted to investigate the role of autonomic burden in clinical outcomes of COMISA.
Support (if any): NYFC (82301290)

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1150
DISTINGUISHING PATTERNS OF COMORBIDITY PROGRESSION IN OBSTRUCTIVE SLEEP APNEA USING REAL-WORLD DATA

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Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder associated with numerous comorbidities, including cardiometabolic and neuropsychiatric diseases. Heterogeneity in presentation and multi-morbidity complicates disease management. This analysis adopts a validated data-driven approach, age-dependent topic modeling (ATM; PMID 37814053), to group OSA-related diagnoses into longitudinal trajectories, elucidating comorbidity progression and its relationship with OSA.
Methods: We analyzed longitudinal electronic health records (EHR) from 38,600 OSA patients in the Mass General Brigham (MGB) system using 411 diagnoses previously associated with OSA. OSA status was ascertained with a validated algorithm incorporating EHR and available polysomnography (PSG). ATM analysis then grouped incident EHR diagnoses into age-dependent patterns (topics) optimized to predict future diagnoses from any given age. Model weights were used to calculate individualized risk scores for each topic, which were standardized and tested for association with OSA in a separate validation cohort of 7,774 OSA cases and 15,294 controls, matched 2:1 on propensity score (accounting for age, sex, BMI, ancestry, and healthcare utilization), and further adjusted for residual confounding.
Results: ATM identified 17 distinct age-dependent comorbidity topics in OSA patients. Of these, 14 were significantly associated ($p< 0.05/17$) with higher scores in OSA cases, representing greater risk for diverse conditions including neuropsychiatric, cardiometabolic, and respiratory disorders. The strongest associations were observed for: 1. A neuropsychiatric topic ($\beta=0.43$, $p< 1.88e-222$), progressing from mood disorders (early-adulthood) to insomnia (middle-age) and cognitive decline (old-age). 2. A respiratory-cardiovascular topic ($\beta=0.35$, $p< 1.35e-147$), progressing from chronic respiratory infections (childhood) to hearing loss and hypertension (middle-age), and cardio-vascular disease (old-age). For example, a 60-year-old with prior mood disorders and incident insomnia is expected to score high in the neuropsychiatric topic, a scenario observed more frequently in OSA, suggesting risk of later cognitive decline.

Conclusion: This study highlights associations between OSA and distinct multimorbidity patterns and suggests age-dependent comorbidity progression as a framework for understanding comorbidity burden in OSA. These findings have potential to guide targeted management strategies and interventions. Future work will integrate longitudinal data and OSA endotypes to further investigate disease heterogeneity and explore physiologically relevant pathways.
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1151
GENDER AND RACIAL DISPARITIES IN OBSTRUCTIVE SLEEP APNEA MORTALITY AMONG ADULTS WITH OBESITY IN THE UNITED STATES: A 22-YEAR ANALYSIS

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Introduction: Obesity and Obstructive Sleep Apnea (OSA) are two of the most prevalent conditions in nutrition sciences and sleep medicine, respectively. Obesity is the strongest risk factor for OSA and its consequent mortality. Therefore, the objective of our study is to evaluate temporal trends and disparities in OSA mortality among adults with obesity stratified by gender, race, and age groups in the United States (US) from 1999 to 2020.
Methods: This retrospective analysis used death certificate data from the US CDC WONDER database of adults ≥25 years with obesity and OSA. Age-adjusted mortality rates (AAMRs) per 1,000,000 population, annual percent change (APC), and average annual percent change (AAPC) were calculated through Joinpoint regression. We used ICD-10 codes for OSA (G47.3) and obesity (E66).
Results: Between 1999 and 2020, a total of 67,999 deaths attributed to OSA and obesity were reported with an overall AAMR of 14.28. The AAMR increased from 1999 to 2006 [APC = 13.93*(95% CI: 7.8 to 22.5)], followed by a steady increase from 2006 to 2018 [APC = 4.89 (95% CI: -0.45 to 18.6)], and a sharp rise thereafter [APC = 13.3*(95% CI: 5.4 to 18.2)]. Men had higher AAMRs than women (17.85 vs 11.02 respectively) with AAPC of 8.49 vs 8.22 respectively. Non-Hispanic (NH) American Indians had the highest AAMRs (21.3) followed by NH African Americans (20.9), NH Whites (14.4), Hispanics (9.3), and NH Asians (3.1). Among different age groups, individuals aged 65-74 had the highest mortality rate (33.5) followed by the 75-84 years age group (28.9). Geographically, the West had the highest AAMR (16.5), followed by the Midwest (16.4), South (13.5), and Northeast (10.6). AAMRs were higher in rural areas (17.1) than urban areas (13.7).
Conclusion: An overall increasing trend in mortality was seen in adults with obesity due to OSA in the US from 1999 to 2020. There are notable disparities in mortality among NH American Indians, males over 65 years, and residents of rural and western regions. This highlights the need for early diagnosis of OSA in obese patients and timely intervention such as weight loss and CPAP in high-risk populations.
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1152
CPAP ADHERENCE TRAJECTORY AND GLYCEMIA AMONG PATIENTS WITH TYPE 2 DIABETES AND OBSTRUCTIVE SLEEP APNEA

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Introduction: Despite evidence of a relationship among obstructive sleep apnea (OSA), metabolic dysregulation, and diabetes, it is uncertain whether long-term continuous positive airway pressure (CPAP) treatment can improve glycemia among patients with type 2 diabetes and OSA.
Methods: CPAP adherence and personal data were collected among 329 participants in the Swedish sleep apnea registry (SESAR). Glycated hemoglobin A1c (HbA1c) were obtained from the Swedish National Diabetes register (NDR) during a median follow-up of 2.2 years. Linear mixed models were used to investigate how CPAP usage changed longitudinally and how the change integrated to HbA1c's trend.
Results: Long term moderate and high CPAP adherence was associated with reduction in HbA1c compared to low adherence, with the multivariable-adjusted β coefficients of -4.567 (-7.781, -1.353), and -4.784 (-8.313, -1.255), respectively. Joint analyses with baseline and trajectories of CPAP adherence show that, compared to irregular-low users, those regular users with moderate and high trajectories over time experienced reduction in HbA1c, with the multivariable-adjusted β coefficients of -5.830 (-9.419, -2.240), and 5.316 (-8.978, -1.653), respectively.
Conclusion: Among patients with established OSA and T2D, we found evidence that moderate and high CPAP therapy over several years significantly improve HbA1c over low adherence. Early identification of patients with irregular use and low adherence could improve glycemia by further interventions.
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1153
PREVALENCE AND RISK FACTORS FOR SLEEP DISTURBANCE IN ACUTE RESPIRATORY FAILURE IN INTENSIVE CARE UNIT SURVIVORS

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Introduction: Patients admitted to the intensive care unit (ICU) due to acute respiratory failure (ARF) frequently experience sleep disturbances which can persist for years. Our study aims to assess the relationship between clinical characteristics and insomnia severity in ARF ICU survivors.
Methods: This is a secondary analysis of the mobile critical care recovery program (mCCRP) clinical trial (n = 466) which included patients 18 years or older admitted with ARF requiring invasive ventilation at 4 Indiana hospital ICUs. Demographics, comorbidities, and clinical characteristics were assessed using the electronic medical record during the index admission. Severity of illness was assessed using the Acute Physiology and

Chronic Health Evaluation Score (APACHE-II). Sleep quality was assessed with the Insomnia Severity Index (ISI) at ICU discharge. ISI scores range from 0 to 28, with higher scores indicating worse insomnia. Patients who completed an ISI at discharge were included in this analysis. Logistic regression was performed to measure the relationship between demographic and clinical characteristics and odds of clinically significant insomnia.
Results: A total of 362 patients were included in the analysis. The mean age of the cohort was 55.2 years (SD 14.0), 53.6% were female, 37.6% identified as Black, and 17.7% had pre-existing sleep disorders. Of the 362 patients, 31.2% reported clinical insomnia and 29.6% reported subthreshold insomnia at ICU discharge. Patients with clinical insomnia had significantly higher pre-ICU diagnoses of anxiety (47%) compared with those with subthreshold insomnia (31%) or no insomnia (25%, p =0.001). Participants with clinical insomnia also had higher rates of pre-ICU depression (53%) compared with those with subthreshold insomnia (31%) or no insomnia (25%, p = 0.032). In a logistic regression model, patients with pre-ICU anxiety had a significantly higher odds of developing clinical insomnia (OR 2.07, 95% CI 1.17 – 3.65). Additionally, patients with a neurologic etiology for their ARF admission had higher odds of clinical insomnia (OR 3.12, 95% CI 1.35 – 7.22).
Conclusion: Insomnia was highly prevalent in our cohort. Mental health and neurological diagnoses were significant risk factors for post-ICU sleep dysfunction. Future research is needed to help determine interventions to reduce sleep disturbances during and after critical illness.
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1154

IMPACT OF DERMATOLOGICAL DISEASES ON SLEEP, INFLAMMATION, AND CARDIOMETABOLIC RISK: FINDINGS FROM THE EPISONO STUDY

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Introduction: Dermatological diseases (DD), including dermatitis, psoriasis, and vitiligo, impact millions worldwide and are increasingly linked to sleep disturbances. Symptoms like pruritus disrupt sleep, triggering pro-inflammatory states that can worsen these conditions and their comorbidities. Despite these connections, this field remains underexplored. This study examined the influence of DD, individually and combined, on sleep parameters, the prevalence of sleep disorders, and associations with inflammatory and cardiometabolic biomarkers using data from the 4th edition of the São Paulo Epidemiological Sleep Study (EPISONO).
Methods: Data from 743 participants (20–80 years) who completed the EPISONO General Health Questionnaire were analyzed. Among these, 86 were identified with DD: dermatitis (n=59), psoriasis (n=19), vitiligo (n=8), and coexisting DD (n=8), compared to 657 Non-DD individuals. Propensity score matching (PSM) was applied to create 86 balanced pairs matched by age, sex, ethnicity, and socioeconomic status. Polysomnography (PSG), validated sleep questionnaires, and biochemical markers were assessed.
Results: Participants with DD experienced significantly poorer sleep quality compared to the Non-DD group. Excessive daytime sleepiness was 2.11 times more prevalent in individuals with dermatitis and 6.36 times higher in those with vitiligo. Psoriasis was linked to reduced mean oxygen saturation and elevated high-sensitivity C-reactive protein, reflecting an increased cardiovascular risk. No significant associations were observed between DD and sleep disorders like obstructive sleep apnea, insomnia, bruxism, or periodic limb movement disorder.
Conclusion: This study underscores the interplay between DD, sleep health, and systemic inflammation. It is the first to examine sleep patterns in vitiligo participants using PSG. These findings highlight the importance of integrating sleep assessments and systemic factors into DD management to prevent cardiovascular complications, improving health and quality of life for these patients.
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1155

THE IMPACT OF SLEEP DISTURBANCE ON DISEASE ACQUISITION; RELATIONSHIPS BETWEEN SLEEP AND MULTIMORBIDITY IN A LARGE-SCALE U.S. SAMPLE

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Introduction: Multimorbidity, or the presence of two or more co-occurring chronic medical conditions, is increasingly prevalent and impactful within the United States (US). Given the significant personal and financial cost of multimorbidity, understanding modifiable behavioral mechanisms that increase susceptibility is essential to inform intervention strategies. Disturbed sleep has been identified as one such modifiable factor. The current study's aim is to examine the impact of sleep disturbance on multimorbidity in adults using longitudinal data from the Survey of Midlife Development in the United States (MIDUS) to better inform person centered sleep interventions and future research.
Methods: Study participants (N=565) self-reported information regarding medical history and subjective sleep quality through questionnaires administered over the phone and in-person at two timepoints (MIDUS 2: 2004-2006, MIDUS 3: 2013-2014). The speed of multimorbidity was operationalized as the difference in number of chronic medical conditions across study timepoints. Hierarchical linear regression was used to assess the association between sleep disturbances and the change in number of chronic diseases. The model was adjusted for the set of covarying demographic and clinical factors (i.e. sex, age, race, ethnicity, education, BMI) to determine the unique contribution of sleep disturbance upon speed of multimorbidity acquisition across time.
Results: The sample was predominantly female (59.4%), 66 years-old, had an average of 2.46 chronic medical conditions at

T1 and 3.26 conditions at T2. Results of the hierarchical linear regression indicated that sleep disturbances significantly predicted the rate of chronic disease accumulation after controlling for clinical and demographic factors ($R^2\Delta$ =.014, p =.005). Significant predictors included BMI in Step 1 (β =.104, p=.016) and Step 2 (β =.094, p=.027), and Sleep Disturbance in Step 2 (β=.120, p=.005).
Conclusion: Results of this analysis demonstrate that the speed at which individuals acquire chronic diseases is accelerated in the presence of disturbed sleep. Given the significant impact of multimorbidity on both individual and systemic levels, the identification of nonspecific disease factors that contribute to the acquisition of multimorbidity presents an important opportunity to develop earlier intervention and prevention protocols to help mitigate negative health consequences and promote longevity.
Support (if any):

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1156
RISK OF METABOLIC ASSOCIATED FATTY LIVER DISEASE (MAFLD) IN PATIENTS WITH NARCOLEPSY: A COHORT STUDY

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Introduction: Metabolic-associated fatty liver disease (MAFLD) is a major public health concern and is closely linked to cardiometabolic dysfunction. While prior research has investigated the relationship between narcolepsy and cardiovascular disease, no studies have examined whether narcolepsy increases the risk of MAFLD, despite the overlap in known risk factors. This study aimed to determine whether narcolepsy increases the risk of MAFLD.
Methods: We conducted a retrospective cohort study using the 2005-2021 MarketScan® Commercial and Medicare Supplemental databases. We included patients with >2 outpatient claims for new narcolepsy diagnoses identified using International Classification of Diseases – Clinical Modification diagnosis codes (narcolepsy group). A comparison cohort of patients without narcolepsy and hypersomnia (non-narcolepsy group) was matched in a 1:3 ratio using propensity score (PS) matching based on baseline demographics, comorbidities, and medication use. We excluded patients with any of the following conditions during the 1-year baseline period: cardiovascular disease, hypertension, hyperlipidemia, diabetes, and MAFLD. After PS matching, we used Cox proportional hazard regression to compare risk of MAFLD between the two groups after. We also conducted subgroup analyses based on age, sex, presence of sleep apnea, and narcolepsy type.
Results: We identified 86,002 patients (22,293 with narcolepsy and 63,709 without; mean age 33.5 ± 14.0 years, 63.7% female). The incidence of MAFLD was 0.42 per 100 person-years in the narcolepsy group and 0.28 per 100 person-years in the non-narcolepsy group. After adjusting for time-fixed and time-varying covariates and relative to non-narcolepsy, narcolepsy was associated with a 48% higher risk of MAFLD (adjusted hazard ratio [aHR] 1.48; 95% confidence interval [CI] 1.28-1.73). These findings remained consistent across all subgroup analyses.
Conclusion: Compared to well-matched patients without narcolepsy, patients with narcolepsy have a significantly elevated risk of being diagnosed with MAFLD.
Support (if any): Sleep Research Society Foundation (23-FRA-001)

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1157
THE IMPACT OF CHRONIC RHINOSINUSITIS ON INSOMNIA SYMPTOMS AND SLEEP DURATION IN WORLD TRADE CENTER RESCUE AND RECOVERY WORKERS

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Introduction: Chronic rhinosinusitis (CRS) is highly prevalent in World Trade Center rescue and recovery workers (WTCRRW) and was found to be a significant risk factor for shorter subjective sleep duration, sleepiness, sleep quality, and insomnia. Symptoms of CRS such as facial pain, congestion, and rhinorrhea may impair subjects' ability to fall asleep and stay asleep. The purpose of this study is to compare objective sleep duration and variability, sleepiness, and insomnia symptoms in subjects with and without CRS.
Methods: WTCRRW underwent 2-week actigraphy. Demographics, CRS symptoms, Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), and sleep duration were collected. CRS+ was defined as ≥3 symptoms: facial pain, post-nasal drip, nasal congestion, blocked nose, anosmia, sneezing, sore throat, or hoarseness. Actigraphy data were analyzed using Cole-Kripke algorithm to obtain mean total sleep time (aTST) in hours and coefficient of variability (CV) across nights. Unadjusted bivariate analyses were performed with significance level at p< 0.05.
Results: 70 subjects (70%M30%F, age 63.8±5.2, BMI 28.8±6.0 kg/m^2) had 14 nights (range=4-16) of actigraphy. Subjective sleep duration and aTST were correlated (r=0.5, p< 0.0001). 35 subjects were CRS+ (50%) and CRS- (50%) each. Age, sex, BMI, and employment status did not differ between groups. CRS+ subjects reported increased moderate to very severe difficulty falling and staying asleep compared to CRS- subjects (17 (48.6%) vs 8 (22.9%), p=0.04 and 19 (54.3%) vs 9 (25.7%), p=0.03 respectively). We found no difference in aTST and variability between CRS+ 6.8 (1.0), CV=18.9 (8.6) and CRS- 7.1 (0.9), CV=17.1 (7.1), p=0.3. Similarly, there were no significant differences in mean subjective sleep duration [CRS+ 7.9 (1.2) vs CRS- 8.1 (0.9), p=0.6], mean ISI [CRS+ 7.2 (5.9) vs CRS- 5.7 (5.1), p=0.3], and mean ESS [CRS+ 5.0 (3.4) vs CRS- 5.0 (3.8), p=0.9].
Conclusion: Although WTCRRW with CRS symptoms subjectively report more difficulty falling and staying asleep, we

were unable to demonstrate a difference in aTST, variability, and sleepiness between CRS groups. A larger sample size and additional measures of CRS severity and insomnia may be needed to better understand the discrepancy between subjective sleep complaints and sleep duration in patients with CRS.
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1158

SEX-BASED ASSOCIATION BETWEEN INSOMNIA AND PAIN IN PATIENTS RECOVERING FROM HIP OR KNEE JOINT ARTHROPLASTY

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Introduction: A reciprocal relationship exists between sleep and pain in the context of surgery where peri-operative pain often leads to disrupted sleep, and poor sleep before surgery can increase the severity of post-operative pain. Sex differences in postoperative pain and sleep quality have also been observed with females reporting greater pain severity and worse sleep quality compared to males. The present clinical trial examined sex-based differences in insomnia severity, pain, and their relationship in osteoarthritis patients before and after hip or knee joint arthroplasty.
Methods: Patients diagnosed with insomnia scheduled for hip or knee joint arthroplasty (N=61, Mean age=67.3±7.7 years; 68% females; 62% Caucasian) completed an online survey that included Insomnia Severity Index (ISI), PROMIS Pain Intensity, and PROMIS Pain Interference +/- 2-4 weeks before and after surgery. Paired t-tests were performed to examine differences between pre- and post-surgery. Pearson correlation tests were performed to examine the association between change scores of insomnia severity and pain measures. Similar analyses were performed on subgroups by sex.
Results: PROMIS Pain Intensity significantly decreased from baseline to post-surgery (55.8±6.1 vs 53.3±6.6; P=0.04). ISI (P=0.21) and PROMIS Pain Interference (P=0.12) pre- and post-surgery were not significantly different. When analyzed by sex, PROMIS Pain Intensity scores in male participants post-surgery were significantly different from baseline (56.8±5.5 vs 52.7±5.7; P=0.04), but not for female participants (P=0.3). ISI change scores from pre- to post-surgery were significantly correlated with change scores of PROMIS Pain Intensity (r=0.4, P=0.02); ISI and PROMIS Pain Interference change scores (P=0.2) were not significantly correlated.
Conclusion: Pain intensity significantly decreased following hip or knee joint arthroplasty, despite no significant changes in pain interference or insomnia symptom severity. The change in pain intensity following surgery was largely driven by male participants who reported significant improvements, whereas women did not experience a significant change in pain intensity. Improvements in pain intensity were associated with improvements in insomnia severity following surgery.
Support (if any): This work is supported by NIH Grant #s R01NR018342 (PI Nowakowski) and IQUEST Center (CIN 13-413).

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1159

INSOMNIA AND PERCEIVED COGNITIVE FUNCTION IN SOLID ORGAN TRANSPLANT RECIPIENTS

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Introduction: Solid organ transplant recipients experience high rates of cognitive impairment; however, little is known about what modifiable factors contribute to cognitive impairment after transplantation, limiting evidence-based treatment options. Insomnia is a sleep disorder that is associated with poor cognitive functioning in healthy adults and is amenable to interventions, but the relationship between insomnia and cognitive impairment after organ transplantation has not been explored. The purpose of this study was to identify relationships between insomnia, sleep characteristics, and perceived cognitive function after organ transplantation.
Methods: We conducted a descriptive, cross-sectional study of adult (>18 years) transplant recipients. We used the Insomnia Severity Index to measure insomnia, 10 days of continuous wrist actigraphy (Ambulatory Monitoring Inc. MicroMotionlogger) to measure sleep characteristics, and the PROMIS Cognitive Function to elicit perceived cognitive function. Descriptive statistics, Spearman's Rho correlations, and Pearson's correlations were used to describe relationships.
Results: We enrolled 34 participants [Mean age 62.5 years (SD 10.7), 64.7% (n=22) female, 85.3% (n=29) white, 17 liver/9 heart/8 kidney, average time since transplant 4.8 years (SD 4.2)]. 73.3% had clinically significant insomnia [mean ISI: 12.9 (SD 6.9)]. Sleep characteristics were obtained using actigraphy (mean duration: 7.03 hours [SD 1.28], onset latency: 9.16 min [SD 4.90], efficiency: 89.49% [SD 8.96], wake after sleep onset: 49.61 [SD 37.37]). Perceived cognitive function for the sample was worse than that of the general population, with a mean T-score of 45.21 (SD 11.44). Lower perceived cognitive function scores were significantly associated with younger age (rs = -.416, p=.016) and shorter time since transplant (rs =-.386, p=.024). Longer wake after sleep onset (rs =.347, p=.048) and lower sleep efficiency (rs=-.358, p=.041) were associated with lower perceived cognitive function. Lower perceived cognitive function was strongly associated with higher insomnia severity scores (r=.817, p=<.001).
Conclusion: Insomnia was common in our sample of transplant recipients and was strongly correlated with worse perceived cognitive function. Future research should incorporate objective measures of cognitive functioning and should consider insomnia treatment as a potential intervention to promote optimal cognitive functioning after organ transplantation.
Support (if any): Mayo Clinic Center for Clinical and Translational Science.

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1160

ASSOCIATIONS OF DAILY SLEEP DURATION AND BLOOD GLUCOSE IN PREGNANT WOMEN WITH DIABETES: AN EXPLORATORY ANALYSIS

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Introduction: Blood glucose management during pregnancy is crucial for individuals with diabetes, but can be complex due to metabolic and behavioral changes that occur in the prenatal period. It can be particularly challenging to maintain optimal sleep behaviors during pregnancy. Prior research has examined associations of average sleep with average blood glucose levels, but this approach obscures important knowledge about between- and within-day fluctuations in glycemia. This study examined within- and between-person associations of daily and average sleep duration with next-day fasting blood glucose levels in pregnant women with diabetes.
Methods: Participants were 8 women [mean (SD) age = 28.5 (4.1) years, gestational age = 21.1 (3.5) weeks, 75% Latina ethnicity, 25% Black race]) enrolled in a physical activity intervention. Participants were instructed to wear Fitbit Alta HR devices (Fitbit, Inc., San Francisco, CA) for up to 12 weeks, until 36 weeks gestation, or 1 week before giving birth. Devices captured sleep duration. Participants self-reported demographic information and daily morning fasting blood glucose. There were 118 observations (nights) with contemporaneous sleep and next-day blood glucose data across participants. Multilevel models were used to examine associations of sleep duration with next-day fasting blood glucose. Models were adjusted for age, gestational age, and educational attainment. Multiple imputation was used to account for missing data. Given statistical power limitations, effect size benchmarks based on past research were emphasized over p-values.
Results: Mean (SD) sleep duration was 7.0 (0.5) hours and next-day fasting blood glucose was 91.1 (4.3) mg/dL. Within-person daily sleep duration was not associated with next-day fasting blood glucose. With one hour longer average sleep duration (between-person), next-day fasting blood glucose was 4.89 mg/dL lower (γ = -4.89, SE = 3.63, a small to medium effect size, p = 0.18).
Conclusion: Our results were similar to previous research linking longer average sleep duration with better glucose management during pregnancy. Results were observed among a sample of women of minoritized racial and ethnic groups with healthy average sleep durations and fasting blood glucose levels. These findings suggest that sleep promotion may be helpful for blood glucose regulation during pregnancy, but replication in larger samples is needed.
Support (if any):

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1161

TEMPORAL STABILITY OF SLEEP AND GLUCOSE METABOLISM AND THEIR RELATIONSHIP DURING PREGNANCY: A CROSS-LAGGED ANALYSIS

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Introduction: The relationship between sleep and glucose metabolism during different trimesters remain inconsistent. The aim of this study was to temporal stability of sleep (including duration, quality, and insomnia symptom) and glucose metabolism indicators, and to analyze their longitudinal associations through cross-lagged models.
Methods: A prospective cohort study involving 216 pregnant women was conducted. Data were collected during the first (T1), second (T2), and third (T3) trimesters from March 2022 to November 2024. Sleep quality was assessed by Pittsburgh Sleep Quality Index (PSQI). Mean sleep duration was calculated from the 7-day sleep diary, and insomnia symptoms was measured by the Insomnia Severity Index (ISI). Glucose metabolism indicators included HbA1C and fasting glucose which were obtained from health records of the participants. Cross-lagged models were used to examine the longitudinal relationship between sleep and glucose metabolism. Age, education, marital status, occupation, and number of children were included as time-invariant covariates.
Results: Both HbA1C and fasting glucose demonstrated temporal stability across the three trimesters (HbA1C_T1→T2: β = 0.573, p < 0.001; T2→T3: β = 0.512, p < 0.001; fasting glucose _T1→T2: β = 16.578, p = 0.002; T2→T3: β = 0.381, p < 0.001). Average sleep duration remained stable over time (Sleep_Avg_ T1→T2: β = 0.373, p < 0.001; T2→T3: β = 0.299, p < 0.001) and sleep duration at T1 was associated with lower HbA1C (β = -0.001, p = 0.009). Both sleep quality (PSQI) and insomnia symptoms (ISI) showed temporal stability (PSQI_T1→T2: β = 0.450, p < 0.001; T2→T3: β = 0.544, p < 0.001; ISI_T1→T2: β = 0.643, p < 0.001; T2→T3: β = 0.589, p < 0.001). Additionally, higher fasting glucose _T1 was associated with lower ISI_T2 (β = -1.242, p = 0.018).
Conclusion: HbA1C and fasting glucose exhibit high temporal stability, and average sleep duration is consistently maintained and influences glycemic indicators. Education level and age modulate both sleep and glucose metabolism. Furthermore, sleep quality and insomnia symptoms are stable over time, and there may be potential interactions between sleep-related measures and blood glucose levels.
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1162

SLEEP DISTURBANCE IN INDIVIDUALS WITH AND WITHOUT MINOR MEMORY COMPLAINTS

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Introduction: Prior research indicates that individuals with Mild Cognitive Impairment (MCI) or Alzheimer's Disease (AD) exhibit higher-than-normal levels of sleep disturbance. Epidemiologic studies suggest that poor sleep may be a risk factor for the progression of Alzheimer's Disease and Related Dementias (ADRD). Despite these findings, the literature is non-specific regarding the types of sleep disturbances that present in this population. We aimed to assess the various forms of sleep disturbance in individuals with and without minor memory complaints (MMC).
Methods: Data were obtained from an online sleep and health survey, with participants directed to the site via advertisements on platforms such as Facebook, Google, TV, and local newspapers. The survey includes sections on general sleep, health conditions, and chronic diseases, and takes approximately 20 minutes to complete. In 2024, three questions regarding memory function were added: (1) recent memory issues, (2) use of supplements or over-the-counter medications for memory, and (3) diagnosis or treatment for memory problems. Two groups were formed based on reported memory problems, distinguishing those with minor memory complaints (MMC) from those without. Analyses focused on sleep patterns (e.g., Time in Bed, Wake After Sleep Onset, Sleep Efficiency), insomnia severity, and frequency of sleep disorders. Bivariate contrasts were conducted with an alpha level set at $p < 0.01$.
Results: The sample included 308 participants (mean age 46.0 ± 12.9, 64% female, 14% non-white). Of these, 134 had MMC and 174 did not. The groups did not differ demographically, but those with MMC exhibited a subtle sleep phase delay (~30 minutes), increased insomnia severity (related to daytime function), and a higher frequency of parasomnic behaviors (e.g., nightmares).
Conclusion: Subjects with MMC demonstrated more severe sleep disturbance, particularly with phase delays and parasomnias. These findings suggest that sleep disturbance may occur early in cognitive decline and could serve as a potential early indicator of MCI. Given the connection between sleep and memory function, these results may offer insight into the pathophysiology of ADRD. Analyses are ongoing.
Support (if any):

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1163
THE IMPACT OF PULMONARY REHABILITATION ON SUBJECTIVE SLEEP QUALITY

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Introduction: Pulmonary rehabilitation (PR) and exercise programs have been shown to improve subjective sleep quality in patients with COPD. We hypothesized that PR would improve sleep quality in all patients irrespective of underlying chronic lung conditions using the Pittsburgh Sleep Quality Index (PSQI), a validated questionnaire to assess levels of sleep disturbance over a 1-month period.
Methods: All new PR patients at Northwell Health Pulmonary Rehabilitation in New Hyde Park, NY were invited to participate. Enrolled subjects participated in the standard PR program (3 sessions weekly for 8 weeks, total 24 sessions) and completed the PSQI at their1st, 12th, and 24th sessions. A preliminary descriptive analysis was performed on data from 28 subjects enrolled between February 2024 and October 2024. 13 subjects completed all three PSQI surveys, while 15 subjects completed at least two. 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.
Results: 28 subjects were included in this preliminary analysis. Subjects were 50% female and 50% male. Mean age was 70.6 years (SD ±10.51) with median BMI 33 kg/m2 (IQR 27.6-35.9) for females and 28.7 kg/m2 (IQR 25.9-30.7) for males. Comorbid conditions included COPD (57.1%), ILD (46.4%), pulmonary hypertension (17.9%), and obstructive sleep apnea (39.3%). Median total PSQI score was 9 at the 1st and 12th sessions and 8 at the 24th session, showing a median decrease of 1 between sessions 1 and 24. The PSQI subscores that demonstrated the greatest maximum improvement were sleep efficiency and need for medication to sleep.
Conclusion: This preliminary analysis suggests that PR may improve subjective sleep quality in patients with a range of chronic pulmonary conditions. Further long-term studies are needed to confirm these findings.
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1164
EARLY MEAL TIMING IMPROVES OVERNIGHT GLUCOSE IN PREGNANCIES COMPLICATED BY GESTATIONAL DIABETES

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Introduction: Gestational diabetes (GDM) results in adverse outcomes for the pregnant individual and neonate. Lifestyle interventions for GDM to improve glucose time-in-range are critically needed. Previous research demonstrates beginning food consumption early in the day is beneficial for glucose metabolism, potentially due to circadian alignment of food ingestion to the circadian clock. This study examines how temporal eating patterns influence glucose concentrations in individuals with GDM.
Methods: This is a secondary analysis of pregnant people with GDM randomized to using continuous glucose monitoring (CGM) versus capillary-blood glucose (CBG) for management of GDM. Participants measured CBG with blinded or real-time CGM and were included in the analysis if post-prandial CBG were available to infer meal timing (n=74). Fasting glycemia was measured at study enrollment with a blood test. The cohort was median split into early (first meal before 10:56) and late eating (first meal after 10:56). The 24-hour CGM glucose profiles were compared between groups by linear and cosinor analyses, adjusted for maternal and gestational age, race, medication, and GDM history. Data are mean ± standard error.
Results: People who ate breakfast later were older on average and less likely to receive Medicaid. Early eating was significantly associated with lower fasting glycemia (92.3±1.4 vs 97.6±1.8 mg/dL; P=0.021). Over 24 h, glucose tended to increase during the day and decrease during the night. This rhythm was shifted earlier for the early eating group. Additionally, the trough glucose

concentration was lower for the early eating group. Overnight glucose (23:00-5:59) decreased in both groups by ~11.7 mg/dL. However, the early eating group had significantly lower overnight glucose (average: 77.5±0.1 vs 82.8±0.1mg/dL, P=0.037). Daytime glucose concentration did not differ between the groups.
Conclusion: These data suggest individuals with GDM who eat their first meal earlier have lower fasting glycemia and lower overnight glucose concentrations compared to individuals who eat later. Food timing, with an emphasis on early eating, is a potential intervention for individuals with GDM.
Support (if any):

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1165
IMPACT OF A 12-WEEK EXERCISE PROGRAM ON SELF-REPORTED SLEEP PARAMETERS IN CANCER SURVIVORS

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Introduction: Sleep disturbances are common among cancer survivors. While increased physical activity (PA) is known to improve sleep in the general population, it is unclear whether exercise can improve sleep in cancer survivors. The purpose of this study was to examine self-reported sleep problems among cancer survivors and to explore whether self-reported sleep parameters change following a 12-week PA program.
Methods: 23 adults (82.6% female; Age: 54.4 ± 7.9 years; BMI: 33.0 ± 9.4; duration since end of treatment: 665.0 ± 728.5 days) who reported being physically inactive were enrolled in a larger study designed to test the feasibility, acceptability, and preliminary efficacy of a 12-week automated Internet program aimed at increasing PA among cancer survivors. Participants were asked to complete the Pittsburgh Sleep Quality Index (PSQI) at baseline and post-intervention assessments. Subcategories of the PSQI were explored, scores for all outcomes range 0-3, with 3 indicating worse dysfunction.
Results: Participants reported high levels of sleep problems at baseline and post-intervention (Sleep duration: pre: 1.2 ± 1, post: 1.3 ± 1.1; Latency: pre: 1.7 ± 1.1, post: 1.5 ± 1.1; Disturbances: pre: 1.7 ± 0.7, post: 1.7 ± 0.7; Daytime dysfunction: pre: 0.9 ± 0.7, post: 0.7 ± 0.6, Sleep medication: pre: 0.9 ± 1.3, post: 0.9 ± 1.2; and subjective sleep quality: pre: 1.2 ± 0.9, post: 1.3 ± 0.9; scores < 1 are typically associated with the absence of sleep problems; scores expressed as m±sd). Despite an increase in objectively measured moderate-to-vigorous physical activity during the intervention (+46.3 min/wk), there were no significant changes in any PSQI subscale scores from baseline to post-intervention (p's=0.23-0.86).
Conclusion: In this sample of cancer survivors, we observed a high rate of self-reported sleep problems, consistent with previous research. Unlike the general population, however, participation in a 12-week PA program did not result in improvements in self-reported sleep quality. While replication is required in larger samples, these findings suggest that targeting PA alone may not be sufficient for modifying sleep in this population and that more comprehensive lifestyle interventions may be needed.
Support (if any): This study was funded by the Legorreta Cancer Center at Brown University.

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1166
A CROSS-STUDY ANALYSIS ON THE IMPACT OF BEHAVIORAL INSOMNIA TREATMENT ON PAIN SEVERITY IN U.S. VETERANS

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Introduction: Insomnia disorder and chronic pain are highly comorbid, and share underlying mechanisms that impact their severity. Literature regarding the impact of behavioral insomnia treatments like cognitive behavioral therapy for insomnia (CBT-I) on pain severity, especially in veterans, has been mixed.
Methods: We harmonized datasets from four randomized clinical trials, yielding a sample of 469 veterans (mean age 63 years, 65.7% male, 56.7% white, 70% not working) who engaged in structured behavioral insomnia treatments (4-5 sessions). All veterans in the sample completed baseline, posttreatment, and at least one follow-up assessment (e.g., 3-, 6-, 9-, or 12-month follow-up). Pain severity was operationalized by harmonizing items from the Brief Pain Inventory and Geriatric Pain Measure related to average pain severity the day of assessment and average pain severity in general. Pain ratings range from 0 (no pain) to 10 (severe pain). Other measures included the Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI). Analyses included mixed effects modeling to evaluate treatment impact.
Results: Baseline pain was mild-to-moderate across the sample (m = 4.3, SD = 2.7). Across pain variables, there was no meaningful effect of behavioral insomnia treatment on pain severity outcomes (-.02 ≤ b ≤.09, p >.05). This lack of effect is present despite significant improvement in both ISI (-.5.9 ≤ b ≤ -7.39, p<.001) and PSQI (-3.45 ≤ b ≤ -4.58, p<.001) at posttreatment and follow-up periods. No differences in effect were observable when examining demographic breakdowns of age, sex, or race.
Conclusion: Though behavioral insomnia treatments do significantly improve insomnia and sleep-related outcomes, they do not appear to meaningfully improve perceived pain severity in a sample of US veterans. This is consistent with similar literature showing a lack of meaningful improvement in pain severity, yet continues to open the door for further research into facets of pain beyond severity (e.g., interference in day-to-day living) that could be impacted by improving sleep.
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1167

TRAJECTORIES OF CHANGE IN CANCER-RELATED FATIGUE AND INSOMNIA OVER 12 WEEKS OF RADIATION THERAPY

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Introduction: The impact of radiation therapy (RT) on insomnia and cancer-related fatigue (CRF) among individuals with cancer is not well understood. Our study aimed to 1) examine trajectories of insomnia and CRF across RT and 2) understand whether these trajectories depend on age or sex.
Methods: Patients with cancer (all types) undergoing RT were recruited immediately prior to starting treatment (N=128; Mage=58.6±12.4y, 38% female, 80% White, 2% Hispanic or Latino). Subjects were asked to report on insomnia and CRF symptoms at baseline and then every 2 weeks for 3 months. Mixed effects models accounting for linear and quadratic effects of time were used to examine change in CRF and insomnia over 12-weeks. Additional models evaluated baseline age and sex as moderators of these relationships. All models were adjusted for the presence of other interventions (e.g., surgery, medications).
Results: There was no significant linear (p=0.11) or quadratic (p=0.29) effect of time on fatigue, and sex did not moderate this effect. However, age moderated this effect (est=0.003, S.E.=0.001, p=0.03) such that those < 47y reported decreased CRF while those >72y reported increased CRF. There was also no significant linear (p=0.09) or quadratic (p=0.16) effect of time on insomnia, and sex did not moderate this effect. Again, age moderated the effect of time on insomnia (est=0.007, S.E.=0.003, p=0.03) such that those either < 47y or >72y reported reductions in insomnia symptoms with those < 47y reported greater reductions in insomnia symptoms compared to those >72y, while those between 47-72y reported slight increases in insomnia symptoms.
Conclusion: Findings indicate that those who are older (>72y) report increased CRF during and after RT compared to those who are younger (< 47y), where fatigue decreased more in this age cohort. Changes in both groups were modest. Results suggest that insomnia and CRF function independently in this population, as CRF increased while insomnia decreased within the full sample. Future research should explore additional risk- and maintenance-factors for insomnia and CRF during and after RT.
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1168

RAPID EYE MOVEMENT SLEEP-SUPPRESSING ANTIDEPRESSANT USE IS ASSOCIATED WITH ENHANCED SURVIVAL IN GUILLAIN-BARRÉ SYNDROME

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Introduction: Patients with neuromuscular conditions are most vulnerable to sleep disordered breathing during rapid eye movement (REM) sleep. Experimentally, pharmacological suppression of REM has been demonstrated to improve nocturnal hypoxia in muscular dystrophy patients. This approach has not been investigated in Gullain-Barré syndrome (GBS), a rare acquired neuromuscular condition.
Methods: We queried the TriNetX U.S. Collaborative Network (Cambridge, MA), an electronic health record (EHR) database of over 120 million US patients from 69 healthcare organizations, for patients with a diagnosis of GBS (ICD-10-CM G61.0) between 01/2003–01/2023. We defined a REM-inhibited cohort of patients prescribed 1 of several antidepressants associated with REM suppression in the year prior to GBS diagnosis, as well as a REM-non-inhibited cohort who received antidepressants not linked to REM suppression, excluding patients who received prescriptions from both classes. The primary outcome was 30-day mortality from GBS diagnosis. We calculated relative risks with 95% confidence intervals using logarithmic transformation and delta method standard errors, complemented by Kaplan-Meier survival analysis. Propensity score matching was performed using age, race, and gender.
Results: We identified 5,113 patients with GBS who met inclusion criteria, of whom 1,158 (22.7%) made up the REM-non-inhibited cohort and 3,955 (77.3%) comprised the REM-inhibited cohort. In the unmatched analysis, one-month mortality was significantly higher in the REM-non-inhibited group (3.0% vs 1.5%, absolute risk difference [ARD] 1.4%, 95% CI 0.4-2.5%), with a relative risk (RR) of 1.92 (95% CI 1.27-2.91, p=0.002). After propensity score matching (n=1,145 per group), this difference persisted (3.0% vs 1.6%, ARD 1.4%, 95% CI 0.2-2.6%), with RR 1.89 (95% CI 1.07-3.33, p=0.025). Kaplan-Meier survival curves demonstrated significantly better survival in the REM-inhibited group both before (log-rank p=0.002) and after matching (p=0.024).
Conclusion: This is the first study examining differential survival in GBS patients receiving REM-inhibiting versus REM-non-inhibiting antidepressants. These findings align with those obtained in patients with other neuromuscular disorders, where REM suppression is associated with clinical benefit. While we faced limitations inherent to studies of observational clinical EHR data and were unable to characterize the fraction of patients who may have had their outpatient medications interrupted due to illness acuity, our findings justify prospective investigation.
Support (if any):

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1169

ASSOCIATION BETWEEN SLEEP DISTURBANCE AND PAIN-RELATED OUTCOMES AMONG FORMER PROFESSIONAL AMERICAN-STYLE FOOTBALL PLAYERS

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Introduction: Sleep disturbances and chronic pain frequently co-occur, exhibiting a bidirectional relationship that exacerbates

both conditions. Former professional American-style football (ASF) players face unique health challenges from the physical demands and injuries sustained during their careers. This study investigates the associations between sleep disturbances and pain-related outcomes in this high-risk population.
Methods: This cross-sectional study analyzed data from 111 former professional ASF players enrolled in the Football Players Health Study at Harvard University. Sleep disturbance and sleep-related impairment were measured using PROMIS T-scores, while sleep-disordered breathing (SDB) was assessed using a single-night apnea-hypopnea index (AHI >15 events/hour). Pain outcomes included PROMIS pain interference T-scores and a 0–10 numeric rating scale for pain intensity. Weighted multivariable linear regression models were employed to evaluate associations, adjusting for demographics, physical activity, smoking status, football position, and number of professional seasons, to generalize findings to the broader Football Players Health Study cohort.
Results: The mean age of the former professional ASF players was 48.2 ± 7.8 years; 59 (53.2%) identified as Black, and 52 (46.8%) as White. The average duration of professional league play was 4.0 years, and 62 (55.9%) primarily played lineman positions. Higher PROMIS sleep disturbance scores were associated with higher pain interference (multivariable model $\beta = 0.47$; 95% CI: 0.16, 0.79; $p < 0.01$) and higher pain intensity ($\beta = 1.03$; 95% CI: 1.00, 1.06; $p = 0.02$). Similarly, sleep-related impairment scores were significantly associated with higher pain interference ($\beta = 0.69$; 95% CI: 0.43, 0.96; $p < 0.001$) and pain intensity ($\beta = 1.05$; 95% CI: 1.03, 1.07; $p < 0.001$). No significant associations were observed between SDB or higher rapid eye movement (REM) sleep percentage and pain intensity ($\beta = 1.12$, 95% CI: 0.70, 1.81, $p = 0.63$; $\beta = 1.02$, 95% CI: 0.98, 1.05, $p = 0.34$).
Conclusion: Patient-reported sleep disturbances and sleep-related impairment are significantly associated with higher pain interference and higher pain intensity among former professional ASF players. These findings underscore the opportunity for interventions to address sleep disturbances as part of comprehensive pain management strategies to reduce symptom burden and improve quality of life in this population.
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1170

EXPLORING THE BEHAVIOR OF AUTOANTIBODIES AND VITAMIN D IN A VITILIGO SAMPLE: A LINK WITH PHOTOTHERAPY AND SLEEP

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Introduction: Poor sleep can impair immune regulation, impacting autoimmune diseases, including the skin disorder vitiligo. Several pathways possibly related to vitiligo, including hormonal, metabolic (particularly vitamin D) and autoimmune vias can be parallelly affected. Concomitant autoimmune diseases and positivity of serum markers can be triggered, including those of thyroid. Phototherapy UVB, the gold-standard treatment of vitiligo, can influence circadian rhythm synchronization and these pathways. This study aimed to investigate autoimmune and metabolic components in individuals with vitiligo; and verify their sleep profile considering these markers and phototherapy.
Methods: It was a cross-sectional study (ethically approved), enrolling 30 patients with vitiligo treated at a Dermatology Service, and 26 controls. The sleep questionnaire Pittsburgh Sleep Quality Index (PSQI) was accessed. Serum vitamin D 25(OH)D, thyroid-stimulating hormone (TSH), and autoimmune markers [antinuclear antibody (ANA), and anti-thyroid autoantibodies (anti-TPO and anti-TG)] were measured. Generalized Linear Model was used to analyze variables, and to relate them with sleep.
Results: Vitiligo group was mostly composed of women at forty decade of life, and individuals with active lesions. Phototherapy UVB was recorded in 43% of vitiligo sample. Most individuals from vitiligo (85%) and control groups (62.5%) were "poor sleepers" (PSQI>5). The descriptive PSQI mean score was slightly lower in the part of vitiligo sample that underwent phototherapy (7.2) compared with those not treated with phototherapy (8.6). The 25(OH)D levels compared between vitiligo and control groups and when associated to phototherapy were not statistically significant. Anti-TPO was frequent in the vitiligo group only. Reactive ANA was detected in 33% of vitiligo patients (and 23.1% of controls); in 46.2% of vitiligo sample treated with phototherapy, and in 23.5% of those without phototherapy. Regarding sleep, all individuals with reactive ANA were "poor sleepers".
Conclusion: Poor sleep predominated in the vitiligo group and in the part of vitiligo sample that have not been treated with phototherapy. Vitamin D was not statistically associated to phototherapy in this study. Anti-TPO and ANA were more frequent in the vitiligo sample. We raise the importance of investigating the interaction of autoimmune and metabolic components, especially vitamin D, with sleep, phototherapy and vitiligo activity.
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1171

OBSTRUCTIVE SLEEP APNEA AND ITS EFFECT ON NON-CYSTIC FIBROSIS BRONCHIECTASIS EXACERBATIONS: A NATIONAL INPATIENT SAMPLE STUDY

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Introduction: A priori bronchiectasis is increasingly recognized as more frequent in patients with Chronic Obstructive Pulmonary Disease and Obstructive Sleep Apnea (OSA) overlap syndrome. It is hypothesized that bronchiectasis in this population may exacerbate hypoxia and increase systemic inflammation. Non-cystic fibrosis bronchiectasis (NCFB) is associated with a broad range of underlying conditions, but the impact of OSA on the clinical outcomes of NCFB patients, particularly during hospitalization, remains unclear.
Methods: Data was gathered using the National Inpatient Sample (NIS) Database from 2016 to 2021. Patients aged 18 or older who had an admitting diagnosis of bronchiectasis with acute exacerbation (J47.1) were included and then stratified in those who had OSA (G47.33) and those who did not. Patients who had a secondary diagnosis of cystic fibrosis were excluded. Primary outcome of interest was length of stay. Propensity score

matching using sociodemographic variables was used to adjust for confounders of this outcome.
Results: A total of 30,975 adult hospital admissions were identified between 2016 and 2021, of which 3,465 had OSA and 27,510 did not. The mean age was 70.6 years, and 68.2% of patients were female. A total of 495 patients required mechanical ventilation. After propensity score matching, 2,960 weighted admissions were included in each group, with a mean age of 68 years in the matched cohorts. There were no significant differences in length of stay between the two groups (5.2 days vs. 5.1 days, p = 0.72). Additionally, there were no significant differences in mechanical ventilation use (OR 0.44, 95% CI 0.15–1.29, p = 0.14) or mortality (OR 0.33, 95% CI 0.03–3.20, p = 0.34) between patients with NCFB and OSA compared to those without OSA.
Conclusion: No significant differences were found in length of stay, mechanical ventilation use, or mortality. These results suggest that OSA may not notably impact clinical outcomes in NCFB exacerbations in the context of acute hospital admissions.
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1172

THE DEVELOPMENT OF OBSTRUCTIVE SLEEP APNEA FOLLOWING RADIOTHERAPY AND CHEMOTHERAPY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: With advances in chemotherapeutic agents and targeted radiation, the quality of life of cancer patients is becoming increasingly relevant. Sleep disturbances and fatigue are a primary complaint of surviving cancer patients. While the interaction between obstructive sleep apnea OSA and oncologic treatment remains poorly understood, multiple proposed mechanisms exist. We conducted a meta-analysis of prospective and retrospective studies evaluating the development of sleep apnea in patients with any cancer type who receive chemotherapy or radiotherapy.
Methods: We aggregated and evaluated OSA following chemotherapy or radiotherapy for cancer. Subsequently we conducted meta-analysis of eligible studies to determine AHI, LSAT, ODI and ESS differences between different combinations of treatment modalities, as well as evaluation for incident OSA diagnosis following treatment. Studies were considered eligible for analysis if the application of either chemotherapy or radiotherapy could be isolated and if the study explicitly listed the rate of OSA in each treatment group.
Results: We identified 559 papers, of which 110 were duplicates. 30 articles met criteria for full text review, and 17 were eligible for meta-analysis. We did not find a significant effect on the development of OSA associated with the application of either chemotherapy or radiotherapy. We observed a modest, nonsignificant trend towards increased development of mild OSA among patients receiving radiotherapy (z=1.21 p = 0.23). The isolated effect of chemotherapy was not associated with any discernible impact on either mild (z=-0.83, p = 0.41) or moderate (z=0.00, p=1.00) OSA. Patients receiving radiotherapy did not have significantly different AHI (z=-0.19, p = 0.85), ODI (z=-0.85, p = 0.40) LSAT (z=-0.15, p = 0.89) or ESS (z=-0.46, p=0.65) compared to controls. Similarly, chemotherapy was not associated with a significantly different AHI (z=0.81, p=0.42) or LSAT (z=0.38, p=0.70).
Conclusion: We find no effect of cancer therapy on development of OSA, in contrast to the conclusion of several individual studies. Literature on the development of OSA in patients treated with chemotherapy or radiotherapy for cancer is thus far limited to small-scale studies that are not powered to detect even moderate effect sizes. Large-scale studies of multiple treatment modalities are warranted.
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1173

THE ROLE OF IRON METABOLISM IN OBSTRUCTIVE SLEEP APNEA SEVERITY IN INDIVIDUALS WITH ANDROGENETIC ALOPECIA (EPISONO)

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Introduction: Androgenetic alopecia (AGA) is a dermatological condition related to progressive hair loss commonly manifested in men, although women can be affected. Sleep patterns and, consequently, quality of life can be impaired. Androgen-sensitive hair follicles are affected as a result from the conversion of testosterone into dihydrotestosterone by the enzyme 5-alpha-reductase. Although the hormonal etiopathogeny is well-documented in AGA, the role of iron metabolism and its relationship with polysomnography (PSG)-measured sleep parameters are not well understood in this hair condition. This study aimed to investigate how iron markers relate to sleep outcomes in individuals with AGA, emphasizing sex differences and obstructive sleep apnea (OSA) severity.
Methods: Data from the 4th Edition of the São Paulo Epidemiological Sleep Study (EPISONO) were analyzed. Participants self-reported AGA, underwent PSG, and provided blood samples for biomarkers analysis. The Propensity Score Matching (PSM) was adopted to statistical control for age, sex, and metabolic syndrome.
Results: From 747 participants, 81 were in the AGA group (17 women and 64 men) and 666 in the Non-AGA group (423 women and 243 men). After PSM, 160 participants (80 matched pairs) were retained, including 34 women (n=17/group) and 126 men (n=63/group). Prior to PSM, women from AGA group presented 2 polysomnographic parameters significantly higher compared to the Non-AGA group: apnea hypopnea index (AHI) and desaturation events. In the AGA group, significant negative correlations were identified between serum iron levels and AHI in both sexes, especially in women. Ferritin positively correlated with both AHI and the desaturation index in women, while serum iron was negatively linked to the desaturation index in men. These results remained significant after PSM. In Non-AGA men, weaker associations were found, with transferrin positively correlated with AHI and negatively with sleep efficiency.
Conclusion: Components of iron regulation, particularly serum iron and ferritin, presented a significant role in OSA severity in AGA, with stronger associations in women. These findings

highlighted the importance of consider iron metabolism in the management of OSA in individuals with AGA, in both sexes. Further examinations are warranted to explore the mechanisms underlying these metabolic associations.
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1174
ASSOCIATION OF OBSTRUCTIVE SLEEP APNEA WITH PULMONARY EMBOLISM: A LARGE-SCALE DATABASE STUDY

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Introduction: Obstructive sleep apnea (OSA) is a common sleep-related breathing condition that has been linked to thromboembolic and cardiovascular events. The prevalence of OSA in the U.S. is nearly 33.4% among men and 17% among women. Pulmonary embolism (PE) is a life-threatening disorder that may occur at augmented rates in people diagnosed with OSA. The aim of this study is to compare the PE's prevalence in patients with any sleep disorder, while also evaluating transitory results, including all-cause mortality and cardiac arrest.
Methods: A retrospective cohort study was performed using the TriNetX Global Health Research Network which offers access as EHRs from different healthcare facilities utilizing US Collaborative Network. Two cohorts were defined: Adult patients (Age 18 or above) with OSA and PE, and patients with PE but no known diagnosis of OSA or other sleep disorders. Propensity score comparison was utilized to address noteworthy variations in demographics and comorbidities between the two clusters. Data analysis was done from 2000 to present, with a one-month follow-up to evaluate the secondary outcomes of all-cause mortality and cardiac arrest.
Results: The patients with PE's who had OSA (n=3,119,120) demonstrated incidence proportion of 2.012% and the prevalence was 3.614%. While the incidence proportion in control group who diagnosed with PE without diagnosis of any sleep disorders (n=98,422,632) was 0.602% and the prevalence was 0.614%. The OSA group with PE's (n=101,031), when compared to the non-OSA group with PE's (n=554,126), demonstrated a reduced risk of all-cause mortality (RR: 0.549; 95% CI: 0:53-0.57) and cardiac arrest (RR: 0.652; 95% CI: 0.564-0.754) within a month after PE diagnosis.
Conclusion: Patients with OSA are at a high risk of developing PE compared to those without OSA. Nonetheless, cardiac arrests and mortality, seem to be significantly lower in the OSA. These findings indicate an intricate interplay between thromboembolic events and OSA, underscoring the necessity for further prospective research to affirm such relationships and the involved mechanisms.
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1175
PROBABLE OSA RISK IN COMMUNITY DWELLING ADULTS IN THE UNITED STATES: THE ROLE OF COPD AND OBESITY

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Introduction: Approximately 14 million US adults suffer from COPD, which is the fifth leading cause of death in the US. OSA prevalence is relatively high among adults with COPD. The coexistence of these two diseases is known as overlap syndrome, which carries an increased risk of cardiopulmonary complications. This study aims to examine the independent and combined effects of COPD and obesity on the risk of probable OSA (pOSA).
Methods: Data from three cycles (2013-14, 2015-16, and 2017-18) of the National Health and Nutrition Examination Survey was utilized to perform a cross-sectional analysis. As previously recommended, pOSA was screened based on self-reported snoring, breathing pauses, and daytime sleepiness. Weight was classified into four categories (normal, overweight, obese, and severely obese). COPD presence was determined by inquiring if subjects were told they had COPD by a health professional. The survey-based Poisson regression model was used to estimate the adjusted prevalence ratio (aPR) with 95% confidence interval (CI).
Results: The total sample population included 10,360 US adults, aged 20 years and older, with the majority being female (52%). Subjects with COPD were 52% more likely to have pOSA compared to those without COPD (aPR 1.52, 95% CI: 1.18–1.97, p = 0.002). Obesity also increased the risk of pOSA, with aPRs of 1.33 (95% CI: 1.18–1.49) for overweight, 1.70 (95% CI: 1.52–1.90) for obese, and 2.03 (95% CI: 1.80–2.28) for severely obese individuals (all $p < 0.001$). While the individual risk of pOSA increased with the severity of obesity, the combined risk across obesity categories remained consistent, with aPRs of 1.84, 1.91, and 1.86 for overweight, obese, and severely obese participants with COPD, respectively.
Conclusion: In this study, both COPD and obesity were found to be independently associated with increased likelihood of pOSA after controlling for potential covariates. The combined impact of COPD and different weight groups did not show a synergistic effect on the risk of probable OSA. Subject reported COPD and OSA may have influenced these findings. These study results confirm the importance of addressing both COPD and obesity as key factors in the management of probable OSA risk in adults.
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1176

IDENTIFYING GAPS IN EVALUATION AND TREATMENT OF INSOMNIA, OSA, AND PTSD IN WOMEN VETERANS

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Introduction: Insomnia disorder, obstructive sleep apnea (OSA), and posttraumatic stress disorder (PTSD) are highly comorbid conditions among veterans. There are clear clinical practice guidelines for the assessment/treatment of these conditions, but sleep disorders remain under documented in electronic health records (EHR) and it is unclear if women veterans are being appropriately assessed and treated for these conditions.
Methods: We sent recruitment letters to 361 veterans potentially eligible for a clinical trial of cognitive behavioral therapy for insomnia (CBT-I) for women veterans with PTSD (NCT05683132). Eighty-one women completed telephone screening which included the Insomnia Severity Index (ISI), STOP, and Primary Care PTSD Screen for DSM-5 (PC-PTSD-5). Clinical cutoff scores were used to determine probable insomnia (ISI ≥ 11), high OSA risk (STOP ≥ 2), and probable PTSD (PC-PTSD-5 ≥ 4). Prior engagement in first-line treatments was assessed for insomnia (CBT-I), OSA (positive airway pressure [PAP]), and PTSD (Cognitive Processing Therapy [CPT], Prolonged Exposure [PE], and Eye Movement Desensitization and Reprocessing [EMDR]).
Results: Among women screened, 90.1% (n = 73) had probable insomnia, 59.3% (n = 48) were at high risk for OSA, and 71.6% (n = 58) had probable PTSD. 55.6% (n = 45) had both probable insomnia and increased risk for OSA. 46.9% (n = 38) were high risk for OSA and had both probable insomnia and PTSD. Among those with probable insomnia, seven (9.6%) had received CBT-I. Among those at increased risk for OSA, 32 (66.7%) had underwent a sleep evaluation, 22 (45.8%) were diagnosed with sleep apnea and prescribed PAP, and seven (14.6%) reported PAP use in the last week. Among those with probable PTSD, 40 (69.0%) received non-medication treatment for PTSD, including 11 (19.0%) who received CPT, PE, or EMDR.
Conclusion: Few women veterans with probable insomnia received CBT-I. One third of women with high OSA risk were not previously evaluated. Most women prescribed PAP were not currently using treatment. Few women with probable PTSD received first-line non-medication treatments for PTSD. Challenges remain in increasing access to evidence-based treatments for women veterans.
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1177

SLEEP OUTCOMES FROM THE APNEA AND INSOMNIA RELIEF (AIR) PILOT TRIAL IN VETERANS WITH POSTTRAUMATIC STRESS DISORDER

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Introduction: Among Veterans with PTSD, approximately 70% have obstructive sleep apnea (OSA) and 90% have insomnia. In patients with PTSD and OSA, positive airway pressure (PAP) use is associated with not only improvements in daytime sleepiness, but also reduction in overall PTSD symptom severity. Unfortunately, patients with PTSD have lower PAP adherence than those without PTSD, and insomnia is associated with lower levels of PAP use. We developed a behavioral sleep treatment called Apnea and Insomnia Relief (AIR) to target comorbid sleep apnea and insomnia (COMISA). This six-session, telehealth-based protocol combines aspects of motivational enhancement, psychoeducation, positive airway pressure (PAP) desensitization, and cognitive behavioral therapy for insomnia.
Methods: We conducted a pilot randomized controlled trial (RCT) comparing AIR to a Sleep Education (SE) control in Veterans with PTSD and COMISA who were recommended for PAP therapy for OSA. Sleep outcomes included PAP adherence (4+ hours use, at least 70% of past seven days), insomnia symptom severity (Insomnia Severity Index; ISI), and daytime sleepiness (Epworth Sleepiness Scale; ESS).
Results: The sample (N=34) included 32 men (94%) and two women (6%); mean age was 50 years (SD=12, range 26-76) and 43% of the sample identified as a racial or ethnic minority. One participant (randomized to AIR) dropped out of the trial. At post-treatment, 41% of participants randomized to AIR met criteria for PAP adherence, compared to 13% of participants randomized to SE ($x2(1,32)=3.06$, $p=.08$). Participants randomized to AIR demonstrated greater reduction in insomnia symptom severity from pre- to post-treatment, with average reduction on the ISI of 7.12 points (SD=7.52) for AIR, versus 4.07 points (SD=4.81) for SE ($t(30)=4.50$, $p=.0001$). Participants randomized to AIR demonstrated greater reduction in daytime sleepiness from pre- to post-treatment, with average reduction on the ESS of 4.00 points (SD=5.98) for AIR, versus 2.80 points (SD=4.07) for SE ($t(31)=3.22$, $p=.003$).
Conclusion: AIR was associated with higher PAP adherence and reduced symptoms of insomnia and daytime sleepiness in Veterans with PTSD and COMISA. Additional trials are needed to establish efficacy in a larger, more diverse sample and evaluate implementation strategies to increase access to this behavioral sleep intervention.
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1178

EMOTIONAL DREAM CONTENT OF ACUTE TRAUMA PATIENTS: ASSOCIATIONS WITH INTERPERSONAL VIOLENCE, NIGHTMARES, AND PTSD

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Introduction: Dreams are involved in the processing of emotions and can serve as markers of emotional distress. The authors developed a rating scale for affect in dreams and applied it to an acute trauma population.
Methods: We recruited 88 patients hospitalized within one week following traumatic injury (Mage = 39.53 ± 14.31 years, 67.0% male, 67.0% Black). Patients who recalled a dream since hospitalization recorded their dream (n = 43). An independent rater scored the dreams using a novel 33-item Affective Neuroscience Dream Rating Scale to indicate the presence of fear, rage, grief, seeking, care, play, and lust. We quantified the emotional valence of dreams by summing positive (seeking + care + play + lust) and negative emotions (fear + rage + grief) and explored their associations with interpersonal violence and clinical outcomes approximately one-month post-trauma.
Results: The emotional valence of dreams across all patients was significantly more negative (M = 4.84 ± 2.91) than positive (M = 1.26 ± 1.16), p <.001. Experiencing negatively toned dreams was associated with increased odds of being hospitalized for interpersonal violence (OR = 1.45, p =.014, 95% CI = 1.08 – 1.96) and more severe acute stress symptoms (β = 0.36, p =.021), regardless of sex. Reporting more negatively toned dreams during hospitalization prospectively predicted risk for trauma-related nightmares one month later (OR = 1.73, p =.045, 95% CI = 1.01 – 2.97), adjusting for time, and was prospectively associated with increased nightmare distress (r =.70, p <.001), night terrors (r =.37, p =.042), and PTSD status (r =.44, p =.033). The dreams of patients who went on to screen positive for PTSD one month after trauma were significantly more negative (M = 5.99) than patients without PTSD (M = 3.70), p =.038, ηp2 = 19, indicating a large effect.
Conclusion: Negative affective tone in dreams immediately after trauma predicted subsequent nightmares and future PTSD and can provide a potential tool for assessing PTSD risk in acute trauma patients.
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1179

TRANSGENDER IDENTITY MODERATES THE ASSOCIATION BETWEEN NIGHTMARE FREQUENCY AND SUICIDAL IDEATION

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Introduction: Frequent nightmares are known risk factors for suicidal ideation. Nightmares and suicide are both relatively understudied within minority populations. Transgender individuals experience disproportionately higher rates of sleep disturbances and suicidality, potentially due to the minority stress of transgender identity. Despite this, the intersection of transgender identity, nightmares, and suicidality has not been adequately investigated. To address this gap, we investigated the potential moderating relationship that transgender identity may play in the association between weekly nightmare frequency and suicidal ideation severity.
Methods: We used the Assessing Nocturnal Sleep/Wake Effects on Risk of Suicide (ANSWERS) data set (N = 971), accessed through the National Sleep Research Resource. Nightmare frequency was measured using the 5-item Disturbing Dream and Nightmare Severity Index (DDNSI). The 25- item Columbia Suicide Severity Ratings Scale (CSSRS) was used to asses lifetime suicidal ideation severity. Linear regression was used to determine the association between nightmare frequency and suicidal ideation while controlling for both age and race. Transgender identity was then included as an interaction term.
Results: Weekly nightmare frequency was independently associated with lifetime suicidal ideation severity (β = 0.14, 95% CI: [0.09, 0.19], p < 0.001). Further, transgender identity moderated the relationship between weekly nightmare frequency and lifetime suicidal ideation severity (β = 0.28, 95% CI: [0.02, 0.54], p = 0.035).
Conclusion: Transgender individuals with higher weekly nightmare frequency appeared to be more likely than non-transgender to have higher lifetime suicidal ideation. This finding highlights a unique mental health disparity within the transgender population, emphasizing the importance of addressing sleep disturbances and their potential contribution to suicidality. Future research should explore the role of intersecting factors, such as minority stress, using larger and more diverse samples. These findings may help prioritize targeted care for transgender individuals experiencing frequent nightmares and suicidal ideation.
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1180

FEASIBILITY OF UNATTENDED IN-HOME POLYSOMNOGRAPHY IN TRAUMA-EXPOSED VETERANS WITH CHRONIC NIGHTMARES

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Introduction: Trauma-related sleep disturbances warrant assessment, but limitations of laboratory studies preclude a comprehensive understanding of these phenomena. This study assessed the feasibility and acceptability of unattended home polysomnography (hPSG) for trauma-exposed Veterans with nightmares.
Methods: Signal quality and outcomes of hPSGs in Veterans enrolled in a study investigating nightmares were reviewed. Study staff applied the equipment in the home and Veterans were instructed to go to bed near their usual bedtime. A successful hPSG was defined as ≥4 hours of total recording time (TRT) with interpretable EEG, and other key channels (muscle tone, thoraco-abdominal bands, airflow, and pulse oximetry) with adequate signal quality for ≥80% of TRT. Perception of sleep quality and the occurrence of a nightmare were collected the next morning via a sleep diary. Feasibility was examined by exploring the percentage of participants with successful and failed hPSGs. To assess acceptability, significant differences in

self-reported sleep quality and nightmare reports were examined between nights with and without hPSG.
Results: Data were available from 46 Veterans. Six participants declined to proceed with the hPSG due to illness, discomfort, or neighborhood safety concerns. Of those who completed a hPSG, 23/40 (57.5%) tests were considered successful based on all pre-specified criteria. Seventy percent had ≥4 hours of interpretable EEG data. Most participants experienced loss of one or more electrodes. Unsuccessful hPSGs were mostly due to EEG recordings being less than four hours. No baseline differences were found between Veterans with and without successful hPSGs. Regarding acceptability between nights with and without the hPSG, no differences were found for nightmare occurrence, but sleep quality was significantly worse with hPSG.
Conclusion: Unattended hPSG is partially feasible and acceptable in a group of Veterans with nightmares; however, failure was common and sleep quality was poorer on nights with the hPSG. Characteristics of a trauma-exposed sample, such as increased sweating, sleep movements, and fragmented sleep, may have contributed to these results. Tools designed to be applied independently and to endure these factors should be considered for this population.
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1181

FEAR OF SLEEP PROSPECTIVELY PREDICTS NIGHTMARE SEVERITY IN ACUTE TRAUMA PATIENTS EXPOSED TO COMMUNITY VIOLENCE

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Introduction: Fear of sleep engenders arousal at bedtime that can promote nightmares. Living in disadvantaged neighborhoods with high rates of community violence may exacerbate fear of sleep and in turn increase nightmare risk. We tested fear of sleep among acute trauma patients as a prospective predictor of nightmares, and whether exposure to community violence moderated this relationship.
Methods: Patients hospitalized in the intensive care unit within one week following traumatic injury (N = 88; Mage = 39.53 ± SD 14.31, 67.0% male, 67.0% Black, 47.7% income ≤ $20,000). Patients completed the Fear of Sleep Inventory (FoSI) Short Form and a community violence questionnaire during hospitalization (T1; N = 88) and the Nightmare Disorder Index (NDI) approximately two months post-trauma (T2; n = 59). We computed an NDI sum score as our outcome to indicate greater nightmare severity (nightmare frequency and nightmare-related awakenings, distress, and impairment). Skin conductance response (SCR) was collected from a subsample of patients (n = 7) during the FoSI to preliminarily explore the psychophysiological correlates of this scale.
Results: Exposure to community violence exacerbated the prospective effect of fear of sleep on future nightmare severity (β = 0.51, p =.039), such that relationship between fear of sleep at T1 and nightmare severity at T2 was strongest for patients reporting exposure to higher levels of community violence in the 90 days prior to hospitalization. SCR to the FoSI was correlated with greater exposure to community violence (r = 0.76, p =.048) and the following fear-of-sleep-related safety behaviors: "I stayed up late to avoid sleeping" (r = 0.87, p =.012) and "I tried to stay as alert as I could while lying in bed," though this relationship was nonsignificant (r = 0.74, p =.060).
Conclusion: Acute trauma patients presenting with a fear of sleep may be at increased risk for posttraumatic nightmares during recovery, especially those living within neighborhoods marked by high levels of community violence. Preliminary results suggest fear of sleep and community violence exposure may share an association with sympathetic activation which, when elevated at bedtime, could increase nightmare production.
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1182

ENHANCING PRIMARY CARE DETECTION AND REFERRAL OF NIGHTMARE DISORDER: A QUALITY IMPROVEMENT PROJECT

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Introduction: Nightmare disorder (NDO) is a significant but often under-recognized condition, especially within the military population. We previously reported that 31.2% of patients referred to our military sleep disorders center have NDO, yet only 3.9% were referred for NDO. Despite the general population's NDO prevalence (2-8%), our center had no referrals for NDO from June 1 to August 31, 2024. This quality improvement (QI) project aimed to improve NDO detection and referral rates using the nightmare disorder index (NDI).
Methods: From September 6 to October 4, 2024, the Internal Medicine Clinic (IMC) at a Military Treatment Facility (MTF) integrated the NDI into routine patient intake. Patients were categorized into three groups: negative for NDO (no nightmares or nightmares without associated symptoms), possible NDO (nightmares causing symptoms), and probable NDO (nightmares causing significant symptoms, indicated by a score of 2 or greater in each NDI section of sections 2-4). Additionally, patients with a prior NDO diagnosis were classified as symptomatic or asymptomatic. Providers were instructed to review the NDIs and refer patients for NDO as clinically appropriate.
Results: Out of 614 patients screened, 580 (94.5%) completed the NDI. Among them, 460 (79.3%) screened negative, 72 (12.4%) screened positive for possible NDO, and 12 (2.1%) for probable NDO. Additionally, 35 patients had a prior NDO diagnosis, with 25 (71.4%) remaining symptomatic. Of these symptomatic patients, 10 were on pharmacologic therapy, 3 engaged in behavioral therapy, 5 received both, and 7 had no treatment. The IMC made 16 referrals to sleep medicine during this period, with 2 referrals indicating concern for NDO.
Conclusion: This quality improvement project successfully incorporated the NDI into routine primary care screening, achieving a high completion rate. The detection of possible and probable NDO is clinically significant. However, far more patients were

identified than were referred for specialty care. Future planned QI cycles will expand this project to other primary care clinics, such as Family Health and Operational Medicine, to improve referral rates and enhance NDO identification and treatment. These efforts, which are generalizable to civilian populations, aim to reduce NDO under-recognition and improve patient quality of life.

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1183

A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL OF DOXAZOSIN FOR NIGHTMARES AND SLEEP DISTURBANCE IN PTSD

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Introduction: Nightmares and non-nightmare sleep disturbances are a core feature of posttraumatic stress disorder. Effective treatments remain elusive. Doxazosin is an alpha-1 adrenergic blocker with demonstrated promise, but there is a dearth of evidence from randomized controlled trials on its effectiveness. We report findings from a randomized, double-blind, placebo-controlled trial evaluating the effectiveness of doxazosin for nightmares and non-nightmare sleep disturbances.

Methods: N = 65 trauma-exposed adults (60 veterans, 21 female) with full or subclinical PTSD and prominent nightmares were randomized to either placebo (N=32) or doxazosin (N = 33) titrated to a maximum dose of 10mg daily. Primary outcomes were nightmare frequency and intensity (CAPS-4), nightmare distress (NDQ), and sleep quality (PSQI). Secondary outcomes were derived from a sleep diary mobile phone application developed by our group and included the weekly number of distressing dreams, worst distressing dream severity, and properties of sleep (sleep latency, wake after sleep onset, sleep maintenance, and total sleep time). For outcomes with two measurements, baseline-adjusted ANCOVAs were used to estimate treatment differences in change from baseline. For outcomes measured at three or more time points, linear mixed effects models were used to model change from baseline. All models adjusted for baseline values of the dependent variable of interest.

Results: Compared to placebo, participants randomized to doxazosin showed greater reduction in wake after sleep onset (adjusted $p = 0.02$), greater increase in sleep maintenance (adjusted $p = 0.047$), and greater reduction in nightmare severity (adjusted $p < 0.001$) over the course of the trial as measured by a daily sleep diary. That said, validated measures of nightmare distress (CAPS-4 nightmare items, nightmare distress questionnaire) and sleep quality (Pittsburg Sleep Quality Index) did not differ significantly over the course of the trial between treatment groups (adjusted p's > 0.05), in part due to robust placebo effects in these measures.

Conclusion: Results suggest that doxazosin may be effective for improving properties of sleep quality and reducing distressing dream severity in those with PTS and highlight the utility of a daily mobile sleep diary application, in contrast with retrospective reporting, for detecting effects.

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1184

ENHANCING DIAGNOSIS OF NIGHTMARE DISORDER AT AN ACADEMIC SLEEP DISORDERS CENTER: A QUALITY IMPROVEMENT INITIATIVE

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Introduction: Nightmare Disorder (NDO) is estimated to impact at least 4% of the US adult population yet is reported to be much higher among service members (SMs). Our Center has previously reported 31.2% of referred SMs had probable NDO based on screening measures, yet only 3.9% reported nightmares as a reason for evaluation. No quality measures report on the rate of confirmed diagnosis, and more importantly, treatment of NDO or its sequelae. This quality improvement project sought to address the barriers to effective identification and diagnosis of NDO by implementing tiered Plan-Do-Study-Act (PDSA) cycles.

Methods: Patients referred to our academic sleep center complete a nightmare disorder index (NDI) during their intake assessment. Retrospective chart review of May 2024 was performed to establish baseline rates of probable and possible NDO based on NDI responses, as well as rates of eventual NDO diagnoses at follow-up clinic appointments. The initial intervention instituted was to include the NDI as part of baseline characteristics listed at the top of polysomnography reports to prompt the provider at follow-up to address the finding. Chart review cycles were performed to assess the efficacy of this intervention in diagnosing NDO at follow-up.

Results: During baseline assessment period of May 2024, 167 new patients completed the NDI, with 33 (19.76%) scoring in the probable, and 66 (39.52%) in the possible NDO range. Ultimately, 5 (2.99%) of these patients were diagnosed with NDO after clinical assessment. The first intervention went into effect in July 2024. Subsequently, 72 patients completed the NDI, with 10 (13.89%) probable and 26 (36.11%) possible NDO. Of these, 3 (4.17%) patients were diagnosed with NDO after clinical assessment.

Conclusion: This ongoing quality improvement project suggests the NDI is detecting probable and possible NDO at high rates in our patient population, consistent with prior reports. The baseline clinical diagnosis of NDO was concerningly low but the initial intervention improved the rate of diagnosis. Planned PDSA cycles include tracking and improving patient follow-up to better understand the sensitivity and specificity of using the NDI in our population, and educating patients and staff on the importance of appropriately diagnosing and treating NDO.

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1185

PREDICTING DREAM RECALL AND SHARING: THE ROLE OF CHILDHOOD EXPERIENCES, MENTAL HEALTH, AND DREAM PHENOMENA

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Introduction: Dream recall frequency (DRF), or how often individuals remember and report dreams, is influenced by factors

such as family dynamics, mental health, and cultural norms. Women tend to report higher DRF and greater distress from nightmares, while individuals with psychiatric conditions often exhibit reduced DRF. This study examined the relative contributions of childhood experiences, mental health, and current dream-related factors in predicting DRF and dream sharing.
Methods: A sample of 360 undergraduate students (mean age = 19.91; 67.7% female; 54.44% White) completed surveys, including the Perception of Parents Scale, Bedtime Routine Questionnaire, PCL-5, GHQ-12, ISI, and Mannheim Dream Questionnaire. Hierarchical linear regression analyses were conducted to identify predictors of DRF and dream sharing.
Results: Childhood nightmares were significant positive predictors of dream recall frequency (DRF; $\beta = 0.209$, $p < 0.001$) and dream sharing ($\beta = 0.208$, $p < 0.001$). Current psychological distress (GHQ-12; $\beta = -0.146$, $p = 0.010$) predicted lower DRF, while PTSD symptoms ($\beta = -0.157$, $p = 0.009$) and distress ($\beta = -0.182$, $p < 0.001$) were associated with less dream sharing. Insomnia severity ($\beta = 0.096$, $p = 0.032$), more dream sharing ($\beta = 0.458$, $p < 0.001$), higher perceived caregiver warmth ($\beta = .082$, $p = 0.048$) and fewer sleep-related phenomena ($\beta = -0.273$, $p < 0.001$) were linked to increased DRF. When accounting for family and mental health factors (Step 3), negative dream attitudes ($\beta = -0.217$, $p < 0.001$), fewer sleep-related phenomena ($\beta = -0.439$, $p < 0.001$), and more déjà vu experiences ($\beta = 0.089$, $p = 0.040$) were significantly associated with greater dream sharing. Individuals with whom participants reported sharing and receiving dreams will be discussed.
Conclusion: While childhood nightmares initially predicted greater DRF and dream sharing, sleep-related phenomena, dream sharing, and negative attitudes toward dreams emerged as the strongest predictors. These findings suggest a dynamic, multifaceted process in which early sleep experiences, current psychological factors, and dream-related attitudes interact to shape patterns of DRF and dream sharing over time.
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1186

CHANGE IN GLOBAL AND TRAUMA-RELATED SLEEP DIFFICULTIES AMONG ADULTS RECEIVING TREATMENT FOR POSTTRAUMATIC STRESS DISORDER

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Introduction: Sleep difficulties are prevalent among individuals with posttraumatic stress disorder (PTSD). While sleep often improves following psychotherapy for PTSD, residual sleep difficulties are common. Most studies assessing sleep in the context of PTSD treatment have relied on single-item scores. This study evaluated associations between sleep difficulties and psychopathology prior to treatment and predictors of change in global and trauma-related sleep problems following PTSD treatment.
Methods: Participants (N=146, 75.3% Female, M Age=36) enrolled in a randomized trial of prolonged exposure (PE) and PE plus sertraline completed the Pittsburgh Sleep Quality Index (PSQI), PSQI PTSD Addendum (PSQI-PTSD), PTSD Symptom Scale Self-Report for DSM-IV (PSS-SR; re-experiencing, avoidance, and arousal subscales), and Quick Inventory of Depressive Symptomatology (QIDS-SR) at baseline, post-treatment, and 3-month follow-up. Sleep-related items were removed from PSS-SR and QIDS-SR scales. Correlations examined associations between baseline self-report measures. For treatment-completers, paired t-tests compared PSQI and PSQI-PTSD scores between baseline and post-treatment and between post-treatment and follow-up. Multivariate linear regression models assessed predictors of change in sleep from baseline to post-treatment.
Results: At baseline, global sleep difficulties (PSQI) were clinically elevated (M=11.77, SD=3.26) and associated with moderately higher PSS-SR avoidance (r=.26, p=.002), arousal (r=.32, p<.001), and QIDS-SR severity (r=.30, p<.001), but not PSS-SR re-experiencing. PTSD-related sleep difficulties (PSQI-PTSD) were associated with greater PSS-SR re-experiencing (r=.48, p<.001), avoidance (r=.35, p<.001), and arousal (r=.29, p<.001) and QIDS-SR severity (r=.44, p<.001). Among treatment-completers, sleep problems decreased substantially between baseline and post-treatment (PSQI: p<.001, d=1.09; PSQI-PTSD: p<.001, d=0.96); however, mean global sleep difficulty scores remained above the clinical-cutoff of 5 (M=7.90, SD=3.87). Change from post-treatment to follow-up was non-significant, suggesting maintenance of gains. When predicting change in PTSD-related, but not global, sleep difficulties, higher baseline re-experiencing symptoms (β=.38, p=.002) was the strongest predictor of improvement in trauma-related sleep difficulties (PSQI-PTSD, R-squared=.20, F(4,84)=5.18, p<.001).
Conclusion: On average, sleep difficulties decreased substantially following trauma-focused intervention, but global sleep difficulties remained elevated. This builds upon research suggesting sleep disturbance may be better conceptualized and treated as comorbid with PTSD rather than secondary. Research identifying mechanisms mediating improved sleep can inform targeted use of adjunctive, sleep-specific interventions for patients receiving trauma-focused therapy.
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1187

AT WHAT FREQUENCY DO NIGHTMARES EFFECT SUICIDE

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Introduction: A robust body of research has linked nightmares to suicide. For example, research has found that nightmares predict suicidal ideation above and beyond other mental health symptoms (such as depression and post-traumatic stress disorder) and that treating nightmares may indirectly decrease the risk of suicide. Considering the established link between nightmares and suicide, our goal was to further extend the literature by examining at what frequency do nightmares become related to suicide.
Methods: Data were collected through an online survey distributed anonymously to our participants. Embedded within the survey were measures of nightmare frequency and cognitions related to suicide. After examining the data for validity, and removing outliers, our final sample size was N = 117. Bivariate linear regression analyses were used to explore the relationship between nightmare frequency and cognitions related to suicide.

Results: Experiencing nightmares several times a month (β = 6.20, p < 0.01) and several times a week (β = 5.75, p < 0.05) both significantly predicted cognitions related to suicide. In contrast, experiencing nightmares several times a year did not significantly predict cognitions related to suicide (β = 2.12, p = 0.32). Weekly frequency accounted for 6.8% of the variance in cognitions related to suicide while monthly frequency accounted for 8.4% of the variance in cognitions related to suicide.
Conclusion: Our results revealed that experiencing nightmares at weekly or monthly rate were both predictive of cognitions related to suicide, while experiencing nightmares a few times a year was not predictive of cognitions related to suicide. Of note, monthly nightmares appeared to explain the most variance in cognitions related to suicide. Overall, our results highlight that experiencing nightmares at a monthly basis may be the tipping point for when nightmares begin to impact the risk for suicide. However, our data was cross-sectional, which impacts our ability to establish a true temporal relationship. Future research should utilize longitudinal methods to further explore at what frequency do nightmares become a risk factor for suicide.
Support (if any): n/a

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1188

A PROPOSED METHODOLOGY TO IDENTIFY TRAUMA-ASSOCIATED SLEEP DISORDER IN VETERANS USING ELECTRONIC HEALTH RECORD DATA

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Introduction: The proposed clinical phenotype of trauma-associated sleep disorder (TASD) includes repetitive trauma nightmares, dream enacting behaviors, and nighttime autonomic symptoms. Symptoms overlap with post-traumatic stress disorder (PTSD), rapid eye movement sleep behavior disorder (RBD) and obstructive sleep apnea (OSA). TASD is clinically relevant given high rates of post-traumatic sleep disturbances and known associations between RBD and neurodegeneration. However, TASD is not formally recognized, and more research is needed on its epidemiology and classification within clinical datasets. Here, we describe planned methods for identification of a potential TASD cohort based on electronic medical record (EMR) data which can be used to further characterize TASD.
Methods: Data was extracted from the EMR of Veterans with polysomnography studies within the national VA system (N= 1,036,952, 92% male, mean [SD] age 64.9 [13.9]) utilizing the VA Informatics and Computing Infrastructure. Sleep and psychiatric diagnoses were obtained from ICD10 codes. Full text search of clinical note data identified documented instances where the phrase "trauma associated sleep disorder" was present within a Veteran's chart, indicating that this diagnosis was likely being considered.
Results: Prevalence of related sleep and psychiatric comorbidities within the full sample were as follows: 36.1% (PTSD), 68.4% (OSA), 1.2% (RBD), 0.8% (other/unspecified parasomnia). There were 519 individuals where clinical note text search identified the term TASD; for these Veterans, prevalence of the above disorders was 86.1% (PTSD), 90.6% (OSA), 35.1% (RBD), and 38.5% (other/unspecified parasomnia).
Conclusion: Preliminary results demonstrate high prevalence of comorbid sleep and related disorders, particularly in Veterans whose clinical charts mention TASD as a diagnostic consideration. This highlights the complexity of creating a proxy variable distinguishing TASD from related diagnoses. Ongoing work will incorporate both subjective (e.g., dream enactment) and objective (e.g., autonomic parameters) clinical data to create a proxy diagnostic phenotype for TASD, which can be combined with polysomnography data to examine sleep architecture and autonomic arousal; data on prescribed medications will also be incorporated. Though preliminary, this line of research has potential to improve our understanding of mechanisms involved in disturbed sleep following trauma.
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1189

NIGHTMARES & INSOMNIA, DIFFERING IMPACTS ON SUICIDE

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Introduction: Previous research has shown that both insomnia and nightmares are related to suicide. However, the literature currently disagrees about the relationship between nightmares and suicide, with some researchers suggesting that the majority of variance in nightmares predicating suicide is better explained by fear of sleep and/or insomnia. Our goal was to use a stepwise regression analysis to further explore the relationship between insomnia, nightmares, and suicide (while controlling for fear of sleep), with the aim of providing clarifying information to the aforementioned argument.
Methods: Participants (N = 218) completed an anonymous online survey which included the following measures: self-reported insomnia symptoms (Insomnia Symptom Index), frequency of trauma-related nightmares (Trauma-Related Nightmare Survey), fear of sleep (Fear of Sleep Inventory; FoS), and cognitions related suicide (Brief Suicide Cognition Scale; SCS). To examine the incremental predictive power of our variables of interest, a stepwise regression model was utilized where in step-1 FoS will be the only predictor, and in step-2 both nightmares and insomnia will be added into the regression model.
Results: In the first step of our model (with FoS as the only predictor), FoS significantly predicted SCS (b = 0.47, p < 0.01; F = 24.89, p < 0.001). In the second step of our model (adding insomnia and nightmares as predictors), nightmares (b = 3.82, p <.05) and insomnia symptoms (b = 0.89, p <.001) both independently predicted cognitions related to suicide, but FoS no longer significantly predicted SCS (p = 0.30). The second step of our model significantly explained 24.04% of the variance in SCS (F = 15.61, p < 0.001).
Conclusion: Increase in suicide cognitions was predicted by both nightmares and insomnia, even when controlling for FoS. These results lend evidence to the idea that both nightmares and insomnia independently impact suicide, and that nightmares are not just an effect of insomnia and/or FoS. This is clinically relevant as it suggests two unique variables (insomnia & suicide) that could be targeted with interventions, with the overall goal of reducing the risk of suicide.
Support (if any): n/a

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1190

INTEGRATED INSOMNIA/PTSD TREATMENT LED TO REDUCTIONS IN INSOMNIA, PTSD, AND PAIN INTERFERENCE AMONG VETERANS

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Introduction: Among Veterans with posttraumatic stress disorder (PTSD), sleep disturbances are almost ubiquitous with 70 - 87% reporting comorbid insomnia. Chronic musculoskeletal pain (CP) likewise frequently co-occurs with PTSD; 50-70% of Veterans seeking PTSD treatment have CP, and comorbid PTSD/CP is associated with high rates of sleep disturbances. Thus, insomnia, PTSD, and pain are highly co-occurring. Though there is evidence that integrated Cognitive Behavioral Therapy for Insomnia (CBT-I) and Prolonged Exposure (PE) are effective in decreasing both insomnia and PTSD symptoms, the effects of integrated PTSD/insomnia treatment on pain over time and whether pain attenuates treatment outcomes is unknown.
Methods: We conducted secondary analyses with data from an RCT comparing integrated CBT-I + PE to a hygiene plus PE to optimize PTSD, sleep, and quality of life outcomes in N = 94 Veterans. PTSD symptom severity (PTSD Checklist; PCL-5), insomnia severity index (ISI), The Brief Pain Inventory (BPI) for pain severity, and the Patient-Reported Outcomes Measurement Information System (PROMIS) Pain Interference measures were collected at baseline, week 5, posttreatment, and 3-month follow up.
Results: Individuals with higher chronic pain severity and pain interference reported greater PTSD symptom severity (r =.33, p <.001; r =.36, p <.001, respectively) and insomnia severity at baseline (r =.34, p <.001; r =.39, p <.001, respectively). Hierarchical linear models showed that neither baseline pain severity nor pain interference hindered successful integrated insomnia + PTSD treatment trajectories (beta = 0.1, p =.22). Finally, collapsing across sleep and PE treatments, treatment resulted in clinically meaningful reduction in both pain interference and pain intensity (beta = -0.11, p =.002); results did not differ by treatment arm.
Conclusion: Integrated sleep + PE treatments were no less effective in reducing insomnia and PTSD symptom severity among Veterans with comorbid chronic pain; in fact, these treatments also led to reductions in pain severity and interference despite not including pain-specific interventions. Thus, integrated insomnia/PTSD treatments are an efficacious, parsimonious options for the common, complex clinical presentation.
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1191

INCREASED RATE OF DEMENTIA IN PTSD IS REDUCED BY ALPHA-1-ANTAGONIST PRAZOSIN TO TREAT NIGHTMARES: A RETROSPECTIVE STUDY OF VETERAN MEDICAL RECORDS

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Introduction: Adults with post-traumatic stress disorder (PTSD) have a significantly increased risk for developing dementia. With previous work linking sleep-related glymphatic dysfunction to neurodegeneration, sleep disturbances in PTSD are a potential target for decreasing this risk. Clinical trials demonstrated prazosin, an alpha-1-antagonist, improves sleep quality by decreasing nightmares in Veterans with PTSD, and rodent trials showed prazosin improves glymphatic flow. Here, we investigate the effect of prazosin on dementia risk in clinical PTSD populations through a retrospective analysis of medical records from the nationwide VA Corporate Data Warehouse.
Methods: Records were divided into 4 groups: -PTSD/-prazosin (control, N = 300,000), -PTSD/+prazosin (N = 47,652), +PTSD/-prazosin (N = 300,000), and +PTSD/+prazosin (N = 59,778). Inverse probability of treatment weighting (IPTW) adjusted for sex, race, ethnicity, birth year, hypertension, benign prostatic hyperplasia, traumatic brain injury, and sleep disorders. ICD-9 and ICD-10 codes were used to determine diagnoses, and prescription history determined prazosin treatment. To prevent reverse causation, all independent variable diagnoses needed to occur ≥ 1 year before the dementia diagnosis, and all records needed to be ≥ 5 years long. Because many Veterans have an unknown PTSD onset date, the record start date was used as onset.
Results: Compared to controls, prazosin alone accounted for 2.6 [2.3, 2.9] 95% CI and 3.7 [3.3, 4.0] 95% CI extra cases of dementia per 1000 people after 10 and 20 years respectively, and PTSD without prazosin accounted for 7.6 [7.4, 7.9] 95% CI and 11.4 [11.1, 11.8] 95% CI extra cases of dementia after 10 and 20 years respectively. There was a significantly reduced incidence of dementia in the PTSD group that received prazosin of 4.3 [3.6, 5.0] 95% CI at 10 years, while the effect decreased at 20 years with an incidence of 10.1 [9.2, 10.9] 95% CI.
Conclusion: Prazosin may have long-term neuroprotective benefits for those with PTSD and the heightened risk for dementia in PTSD may be prevented. More research is needed on neurological and glymphatic effects of prazosin in healthy and PTSD populations.
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1192

THE SEATTLE TRAUMA AND AUTONOMIC RELATED SLEEP SYMPTOMS SCALE: A SELF-REPORT FOR NIGHTMARES AND SLEEP DISRUPTIONS WITH ASSOCIATED AUTONOMIC SYMPTOMS

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Introduction: Nightmares and sleep disruption are hallmarks of posttraumatic stress disorder (PTSD), cause significant distress, and often persist after the remission of other symptoms. Autonomic dysregulation, including tachycardia, excessive sweating, and panic, have been implicated in the pathophysiology of PTSD. Existing self-report measures for nightmares and disrupted sleep primarily focus on subsets of the relevant clinical features, with relatively little emphasis on symptoms of autonomic dysregulation during sleep, restricting their ability to quantitatively assess the impact of trauma on sleep or to track treatment response. Here, we describe a new 11-item self-report measure, the Seattle Trauma and Autonomic Reactivity Sleep Symptoms Scale (STARSS), which assesses commonly encountered clinical symptomatology of trauma-associated sleep disruptions including nightmares, autonomic symptoms during sleep, and sleep-related hypervigilance.
Methods: Items of the scale were derived from a series of clinician assessments of sleep-related symptoms observed in practice and research settings of PTSD treatment to respond to prazosin, an alpha-1 adrenoceptor antagonist. Psychometric validation of the STARSS was conducted in a sample of 830 healthcare workers and first responders working during the COVID-19 pandemic. Measures of internal consistency, discriminant and convergent validity, sensitivity, specificity, and factor structure were conducted in the study sample.
Results: The STARSS was positively correlated with self-report measures covering symptom domains additional to nightmares and commonly elevated following trauma exposure, including PTSD (PCL-5; r=0.76), anxiety (GAD7; r=0.67), depression (PHQ9; r=0.63), and insomnia (ISI; r=0.54), and displayed strong internal consistency (α=0.88; ω=0.93). Underlying factors included sleep-related hyperarousal, partner/self-reported activity in sleep, and trauma dream intensity.
Conclusion: The STARSS is a brief, clinically informed questionnaire assessing autonomic and trauma-related symptoms during sleep, with strong psychometric validity. The scale is more highly correlated to PTSD symptom burden than are existing measures of insomnia and anxiety, suggesting specificity for trauma-related sleep disruption. Future work will explore the utility of the STARSS in clinical and research contexts for identifying treatment targets and tracking treatment response, as well as testing the potential for the measure to identify individuals likely to respond to specific interventions, supporting a precision medicine approach.
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1193

INCREASED ELECTROMYOGRAPHIC ACTIVITY DURING RAPID EYE MOVEMENT SLEEP IN ACTIVE DUTY WARFIGHTERS WITH POST-TRAUMATIC STRESS DISORDER

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Introduction: REM sleep without atonia (RSWA) is a key criteria for diagnosing REM Behavior Disorders (RBD), which has been strongly associated with Parkinson's disease and dementia. RBD prevalence is increased in the Veteran population, and further increased in Veterans that have been diagnosed with traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD). PTSD and TBI share common underlying pathology that could manifest in RBD, and some data suggests RSWA is increased in these populations RSWA, therefore, may have potential to serve as a biomarker of neurodegeneration and/or sympathetic hyperactivityIn this study, we aimed to investigate whether RSWA differs between Warfighters with PTSD (PTSD+) and those without (PTSD-).
Methods: We compared polysomnography data of 7 PTSD+ active duty Warfighters from Walter Reed National Military Medical Center and compared these data to 5 healthy control Active Duty Warfighters. Following clinician graded sleep scoring, we used the RBDtector, an open-source software, 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+ Warfighters compared to PTSD-.
Results: PTSD+ Warfighters had significantly higher phasic (0.1 – 5.0s) bouts of chin EMG activity ($p < 0.001$). Further, there was overall increased EMG activity ($p = 0.003$) in PTSD+ compared to controls. Data analysis is still ongoing to reach 150 participants in each group. Further analysis will include linear mixed effect models, controlling for age and medications such as serotonin norepinephrine reuptake inhibitors.
Conclusion: Our data show that Warfighters with PTSD had higher EMG activity during REM sleep than Warfighters without PTSD. More data will lend further insights to support these findings and provide more evidence to support the overlapping underlying neuropathologic pathways in PTSD and RBD. Such insights could enhance our understanding of the shared mechanisms underlying PTSD, RBD, and related neurodegenerative conditions.
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1194

TARGETED DREAM INCUBATION'S IMPACT ON DREAM SELF-EFFICACY & JOY

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Introduction: Targeted Dream Incubation (TDI) is the process of utilizing verbal cues (such as, "while you try to fall asleep, try and think of a tree") during pre-sleep stages in order to directly shape dream content. Preliminary results have demonstrated that TDI may be able to increase dreaming self-efficacy (DSE). Our study aimed to replicate and extend initial findings by examining TDI's impact on DSE and related variables.
Methods: Fifteen participants completed the TDI protocol, which included a pre-nap assessment (baseline), a 1.5-hour nap opportunity, a post-nap assessment, and a one-week follow-up assessment. In all assessments, we measured DSE and subjective feelings related to dreaming. During the nap, when entry into hypnagogia was detected (via a portable EEG system) dream reports were collected and afterwards participants were again given the verbal cue and told to continue sleeping. Non-parametric statistics were used to examine descriptives, compare means, and explore linear relationships.

Results: Most participants (n = 12; 80%) reported at least one dream that included the cued subject (a tree). Mean comparison analyses found that post-nap DSE (M = 4.56, SD = 1.55) and one-week follow-up DSE (M = 4.45, SD = 1.69; $p < 0.05$) were both significantly higher than baseline DSE (M = 3.49, SD = 1.54; $p < 0.05$); and that joy related to dreams measured at the one-week follow-up (M = 4.36, SD = 1.55) was significantly higher than joy related to dreams measured at baseline (M = 3.14, SD = 0.66; $p < 0.05$).
Conclusion: Findings both replicate and extend prior research, by demonstrating that TDI may be a reliable method for increasing DSE. Additionally, these findings are the first of their kind to demonstrate that TDI may also impact joy related to dreaming. Both results are quite meaningful as prior research has linked self-efficacy to positive treatment outcomes, and low levels of joy have been linked to outcomes such as depression and suicide. Although statistical power was accounted for, the small sample size is still a limitation of the findings and directly impacts generalizability.
Support (if any):

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1195
EXPLORING DREAM SELF-EFFICACY'S RELATIONSHIP WITH SUICIDE

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Introduction: Research has begun to identify self-efficacy as a crucial variable related to positive treatment outcomes. For treatments targeting nightmares, self-efficacy related to dreaming (DSE) has been proposed to be a key mechanism of change. Additionally, a robust amount of research exists that links nightmares to suicide, suggesting that mechanisms related to trauma-related nightmares may also be related to suicide. Thus, we sought to explore the relationship between DSE and suicide in a protocol that actively attempted to increase DSE.
Methods: Fifteen participants completed our Targeted Dream Incubation (TDI) protocol, which includes cueing participants for dream reports once hypnogogic sleep is detected, then after dream reports giving participants the following cue, "while you try to fall asleep, try and think of a tree". Then after the cue is given, allowing participants to continue sleeping. The protocol included a pre-nap assessment (baseline), a 1.5-hour nap, a post-nap assessment, and a one-week follow-up assessment. In all assessments, we measured DSE. Cognitions related to suicide were measured at baseline and one-week follow-up. Non-parametric mean comparison analyses and bivariate regressions were used to analyses our aims.
Results: Post-nap DSE scores ($t = -2.11$, $p < 0.05$) and follow-up DSE scores ($t = -1.89$, $p < 0.05$) significantly increased after the TDI protocol. Pre-nap DSE ($r = -0.59$), Post-nap DSE ($r = -0.66$) and follow-up DSE ($r = -0.74$) were all significantly negatively correlated with follow-up cognitions related to suicide ($p < 0.05$). The change of DSE between baseline and follow-up was significantly negatively predictive of cognitions related to suicide ($b = -0.24$, $p < 005$).
Conclusion: Our results are the first of their kind to demonstrate the DSE is both correlated with and predictive of cognitions related to suicide. Furthermore, our results highlight that changes in DSE brought about by TDI may reduce suicidal cognitions. Future research should examine DSE, suicide, and TDI under the context of a trauma-related nightmare intervention. Although statistical power was accounted for, our small sample size was small and directly impacts generalizability. Further data collection is needed to strengthen and confirm our findings.
Support (if any):

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1196
PERSONALITY TRAITS ARE ASSOCIATED WITH NIGHTMARE FREQUENCY AND DISTRESS

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Introduction: Many studies involving the relationship between personality and nightmare frequency (NF), common in cross-sectional data, have only looked at neuroticism in isolation, assumed a linear relationship, or did not include nightmare disorder index (NDI) to determine if personality traits might predict NDI over NF. While neuroticism is the personality trait most commonly associated with nightmares, theoretically due to negative emotionality or emotional instability, including all five traits allows for a more holistic outlook into this relationship. Particularly, conscientiousness, agreeableness, and (low) neuroticism tend to form a higher order stability composite, whereas openness and extraversion are more related to adaptability to new experiences.
Methods: Our pre-registered data analysis comes from Wave 5 of the NDSU National COVID study, where participants completed questionnaires about the Big Five, NF, and NDI (N=436; mean age = 59.20, range 22-93; 55.96% female). Pearson correlations were used to examine bivariate associations between personality and nightmares, and Loess curves were used to evaluate possible curvilinear associations.
Results: Neuroticism was the strongest, statistically significant correlate of NF and NDI ($r = .26$ and $.25$, respectively), followed by conscientiousness ($r = -.16$ and $-.14$). Next, extraversion was correlated with NF and NDI ($r = -.11$ and $-.12$), while agreeableness was only correlated with NF ($r = -.16$, $p = .001$). Associations for openness were not statistically significant ($p \geq .26$), and we found no strong evidence of curvilinearity.
Conclusion: Our results clarify the relevance of personality for nightmares. In line with prior studies, we find moderate associations between neuroticism and nightmares, as well as three of the other Big Five traits (conscientiousness, extraversion, and agreeableness). Overall, these traits emphasize the relevance of self-regulatory personality processes for sleep. We also found similar associations for NF and distress, highlighting the relevance of self-regulatory traits for multiple dream-related sequelae. These findings highlight the need for longitudinal research on personality and nightmares, which can inform clinical work using personality as a tool to identify people at risk of nightmares and identify whether personality can be leveraged in clinical interventions.
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1197

DIFFERENTIATING TYPICAL DREAMS, DISRUPTIVE DREAMS, PERCEIVED NIGHTMARES, AND TRUE NIGHTMARES USING DISCRIMINANT FUNCTION ANALYSIS

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Introduction: There is currently no consensus on the definition of nightmares. Most participants define nightmares as "bad dreams" with intense, distressing emotions. Per the DSM-5, nightmares are distressing dreams, but to be diagnosed with nightmare disorder, the dreams must awaken the dreamer. Surprisingly, research has not evaluated the characteristics dreamers use to categorize their nightmares. Evaluating the characteristics that distinguish between dream types can reduce ambiguity and potentially improve clinical research.
Methods: In this ongoing pre-registered study, participants (n=53) self-report their psychosocial factors, sleep, and the most recent dream. Participants are given instructions to maintain actigraphy, sleep diaries, and dream diaries for one week. Thus, participants have up to 2 dream reports across the week of the study. We utilized discriminant function analysis (DFA) to describe the differences in dream content for dreams classified as true nightmares, perceived nightmares, disruptive dreams, and typical dreams.
Results: Overall, the DFA could distinguish between dream types using one canonical correlation ($p<.0001$) which classified dreams much better than chance. However, errors were heterogeneous and were highest for classifying true nightmares, followed by perceived nightmares (33% and 30%, respectively). Adversity, positivity, negativity, and deception were important in distinguishing dream types. Follow-up contrast analyses showed dream characteristics did not significantly differentiate true nightmares from other dream types. However, when true and perceived nightmares were grouped, they were significantly more negative than disruptive and typical dreams ($p=.002$). Surprisingly, there were no significant differences between dreams that woke participants up and those that did not, as well as no differences between typical dreams and all others ($ps\geq.08$).
Conclusion: These results suggest that dream content distinguishes dream types, but not following current clinical guidelines: true (clinical) nightmares and perceived nightmares were more similar to each other than all other categories. This implies the awakening definition of nightmares is too restrictive, and that intense negativity perhaps best distinguishes clinically-meaningful nightmares from all other dream types. The definition of nightmares is important when considering the generalizability of research and screening for nightmares at the population level.
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1198

2NITEMARES: THE RELATIONSHIP BETWEEN NIGHTMARES AND INTEGRATED CBT-I AND PROLONGED EXPOSURE TREATMENTS AMONG VETERANS WITH INSOMNIA AND PTSD

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Introduction: Nightmares and insomnia commonly co-occur with Posttraumatic Stress Disorder (PTSD), with 70% to 91% of individuals with PTSD reporting chronic nightmares and insomnia. Evidence suggests that even gold standard treatments for PTSD (such as Prolonged Exposure, PE) and insomnia (CBT-I) individually may not fully resolve nightmares. Our study presents secondary analyses of a randomized controlled trial of integrated CBT-I and PE (CBTI-PE), compared to sleep hygiene and PE (hygiene-PE) on nightmares.
Methods: We examined a) how nightmare frequency and maximum distress severity changed over the course of treatments (baseline, 5-week, post, and 3-month follow up); and b) if baseline nightmares interfered with the efficacy of treatment. Participants were 94 Veterans with PTSD and insomnia (23.4% female; 52.1% white; age M= 40, SD=12) with mean baseline PTSD Checklist (PCL-5) score of 55.6 (SD = 12.55) and Insomnia Severity Index (ISI) score of 20.53 (SD = 4.73). Participants completed seven-day sleep diaries including number and severity of distress from nightmares (0-10). Nightmare maximum distress was the highest severity rating.
Results: Baseline sleep diaries showed participants averaged 0.86 nightmares per night (SD = 0.89) with maximum distress of 5.69 (SD=1.47) out of 10. Neither baseline average number of nightmares nor maximum nightmare distress correlated with ISI ($r=.26$, $r=.13$, $p=.32$). Only maximum distress correlated with PTSD at baseline ($r=.41$, $p<.001$). Hierarchical linear modeling showed that the number nightmares ($\beta = -0.11$, $p =.002$) and maximum distress ($\beta =-0.46$, $p =.02$) significantly decreased over both treatments, but there were no differences between groups. Follow-up analyses suggest that PE (after week 5) had larger effects on nightmares than either sleep intervention. No baseline nightmare variables interfered with PTSD or ISI treatment outcomes.
Conclusion: CBTI-PE and hygiene-PE showed decreased nightmare frequency and severity; this may be due to the PTSD treatment. However, there were residual nightmares and maximum distress that may require further intervention. Our finding that nightmares do not have an impact on insomnia and PTSD treatment efficacy is consistent with recent literature.
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1199

PREDICTORS OF SUICIDAL IDEATION WITHIN THE FIRST YEAR POSTPARTUM: WHAT'S SLEEP GOT TO DO WITH IT?

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Introduction: Together, sleep disturbance and postpartum depression constitute the most prevalent pregnancy-related medical complications. Suicide is the leading cause of death in the first year postpartum. However, longitudinal follow-up of suicidal ideation is rare, especially among women who experience early, persistent sleep disturbance. We assessed the stability of suicidal ideation (SI) over the first year postpartum, and whether sleep disturbance (insomnia severity, disordered breathing)

modified the relationship between postpartum depression and SI, over time.
Methods: 324 women repeated sleep (Pittsburgh Sleep Quality Index), and mood (Edinburgh Postnatal Depression Scale) assessments at postpartum week-6, 12, 24, 36, 50. The EPDS included a single item probing suicidal ideation on a 4-point Likert scale. Among these, 49 women also completed wrist actigraphy at 6-8 weeks postpartum.
Results: Forty-seven (14.5%) women endorsed some form of SI during the first year postpartum. Within-woman, these assessments tended to peak at 9-months postpartum. Among women with accelerometer and diary data, those with later sleep onset and midpoint at 6-weeks postpartum were significantly more likely to experience more severe depression (d=.3, p<.01). Ten of these women (20%) endorsed thoughts of self-harm above "never" at some point during the first year postpartum. Women with shorter objective and self-reported sleep duration, as well as difficulty initiating and maintaining sleep were at greater risk for SI over time (Beta =.91, p<.01). Women with greater variability in night-to-night sleep patterns experienced the most severe SI at each time point assessed.
Conclusion: Both sleep timing and insomnia may predict suicidal ideation among women with mild-moderate postpartum depression symptoms. Objective accelerometer data on night-to-night patterns seemed to be the strongest predictor of frequency and severity of SI. Women with PPD would benefit from ongoing assessments of both sleep and mood throughout the first year postpartum, with the understanding that sleep may be less stigmatizing to probe.
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1200

MELANOPSIN-DRIVEN LIGHT RESPONSIVITY AND REWARD MOTIVATION IN YOUNG PEOPLE AT RISK FOR MANIA

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Introduction: Mania is associated with circadian and reward dysregulation, and there are strong reciprocal relationships between the circadian and reward systems. To better detect and prevent mania, it is essential to characterize potentially abnormal biobehavioral relationships between the circadian and reward systems that may confer risk for mania. Light signals conveyed through melanopsin-containing retinal ganglion cells are one of the strongest influences on the biological clock. We examined the extent to which melanopsin-driven light responsivity (via pupillometry) is associated with reward dysregulation in young people at-risk for mania.
Methods: Ninety-five participants aged 16-24yr (M=21.82, SD=2.02) spanning a spectrum of mania vulnerability (MOODS-SR-Lifetime, MOODS) completed a 24-hr lab visit. Testing included melanopsin-driven pupil responsivity (post-illumination pupil response, PIPR), reward-based aggression (Point Subtraction Aggression Paradigm, PSAP), and reward motivation (Effort Expenditure for Rewards Task, EEfRT). PIPR was estimated at 10-40sec (PIPR30) after the light stimulus, calculated as a percent of baseline. Poisson regression models assessed PIPR's associations with reward-related outcomes and moderation by lifetime mania risk (MOODS mania score), adjusting for age, sex assigned at birth, past-week depression and mania symptoms, psychotropic medication use, time spent awake, photoperiod, and MOODS depression score. Johnson-Neyman intervals were used to examine the range of significant moderation (interaction) effects.
Results: There was a significant interaction (RR=1.45. p< 0.001) between melanopsin-driven light sensitivity (PIPR30) and mania risk (MOODS-Mania) for reward-related aggression (PSAP percent steals). A Johnson-Neyman test showed that lower PIPR30 was associated with greater PSAP percent steals at low/moderate mania vulnerability (MOODS-Mania values < 16) but this relationship was reversed for individuals with higher levels of mania vulnerability (MOODS-Mania> 23). There was not a significant association between PIPR30 and reward motivation (EEfRT % hard choices; RR=0.14, p=0.643) nor a significant moderating effect of mania risk (RR=2.00. p=0.238).
Conclusion: Our interim findings indicate that, as mania risk increases, greater melanopsin-driven pupil responsivity is associated with greater reward-related aggression. This finding may reflect abnormal associations between the circadian and reward systems among individuals with elevated vulnerability to mania that, when exacerbated, contribute to irritability and aggressive behavior associated with mania/hypomania.
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1201

WEEKEND CATCH-UP SLEEP AND DEPRESSIVE SYMPTOMS IN EMERGING ADULTS: RESULTS FROM THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY

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Introduction: Short sleep duration and late and irregular sleep timing are associated with risk for depressive symptoms, a leading cause of disability in emerging adults. However, weekend catch-up sleep (WCS) -- compensatory sleep with later sleep timing on weekends -- has been associated with reductions in depressive symptoms in some adult samples. The present study evaluates associations between WCS and daily depressive symptoms in a large and nationally representative sample of emerging adults.
Methods: Secondary data analyses were conducted using data from 16–24-year-olds in the National Health and Nutrition Examination Survey (NHANES 2021-2023; N = 1087). Participants' reports of weekend and weekday bed- and wake-times were used to calculate WCS. Analyses were conducted with dichotomized WCS (>0 h or 2h, >0-2h,
Results: Emerging adults with WCS had 60% lower odds of daily depressive symptoms compared to those without WCS. Analyses with three categories of WCS indicated that emerging adults with WCS up to or greater than 2 hours had lower odds of depressive symptoms compared to those without WCS, but depression risk did not differ between those with WCS of >0-2 h versus >2h.
Conclusion: WCS may reduce the frequency of daily depressive symptoms in emerging adults. For emerging adults who find it difficult to get enough sleep during the week or maintain consistent bed- and wake-times, WCS can be a healthy sleep habit.

Additional research is needed to parse the relative benefits of WCS versus consistent weekday-weekend sleep duration and timing.
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1202
DAYTIME NAPPING AND DEPRESSION IN BIPOLAR DISORDER: FINDING FROM THE APPLE COHORT STUDY

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Introduction: The relationship between daytime napping and depression remains debatable. Thus, we investigated whether daytime napping is associated with depressive symptoms in patients with bipolar disorder.
Methods: In a cross-sectional study, we recruited 204 outpatients with bipolar disorder who were participants in the Association between Pathology of Bipolar Disorder and Light Exposure in Daily Life (APPLE) cohort study. Each participant's daytime napping was measured using an actigraph over 7 consecutive days. Depressive symptoms were evaluated using the Montgomery–Åsberg Depression Rating Scale, and scores of ≥8 points were considered indicative of a depressed state.
Results: One-hundred and ten (53.9%) participants were depressed. In multivariable logistic regression analysis, as the number of nap days, number of naps per day, and nap duration increased, the odds ratio (OR) for depressed state significantly increased. Additionally, compared to the participants who did not nap, the participants who napped on five or more days a week or who had an average nap duration over 60 min had more than three times higher ORs in the depressed state (number of nap days: OR, 3.66; 95% confidence interval [CI], 1.32–10.17; nap duration: OR, 3.14; 95% CI, 1.12–8.81).
Conclusion: We found a significant and independent association between daytime napping and depressive symptoms in patients with bipolar disorder. Further studies are needed to identify the effect of short napping on depressive symptoms in patients with bipolar disorder.
Support (if any):

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1203
THE ROLE OF SLEEP HYGIENE IN THE COMORBIDITY OF GAD AND MDD SYMPTOMS IN AN UNDERGRADUATE SAMPLE

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Introduction: Major depressive disorder (MDD) and generalized anxiety disorder (GAD) are highly comorbid. These conditions commonly develop during early adulthood, and they negatively impact health and social, academic, and workplace functioning. Sleep hygiene, which includes behaviors and routines that support consolidated sleep, may be a factor in GAD/MDD comorbidity. Indeed, sleep disturbances are a symptom of both disorders. We tested the hypothesis that GAD and MDD symptoms would be more highly correlated at lower levels of sleep hygiene. Participants (N= 180) were undergraduate students recruited from the online Sona research pool from a large Southern university. Regression analyses supported the hypothesis, suggesting that the association of GAD with MDD symptoms was moderated by sleep hygiene, Specifically, the environment and behavior aspects of sleep hygiene were associated with a stronger association between GAD and MDD symptoms. The findings implicate sleep hygiene as a moderator in the comorbidity of GAD and MDD.
Methods: Participants (n= 180) were undergraduate students recruited from a large, urban university. Measures used were the Sleep Hygiene Index, Patient Health Questionnaire- 9, and Generalized Anxiety Disorder- 7. The hypothesis was tested using the Process macro.
Results: GAD symptoms were associated with depression symptoms, B =.610, 95% CI [.474,.747]. Sleep disturbing environment/behavior was associated with depression, B =.166, 95% CI [.005,.326], but irregular sleep-wake schedule was not, B = -.000, 95% CI [-.038,.037]. There was an interaction between GAD symptoms and sleep disturbing environment/behavior, B =.024, 95% CI [.001,.048], but not between GAD symptoms and irregular sleep-wake cycle, B = -.000, 95% CI [-.038,.037]. Evaluation of simple slopes indicated that the association between GAD symptoms and depression was stronger at higher levels of sleep disturbing environment/behavior.
Conclusion: In conclusion, we found that the association between GAD and MDD symptoms was stronger at higher levels of environmental and behavioral components of poor sleep hygiene. Our findings suggest that the relation between GAD and MDD symptoms was stronger in those with higher levels of sleep disturbing environment and behaviors. Comorbidity did not depend on sleep/wake cycle. Our findings have implications for GAD/MDD interventions.
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1204
INSOMNIA AFTER SPOUSAL DEATH AND ITS ASSOCIATION WITH COMPLICATED GRIEF IN LATE-LIFE

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Introduction: Beavement is characterized by sleep problems including poor sleep quality, difficulty falling asleep, and short sleep duration. This study examined cross-sectional and longitudinal relationships of insomnia with maladaptive or complicated grief (CG) symptoms in acutely-bereaved older adults.
Methods: This secondary analysis used data collected from a randomized controlled trial for depression prevention in adults 60 years of age or older who experienced the death of their spouse/life partner within the previous 12 months. One hundred fifty adults were randomly assigned to a digital health intervention arm or an enhanced usual care arm. The Insomnia Severity Index and Inventory of Complicated Grief were administered at baseline and 3 months later. Linear regression analysis examined associations of insomnia with CG at baseline and over time, while controlling for well-established correlates of CG (age, time since loss, medical illness burden, and perceived loneliness). Separate regression models were fit for each CG symptom cluster: yearning and preoccupation with the deceased, anger; shock

and disbelief; estrangement from others; hallucinations of the deceased; and behavior change.
Results: Participants were a mean (SD) of 70.6 (7.1) years and bereaved 208.13 (102.42) days; 80% were women and 85% were White. Greater insomnia severity was associated with more yearning and preoccupation (t=2.175; p=0.031) and more behavior change including avoidance behaviors (t=2.334; p=0.021) at baseline. Improvement in insomnia was correlated with reductions in yearning and preoccupation over a 3-month follow-up (β=0.185; p=0.033; R2=0.293).
Conclusion: Greater insomnia severity is associated with more yearning and preoccupation with the deceased at baseline and over 3 months. Intense yearning is a key characteristic of prolonged grief disorder. This observation generates the hypothesis that behavioral interventions that directly target and modify insomnia symptoms may benefit older adults with maladaptive/complicated grief following the death of a loved one.
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1205

SHORT-TERM VARIABILITY IN SLEEP AND SUICIDAL IDEATION IN DEPRESSED OLDER ADULTS

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Introduction: Sleep disturbances are linked to suicidal ideation and depression in older adults. Depression is also linked to contemplation of suicide and suicidal behavior. While there are complex, bi-directional relationships between sleep, depression, and suicide risk, these relationships have yet to be measured in well-defined suicide risk groups in late life. This study explored the association between sleep and suicidal ideation using actigraphy and digital sleep diaries via a 3-week ecological momentary assessment protocol.
Methods: Participants included 72 older adults (M±SD=65.3±6.5 years) with clinical depression, defined by a Hamilton Rating Scale for Depression (HRSD) score≥14. Forty-six percent (n=33) of participants had a lifetime suicide attempt. Actigraphic recordings of sleep including sleep duration and sleep efficiency were measured using Philips Spectrum Plus/ Pro actiwatches. Sleep diaries were completed in the morning, including sleep quality. Clinician-administered assessments of suicidal ideation (Scale for Suicidal ideation [SSI]) and depression (HRSD) were collected weekly, for 3 weeks. Mixed effect regression models were used to assess the associations between daily/weekly measures of sleep and suicidal ideation.
Results: Results: Thirty eight percent of participants reported experiencing suicidal ideation (SSI score ≥ 2) during the 3-week protocol. Presence of suicidal ideation was significantly associated with sleep duration. On the aggregate over 3 weeks, ideators had greater sleep duration (M±SD = 441.00±77.29) relative to non-ideators (M±SD=404.82±68.94); t = -2.071,df=70: p =.042. Among ideators, longer sleep duration was significantly associated with greater severity of suicidal ideation the next day (b=0.011, SE=0.004, t=2.54, df=80, p=0.013), Poor sleep quality the night prior to completing the SSI was also associated with the presence of suicidal ideation (OR=0.71, 95% CI: 0.51-0.99, z=-2.03, p=0.043).
Conclusion: Longer sleep duration was predictive of suicidal ideation in weekly and daily models. Long sleep is a symptom of atypical depression and associated with cardiovascular disease, cancer, and cognitive decline in late life, among others. Long sleep duration may compensate for poor sleep quality, which was associated with suicidal ideation in our sample of depressed older adults. Future research should replicate the above findings and verify mechanisms linking long sleep to suicidal ideation in older adults.
Support (if any): R01 MH085651

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1206

THE MEDIATING ROLE OF SLEEP QUALITY IN THE ASSOCIATION BETWEEN DEPRESSION AND PAIN INTENSITY IN OLDER ADULTS

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Introduction: Chronic low back pain (LBP) is a prevalent condition in older adults, often co-occurring with depression and impaired sleep quality. While the bidirectional relationship between sleep disturbances, depression, and pain is recognized, evidence on the mediating role of sleep quality in this association is scarce. The aim of this study was to evaluate whether sleep quality mediates the relationship between depressive symptoms and pain intensity in older adults with chronic LBP.
Methods: This cohort study included 171 adults aged ≥60 years with chronic LBP. Data was collected at baseline, 6 months, and 12 months. Depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale, pain intensity with a Numeric Pain Scale, and sleep quality with the Pittsburgh Sleep Quality Index. Mediation analysis was conducted to analyze whether sleep quality at 6 months mediated the relationship between baseline depressive symptoms and pain intensity at 12 months. Statistical significance was set at $p < 0.05$, and the bootstrap method with 1,000 resamples was used to calculate confidence intervals.
Results: The mediation analysis showed a significant indirect effect of baseline depressive symptoms on pain intensity at 12 months through sleep quality at 6 months. The total effect remained significant with 43.54% of the effect mediated by sleep quality. The direct effect between depressive symptoms and pain intensity at 12 months did not show statistical significance.
Conclusion: These findings suggest that in long term sleep quality mediates the relationship between depressive symptoms and pain intensity in older adults with chronic LBP. Interventions targeting sleep disturbances may be a potential strategy to reduce pain intensity and improve outcomes in this population.
Support (if any): Our studies are supported by grants from the Associacão Fundo de Incentivo à Pesquisa (AFIP). CG and PKM are supported by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brazil (CAPES) – Finance Code 001 and the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP 2022/00328-5) to VAK, FAPESP 2021/05920-7 to ASP and 2015/11877-6 to PKM). MLA is supported by a grant from FAPESP (#2020/13467-8). RZP, MLA and ST are National Council for Scientific and Technological Development (CNPq) fellowship recipients.

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1207

INSOMNIA INTERVENTION ASSOCIATED WITH IMPROVEMENTS IN AFFECTIVE BRAIN FUNCTION, MOOD, AND SLEEP IN DEPRESSION

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Introduction: Depression and insomnia are bidirectionally related. It is hypothesized that fronto-limbic brain function, specifically the amygdala and medial prefrontal cortex (mPFC), links sleep and mood disturbances and represents targets of insomnia-related emotional dysfunction. A primary aim of this first-phase of a two-phase mechanistic clinical trial was to test whether insomnia treatment engages these affective circuits. Secondarily, we examined treatment-related changes in emotion and sleep outcomes and their associations with changes in fronto-limbic brain function.

Methods: 47 adults (64% female; age 25-60) with depression and insomnia completed six sessions of therapist-delivered cognitive-behavioral therapy for insomnia (CBT-I). FMRI of emotional faces and regulation tasks and at-home polysomnography were acquired before and after treatment. Primary outcomes were treatment-associated changes in amygdala reactivity and amygdala-mPFC task-modulated connectivity, analyzed using linear mixed-effect modeling and FDR-correction across task-contrasts and mPFC regions-of-interest (q=0.05). Secondary outcomes included depression, anxiety, and insomnia symptoms, emotion regulation habits, N3 duration, and sleep efficiency. Secondary analyses examining associations between fronto-limbic brain function and secondary outcomes used linear regression. All models controlled for age and sex.

Results: Following treatment, participants experienced reduced amygdala reactivity to fearful faces (b=-0.17 [CI:-0.25-0.08], puncorrected=0.003, padjusted=0.008) and a trend towards increased amygdala connectivity with the subgenual anterior cingulate cortex that did not survive FDR correction (b=0.16 [CI:0.008-0.31], puncorrected=0.045, padjusted=0.23). No significant changes were observed in regions-of-interest during active emotion regulation (b< 0.05 [CI:-1.26-0.23], puncorrected>0.64). Treatment was associated with improvements in depression, anxiety, and habitual cognitive reappraisal (p's< 0.002), as well as reduced insomnia symptoms and increased N3 sleep and sleep efficiency (p's< 0.001). Despite parallel improvements in brain, mood, and sleep, amygdala reactivity changes were only associated with improvements in cognitive reappraisal (b=5.4 [CI: 0.94-9.91], p=0.019). There were no other relationships between changes in amygdala reactivity or connectivity with emotion or sleep improvements (all p's>0.293).

Conclusion: This is the first study to establish that CBT-I is associated with improved fronto-limbic brain function, mood, emotion regulation, and objective sleep quality in individuals with co-occurring insomnia and depression symptoms. However, the improvements in emotion and sleep largely do not appear to be driven by the changes in brain function.

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1208

IMPACT OF INSOMNIA SYMPTOMS ON ANXIETY, DEPRESSION AND QUALITY OF LIFE IN WOMEN: EPISONO COHORT STUDY

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Introduction: The maintenance of a good sleep is fundamental for human health. From adulthood onwards, women tend to present more sleep complaints, such as inadequate sleep time and insomnia. This study evaluated the effect of insomnia symptoms over time on women, having the level of anxiety, depression, fatigue, quality of life and sleep pattern as measuring outcomes, compared to the control group.

Methods: We used data from Sao Paulo Epidemiologic Sleep Study (EPISONO), which observed the sleep patter in a representative sample of Sao Paulo in 2007 (n=1,042), with a follow-up in 2015. Women who took part in both editions of the study were distributed in two groups: those with insomnia symptoms (GIS) and those without insomnia symptoms (GWIS), according to their responses to question from the Unifesp sleep questionnaire and the Pittsburgh Sleep Quality Index. To evaluate the effect of groups over time, the Chalder Fatigue Questionnaire, the Beck Anxiety Index, the Beck Depression Index, and the World Health Organization Quality of Life assessment were used. Additionally, full night polysomnography was used to assess the participants' sleep pattern.

Results: The GWIS comprised 70 women, and the GIS 141 women. The GWIS presented significantly less fatigue, anxiety, depression, and better results in all domains of quality of life, in both EPISONO editions. Time had a significant impact on the level of depression, regardless of groups. In relation to the sleep pattern, the sleep onset latency was increased in the GIS, regardless of time.

Conclusion: This study hypothesized that GWIS would worsen over time in terms of quality of life perception and mood. Our findings indicated that regardless of time, insomnia symptoms were associated with higher levels of anxiety, depression, fatigue, and lower perception of quality of life. Moreover, time impacted the level of depression in all participants.

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1209

DIFFERENCES OF MYELIN-RELATED VALUES AMONG DEPRESSIVE PATIENTS WITH AND WITHOUT INSOMNIA AND HEALTHY CONTROL

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Introduction: Decreased myelin has been reported in depression and insomnia in previous studies. This study aimed to investigate whether myelin differs between major depressive disorder (MDD) patients with and without insomnia. Myelin-related differences in cortical gray and white matter regions were examined among three groups: MDD with insomnia, MDD without insomnia, and healthy controls.
Methods: Clinical evaluations and high-resolution 7T magnetic resonance imaging (MRI) were conducted on participants, including patients with clinically significant insomnia, patients with MDD without significant insomnia, and healthy controls. Sagittal brain images were obtained using the prototype multi-echo magnetization-prepared 2 rapid gradient echoes (ME-MP2RAGE) sequence. Quantitative myelin maps (q-Ratio) were derived by dividing R1 images by T2 images and were subsequently smoothed to create smoothed q-Ratio (sq-Ratio) maps. Statistical analyses were performed to identify differences in myelin-related values across major brain regions of interest among the three groups.
Results: MDD patients with insomnia exhibited significantly lower myelin-related values in specific brain regions compared to those without insomnia. While the sq-Ratio myelin-related maps showed a trend toward lower myelin values in the MDD with insomnia group compared to the other groups, this overall difference was not statistically significant. However, significant reductions in myelin-related values were observed in the olfactory cortex, superior temporal gyrus, amygdala, frontal regions, and five cerebellar regions in gray matter, as well as the inferior fronto-occipital fasciculus in white matter, in MDD with insomnia compared to MDD without insomnia.
Conclusion: This study identified significant myelin differences in specific brain regions between MDD patients with and without insomnia, highlighting the distinct neurobiological changes associated with insomnia in MDD. These findings underscore the critical role of insomnia in influencing brain myelin content and provide novel insights into the interplay between insomnia and depression, with implications for understanding the neurobiology of comorbid conditions.
Support (if any):

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1210

EXAMINING DAILY SLEEP AND EMOTIONAL DYSREGULATION AMONG EMERGING ADULTS WITH HEAVY ALCOHOL USE PATTERNS

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Introduction: Emerging adults with high alcohol use patterns often experience sleep disturbances and emotional dysregulation, which frequently co-occur with anxiety. While sleep disturbances are linked with emotional dysregulation, few studies have examined within-person bidirectional associations, focusing on within-day fluctuations in emotional dysregulation, or considered the potential moderating effect of anxiety symptoms. Therefore, the current study examined the following two questions: (1) Is there a daily, bidirectional relationship between sleep (e.g., quality and duration) and emotional dysregulation? (2) Does anxiety moderate the relationship between sleep and emotional dysregulation?
Methods: Data are from a longitudinal study of heavy drinkers (N = 300, 65.4% women, Mage 24.57, range: 21-29) who completed a single 14-day ecological momentary assessment burst, documenting sleep quality and duration, positive and negative emotional states, and completed a prior survey on anxiety symptoms. Multilevel modeling was used to explore within- and between-person associations between sleep (quality and duration) and next-day emotional dysregulation, as well as the effect of emotional dysregulation on same-night sleep. The moderating effect of anxiety was also examined.
Results: Findings suggest better sleep quality was associated with lower emotional dysregulation for negative affect (b = -.06, SE =.02, 95%CI= [-.09,.-.03], p <.001). Furthermore, on days when participants experienced above-average sleep quality or duration, they reported reduced emotional dysregulation for positive affect the following day (sleep quality: b = -.05, SE =.02, 95%CI = [-.08, -.01], p =.01; sleep duration: b = -.03, SE =.01, 95%CI = [-.05, -.02], p <.001). Daily emotional dysregulation did not predict sleep outcomes, nor did anxiety symptoms moderate these associations.
Conclusion: This study sheds light on the dynamic interplay between daily sleep and emotional dysregulation in emerging adults with heavy alcohol use patterns. These findings highlight a predominantly unidirectional influence from sleep to emotional regulation, emphasizing the importance of optimizing sleep to help reduce emotional dysregulation, especially among heavy drinkers.
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1211

SLEEP OUTCOMES AND RELATIONSHIPS WITH ANXIETY AND DEPRESSION SYMPTOMS IN YOUTH WITH AND WITHOUT CYSTIC FIBROSIS

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Introduction: The adolescent and young adult (AYA) developmental period is a time of risk for both sleep and mental health concerns which may be amplified for those living with cystic fibrosis (CF). This study aimed to better understand sleep, sleep disturbance, and relationships to anxiety and depression symptoms in AYA with CF.
Methods: This study examined whether significant differences exist between AYA with CF and healthy controls, aged 14-25, in actigraphic (TST, SE, WASO, number of night awakenings) or self-reported sleep outcomes (PSQI, PROMIS-SD, PROMIS-SRI, sleep diary); anxiety or depression symptoms (STAI-S, CES-D); and examined whether anxiety or depression symptoms were associated with sleep outcomes in AYA with CF. Semi-structured interviews were conducted with a subset of purposively sampled participants with CF aiming to capture maximum variation in sleep experience as defined by the PSQI. Disease characteristics were also collected from the CF National Data Registry for all CF participants. Quantitative analysis: linear regression models

were used to determine differences between groups and to examine associations between sleep and mental health outcomes. Qualitative analysis: interviews were audio-recorded, de-identified, and transcribed verbatim. Data was analyzed through content analysis, independently by two researchers using qualitative descriptive methods.
Results: This study (n=86; n=45 with CF, n=41 without CF) found no significant difference between AYA with CF and healthy controls in actigraphically-measured or self-reported sleep outcomes, or in anxiety or depression symptoms. In participants with CF, self-reported sleep quality was significantly associated with both anxiety (p< 0.001) and depression (p< 0.001) symptoms, but actigraphically-measured sleep was not. The qualitative arm (n=19) found that AYA with CF reported that CF symptoms, CF treatments, anxiety, changes in health status, and initiation of elexacaftor/tezacaftor/ ivacaftor (ETI) interfere with sleep, while, positioning, good sleep hygiene, breathing therapies, and being stable on ETI were described as benefitting sleep. AYA's with CF also discussed a desire to engage in discussions about sleep with their CF care teams.
Conclusion: Within the current context of improving treatments and care, sleep and mental health outcomes may be improving for AYA with CF. Despite potential improvements, AYA with CF still report unique sleep challenges.
Support (if any):

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1212
ARE REM SLEEP ALTERATIONS ASSOCIATED WITH DEPRESSIVE SYMPTOMS IN PEDIATRIC NARCOLEPSY TYPE 1?

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Introduction: Children and adolescents with pediatric Narcolepsy Type 1 (pNT1) experience short REM sleep latency and REM sleep fragmentation at night and depression is a common pNT1 co-morbidity. Notably, depressive symptoms in otherwise healthy adults and adolescents are associated with short REM latency and an increase in total REM duration (Riemmann, 2020; Pesonen et al., 2019). The relationship between these REM disturbances and depressive symptoms in adolescents with pNT1 is understudied. We hypothesize that shorter REM latency, longer REM duration, and more REM fragmentation will be more associated with depressive symptoms in pNT1 than healthy controls (HC).
Methods: We collected data from 25 pNT1 participants (not on oxybate and weaned or naïve from stimulant/wake promoting agents) and 25 HC, aged 9-20 years old. Participants completed the Child Depression Inventory (CDI), the Positive and Negative Affect Scale (PNAS), and underwent an in-lab polysomnogram. We compared survey responses and REM sleep variables (REM latency, total REM duration, and REM mean bout duration) between groups. We used linear regression controlling for age, gender, and SSRI use to determine relationships between depressive symptoms and REM sleep in our cohorts.
Results: pNT1 participants had significantly higher scores on the CDI and lower scores on the PNAS positive affect scale than HC participants (p's< 0.001). While REM latency and total REM duration did not differ significantly between groups, the pNT1 group had shorter REM mean bout durations than HC (p=0.003). Across groups, we found a main effect of total REM duration on the CDI score (F=5.556, B=-0.61, p=0.023, 95% Cl: -0.114 to -0.009), but results were not significant within groups. We found no relationship between REM latency and REM mean bout duration across or within groups with CDI or PNAS scores.
Conclusion: REM sleep alterations in pNT1 participants were not associated with increased depressive symptoms in our study. Future studies may need to include larger cohorts of pNT1 with a wider range of depressive and psychiatric symptoms to study this question in more depth.
Support (if any): Wake Up Narcolepsy, Inc.

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1213
SELF-REPORTED SLEEP QUALITY AND ACTIGRAPHY IN A SAMPLE USING CANNABIS FOR ANXIETY

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Introduction: The public is increasingly motivated to use cannabis for sleep or anxiety. However, research on the effects of cannabis on these symptoms remains equivocal. This study examined the effects of cannabis on subjective sleep quality and objective sleep measures collected via actigraphy in an anxious sample.
Methods: Participants were in one of 4 conditions: a) no cannabis use, b) tetrahydrocannabinol (THC) dominant cannabis, c) cannabidiol (CBD) dominant cannabis, or d) a product with roughly equal proportions of THC and CBD (1:1). Cannabis using participants were further allocated to either flower or edible forms. Participants were assessed after 4 weeks of ad libitum use of their assigned product, with actigraphy monitors worn starting at the 2 week timepoint. A condition and form analysis of variance was conducted for outcomes of Pittsburgh Sleep Quality Index (PSQI) and average sleep latency, number of awakenings, and total sleep time (TST) collected by actigraphy.
Results: 150 participants used cannabis for anxiety (41 THC dominant, 48 CBD dominant, and 40 in the 1:1 condition; 50 in edible form, 79 in flower form) and 21 participants were in the no-use condition (Age M=34.72, SD=14.38; 58.67% female). Levels of anxiety at baseline were mild-moderate on the Beck Anxiety Inventory (BAI; M=13.01, SD=8.25). Participants who used cannabis in flower form ($F(1, 141)=7.53$, p=.007, $\eta^2G=0.05$) or were in the THC condition ($F(2, 141)=4.69$, p=.01, $\eta^2G=0.06$) reported the lowest average PSQI scores at the 4 week timepoint. There were no significant effects of condition or form on the outcomes of sleep latency, number of awakenings, or TST from actigraphy (p's >.05).
Conclusion: These results highlight a discrepancy between subjective and objective measurement of sleep quality parameters in participants using cannabis for anxiety. These results contrast with 30-day daily diary data previously reported by our group favoring CBD dominant edible forms of cannabis. Results may be influenced by expectancy effects or the duration of the study. More research is needed to understand the relationship between varying forms of cannabis and sleep.
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1214

AN AI-DRIVEN MODEL FOR DEPRESSION DETECTION USING SLEEP HEARTBEAT AND BREATHING SIGNALS

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Introduction: Autonomic dysfunction, marked by changes in heart rate and breathing patterns, is a core symptom of depression. However, the role of autonomic dysfunction during sleep as a marker for depression is not well understood. This study evaluates the utility of polysomnography (PSG)-derived cardiorespiratory signals for depression detection and compares their predictive value to that of sleep electroencephalography (EEG), a widely studied modality in depression research.

Methods: We examined clinical PSG data and electronic health records at Sir Run Run Shaw Hospital, collected between 2018 and 2023. Depression cases were identified using the International Classification of Diseases, 10th Revision (ICD-10) diagnosis, Hamilton Depression Rating Scale (HAMD) scores of 8 or higher, and/or chief complaints indicative of depression. Age- and sex-matched controls were sourced from the National Sleep Research Resource, selected based on physician diagnoses or validated depression scales. Predictive models were developed using a foundational model approach: electrocardiogram (ECG) and abdominal (ABD) signals were pre-trained to predict other PSG channels and annotations, followed by fine-tuning with logistic regression for depression classification. An EEG-based model was used for comparison. Data were divided into 80% training and 20% testing sets for evaluation. Model performance was evaluated using the area under the receiver operating characteristic curve (AUROC), sensitivity, and specificity.

Results: The study sample consists of 1863 depression cases (mean age 50.9 ± 15.7 years, 57.5% female) and 2547 controls (mean age 55.2 ± 15.6 years, 57.0% female). The ECG+ABD model achieved an AUROC of 0.960, with a specificity of 0.897 and sensitivity of 0.902. These results were comparable to those of the EEG-based model, which yielded an AUROC of 0.975, with specificity of 0.924 and sensitivity of 0.913.

Conclusion: Our findings demonstrate that AI-driven analysis of sleep-derived heartbeat and breathing signals can detect depression with performance comparable to that of the EEG-based model. This strategy holds promise for non-invasive monitoring to facilitate at-home depression screening, paving the way for advancements in precision mental health management.

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1215

ASSOCIATIONS BETWEEN SLEEP DISTURBANCES, DEPRESSION, AND THE RISK OF SUICIDAL IDEATION

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Introduction: The relationship between sleep disturbances and the risk of suicidal ideation has been explored in previous research. However, it remains unclear whether specific sleep parameters contribute differently to this risk and whether the presence of depression moderates these associations.

Methods: This study is part of the Kangbuk Samsung Health Study, a prospective cohort of Korean adults who underwent annual or biannual health screenings between 2011 and 2022. A total of 49,834 participants were included after excluding those with baseline suicidal ideation or major psychiatric/neurological illnesses other than depression. Subjective sleep parameters, including sleep duration, sleep quality, and daytime dysfunction, were evaluated using the Pittsburgh Sleep Quality Index. Depression and suicidal ideation were assessed using the Center for Epidemiologic Studies Depression Scale and a self-reported questionnaire adapted from the Korea National Health and Nutrition Examination Survey.

Results: Over 302,902 person-years (mean follow-up: 6.1 ± 3.1 years), 3,695 cases of suicidal ideation were identified. Multivariate Cox proportional hazard models, adjusted for depression and confounders (age, sex, lifestyle factors, hypertension, diabetes, serum lipids, and obesity), revealed that poor sleep quality (hazard ratio [HR] = 1.24, 95% confidence interval [CI] = 1.15 – 1.35), daytime dysfunction (HR = 1.16, 95% CI = 1.07 – 1.27), and short sleep duration (HR = 1.16, 95% CI = 1.00 – 1.34) were associated with an increased risk of suicidal ideation. Among non-depressed participants (n = 45,271; 277,379 person-years), the associations with poor sleep quality (HR = 1.34, 95% CI = 1.22 – 1.46) and daytime dysfunction (HR = 1.21, 95% CI = 1.10 – 1.34) were stronger, while sleep duration was not statistically significant. Among depressed participants (n = 4,563; 25,523 person-years), none of the sleep parameters were significantly associated with suicidal ideation.

Conclusion: Individuals with sleep disturbances may be at increased risk of developing suicidality, even in the absence of depression. Specifically, careful monitoring and timely intervention to address poor sleep quality and daytime dysfunction are crucial.

Support (if any):

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1216

AUTONOMIC DYSREGULATION DURING SLEEP IN PREMENSTRUAL DYSPHORIC DISORDER

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Introduction: Premenstrual Dysphoric Disorder (PMDD) is a menstrual cycle-related mood disorder, frequently associated with insomnia during the luteal phase (LP). Mood disorders and sleep disturbances are independently associated with altered autonomic nervous system (ANS) function. Research suggests that the menstrual cycle modulates ANS during wakefulness, with decreased parasympathetic activity from the follicular to LP. We hypothesize disturbed ANS regulation during sleep in PMDD during the symptomatic LP. This study aimed to investigate whether menstrual cycle–related variation in ANS activity is accentuated in women with PMDD compared to controls, and how such differences might relate to anxiety and sleep quality.

Methods: Seven women (32.0 ± 5.7 years) with PMDD-related LP insomnia and five healthy controls (30.4 ± 8.2 years) underwent polysomnography every third night across one menstrual

cycle (n=96 nights). Heart rate variability (HRV) measures, including high frequency (HF), low frequency (LF), LF/HF ratio, and rMSSD, were extracted from non-rapid eye movement (NREM) sleep. Menstrual phase and group effects were evaluated using mixed-model ANOVA. Morning questionnaires assessed anxiety (visual analogue scale) and sleep quality (7-point Likert scale), which were correlated with HRV parameters.
Results: Compared to controls, PMDD participants showed significantly reduced HF ($F_{1,24}=7.4$ $p= 0.008$) and rMSSD ($F_{1,24}=16.4$, $p < 0.001$), reflecting lower vagal tone, and elevated LF/HF ratios ($F_{1,24}=35.0$, $p < 0.001$), an index of HRV reflecting sympathetic and parasympathetic nerve activity. No main effects of the menstrual phase or interaction effects were found. Anxiety was associated positively with LF/HF ratio ($r=0.32$, $p=0.02$) and negatively with rMSSD ($r=-0.42$, $p=0.003$). No significant association was found between HRV parameters and reported sleep quality.
Conclusion: These results suggest a stable, trait-like autonomic vulnerability in PMDD, independent of the menstrual phase, characterized by diminished parasympathetic activity. The lack of a menstrual phase effect may reflect differences from previous studies, which primarily assessed ANS during wakefulness, or could be due to our limited sample size. Furthermore, our findings suggest a potential relationship between autonomic dysregulation during sleep and elevated anxiety in PMDD, independent of changes in sleep quality.
Support (if any): This study was supported the Canadian Institutes of Health Research (CIHR, grant MOP-38064).

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1217

ANHEDONIA LINKS SLEEP PROBLEMS AND SUICIDAL THOUGHTS: AN INTENSIVE LONGITUDINAL STUDY IN HIGH-RISK ADOLESCENTS

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Introduction: Sleep problems refer to a broad range of difficulties associated with the onset and maintenance of sleep, and growing research indicates a robust association between sleep problems and suicidal thoughts and behaviors in adolescents. However, relatively little is known about how this risk is conferred. This study used an intensive longitudinal design to investigate anhedonia as a mechanism linking sleep problems and next-day suicidal thoughts in a clinically high-risk sample of adolescents.
Methods: Adolescents (N=48; Mage=14.96; 77.1% white, 64.6% female) completed an ecological momentary assessment study design for 28 days following discharge from acute psychiatric care for suicide risk. Daily sleep diaries were used to assess prior night total sleep time and sleep onset latency. Ecological momentary assessment was used to assess anhedonia and suicidal thoughts up to six times per day. A series of multi-level structural equation models were used to examine facets of anhedonia as parallel mediators of the association between sleep problems and next-day suicidal thoughts.
Results: Significant direct effects were found between sleep problems (i.e., shorter total sleep time, longer sleep onset latency) and consummatory anhedonia, consummatory anhedonia and suicidal thoughts, and anticipatory anhedonia and suicidal thoughts. There were significant indirect (mediated) effects between sleep problems and next-day suicidal thoughts through consummatory anhedonia, but not anticipatory anhedonia.
Conclusion: This study significantly extends prior research on the sleep problem-suicidal thoughts association by investigating how, or the processes by which, sleep problems confer risk for suicidal thoughts. Our findings revealed consummatory anhedonia significantly mediated the relation between sleep problems and suicidal thoughts. Future research is needed to replicate these findings in larger samples and investigate how modifying sleep problems and anhedonia may mitigate suicide risk in adolescents.
Support (if any): This research was supported in part by a grant from the American Foundation for Suicide Prevention [YIG-1-054-16] and pilot funding from the University of Rochester Medical Center.

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1218

RELATIONSHIP BETWEEN SUBJECTIVE SLEEP QUALITY AND OBJECTIVE SLEEP PARAMETERS FROM WEARABLE EEG IN YOUTH WITH SIGNIFICANT ANXIETY AND RELATED DISORDERS

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Introduction: Sleep problems are prevalent in pediatric anxiety and related disorders (ARD), affecting nearly 90% of patients. Nevertheless, subjective sleep complaints routinely demonstrate poor agreement with objective sleep patterns derived from either actigraphy or polysomnography in non-psychiatric samples. The aim of this submission is to examine the relationship between subjective and objective metrics of sleep quality in youth with moderate-to-severe ARD.
Methods: We conducted a multi-method study involving a clinical sample of treatment-seeking youth (ages 11-17) participating in a CBT-based partial hospital program specialized in ARD. Participants complete standardized clinical interviews, sleep quality questionnaires, up to 10 nights of sleep diaries and wearable actigraphy, and at-home overnight ZMax EEG (up to 4 nights). To date, 44 participants (54% female, 86% white, mean age 15y) have completed data collection. We analyzed self-report questionnaires and three sleep stage variables from ZMax EEG scored using Dreamento): sleep efficiency (SE%; total sleep time / sleep period time), slow wave sleep (SWS%; minutes of SWS / total sleep time) and a sleep fragmentation index (SFI; the total number of awakenings or shifts to stage 1 divided by total sleep time [in hours]).
Results: Participants experienced high severity of illness as indexed by Clinical Global Impression (mean CGI = 5.4, sd = 0.8). Sleep disturbances and sleep-related impairments were present in our sample (PROMIS self-report sleep disturbance

mean = 61.01 sd = 9.74, sleep-related impairment mean = 61.9, sd = 7.84). Average SE was 77% (sd = 15%) and average SWS% was 60% (sd = 20%; range = 79%). Average SFI was 8.1/h (sd = 4.7). Subjective sleep quality was not significantly correlated to any of our objective sleep indexes (|r|'s < 0.12; p's > 0.05).
Conclusion: Our youth with moderate-to-severe ARD report clinically significant problems with sleep and sleep-related impairments. Sleep efficiency may be lower than age-matched non clinical samples. Objective indexes of sleep depth and quality were not related to subjective reports. Next steps will include expanding the analyses to include additional data and examining these relationships with specific clinical symptoms.
Support (if any): NIGMS COBRE (P20GM139743)

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1219
EXPLORING THE LINK BETWEEN SOCIAL FUNCTIONING AND DEPRESSION REDUCTION IN CBT-I

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Introduction: Cognitive-behavioral therapy for insomnia (CBT-I) effectively treats insomnia and reduces depression symptom severity. However, research elucidating the mechanisms driving depression reduction via CBT-I is still underway. One underexplored mechanism may be social functioning. Prior research has shown that insomnia patients reduce their social activities, likely due to fatigue. As social functioning is important to mood regulation, this may also drive depressed mood. This study investigated whether improvements in social functioning would predict reductions in depressive symptoms.
Methods: Patients with insomnia disorder (N=1321) were randomly assigned to digital CBT-I (dCBT-I, n=905) or a sleep education control (SE, n=416). Depression severity (QIDS) and social functioning (FSS and SNI) were evaluated at baseline and 1-year post-intervention. Social functioning was quantified along three dimensions: 1) relationship strain, 2) quantity of supportive relationships, and 3) frequency of social interactions. Change scores (post-treatment - baseline) were calculated for depression severity and social functioning. Linear regressions determined whether changes in social functioning predicted changes in depression symptom.
Results: Regression analyses revealed that reduced relationship strain (β = -.361, p <.001), increased number of supportive relationships (β =.151, p <.001), and increased frequency of interactions (β =.088, P <.001) following treatment were associated with improved depression symptoms. Furthermore, change in relationship strain was a significant moderator of the antidepressant effect of dCBT-I (β =.262, p <.001); those who had greater reductions in relationship strain following treatment also showed greater improvements in depression.
Conclusion: Results point to improved social functioning following CBT-I as a potentially important factor in the antidepressant effect of insomnia treatment. This effect appears to be strongest with reduced relationship strain. Future research should explore how to optimize CBT-I to enhance social functioning and support, especially for patients with both depression and insomnia.
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1220
SLEEP HEALTH PROFILES OF NIGHT SHIFT NURSES: A LATENT PROFILE ANALYSIS AND ASSOCIATIONS WITH DEPRESSION

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Introduction: Night shift nurses are vulnerable to worse and varied sleep and depression due to the nature of their work schedules. Although sleep and depression are associated in the literature, these associations are understudied in shift workers. This study aimed to identify sleep profiles of night shift nurses and compare them across sleep and depression facets.
Methods: Night shift nurses (N=95, Mage=35.58 years, 88.42% Female) completed measures of insomnia, depression, stress, and circadian preference. They also completed 14 days of daily diaries measuring sleep and depression. Latent Profile Analysis (LPA) was run to identify distinct profiles based on sleep efficiency, duration, quality, and midpoint. One-way analyses of variance (ANOVAs) examined sleep and mental health differences across profiles.
Results: LPA suggested profiles of "less efficient and variable sleepers" (n=34), "later and good quality sleepers" (n=35), and "earlier and highly efficient sleepers" (n=26). "Less efficient and variable sleepers" had the worst sleep efficiency, quality, and duration of the profiles. "Later and good quality sleepers" had better sleep efficiency, highest quality, and latest midpoint. "Earlier and highly efficient sleepers" had the highest sleep efficiency, longest duration, and earliest midpoint. ANOVAs showed significant group differences for depression ($F(2, 1327)=106.10$, $\eta^2=0.14$), perceived stress ($F(2, 1327)=85.26$, $\eta^2=0.11$), circadian preference ($F(2, 1327)=87.01$, $\eta^2=0.25$), variability of sleep midpoint ($F(2, 1327)=169.10$, $\eta^2=0.20$), and variability of depression ($F(2, 1327)=92.35$, $\eta^2=0.12$, all p's <.001). Post-hoc tests revealed "less efficient and variable sleepers" experienced significantly higher depression, stress, and variability of sleep timing and depression than the other profiles (p's <.001). In contrast, "earlier and highly efficient sleepers" had significantly lower depression, lower variability in sleep timing, and earlier circadian preference than the other profiles (p's < 0.05).
Conclusion: Results reveal sleep profiles of night shift nurses with "less efficient and variable sleepers" reporting worst sleep and depression facets. Although they did not differ with "later and good quality sleepers" on circadian preference, the latter group showed later and less variable sleep timing, good sleep quality, and better mental health outcomes. This may suggest the importance of alignment and consistency between one's circadian preference and sleep timing on mental health.
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1221
RESILIENCE MODERATES THE RELATIONSHIP BETWEEN SLEEP DISTURBANCES AND ANXIETY SYMPTOMS IN MILITARY VETERANS

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Introduction: Sleep disturbances are common in military veterans and are associated with heightened anxiety symptoms. Inter-individual differences in resilience, or the ability to cope with and adapt to stress, may influence how sleep disturbances and anxiety symptoms interact, but few studies have examined resilience in relation to objective sleep measures among military veterans. This study investigated resilience as a moderator of the relationship between actigraphy-assessed sleep variables (sleep onset latency, SOL; mean wake episodes per night, MWE; and wake after sleep onset, WASO) and anxiety symptoms in this population.
Methods: Participants were N=68 treatment-seeking veterans with PTSD (74% male) who completed self-report measures of anxiety (Generalized Anxiety Disorder-7; Spitzer et al., 2006) and resilience prior to treatment (Connor-Davidson Resilience Scale; Connor & Davidson, 2003). Objective sleep data were collected for one week using actigraphy. Moderation analyses controlling for age and sex were conducted to examine the relationship between sleep disturbances and anxiety symptoms, including whether resilience moderated these relationships.
Results: The full model predicting anxiety symptoms from resilience, SOL, and resilience x SOL was significant, R^2 =.252, F(5, 62), p=.003. SOL significantly predicted anxiety symptoms at low (-1 SD) resilience levels (b=.08, t=2.29, p=.03), but not at medium or high levels. Similarly, the model examining resilience, MWE, and their interaction on anxiety symptoms was significant, R^2=0.345, F(5,62)=6.521, p <.001, including a positive relationship between MWE and anxiety symptoms at medium resilience levels (b=0.37, t=3.21, p< 0.001), and high resilience levels (b=0.68, t=4.02, p< 0.001), but not at low levels. WASO alone was not a significant predictor of anxiety symptoms, but its interaction with resilience was significant R^2=0.307, F(5,62)=5.483, p< 0.001 in that greater resilience reduced the strength of the association between increased WASO and higher anxiety symptoms (b=0.002, t=2.24, p=0.029).
Conclusion: Findings suggest that higher levels of resilience may buffer against the adverse effects of poor sleep on anxiety symptoms among military veterans. Clinically, interventions targeting resilience may help mitigate impairment associated with both poor sleep and anxiety in PTSD sufferers. As resilience has been operationalized in various ways, future research should explore the precise mechanisms underlying these interactions in veterans.
Support (if any):

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1222

ELECTRICAL VESTIBULAR NERVE STIMULATION (VENS) FOR DEPRESSION AND ITS EFFECT ON INSOMNIA SEVERITY: FINDINGS FROM A RANDOMIZED, SHAM-CONTROLLED TRIAL

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Introduction: The bi-directional relationship between sleep and depression is well reported, with up to 70% of individuals with major depressive disorder (MDD) experiencing insomnia, and pre-existing insomnia doubling the risk of developing depression. The aim was to explore the impact of an electrical vestibular nerve stimulation (VeNS) treatment for depression on insomnia symptoms.
Methods: The study was a double-blind randomised, sham-controlled trial (RCT) that evaluated the efficacy and safety of VeNS on MDD. The study was undertaken in Andhra Pradesh, India (ID: NCT06051864) and included adults (18-80 years) with MDD (Patient Health Questionnaire (PHQ-9) score ≥10) at screening who were on anti-depressant medication (SSRI or SNRI) to treat depression for at least 1 year. Eligible participants who provided written consent, were randomly assigned to receive an active device (n=31) or a sham device (n=31). All participants attended the clinic to complete up to 5 stimulation sessions per week, over a period of 8 weeks, with each session lasting 30 minutes. The primary outcome was change in Beck's Depression Inventory (BDI-II) score from baseline to week 8. A secondary outcome was change in Insomnia Severity Index (ISI) at 8 weeks.
Results: A total of 62 participants (mean age: 43.1±5.0 yrs; 45% female) were recruited with two participants not completing the study. An ITT analysis showed that the active group, compared to the sham group, reported a greater mean reduction in BDI-II scores (-9.0 [95% CI: -10.45, -7.55] vs -2.61 [95% CI: -4.08, -1.14], p< 0.001; respectively) as well as a greater mean reduction in ISI scores (-6.29 [95% CI: -7.27, -5.31] vs. -2.23 [95% CI: -3.40, -1.05], p< 0.001; respectively). Additionally, 61% (n=19) of the active group, compared with 16% (n=6) of the sham group (p< 0.001) achieved a ≥6 point reduction in ISI which is considered clinically meaningful. No adverse events were reported in the active group.
Conclusion: The findings suggest that VeNS not only offers a significant reduction in depressive symptoms but also has a clinically meaningful impact on improving insomnia. This dual benefit highlights VeNS as a potential therapeutic option for adults struggling with both depression and insomnia.
Support (if any):

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1223

SOCIAL DESIRABILITY, SELF-REPORTED SLEEP DISTURBANCE, AND MENTAL HEALTH IN COLLEGE STUDENTS

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Introduction: The validity of self-report measures may be impacted when individuals feel obligated to respond in a way that represents themselves favorably. This is known as social-desirability bias. Prior research has examined social desirability effects on academic achievement reports (e.g., GPA) and financial behavior. However, little research has explored the role of social desirability in self-reported mental health. This study aims to investigate the effect of social desirability on multiple mental health screeners.
Methods: College students (N=1886; Mage=20.54 years, 57% female, 73.80% Caucasian) from two universities completed self-report questionnaires on the following domains: social desirability (SDRS-5), sleep disturbance (ASSQ-SDS), generalized anxiety disorder (GAD-7), major depressive disorder (PHQ-9), and posttraumatic stress disorder (PC-PTSD-5). Multivariate multiple regression was used to examine social desirability on the total scores of the mental health screeners.
Results: The overall multivariate multiple regression model was significant, F(4,1331) = 5.507, p <.001, Wilks' lamba = 0.984. Social desirability predicted symptoms of PTSD (PCL-5, F(1,

1334) = 14.985, p <.001, B = -1.378), generalized anxiety (GAD-7, F(1, 1334) = 16.375, p <.001, B = -.462), and major depression (PHQ-9, F(1, 1334) = 19.461, p <.001, B = -.550), but not sleep disturbance (ASSQ-SDS, F(1, 1334) = 2.549, p =.111, B = -.109).
Conclusion: The results of this study highlight the role that social desirability plays in self-reported sleep disturbance and mental health symptomology. While social desirability significantly predicted lower scores on self-reported mental health symptoms, its effect on sleep disturbances was not statistically significant. This suggests that sleep-related concerns may be perceived differently or are potentially less stigmatized than other mental health concerns. Future research may explore whether the relationship between social desirability and sleep reporting varies based on symptom severity, chronicity, or comorbid mental health concerns.
Support (if any): Pacific-12 Conference Student-Athlete Health and Well-being Initiative Grant

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1224

COMPARING ACTIGRAPHY SCORING PROTOCOLS IN ADOLESCENTS WITH ANXIETY AND RELATED DISORDERS (ARD)

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Introduction: Estimating sleep from actigraphy is a challenge in psychiatric populations where criteria may be susceptible to altered physical activity. Expert-consensus procedures may introduce bias. Alternative scoring protocols may resolve ambiguities, avoid the need for consensus, and increase reproducibility. This study compared two scoring procedures in a treatment-seeking sample of adolescents with ARD.
Methods: Thirty-six adolescents (24 F; ages 13-17yrs [m±sd: 15±1.7yrs]) diagnosed with ARD wore a patch activity monitor on their dominant triceps and completed sleep diaries for 8.7±3.1 nights resulting in 180 unique nights. Sleep was estimated in 1-minute epochs (Sadeh); sleep periods were scored with sleep diaries using two scoring protocols: (1) "3-5" (onset at first of 3 consecutive minutes of sleep; offset at last of 5 consecutive minutes of sleep); and (2) "15-15" (onset at first of 15 consecutive minutes of sleep; offset at last of 15 consecutive minutes of sleep). We tabulated nights requiring group consensus (e.g., ambiguity of sleep within an hour before, or after, the major sleep episode). We examined differences in sleep period time and total sleep time (in minutes) and sleep midpoint, onset, and offset (in decimalized clock-hour) from five randomly selected weeknights.
Results: 15-15 scoring produced fewer nights requiring consensus (70 nights, average: 17% per participant) compared to 3-5 scoring (147 nights, average: 30% per participant). 15-15 scoring reduced estimated sleep period time by 30.2±51.1 minutes (3-5: 543.4±86.2 min; 15-15: 513.2±71.9 min; difference 95%CI: [-46.91, -13.54]; p=.001), but not total sleep time (3-5: 448.7±69.7 min; 15-15: 443.5±66.2 min; difference: -5.2±33.5 minutes [-16.2, 5.8]; p=.39). 15-15 scoring shifted estimated sleep midpoint 0.25±0.4 hours earlier versus the 3-5 rule [3-5: 4.5h±0.7h; 15-15: 4.3h±0.6h; difference 95%CI: [-0.39h,-0.11h], p=.001). The two procedures did not shift estimates (p's>.42) of sleep onset (3-5: 19.6h±4.3h, 15-15: 19.4h±4.6h) or offset (3-5: 7.5h±1.3h, 15:15: 7.4h±1.2h).
Conclusion: The 15-15 scoring protocol reduced ambiguities and the need for consensus compared to the 3-5 protocol in a psychiatric adolescent sample. It affected estimates of sleep period time and sleep midpoint but not total sleep time. These data indicate that alternative scoring may be considered in populations where symptoms may contribute to sedentary activity.
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1225

SLEEPING LESS THAN USUAL IS ASSOCIATED WITH GREATER NEXT DAY DEPRESSION AND NEGATIVE REACTIVITY TO INTERPERSONAL EVENTS AMONG SUICIDAL ADOLESCENTS

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Introduction: Daily changes in sleep can impact emotional functioning and may contribute to depression symptomatology and suicidality. The current study examined daily and longitudinal changes in sleep and next-day depression in a high-risk adolescent and young adult sample with severe psychopathology, and examined whether daily changes in sleep impacted next-day interpersonal affective reactivity.
Methods: Participants (N=198, ages 13-23, 82% White, 76% female) were enrolled in an intensive outpatient treatment program for depression and suicidality. Participants wore an actigraph and completed daily ratings of depression, sleep, and positive and negative reactivity to interpersonal events throughout treatment (M=60 days, SD=22 days). Clinicians rated weekly depression severity. Multilevel models tested changes in sleep and next-day depression and examined daily relationships between total sleep time (TST), next-day depression, and event reactivity. Covariates included age, sex, study day, clinician-rated depression, and weekday/weekend.
Results: Over the course of treatment, self-reported TST increased (b=0.01; SE=0.01; p< 0.001) and depression decreased (b=-0.06; SE=0.02; p=0.02), although actigraphy-assessed TST did not change (b=0.01; SE=0.01; p=0.16). At the daily level, sleeping less than usual was related to worse next-day depression from diaries (b=-0.29; SE=0.13; p=0.02) but not actigraphy (b=-0.19; SE=0.14; p=0.18). There was a significant cross-level interaction, with the effects of TST on next day depression were amplified for participants with greater clinician-rated depression severity for both diary (b=-0.22; SE=0.10; p=0.03) and actigraphy-assessed TST (b=-0.32; SE=0.13; p=0.01). Further, sleeping less than usual was associated with greater next-day negative event reactivity (diary: b=-0.32; SE=0.13; p=0.01|actigraphy: b=-0.81; SE=0.19; p< 0.001), but not positivity event reactivity (diary: b=-0.02; SE=0.13; p=0.83|actigraphy: b=-0.26; SE=0.15; p=0.14).
Conclusion: Sleeping less than usual negatively impacted next-day depressive symptom severity, particularly for individuals with moderate-to-severe depression. Short sleep may perpetuate depression through increased negative reactivity to interpersonal events, although mediation models are needed to test causality.

Notably, self-reported total sleep time increased throughout an intensive treatment program focused on depression and suicidality. Future work is needed to examine whether increases in sleep duration underlie depressive symptom improvement in this high-risk sample, and/or whether targeted interventions to improve sleep may hasten symptom improvement.
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1226
A NOVEL ECG-BASED MACHINE LEARNING PIPELINE FOR SCREENING MAJOR DEPRESSIVE EPISODES IN SLEEP DISORDER PATIENTS

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Introduction: Major Depressive Episodes are a significant global health challenge, often co-occurring with sleep disorders. Accurate and efficient screening for current MDE (cMDE) in patients undergoing evaluation for sleep disturbances could improve diagnostic efficiency and treatment outcomes. Traditional diagnostic methods for cMDE, such as clinical interviews and questionnaires, are resource-intensive and require significant clinical expertise. Advances in machine learning (ML) and physiological data analysis have opened new avenues for leveraging objective signals like ECG to screen for cMDE. Polysomnography routinely captures ECG signals, providing a unique opportunity to explore their potential in identifying autonomic and sleep-related patterns indicative of depressive symptoms. This project aims to investigate the accuracy of a pipeline of ML algorithms that allow screening for cMDE using only ECG as a physiological signal in subjects undergoing in-patient polysomnography.
Methods: 296 subjects from a recently completed prospective, single-arm, non-randomized cohort study have been used to investigate the screening performance of the cMDE determination pipeline compared to the MINI neuropsychiatric interview. All subjects recruited in this study were referred for inpatient polysomnography due to suspected sleep disorders. The cMDE determination pipeline begins with a deep learning algorithm that classifies sleep stages using only the lead-II ECG signal. Subsequently, heart rate (HR) and heart rate variability (HRV) metrics are computed across the identified sleep stages, and macrostructure indices derived from the ECG-based sleep staging are calculated. Finally, HR and HRV metrics and macrostructure indices are combined with the responses to items 1 and 2 of the PHQ-9 questionnaire and used as input for an ML algorithm to perform the final cMDE determination.
Results: The observed sensitivity relative to the MINI cMDE determination was 80.85% (95% CI: 66.74%-90.85%), the specificity was 71.37% (95% CI: 65.31%-76.91%), the positive predictive value was 34.86% (95% CI: 25.99%-44.58%), and the negative predictive value was 95.16% (95% CI: 91.01%-97.76%).
Conclusion: The proposed machine learning pipeline leveraging the ECG as a physiological signal demonstrates promising potential as a screening tool for cMDE in patients undergoing polysomnography for suspected sleep disorders.
Support (if any): Medibio Limited (Savage, MN) sponsored the cost associated with the Sleep Analysis Major Depressive Episode (CIP-0089 SAMDE; NCT 05708222) study.

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1227
A SCREENING ALTERNATIVE FOR DEPRESSIVE EPISODES IN COMISA: A COMPARATIVE EVALUATION OF A NOVEL SOFTWARE COMPARED TO NEUROPSYCHOMETRIC ASSESSMENTS

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Introduction: In recent years, numerous studies have focused on enhancing the understanding of sleep disorders within military, veteran, and civilian populations. Among these, insomnia and obstructive sleep apnea (OSA) have emerged as the two most prevalent sleep disorders affecting both military personnel and civilians. The term COMISA was introduced to describe the co-occurrence of insomnia and OSA, highlighting the significant burden associated with this dual condition. Research has shown that COMISA is associated with more severe mental health challenges compared to insomnia or OSA alone. The aim of this study is to investigate the agreement between the determination for current Major Depressive Episodes (cMDE) made by the MEB-001 software (Medibio Limited) and the MINI's cMDE diagnosis across specific clinical subgroups. These include individuals with suspected insomnia but no confirmed sleep apnea, individuals with confirmed sleep apnea but no suspected insomnia, and those with COMISA.
Methods: This study analyzes data from the recently completed prospective, single-arm, non-randomized cohort study. The subjects recruited in this study were referred for an inpatient polysomnography for suspected sleep disorders.
Results: In a preliminary analysis, in the subgroup of subjects with insomnia but no confirmed sleep apnea (n=55), the observed sensitivity relative to the MINI cMDE determination was 90.91% (95% CI: 58.72%-99.97%), the specificity was 61.36% (95% CI: 45.50%-75.64%), the PPV was 34.17% (95% CI: 9.69%-53.48%), and the NPV was 96.43% (95% CI: 81.65%-99.91%). Instead, in the COMISA sub-group (n=147), the observed sensitivity relative to the MINI cMDE determination was 88.46% (95% CI: 69.85%-97.55%), the specificity was 71.07% (95% CI: 62.13%-78.95%), the PPV was 39.66% (95% CI: 27.05%-53.36%) and the NPV was 96.63% (95% CI: 90.46%-99.30%).
Conclusion: The MEB-001 software demonstrated strong sensitivity and high negative predictive value for detecting current Major Depressive Episodes (cMDE) across clinical subgroups, particularly in individuals with COMISA and insomnia without sleep apnea.
Support (if any): Medibio Limited sponsored the cost associated with the Sleep Analysis Major Depressive Episode (CIP-0089 SAMDE; NCT 05708222) study.

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1228
EFFICACY AND USAGE OF HYPOGLOSSAL NERVE STIMULATION IN PATIENTS WITH COMORBID OBSTRUCTIVE SLEEP APNEA AND POST-TRAUMATIC STRESS DISORDER

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Introduction: Hypoglossal nerve stimulation (HGNS) is an effective treatment for patients with obstructive sleep apnea (OSA)

patients, whose positive airway pressure (PAP) intolerance may be related to comorbidities such as post-traumatic stress disorder (PTSD). We aimed to determine the prevalence of PTSD in our study population and compare efficacy, quality of life, and usage outcomes in patients with and without a history of PTSD after HGNS implantation.

Methods: The ADHERE registry collected data before and after HGNS (Inspire Medical, Golden Valley, MN), including baseline medical and psychiatric comorbidities. Patients were categorized into two groups based on the presence or absence of PTSD at baseline. Patients with comorbidity data and at least one of the following data points at final visit were included: apnea hypopnea index (AHI), Epworth Sleepiness Scale (ESS), nightly therapy usage (NTU), Clinical Global Impression, and patient satisfaction. Two-sided t-tests were used to determine outcome differences between the groups. One sided t-tests with pre-defined non-inferiority margins were used to determine non-inferiority between the groups.

Results: 37 of 2725 patients who completed a final follow-up visit (1.36%) reported a baseline history of PTSD. Patients with PTSD were younger (PTSD: 55.23±12.57; No PTSD: 61.03±10.75) and had a higher BMI (PTSD: 30.66±3.37; No PTSD: 29.15±3.65) than those without PTSD. Average final visit AHI was similar between both groups (PTSD: 15.75±12.06; no PTSD: 16.22±14.84). AHI and ESS reduction from baseline to final visit and the final NTU for patients with PTSD (AHI Reduction: 20.33±15.32, ESS Reduction: 5.74±4.9, NTU: 6.07±2) were non-inferior to those without PTSD (AHI Reduction: 18.84 ±18.44, ESS Reduction: 4.21±5.12, NTU: 5.76±2.24), as the confidence interval for the difference between the groups was within the margin of acceptability (AHI reduction: 7.5; ESS reduction: 2; NTU: 0.5).

Conclusion: Comorbid PTSD/OSA within the ADHERE registry was lower than reported in the medical literature. However, patients with a baseline history of PTSD received significant benefit from HGNS in terms of AHI and ESS reduction; nightly usage for patients with PTSD was non-inferior compared to those without PTSD. HGNS may be a helpful alternative treatment for patients with PTSD who cannot tolerate PAP.

Support (if any):

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1229

PREDICTION OF DEPRESSIVE SYMPTOMS BASED ON SLEEP PATTERNS

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Introduction: Irregular sleep schedules can affect mood and risk of developing symptoms of depression. Particularly, individuals with depression tend to sleep more than usual, which appears to be an attempt to avoid emotional distress. Depression and sleep problems are closely linked, but there is a lack of studies on how specific changes in sleep patterns occur in depression. Receiver operating characteristic analysis was performed to examine whether which sleep parameters can discriminate between the individuals with depression and those with non-depression.

Methods: Participants above 50 years old were recruited at Chosun University Hospital. The Korean Version of the Patient Health Questionnaire-9(PHQ-9) was administered. Actigraphy monitorings were conducted at home, and the following sleep parameters were included: bedtime(BT), wake time, time in bed(TIB), total sleep time, sleep onset latency, sleep efficiency, wake time after sleep onset, and fragmentation index. Participants with the PHQ-9 score ≥ 10 were classified into depression group(DG). Thirteen DG(67.46 ±9.3 years) and 6 non-depression group(NDG)(70.0±6.4years) were finally selected.

Results: The DG had significantly higher scores in the PHQ-9 and MDRS compared to the NDG ($p< 0.01$). There were significant differences in the BT and TIB of sleep parameters between the NDG and DG, showing the DG had earlier BT and longer TIB compared to the NDG ($p< 0.05$). The TIB among the sleep parameters were derived as indicators for discriminating depression ($p=0.04$). The area under the ROC for the TIB was 0.795 (cut-off scores ≥ 9h: 58m, sensitivity= 0.62, specificity=0.83).

Conclusion: We found the changes of sleep habits in individuals with depressive symptoms, including earlier bedtimes and longer time in bed, compared to those without symptoms.In particular, the TIB for individuals with depressive symptoms was more than 2 hours longer and was identified as a predictor of depression, suggesting that longer TIB is a risk factor for depression.

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1230

SLEEP PREDICTS TIME TO SEVERE DEPRESSIVE SYMPTOMS AND SUICIDAL IDEATION IN A LONGITUDINAL STUDY OF ADOLESCENTS

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Introduction: Sleep and depression have bi-directional relationships. While most individuals with major depression have sleep quality complaints, and insomnia/hypersomnia are core symptoms, poor sleep health is a risk factor for the onset of depression. This may be particularly relevant during adolescence, a time of rapid changes in sleep and circadian rhythms coincident with escalating risk for the development of major depression and suicidality.

Methods: We enrolled 197 never-depressed youth in grades 7–9 (ages 11.7–15.9 years old; N=95 Female [F]; N=102 Male [M]) in the Pittsburgh Sleep in Teens Study—a longitudinal study measuring sleep (Sleep Timing Questionnaire), insomnia (Insomnia Severity Index), depression symptoms (Center for Epidemiologic Studies Depression [CES-D] scale), and suicidal ideation (Suicidal Ideation Questionnaire-Junior) every 3 months. Here we report on data through 1.5 years of follow-up. Survival analyses were used to predict time to severe depressive

symptoms (CES-D>23 with the sleep item removed) and time to endorsing suicidal ideation with Cox proportional hazard models, adjusting for sex and summer/school year.
Results: Over the 1.5 year follow-up, 19% (27% F; 11% M) developed severe depressive symptoms (CES-D>23), 17% (19% F; 15% M) developed suicidal ideation, and 36% (45% F; 28% M) developed elevated insomnia symptoms (ISI>8). Shorter sleep duration (Hazard Ratio [HR]=0.61 [95% CI: 0.48; 0.77]; p< 0.001), lower sleep efficiency (HR=3.12 [2.05; 4.74]; p< 0.001), longer sleep onset latency (HR=4.14 [2.15; 7.99; p< 0.001), and more insomnia (HR=1.39 [1.29; 1.51]; p< 0.001) were all robust predictors of time to severe depression. Shorter sleep duration (HR=0.65 [0.49; 0.86]; p=0.002), lower sleep efficiency (HR=2.39 [1.52; 3.76]; p< 0.001), longer sleep onset latency (HR=3.44 [1.56; 7.61]; p=0.002), and more insomnia (HR=1.12 [1.03; 1.21]; p=0.005) also predicted time to first occurrence of suicidal ideation. Sleep timing (midsleep) did not predict time to depression (p=0.12) or suicidal ideation (p=0.75).
Conclusion: Multiple sleep health dimensions were associated with the risk of developing severe depressive symptoms and suicidal ideation over 1.5 years in a sample of never-depressed adolescents. Trials testing preventative interventions are needed to see if risk for depression and suicidal thoughts can be ameliorated during this high-risk developmental period.
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1231
SLEEP MEASURES BEFORE AND AFTER TREATMENT IN PSYCHIATRIC POPULATIONS

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Introduction: Sleep problems are prevalent in psychiatric populations, and may serve as a marker or mediator of disease severity. However, systematic measurements of subjective and objective sleep parameters are lacking in this population. We hypothesize that patients under treatment for psychiatric conditions would (1) exhibit a high prevalence of poor sleep quality at baseline, (2) show improvement in sleep over the course of treatment, and (3) exhibit associations between changes in sleep quality and psychiatric symptom severity.
Methods: We collected longitudinal subjective and objective (wrist actigraphy) measures of sleep in patients at the Johns Hopkins Intensive Outpatient Program for Adults (IOPA), which provides acute intensive treatment for patients with psychiatric disorders. From May 2018 until February 2020, we recruited consecutive IOPA patients. Depression, Anxiety and Stress Scale-21 (DASS-21) and actigraphy were collected at the first (baseline) and final two weeks of treatment. Sleep was estimated from actigraphy with Tudor-Locke and Cole-Kripke algorithms. By examining the distribution of sleep periods as a function of time of day, we summarized sleep timing and duration and examined their association with DASS-21 scores at both timepoints and change before and after intervention.
Results: Of 38 consented patients, complete data was available in 27 (Female:Male; 14:13; 42±15 yo) {mean±std}. At baseline, scores of depression (20.2±7.7), anxiety (12.9±7.7) and stress (19.3±9.4) fell at treatment completion, by ({mean±std/p-value}: 5.6±10.6/0.01; 3.5±6.4/0.01; 3.4±8.5/0.05, respectively). At baseline, self reported measures of sleep differed with objective measures by 22.3±109.4 minutes. DASS scores were associated with later median sleep onset time ({rho/p-value}: 0.48/0.01; 0.39/0.04; 0.43/0.02, respectively). Increased depression scores were associated with lesser sleep efficiency (-0.40/0.04) and greater movement index (0.43/0.03). PrePost reductions in DASS delta depression was associated with increased delta total sleep time (TST) (0.43/0.03). Delta stress associated with an increase in delta TST and time in bed (0.42/0.03; 0.42/0.03).
Conclusion: The IOPA is an acute intensive program treating severe psychiatric symptoms. Improvements in symptoms and sleep duration and timing have been demonstrated in these patients. Improvements in sleep may mediate psychiatric symptom improvements.
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1232
THE LACK OF CORRELATION BETWEEN POLYSOMNOGRAPHIC AND SELF-REPORTED MEASURES OF SLEEP DISTURBANCE IN PATIENTS WITH HISTORY OF DEPRESSION

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Introduction: Depression is associated with poor subjective sleep on Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI), and with polysomnographic (PSG) sleep disturbances. However, how physiological variables relate to self-reported sleep remains unclear. This analysis compares PSG and self-reported sleep measures between patients with vs. without depression history, and correlates self-reported and PSG measures.
Methods: From 1666 consecutive clinical baseline adult PSG studies, 201 patients were selected who had ≥120 minutes of total sleep time (TST), AHI< 5.0, no history of shift work or significant pain, neurological, cardiac, pulmonary, endocrine and psychiatric diagnoses, except depression (with or without anxiety). Only 18 patients (10 women, 16 white) with depression met other inclusion criteria; 17 of them were taking various mood stabilizers. MANCOVA, with sex, age and BMI covariates, was used to compare patients with vs. without depression history on PSQI, ISI, Center for Epidemiological Studies Depressions Scale Revised (CESDR), TST, N1%, N3%, REM%, SL, REM latency (REMLat) sleep efficiency (SE), WASO, number of awakenings (AW) and total arousal index (TAI). PSG variables showing between-group differences were used to predict ISI and PSQI in multiple regression models.
Results: Depression group had higher CESDR (M[Depression]=28.8±16.6 vs. M[No-Deprression]=12.7±10.6, p< 0.001), ISI (M[Deprression]=17.4±6.1 vs. M[No-Deprression]=12.1±6.4, p=0.001), PSQI (M[Deprression]=11.4±4.8 vs. M[No-Deprression]=8.7±3.7, p=0.009), more frequent AW (M[Deprression]=32.7±23.2 vs. M[No-Deprression]=28.0±12.0, p=0.02) and TAI (M[Deprression]=29.5±19.1 vs. M[No-Deprression]=22.4±12.7, p=0.01), lower N3% (M[Deprression]=14.1±9.1 vs. M[No-Deprression]=19.6±6.4, p< 0.001), longer REMLat (M[Deprression]=164.6±110.3 vs. M[No-Deprression]=107.7±62.3, p=0.006) and marginally longer SL

(M[Deprression]=47.9±38.6 vs. M[No-Deprression]=29.9±32.2, p=0.055). In multiple regressions, no PSG variables predicted ISI or PSQI in either group or in both groups combined (all p values >0.09).
Conclusion: This small sample of depressed patients without major medical or psychiatric comorbidities evidenced both subjective and objective sleep disturbance, in comparison with non-depressed patients. However, PSG variables do not appear to account for subjective sleep disturbance as measured by ISI and PSQI. These results suggest a complex relationship between depression and different measures of sleep. Effect of depression on subjective sleep may be mediated by factors other than PSG variables, including antidepressant use and daytime symptoms.
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1233
THE RELATIONSHIP BETWEEN OSA AND DEPRESSIVE SYMPTOMATOLOGY MAY DEPEND ON THE HISTORY OF DEPRESSION

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Introduction: Depression has been associated with OSA, and causal effects of apnea-related sleep fragmentation and hypoxemia on mood have been proposed. However, the nature of the relationship remains unclear and may be modulated by demographic variables. This study related mood and polysomnographic (PSG) measures in patients undergoing OSA evaluation.
Methods: From 1676 consecutive clinical baseline PSG studies, we excluded those with < 120 minutes of total sleep time (TST), history of shift work, significant pain, neurological, cardiac, pulmonary, endocrine and psychiatric diagnoses other than depression with or without anxiety. The sample included 36 patients with depression (20 women, 27 white, M[age]=45.6±15.3, 34 taking antidepressants), and 546 without depression/anxiety (297 women, 173 white, M[age]=48.7±15.7). A logistic regression was used to predict the presence of depression from OSA diagnosis (AHI≥5/hr), with sex, age and BMI covariates. In a general linear model (GLM), the score on the Center for Epidemiological Studies Depressions Scale Revised (CESDR) was predicted from AHI, SpO2% nadir, time below SpO90%, TST, sleep efficiency, sleep latency, REM latency, awakenings, wake after sleep onset, total arousal index, N1%, N3%, REM%, OSA, and OSA-by-depression interaction.
Results: In the logistic regression, depression was significantly predicted by OSA alone (p=0.03), but not after the demographic covariates were introduced (p=0.32). In the GLM, no PSG variables predicted CESDR; however, the OSA-by-depression interaction was significant (p< 0.001). Among patients without depression, the presence of OSA was associated with marginally lower CESDR (M[OSA]=10.9±11.1 vs. M[No-OSA]=12.7±10.4, p=0.065). In patients with depression, CESDR scores were not related to OSA (M[OSA]=25.8±12.8 vs. M[No-OSA]=24.6±16.6, p=0.82). Mean group AHI and CESDR scores were, respectively, AHI: M[Depression]=8.63±11.9 vs. M[No-depression]=15.0±20.6 (n.s.), CESDR: M[Depression]=25.9±15.1 vs. M[No-depression]=11.6±10.8 (p< 0.001).
Conclusion: In this sample of patients without significant comorbid conditions, history of depression did not relate the presence or severity of OSA after controlling for demographic variables. The relationship between OSA and CESDR appeared to be modulated by depression. Patients without depression had a tendency towards lower CESDR scores when OSA was present. In patients with depression, CESDR scores were nearly identical with or without OSA. Antidepressant use may have masked the OSA-CESDR relationship.
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1234
RELATIONSHIP BETWEEN PAIN AND DEPRESSIVE SYMPTOMATOLOGY IN OSA PATIENTS IS MODULATED BY THE CLINICAL HISTORY OF DEPRESSION

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Introduction: Prior studies reported altered pain perception in OSA, possibly due sleep fragmentation and hypoxemia. Additionally, OSA may impact mood, which also relates to pain perception. This study examined effects of polysomnographic (PSG) and mood variables on pain reports in patients evaluated for OSA.
Methods: Clinical histories of 1676 adults undergoing consecutive baseline PSG studies were used to exclude patients with chronic pain, neurological, cardiac, pulmonary, endocrine, psychiatric conditions other than depression (with or without anxiety), shift work and < 120 minutes of total sleep time (TST). Remaining sample included 546 patients without depression (297 women, 173 white, M[age]=48.7±15.7) and 36 with depression (20 women, 27 white, M[age]=45.6±15.3, 34 taking antidepressants). A general linear model, with sex, age and BMI covariates, predicted self-reported pain intensity over the preceding 6 months (PI, 0-10 scale) from TST, sleep latency, sleep efficiency, REM latency, awakenings, wake after sleep onset, arousal index, N1%, N3%, REM%, AHI, SpO2% nadir, time below SpO90%, OSA(AHI≥5/hr), Center for Epidemiological Studies Depressions Scale Revised (CESDR) score, and interactions: OSA-by-depression, OSA-by-CESDR and depression-by-CESDR.
Results: PI was associated with CESDR (p=0.013); however, the depression-by-CESDR interaction was significant (p=0.008). In patients without depression, CESDR predicted PI (p< 0.001, R2=11%). Patients with the history of depression showed no PI-CESDR relationship (p=0.8, R2< 0.01%). PI was not significantly related to any PSG variables. Mean group PI, CESDR and AHI values were, respectively, PI: M[Depression]=1.9±2.6 vs. M[No-depression]=2.5±2.7 (n.s.), CESDR: M[Depression]=25.9±15.1 vs. M[No-depression]=11.6±10.8 (p< 0.001); AHI: M[Depression]=8.63±11.9 vs. M[No-depression]=15.0±20.6 (n.s.).
Conclusion: Depressive symptoms and pain intensity were directly related only in patients without clinical history depression. The use of antidepressant medications in patients with depression may alter the relationship between CESDR and pain. As PSG measures of OSA and sleep architecture were unrelated to reports of pain in this sample, the possibility of a mediating role of depressive symptoms in the relationship between OSA and pain may be explored in the future.
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1235

DIFFERENCES IN SLEEP SCHEDULING IN VETERANS WITH PTSD AND HIGH VERSUS LOW RISK FOR SUICIDE

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Introduction: Sleep disturbances confer excess risk for suicidal ideation and behavior. This raises the question of whether long-term sleep monitoring with internet-enabled "non-wearable" devices imposing little burden might aid surveillance programs designed to promote timely interventions. Here we report proof-of-concept and preliminary group level data.
Methods: High-risk participants were identified using lists maintained by the Department of Veterans Affairs (REACH VET and HRS-PRF), maintained to facilitate surveillance for suicidality and other adverse outcomes. Both High- and Low-Risk participants were also diagnosed with PTSD per the EHR. Recruitment proceeded through treating clinicians. Consenting participants were mailed a piezoelectric, mattress-top sensor (RestOn Smart Sleep Monitor Model Z400T), a tablet computer, cables, and instructions. Participants were coached over the phone to connect the tablet computer to the internet after which staff used a remote-control utility to complete installation. Raw actigraphic data were automatically transferred daily to a cloud site from where they were downloaded, processed, and reviewed. Participants underwent weekly telephone assessments for one (Low Risk) or two (High Risk) months tracking suicidal ideation and sleep-related behaviors.
Results: The following results contrasted 54 High-Risk Veterans and 21 Low-Risk Veterans. Demographic and psychometric distinctions between the groups were minor except for the presence of comorbid MDD (72% vs 14%), suicidal symptoms (DSI-SI: 8.3 vs 4.9) and cognitions (SCSS: 15.2 vs 10.6), all higher in the High-Risk group. High-Risk participants went to bed at 21:51, more than one hour earlier than Low-Risk participants (23:02, $t(50) = -2.59$, $p = 0.013$). The groups did not differ on out-of-bed time (07:12 vs 07:57, $t(30) = -1.02$, $p = 0.32$). In-bed time variability, quantified as RMSSD within assessment weeks, did not distinguish the groups (108 versus 105 minutes, $t(21) = 0.11$, $p = 0.92$); however, out-of-bed time RMSSD was larger in the High-Risk group (118 versus 84 minutes, $t(47) = 2.37$, $p = 0.022$).
Conclusion: In contrast to the Romier meta-analysis finding reduced TST in suicidality, we observed earlier bedtimes and more variable arousal times. The former is compatible with social withdrawal. The latter is compatible with prior findings of Bernert.
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1236

IMPACT OF MEDICATION USE ON REM SLEEP WITHOUT ATONIA: DIFFERENTIATING MEDICATION EFFECT FROM DEPRESSION DIAGNOSIS

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Introduction: REM Sleep without Atonia (RSWA) is the polysomnographic biomarker of REM Sleep Behavior Disorder (RBD). RSWA is associated with serotonergic (SSRIs/SNRIs) antidepressants (ADs). The effects of other ADs and depression on RSWA are unknown. We analyzed the relationship between AD use and RSWA by depression diagnosis status aiming to determine whether RSWA is influenced by the diagnosis of depression, serotonergic agents, or ADs in general.
Methods: Polysomnograms at Cleveland Clinic (September 2018-October 2024) with >10% REM sleep and RSWA scoring by chin and flexor digitorum superficialis signals were included. Cases were categorized by depression status (yes=923; no=564), then stratified by AD use including any AD (SSRIs-386, SNRIs-181, bupropion-145, trazodone-117, tricyclic AD-60, mirtazapine-29), serotonergic (SSRI/SNRI), non-serotonergic (bupropion-n=145, mirtazapine-n=), and AD-free (n=653), and finally by gender. RSWA was quantified by AASM V2.6 criteria. Wilcoxon rank sum tests compared RSWA% between depression and medication status groups. Results are shown as median (IQR).
Results: A total of 1,487 were included: mean age 52.9±16.7, 47.2% female. Depression (vs no depression) was predominantly present in females (56.7% vs. 31.7%, $p< 0.001$) but had similar RSWA% (3.9[0.5, 14.6] vs 4.2[0.0, 18.0], $p=0.72$). RSWA% was 6.3[1.1,19.2], 6.7[1.3, 18.3], 0.7[0.0, 6.3], and 2.9[0.0, 11.4] in any AD, serotonergic, non-serotonergic, and drug free AD groups, respectively ($p< 0.001$). Serotonergic and AD-free groups without depression had higher RSWA% than those with depression (11.8[3.4, 31.5]/3.2[0.0, 14] vs 7.4[1.5, 20]/2.5[0.0, 9.4], $p=0.04$/$p=0.038$). For serotonergic ADs, this relationship was present only in women. RSWA did not differ in the any AD and non-serotonergic group by depression status ($p=0.56$).
Conclusion: RSWA is influenced by AD use rather than depression itself. Serotonergic agents are associated with higher RSWA% than non-serotonergic ADs, particularly in patients without depression. A possible explanation is that RSWA may be mediated by serotonin, as patients without depression, and thus without serotonergic depletion, appear more sensitive to the effects of serotonergic ADs. Our findings support the use of non-serotonergic agents over serotonergic agents, if clinically appropriate in populations at risk for RBD and α-synucleinopathies. This work has important implications on quantification of RSWA for the diagnosis of RBD.
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1237

THE ROLE OF INTERINDIVIDUAL SLEEP VARIABILITY AND SLEEP STAGES IN PRODROMAL PSYCHOSIS SYMPTOMS

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Introduction: Changes in sleep architecture have been noted as a key aspect of the pathophysiology of schizophrenia, early psychosis and At Risk Mental States (ARMS). We aimed to assess the association between sleep metrics and prodromal psychosis symptoms.

Methods: This investigation utilized two-year follow up data (M age = 11.96) from the Adolescent Brain Cognitive Development (ABCD) Study, a longitudinal study examining brain development and health of children from ages 9-19. The sample was composed of participants (n = 5808, 48.79% female) who completed Fitbit sleep tracking and the Prodromal Psychosis Scale (PBQ).
Results: Linear regression analyses indicated that higher sleep variability across the study period was associated with an increased symptom count ($\beta = 0.12$, $p < 0.001$) and symptom severity ($\beta = 0.12$, $p < 0.001$). Lower average weekend sleep duration was linked to greater symptom count ($\beta = -0.09$, $p = 0.0385$). Greater awakenings and more time spent in light sleep were negatively associated with symptom count (awakenings: $\beta = -0.08$, $p < 0.001$; light sleep: $\beta = -0.08$, $p < 0.001$) and severity (awakenings: $\beta = -0.08$, $p < 0.001$; light sleep: $\beta = -0.05$, $p = 0.003$). Weekend sleep duration magnified the impact of sleep variability on psychosis symptoms ($\beta = 0.05$, $p = 0.0342$). Significant interactions were observed between awakenings, light sleep, and deep sleep. No additional significant associations were identified between other sleep stages and prodromal symptoms.
Conclusion: These findings highlight the importance of sleep consistency and adequacy in mitigating psychotic symptomatology. Although the examination of sleep stages in relation to prodromal symptoms is limited by methodology, it is possible that associations between sleep stages and psychosis may become more pronounced in older adolescents as the propensity for psychosis increases. Further research is needed to explore the long-term impact of sleep disruptions on psychotic symptom progression and to consider interventions for youth with an ARMS targeting sleep consistency.
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1238

THE DYNAMIC INTERPLAY BETWEEN UNDERGRADUATES' ECONOMIC STRESSORS AND SLEEP CAPTURED THROUGH MULTI-NIGHT AMBULATORY SLEEP EEG

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Introduction: With 43% of college students obtaining less than the recommended 7-9 hours of nightly sleep and with over 75% reporting feeling tired/sleepy across the week (ACHA, 2023), this population is at significant risk for mental health, physical, and academic problems (Gaultney, 2010). These risks are exacerbated for students experiencing stress due to socio-economic challenges, which has been shown to impact both their sleep and mental health (Peltz et al., 2021). Research has tended to focus 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 build on prior research (e.g., Pesonen et al., 2021) and address this gap, this study used ambulatory sleep EEG to examine the dynamic links between college students' experiences of economic strain/stress, their sleep architecture, and self-reported sleep quality.
Methods: The sample's (N=157, 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 29.3% were considered first-generation students, and 68.8% maintained part/full-time employment while attending school. Baseline measures included economic strain, anxiety symptoms, and demographic controls. Sleep architecture was assessed with the Muse S (Interaxon, Inc.) across 10 consecutive nights, which measured, in addition to sleep stages, sleep onset latency and total sleep time (TST). Sleep quality was self-reported each morning through an online sleep diary.
Results: Multilevel structural equation modeling was conducted in Mplus (v. 8.8, Muthen & Muthen, 2022) and demonstrated two significant mediational pathways. Controlling for other effects in the model, higher economic strain was associated with less N3 sleep, which, in turn, predicted lower sleep quality. Furthermore, first-generation status predicted lower TST, and nightly decreases in TST were associated with corresponding decreases in sleep quality.
Conclusion: Our results highlight the negative impact of economic stress and first-generation status on undergraduates' sleep architecture and resulting sleep quality. This study underscores the negative impact of socio-economic stressors on undergraduates' sleep and introduces critical opportunities for interventions.
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1239

LONGITUDINAL STUDY OF ATTENTION DEFICIT AND HYPERACTIVITY DISORDER (ADHD) IN THE US ADULT GENERAL POPULATION

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Introduction: Attention Deficit and Hyperactivity Disorder (ADHD) is becoming more acknowledged as a common problem among adults, garnering greater interest from researchers lately. The consequences of undiagnosed or untreated ADHD in adults can be significant. Numerous individuals face challenges in their work and everyday activities, resulting in increased stress. This, in turn, can cause sleep issues, making it harder to maintain concentration.
Methods: The initial study involved 15,929 participants across 15 US States. The longitudinal research took place in eight of the most densely populated states. During the first wave of interviews (W1), 12,218 subjects were contacted via phone, and 10,930 returned for the follow-up interview (W2) three years later. Analyses focused solely on those who participated in both W1 and W2 (N=10,930). ADHD was identified using DSM-5 criteria.
Results: At W1, 5.7% of participants met the ADHD criteria, but this percentage fell to 4.5% at W2. The disorder was more common in men than in women (6.6% compared to 5.0%; $p< 0.001$), and the rates decreased among individuals aged 55 and older (6.2% to 7.8% for those under 55, 5.3% for those aged 55 to 64, and 2.6% for those 65 and above; $p< 0.001$). ADHD was persistent in 47.4% of the cases across both interviews. After adjusting for age and gender, and controlling for the presence of a mental disorder and sleep duration, ADHD continued to be a strong indicator for insomnia symptoms (AOR: 1.69; 95% C.I.: 1.4-2.0), severe fatigue (AOR: 2.97; 95% C.I.: 2.2-4.0), and significant daytime sleepiness (AOR: 2.45; 95% C.I.: 1.9-3.2). At

W2, a sleep duration of less than 7 hours (AOR: 1.66; 95% C.I.: 1.2-2.3), trouble falling asleep (AOR: 3.41; 95% C.I.: 2.0-5.8), and moderate (AOR: 3.39; 95% C.I.: 2.0-5.7) or severe fatigue (AOR: 4.5; 95% C.I.: 2.6-7.9) at the initial interview were predictors of ADHD incidence.
Conclusion: The rate of ADHD in adults within the general population started at 5.7%, but this figure declined over three years. There is a significant link to sleep issues, as it can predict insomnia, fatigue, and significant sleepiness, and is also related to reduced sleep duration.
Support (if any):

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1240

DECREASED SLEEP SPINDLE DENSITY IS ASSOCIATED WITH SUICIDALITY IN YOUNG ADULTS: THE PENN STATE CHILD COHORT

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Introduction: Sleep spindle deficits have been observed in different forms of psychopathology. Young adulthood is a developmental stage associated with increased rates of psychopathology and suicidality. Whether deficits in sleep spindle density (SSD) are associated with increased suicidality in young adults remains unknown.
Methods: A total of 246 participants from the Penn State Child Cohort, a population-based sample, underwent 9-hour in-lab polysomnography in young adulthood (age range 20-30y; 52% female, 24% racial/ethnic minority). We extracted SSD during N2 using MSS software. Suicidality was assessed via five items tapping lifetime, past-6-months, past-month and past-week suicidal attempts and/or ideation (SAI). Logistic regression models tested the association of SSD with SAI in young adulthood, while adjusting for sex, age, race/ethnicity, insomnia symptoms, body mass, apnea/hypopnea and periodic limb movements indices as well as prior SAI in childhood (age range 5-12y).
Results: SSD was negatively associated with SAI (OR=0.76, 95%CI=0.59-0.98, p=0.033). Young adults with less than 4 spindles per minute during N2 were associated with a 2.69-fold (95%CI=1.09-6.66) increased odds of SAI (p=0.033) than those with 4 spindles or more per minute.
Conclusion: Our data provide evidence linking deficits in spindle density with suicidality in young adults. Future studies should examine whether abnormal developmental declines in SSD drive the observed association with increased suicidality in young adulthood.
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1241

EXPLORING THE RELATIONSHIP BETWEEN NARCOLEPSY AND CANNABIS USE DISORDER

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Introduction: The human sleep cycle consists of four stages—three NREM phases and one REM phase—regulated by neuromodulators, many acting on the lateral hypothalamus. Disruptions to this cycle can result in sleep disorders, including narcolepsy. Narcolepsy is a chronic disorder affecting sleep-wake cycle control, causing excessive daytime sleepiness and other symptoms. It is categorized into two types: Type 1, associated with cataplexy and decreased hypocretin (a hypothalamic neuromodulator), and Type 2, which lacks these features. Diagnosis typically involves clinical history and sleep studies. Cannabis, known for its psychoactive component THC, can also disrupt sleep. This meta-analysis evaluates the relationship between cannabis use disorder and narcolepsy, aiming to contribute to the existing body of literature.
Methods: A comprehensive PubMed search yielded 13 studies on cannabis use and narcolepsy. Only one examined adult cannabis use and hypersomnia using urine toxicology and sleep studies. A similar pediatric study was identified via Google Scholar. Additional literature on excessive daytime sleepiness, the hypocretin pathway, the endocannabinoid pathway, and cannabis use was also reviewed.
Results: Though literature is limited, this analysis highlights a relationship between cannabis use and narcolepsy. Endogenous cannabinoids, which act on the same receptors as those in cannabis, inhibit hypocretin-secreting neurons, reducing arousal and increasing sedation. The frequency and severity of cannabis use influenced symptom severity and disrupted sleep phases. Studies noted THC's sedating effects and CBD's wakefulness-promoting effects. Retrospective studies on adults and pediatric patients revealed narcolepsy-consistent sleep study results in THC-positive individuals.
Conclusion: Cannabis use can complicate clinical history and sleep study interpretations, impacting the sleep cycle and associated neuronal pathways. These findings underscore a relationship between cannabis use disorder and narcolepsy, emphasizing the need for a patient-centered approach in evaluation and management to account for this potential confounder.
Support (if any):

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1242

SLEEP DURATION AND ABSTINENCE IN PATIENTS UNDERGOING METHADONE MAINTENANCE THERAPY OVER A 5-WEEK PERIOD

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Introduction: Poor sleep is a risk factor for relapse in patients undergoing methadone maintenance therapy (MMT) for opioid use disorder (OUD). The aim of this pilot study was to examine the relationship between habitual sleep duration and opioid use over a 5-week period in MMT patients at the Institutes for Behavior Resources (IBR) Recovery Enhanced by Access to Comprehensive Healthcare (REACH) out-patient clinic in Baltimore, Maryland.
Methods: N=19 opioid-dependent patients MMT wore MotionLogger actigraphs (AMI) continuously and provided a weekly urine sample for up to five weeks. Patients were split between those who tested positive for opioids at least once during the study period (Test+) and those who consistently tested negative (Test-). Changes in weekly average total sleep time (TST) and changes in average TST between the first and last two weeks

of the study were compared between Test- and Test+ groups using paired samples t-tests and analysis of variance (ANOVA).
Results: Patients' average TST over the course of the entire study period was less than 5 hours per 24-hour period (292±81 minutes). However, TST increased an average of 23±106 min per 24-hour period between the first 2 weeks of the study period (273±118 min) and the final 2 weeks of the study period (297±78 min) across all patients. Patients were unevenly split between Test+ (n=6) and Test- (n=13) groups. Test- patients had longer TST than Test+ patients during the first two weeks of the study (288±125 min vs. 243±104 min), the final two weeks of the study (299±71 min vs. 292±100 min), and across all study days (298±80 min vs. 279±89 min). Test+ patients had a greater increase in TST over time (49±25 min) than Test- patients (11±34 min).
Conclusion: These data suggest that abstinence from opioid use may be related to habitual sleep duration at intake for MMT patients and that time in treatment may be related to increased sleep duration, particularly for individuals with worse sleep at intake. A larger study population and a longer observation period is needed in order to confirm the relationship between sleep duration and treatment outcomes.
Support (if any): N/A

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1243
SLEEP OF CAREGIVING FAMILY MEMBERS FOR ADULTS WITH SERIOUS MENTAL ILLNESS

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Introduction: Inadequate sleep is common concern among caregivers. Evidence is drawn mostly from caregivers of patients with dementia and physical ailments. However, research into sleep impairment among familial caregivers of patients with serious mental illness (SMI) is based on data from fewer than 150 participants and suggests high rates of sleep impairment. Sleep is important for caregivers as it is linked to both physical and mental health. Poor sleep contributes to diminished resources for coping with stress, low mood, and decreased wellbeing, which may exacerbate burdens caregivers are already facing. Existing interventions for sleep health may not address the unique challenges that caregivers of family with SMI experience. The current study aims to describe sleep difficulties among caregivers of family with SMI with the goal of informing development of a targeted sleep health intervention.
Methods: We conducted qualitative focus groups with 38 caregivers of an adult family member with SMI (92% women, 87% White, mean age=62 years). Participants also completed the Insomnia Severity Index (ISI), PROMIS Sleep Disturbance (PROMIS-SD), PROMIS Sleep-Related Impairment (PROMIS-SRI), Patient Health Questionnaire-4 (PHQ-4), Burden Scale for Family Caregivers- Short Version (BSFC), and measures describing their caregiving experience.
Results: Caregivers provided care most commonly for a family member with schizophrenia, schizoaffective disorder, bipolar disorder, anxiety, and/or depression. Caregivers cared for an adult offspring (81.6%), sibling (7.9%), spouse/partner (7.9%), or parent (2.6%). Mean insomnia severity (ISI) was 11.3 (SD=4.8), mean PROMIS-SD was 52.7 (SD=3.8), mean PROMIS-SRI was 56.6 (SD=7.0), and mean PHQ-4 was 4.8, SD=3.5). 28% reported waking up during the night to provide care more than once a week. Caregiver burden was high (mean BSFC=20.8, SD=4.6). One theme that emerged was waking up with a racing mind about concerns related to caregiving during the night.
Conclusion: Caregivers for SMI experience high degrees of burden and at least mild degrees of sleep difficulties and impairment due to caregiving. Data suggest caregivers of SMI might benefit from a targeted intervention to improve their sleep.
Support (if any): Stanford University Department of Psychiatry and Behavioral Sciences, Dolores Gallagher-Thompson & Larry Wolford Thompson Caregiver Research and Practice Fund and T32MH019938

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1244
ARE DYSMENORRHEA, SLEEP DURATION AND DEPRESSION ASSOCIATED WITH MISCARRIAGE? A CROSS-SECTIONAL STUDY FROM EPISONO

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Introduction: Being pregnant has been a challenge for many women. Almost 30% of the pregnancies end in miscarriage. It became prevalent in our society, and, regardless of the chromosomal abnormalities, it might be impacted by lifestyle, gynecological dysfunctions and sleep restriction. Our study aimed to identify the association of miscarriage occurrence with sleep duration, and dysmenorrhea and depression symptoms in women.
Methods: A total of 283 women participants of the epidemiological sleep study (EPISONO) from São Paulo city, Brazil, were included in this study. They responded to an institutional women questionnaire to obtain information about miscarriage occurrence and dysmenorrhea symptoms. To evaluate depression symptoms, the participants responded to the Beck Depression Inventory and underwent a full-night polysomnography exam to assess the sleep duration and wake after sleep onset (WASO). For evaluation of the sleep quality, participants responded to Pittsburgh Sleep Quality Index (PSQI).
Results: Considering the occurrence of miscarriage (yes or no) as the dependent variable, the results of the binary logistic regression model revealed that the following factors exhibited statistically significant association with miscarriage: age (OR=1.10; 95%CI=1.062-1.154; p< 0.001), dysmenorrhea (OR=1.83; 95%CI=1.009-3.340; p=0.047), total sleep time (OR=1.004; 95%CI=1.000-1.008; p=0.028), and moderate depression symptoms (OR=5.74; 95%CI=1.889-17.447; p=0.002). No statistically significant associations were observed in relation to body mass index, WASO and PSQI scores.
Conclusion: Our findings suggest that women who are trying to become pregnant should be screened in relation to sleep, and depression and dysmenorrhea symptoms to increase the risk of success in pregnancy attempts.
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1245

RISK IN TOBACCO CONSUMPTION IS AFFECTED BY WORK AND SLEEP VARIABLES: A CROSS-SECTIONAL EPIDEMIOLOGICAL STUDY

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Introduction: Substance misuse may lead to adverse developments in the health of the individual and constitutes a critical concern for health services and an elusive matter in the scientific community. Sleep and workplace environment variables have been assessed previously as contributing factors, but investigations covering both at the same time are still scarce. Therefore, we aimed at evaluating how sleep and workplace modulate risk in the consumption of substances.
Methods: 1,042 volunteers from the EPISONO 2007, a large-scale epidemiological study mapping sleep in dwellers from São Paulo, Brazil were included. Volunteers answered questionnaires evaluating their general health and underwent a full-night polysomnographic exam. We assessed how the score of the ASSIST questionnaire, used to gauge risk in the use of substances, was connected to variables concerning work and sleep conditions. These variables covered subjective and objective sleep, as well as questions about work characteristics, including working hours, number of jobs, amount of physical and mental effort, demand for precision of movements and working positions.
Results: Analyses focused in tobacco, cocaine and cannabis data. More time awake after sleep onset (WASO) was significantly associated with a rise of 0.054 in the ASSIST score for cocaine risk. Lower demand of movement precision in the job was significantly associated with augmented risk in the consumption of cannabis in 0.849. Greater total sleep time and necessity of more physical effort in the job were significantly associated, respectively, with a 0.014 and 1.786 increase in ASSIST score for tobacco risk.
Conclusion: We identified a concomitant effect of both sleep and work variables on risk in tobacco consumption, emphasizing the importance of a multifactorial approach when addressing use of this substance. It was found that poor sleep participates in the risk for cocaine usage and how work characteristic may affect risk for cannabis. These results reinforce the need for expansion in research in this area, contributing to the understanding on the network connecting work, sleep and substance use.
Support (if any): Our studies are supported by grants from the Associacão Fundo de Incentivo à Pesquisa (AFIP). JCFG, ST and MLA are Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) fellowship recipients.

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1246

DAILY ALCOHOL USE MODERATES THE DAILY RELATIONSHIP BETWEEN FATIGUE AND SLEEP AMONG HEAVY-DRINKING VETERANS

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Introduction: Compared to the civilian population, Veterans often report higher levels of fatigue and sleep disturbances, which are frequently accompanied by self-medication with alcohol. However, the daily bidirectional dynamics between sleep and fatigue in the context of substance use remain underexplored. This study examined daily alcohol consumption as a moderator of the association between sleep and fatigue among heavy-drinking Veterans.
Methods: Heavy-drinking Veterans experiencing sleep disturbances were recruited from an insomnia treatment trial. Participants (N=130; 85.5% male; mean age=38.70 years) completed 14 days of morning sleep diaries. Diaries captured sleep parameters [quality, duration, sleep efficiency (SE), wake after sleep onset (WASO), sleep onset latency (SOL)], alcohol consumption (in standard drinks), and fatigue. Multilevel modeling was used to assess within- and between-person effects of sleep on next-day fatigue and vice versa, with daily alcohol use (0=no, 1=yes) as a moderator.
Results: Within persons, better sleep quality (b= -2.56, SE=0.64, 95% CI= [-3.82, -1.31], p <.001) and longer sleep duration (b=-0.94, SE=0.30, 95% CI= [-1.54, -0.34], p=.002) predicted lower next-day fatigue. Alcohol moderated the relationship between fatigue and same-night sleep parameters. Specifically, on days of alcohol use, higher fatigue was associated with lower sleep quality (z= -2.13, p = 0.03) and SE (z= -2.15, p=0.03). These relationships were nonsignificant on alcohol-free days (sleep quality: z=1.15, p=0.25; SE: z=1.00, p=0.32).
Conclusion: Sleep quality and duration influence next-day fatigue irrespective of alcohol use. However, fatigue adversely affects same-day sleep quality and SE only when alcohol is consumed. This suggests that alcohol use may compound fatigue's negative effects on sleep at the daily level. Findings can be incorporated into Veteran health education that alcohol use is contraindicated for sleep, particularly when one is already fatigued.
Support (if any): This research was supported by the American Academy of Sleep Medicine Foundation and the National Institute on Alcohol Abuse and Alcoholism (K23AA026895).

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1247

DELTA-8 TETRAHYDROCANNABINOL (THC) USE AND ITS ASSOCIATION WITH SLEEP DIFFICULTIES:INSIGHTS FROM HERBAL HEART STUDY

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Introduction: Delta-8 tetrahydrocannabinol (THC), a lesser-studied cannabinoid, has gained popularity in the U.S. due to its psychoactive effects, widespread availability, federal legality, and increasing consumer demand. Despite its growing use, there is a significant lack of research examining its impact on sleep. This analysis addresses this gap by exploring the association between self-reported sleep difficulties and Delta-8 THC use.

Methods: Data were drawn from the ongoing Herbal Heart Study (N=200), which investigates cannabis use and subclinical cardiovascular risk among 18-35-year-olds in South Florida. The primary exposure was self-reported lifetime use of Delta-8 THC. Main outcomes included self-reported (a) difficulty falling asleep, and (b) difficulty staying asleep in the past month. A composite variable, "poor sleep," was created for participants reporting either sleep difficulty. Sleep satisfaction was assessed using the WHO Quality of Life questionnaire and categorized as satisfied, unsatisfied, or neutral. Chi-squared/Fisher's Exact tests compared Delta-8 use prevalence across sleep variables. Multivariable logistic regression examined the association between Delta-8 use and poor sleep, adjusting for sociodemographic, behavioral, and mental health factors.
Results: Of the total sample (mean age: 25.2 years, SD=4.8), 65% were female, the majority were Hispanic (54.5%) followed by non-Hispanic White (18.5%), and non-Hispanic Black (17.5%). Delta-8 THC use was reported by 38.5% of participants. Overall, 23.0% of the sample reported difficulty falling asleep, and 16.5% reported difficulty staying asleep. Sleep issues were more common among Delta-8 consumers, with a higher prevalence of difficulty falling asleep (32.5% vs. 17.1%, $p = 0.01$), staying asleep (26.0% vs. 10.6%, $p < 0.01$), and poor sleep overall (41.6% vs. 21.1%, $p < 0.01$), though self-reported sleep satisfaction did not differ. Multivariable logistic regression analysis showed that Delta-8 consumers had nearly three-fold higher odds of poor sleep (AOR: 2.96; 95%CI: 1.27-6.9) compared to non-consumers.
Conclusion: Delta-8 THC consumers had a notably higher likelihood of reporting sleep difficulties compared to non-consumers. These results highlight the need for further exploration into the sleep-related effects of Delta-8 THC use.
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1248

POOR SLEEP QUALITY AND SUICIDAL IDEATION: CONSIDERING THE ROLE OF OCCUPATIONAL STRESS

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Introduction: The link between sleep quality and suicidal ideation has been explored, but it is unclear how occupational stress affects the relationship between them. The aim of this study was to identify the association between poor sleep quality and suicidal ideation among workers in various occupations and to determine how occupational stress is related to this association.
Methods: This cross-sectional study collected data from 13,684 participants aged 19 to 65 who underwent mental health screening at 25 companies and public institutions. Sleep quality and occupational stress were assessed using the Pittsburgh Sleep Quality Index and Korean Occupational Stress Scale (KOSS), respectively. Sub-categories of KOSS include job demands, insufficient job control, interpersonal conflict, job insecurity, organizational system, lack of reward, and occupational climate. Suicidal ideation was assessed using the National Health and Nutrition Examination Survey.
Results: The 15.2% (n=2,077) of total participants had suicidal ideation. The 23.2% (n=1,244) of participants with poor sleep quality had suicidal ideation, whereas only 10% (n=833) of those with good sleep quality had suicidal ideation. Poor sleep quality was associated with an increased risk of suicidal ideation even after adjusting for occupational stress, depression, and other covariates (odds ratio [OR] = 1.26, 95% confidence interval [CI] = 1.13-1.42). When occupational stress was high, poor sleep quality was associated with 32% increased risk of suicidal ideation (OR = 1.32, 95% CI = 1.11-1.57). Among participants with poor sleep quality, high occupational stress was associated with the risk of suicidal ideation (OR = 1.52, 95% CI = 1.32-1.75). When we analyzed by the sub-categories of occupational stress, lack of reward and job insecurity were associated with 37% (OR = 1.37, 95% CI = 1.16-1.61) and 14% (OR = 1.14, 95% CI = 0.99-1.32) increased risk of suicidal ideation, respectively.
Conclusion: Poor sleep quality is independently associated with suicidal ideation among workers. Particular attention should be paid to employees with poor sleep quality who also have high levels of lack of reward and job insecurity.
Support (if any):

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1249

THE ROLE OF SOCIAL MEDIA USAGE IN SLEEP AND DEPRESSION IN SUICIDAL ADOLESCENTS

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Introduction: Social media use during adolescence may impact both sleep and depression. Social media usage could have impairing effects on mood and sleep duration and quality, and positive effects through obtaining support. Few studies have examined these relationships in clinical populations of adolescents with severe psychiatric disorders.
Methods: 143 adolescents (mean age 15.8 years, 76.9% Female) with suicidal ideation and major depression being treated in an Intensive Outpatient Program (IOP) completed social media and sleep questionnaires at baseline and monthly for up to 2 months. The social media questionnaire consisted of items regarding social media experiences, addiction, and frequency of use before bed. Monthly self-reports of sleep were measured with the Patient-Reported Outcomes Measurement Information System (PROMIS) Sleep Disturbance and Sleep Related Impairment scales, and depression through the Mood and Feelings Questionnaire (MFQ). Sleep and and social media were examined as predictors of depression severity through Pearson correlations.
Results: Nearly 72% of the sample reported social media use 2 hours before bed on most days, with 69% of adolescents using social media in bed and 44% using social media while intending to fall asleep. Negative, stressful interactions on social media were significantly associated with more depression ($r=.30$, $p< 0.01$) and sleep related impairment ($r =.27$, $p< 0.01$) within the same month. Social media addiction was significantly associated with depression ($r=.30$, $p< 0.01$) and sleep impairment ($r=0.318$, $p< 0.01$) within the same month. Duration of social media use after intent to fall asleep was significantly associated with depression ($r=.214$, $p< 0.05$), sleep disturbance ($r=.20$, $p< 0.05$), and sleep impairment ($r=.25$, $p< 0.01$) within the same month. Positive interactions on social media were notably only related to sleep impairment ($r=.214$, $p< 0.05$). No significant longitudinal associations between lagged social media use predictors and depression and sleep were found.

Conclusion: This study contributes to growing evidence regarding relationships between social media use, depression severity, and sleep-related issues in high-risk youth. Longitudinal studies further analyzing this relationship could reveal a specific pathway or mediation. Understanding social media's impact on adolescents affect and sleep health may help inform interventions specifically catered to depressed and suicidal youth.
Support (if any): R01 MH124907

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1250
NIGHTMARES AND SELF-INJURIOUS THOUGHTS AMONG HIGH-RISK ADOLESCENTS: EXAMINING NEGATIVE AFFECT AS A POTENTIAL MECHANISM

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Introduction: Self-injurious thoughts and behaviors (SITBs) are a critical public health concern among adolescents. Emerging research identifies nightmares—a sleep problem characterized by vivid, dysphoric dreams—as a promising proximal and modifiable risk factor for SITBs. However, little is known about the mechanisms through which nightmares may confer risk for SITBs among youth. This study aimed to address this gap by investigating whether negative affect intensity mediates the relationship between nightmares and SITBs in a sample of clinically high-risk adolescents.
Methods: Adolescents (N=86; ages 12–18) were recruited after discharge from acute psychiatric care settings (e.g., psychiatric inpatient hospitalization) and assessed using a 28-day ecological momentary assessment (EMA) design. Nightmare presence and intensity were assessed each morning, while negative affect (NA), suicidal thoughts, and non-suicidal self-injurious (NSSI) thoughts were measured multiple times per day. Multilevel structural equation modeling was employed to examine within- and between-person effects.
Results: Results revealed significant between-person mediation effects: adolescents who experienced more frequent or intense nightmares reported greater NA intensity, which in turn was associated with greater suicidal and NSSI thought intensity. Notably, these associations were observed at the between-person level but not within-person level, suggesting that the risk associated with nightmares and NA may be more reflective of stable individual differences rather than short-term, dynamic fluctuations.
Conclusion: These findings represent one of the first attempts to examine a mechanistic pathway linking nightmares to SITBs in adolescents, using temporally sensitive data collected during the critical period following discharge from acute psychiatric care—a time of heightened risk for SITBs. The findings have important clinical implications. Targeted interventions to reduce nightmare frequency and intensity may hold promise for mitigating SITB risk among high-risk adolescents. In sum, this study advances the understanding of how nightmares and NA intensity contribute to SITBs, providing a foundation for targeted, evidence-based interventions aimed at reducing suicide risk among vulnerable youth.
Support (if any): This research was supported by a grant from the National Institute of Mental Health (R01MH124899 to EMK/CRG/RTL).

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1251
PERSONALITY TRAITS ARE NOT AN ADEQUATE PREDICTOR OF FOOD CRAVINGS DURING SLEEP DEPRIVATION

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Introduction: Previous evidence has found an association between trait neuroticism and eating behavior. We hypothesized that individuals who indicated a higher degree of neuroticism would consume higher quantities of foods high in fat and sugar under sleep-deprived conditions.
Methods: A group of healthy participants (n=46; 50% female; mean age 25 years; mean body mass index (BMI) 24 kg/m2) were brought into the laboratory for a period of 30 hours of total sleep restriction. A series of neurocognitive tasks were administered at baseline, including the NEO Personality Inventory (NEO-PI). Participants were shown images of food and non-food items five times during the sleep deprivation period (approximately every 3 hours) and asked how much they wanted to eat the items on an ordinal scale (1-7). Foods were categorized as: "high-fat non-sweet", "high-fat sweet", "high-fat", "low-fat non-sweet", "low-fat sweet", "low-fat", "non-sweet", and "sweet". The "high-fat sweet" category was operationalized as the focus for unhealthy food cravings.
Results: A multivariate regression was used with NEO-PI neuroticism and interactions with other NEO-PI domains scores as predictors and the mean high-fat sweet rating across all five test intervals as the outcome due to consistency in ratings across the sleep deprivation period. No significant associations were found for NEO-PI neuroticism or interactions with other domains and high-fat sweet scores ($p=0.933$, $R2=0.061$) when adjusted for age and BMI.
Conclusion: Personality traits alone were not reliable predictors for high-fat sweet food ratings in this sample. Further research is needed to determine whether personality traits better predict actual food intake, and where discrepancies arise between self-reported hunger/food ratings and energy intake.
Support (if any): D12AP00241

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1252
DOMESTIC VIOLENCE EXPOSURE ASSOCIATED WITH CURRENT SLEEP HEALTH

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Introduction: Domestic violence exposure (DVE) is a pervasive public health issue with profound effects on physical and mental health. Emerging evidence highlights the significant impact of DVE on sleep health, a critical determinant of overall well-being. This abstract examines the relationship between DVE and current sleep health.
Methods: Data were from the Sleep and Healthy Activity, Diet, Environment, and Socialization (SHADES) Study, consisting of N=1007 adults age 22-60. Domestic violence was assessed with the HITS scale, asking how often a partner would "physically

hurt you," "insult or talk down to you," "threaten you with harm," "scream or curse at you." Sleep health variables included insomnia (Insomnia Severity Index [ISI]), sleep duration (NHANES), sleep quality (Pittsburgh Sleep Quality Index [PSQI]), sleep control (Brief Index of Sleep Control [BRISC]), sleepiness (Epworth Sleepiness Scale [ESS]), sleep apnea risk (STOP-BANG), and items to capture habitual sleep latency (SL) and wake after sleep onset (WASO), and frequency of nightmares and loud snoring. Covariates included age, sex, race/ethnicity, education, income, relationship status, home type (single-family vs shared), and overall environmental safety. Analyses examined each HITS item and composite score. Results are expressed as unstandardized linear coefficients (B) or ordinal odds ratios (oOR).

Results: In fully adjusted models, history of physical abuse was associated with insomnia (B=1.7pts), sleep latency (B=7.5mins), sleep quality (B=0.8pts), sleepiness (B=1.4pts), and STOP-BANG score (oOR=1.4). History of verbal abuse was associated with insomnia (B=1.1pts), sleep duration (B=-11.9mins), sleep quality (B=0.6pts), sleepiness (B=0.7pts), nightmares (oOR=1.2), loud snoring (oOR=1.3), and STOP-BANG score (oOR=1.3). History of threats was associated with insomnia (B=1.7pts), sleep quality (B=0.8pts), sleepiness (B=1.2pts), nightmares (oOR=1.4), loud snoring (oOR=1.3), and STOP-BANG score (oOR=1.4). History of screaming was associated with insomnia (B=1.2pts), sleep duration (B=-8.4mins), sleep quality (B=0.8pts), control (B=-0.1), sleepiness (B=0.6pts), nightmares (oOR=1.3), loud snoring (oOR=1.3), and STOP-BANG score (oOR=1.4). HITS total score was associated with insomnia (B=0.5pts), sleep duration (B=-3.8mins), sleep quality (B=0.3pts), sleepiness (B=0.3pts), nightmares (oOR=1.1), loud snoring (oOR=1.1), and STOP-BANG score (oOR=1.1).

Conclusion: Exposure to various forms of abuse is associated with poorer sleep health across multiple dimensions. Future work should evaluate the benefit of adding sleep to DV interventions.

Support (if any):

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1253

PREVALENCE OF PSYCHIATRIC CONDITIONS IN A LARGE SLEEP CLINIC POPULATION

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Introduction: Psychiatric conditions often affect sleep, and sleep disorders can also affect mental health. The prevalence of psychiatric conditions in patients evaluated for sleep disorders is not well-established. This study reviews electronic medical records (EMRs) from a major metropolitan health system to assess the burden of psychiatric conditions in patients with suspected sleep disorders who underwent nocturnal polysomnography.

Methods: We analyzed EMR data for patients who underwent a sleep study between October 2016 and August 2023. Psychiatric diagnoses (ICD-10 F-Codes) within six months prior to the sleep study were extracted. Descriptive statistics summarized diagnoses and demographic variables, including sex, age, and AHI data for patients with F-Codes.

Results: Of 6,462 patients who completed a polysomnographic study, 310 (4.8%) had at least one F-Code diagnosis. Of these, 158 (51.0%) were female, with a mean age of 45.25 years (range: 19-82). Among all patients, 112 (1.73%) had a Nonorganic Sleep Disorder (F51), 240 (3.71%) had other F-Code diagnoses, and 70 (1.08%) had an isolated F51 code. Forty=two (0.65%) had both F51 and another F-Code diagnosis. The most common non-sleep diagnoses included Anxiety (F41, N=116, 1.80%), Non-Bipolar Mood disorders (F32-F39, N=92, 1.42%), Stress disorders (F43, N=37, 0.57%), Substance Use disorders (F11-19, N=30, 0.46%), particularly Nicotine Use (F17.2, N=23, 0.36%), and Somatoform disorders (F45, N=23, 0.36%). Among patients with any F-Code, the median AHI was 9.10 (IQR 2.64–21.57). For those with an F51 code, median AHI was 7.82 (2.68-22.04), and for those with no F51 diagnosis, median AHI was 10.34 (2.56-20.11). Patients with an AHI >5 consistently had a higher burden of psychiatric illness than those with an AHI < 5 for each F-Code.

Conclusion: Psychiatric diagnoses, especially nonorganic sleep, anxiety, mood disorders, and substance use, are common in patients undergoing sleep evaluation. However, these rates are lower than national averages, suggesting potential gaps in diagnostic practices. Median AHI values fell within the mild to moderate obstructive sleep apnea range. Those with an AHI >5 had a higher burden of psychiatric illness on average, although further research is needed. A key limitation is the six-month time frame for psychiatric data collection.

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1254

IDENTIFYING ADOLESCENTS AT RISK FOR SUICIDE USING OBSERVED CLASSROOM BEHAVIOR INDICATIVE OF EXCESSIVE DAYTIME SLEEPINESS

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Introduction: Suicide is the second leading cause of death among teenagers. Unfortunately, many at-risk adolescents do not seek help, making it challenging for educators and mental health professionals to identify those in need of support. Adolescents at high risk for suicide exhibit higher daytime sleepiness compared to their low-risk counterparts. The present study therefore evaluated the validity of categorizing adolescents into high and low suicide risk groups based on observed classroom behaviors indicative of excessive daytime sleepiness.

Methods: Participants: 188 adolescents (M= 14.32 years, SD = 1.88; 59 boys). Measures: Suicidality was assessed using Item 9 of the Beck Depression Inventory: Participants responding "I do not have any thoughts of killing myself" were classified as low risk, while those indicating "I have thoughts of killing myself, but I would not carry them out," "I would like to kill myself," or "I would kill myself if I had the chance" were classified as high risk. Daytime sleepiness was assessed using the Sleepiness subscale of the School Sleep Habits Survey, which asks respondents to indicate whether they had struggled to remain awake in ten different situations.

Results: Discriminant function analysis and group classification were used to predict group membership. One discriminant function was extracted, accounting for 100% of the total variance. The function significantly discriminated between the groups (Wilks' Lambda =.94, $\chi^2(2) = 11.36$, $p < .003$), indicating strong group separation. Falling asleep in a face-to-face conversation with

another person and in class were the strongest variables for differentiating between the two groups. Group classification resulted in 82.2% accuracy for predicting the level of adolescent suicidality.
Conclusion: Classroom behaviors indicative of excessive daytime sleepiness can effectively differentiate between adolescents at high and low risk for suicide. Engaging with students who fall asleep in class may assist educators and clinicians in identifying adolescents at risk for suicide. By recognizing these behaviors, schools can play a pivotal role in early identification and intervention efforts. Understanding the sources of sleepiness and implementing appropriate interventions have the potential to significantly reduce the risk of suicide within this vulnerable population.
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1255

HIGH SUICIDE RISK IN ADOLESCENTS WITHOUT SLEEP DISTURBANCES IS ASSOCIATED WITH HIGHER DAYTIME SLEEPINESS AND LATER RISE TIME

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Introduction: Suicide is a leading cause of death among adolescents. Although sleep disturbances are well-documented risk factors for suicidal thoughts and behaviors, little research has examined the association between sleep and suicide risk among adolescents without sleep disorders, particularly in community samples. To fill this gap, the present study compared sleep and circadian parameters of adolescents without sleep disturbances who showed high and low levels of suicidality.
Methods: 188 adolescents (M= 14.32 years, SD = 1.88; 59 boys) scoring in the normal range on the Sleep Disorders Inventory–Adolescent Form were recruited from high schools in Quebec. They wore actigraphs at home for six consecutive nights, completed a sleep diary nightly, and completed the Epworth Sleepiness Scale and the Munich Chronotype Questionnaire (MCTQ). Demographic information was obtained from their parents. Suicidality was assessed based on the participants' response to the 9th item of the Beck Depression Inventory. If they responded "I do not have any thoughts of killing myself," they were classified as having low suicide risk, whereas if they responded "I have thoughts of killing myself, but I would not carry them out" or "I would like to kill myself" or "I would kill myself if I had the chance," they were classified as having high suicide risk.
Results: Thirty-three adolescents (17.6%; 27 girls, 6 boys) reported suicidal ideation whereas 155 (82.4%; 102 girls, 53 boys) reported no suicidal ideation. MANCOVAs revealed significantly higher daytime sleepiness and significantly later rise time in the group with high suicide risk compared to those with low risk. There were no significant group differences in sleep duration, quality, chronotype, or circadian preferences.
Conclusion: In this community sample of adolescents without sleep disturbances, adolescents at risk for suicide showed higher daytime sleepiness and later rise times during the school year. These findings highlight the importance of improved awareness of signs of daytime sleepiness among adolescents and point to the potential benefits of including sleep health promotion as an important component of interventions aimed at lowering youth suicide risk. Limitations. The cross-sectional design of this study limits determination of causality.
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1256

PROLONGED GRIEF AND RELATED HEALTH FACTORS MODIFY THE RELATIONSHIP BETWEEN BEDROOM LIGHT EXPOSURE AND SLEEP FRAGMENTATION

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Introduction: Light information critically influences sleep and emotion regulation. Nighttime light exposure has been suggested to disrupt sleep and predict poor health outcomes. However, little is known about how sleep changes after bereavement and how sleep changes contribute to prolonged grief. We examined the association between nighttime light exposure and sleep continuity in bereaved adults.
Methods: In this cross-sectional study, 30 adults who had been bereaved for at least one year, wore a wrist actigraphy for seven consecutive nights. Bedroom light intensity from bedtime to rising time (BLI, lux) and sleep continuity variables were estimated from the wrist actigraphy. We tested the association between BLI and natural log-transformed sleep continuity measures and explored factors that modify this relationship in multivariable-adjusted generalized linear models.
Results: Nearly 40% of participants were diagnosed with current prolonged grief disorder (PGD), even after a median of 2.5 years since the loss. The mean BLI was 3.72 lux. Overall, higher BLI was associated with lower sleep continuity, independently of psychological, physical, and sleep covariates, including total sleep time, sleep midpoint, and season. This was particularly evident for sleep fragmentation index (B = 0.076; 95% CI, 0.029–0.122; exp[B] = 1.079), indicating that every 1-unit increase in BLI was associated with a 7.9% increase in sleep fragmentation index. Moreover, the association between BLI and sleep fragmentation was more robust in participants with current PGD, those who had lost a child or spouse, and those whose loss was violent or sudden than in those without each of these characteristics. Similarly, depressive symptoms, hypnotic use, and regular alcohol drinking also modified the relationship between BLI and sleep fragmentation.
Conclusion: These data strengthen the evidence for nighttime light exposure and sleep fragmentation. Our findings suggest that post-loss stress and vulnerability factors interact to disrupt sleep through increased light sensitivity at night. Further research is needed to determine the role of sleep fragmentation in the maintenance of and recovery from grief.
Support (if any): This work was supported by the Intramural Research Grant for Neurological and Psychiatric Disorders of NCNP (Grant numbers #3-1 and #6-1) and KAKENHI (Grant numbers #20H01774 and #23H01045).

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1257

REST BEST: NAVIGATING SLEEP SOLUTIONS FOR PERSONS WITH OPIOID USE DISORDER THROUGH AN ENGAGING MHEALTH APP

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Introduction: Sleep disorders are highly prevalent among individuals undergoing treatment for opioid use disorder (OUD) with medications for OUD (MOUD) and often remain largely untreated. There is a critical need for effective interventions for sleep disorders that can be integrated into ongoing MOUD treatment with minimal burden and risk to both providers and patients. This project aims to develop an mHealth, MOUD-adjacent program in the form of a smartphone application, RestBest, to guide patients through a brief, structured transdiagnostic program for sleep problems.
Methods: This study employed a two-phase approach: 1) Qualitative interviews were conducted with 15 adults (5 newly beginning MOUD, 5 stabilized on MOUD, and 5 MOUD providers) to review storyboards and create an initial build of RestBest; 2) The initial build was then tested with 10 adults who recently initiated or modified their MOUD prescription. Participants completed daily in-app sleep logs over 4 weeks and engaged with 6 chapters of animated videos that included basic sleep habits, the science of sleep and substance use, sleep scheduling, daytime functioning, bedtime relaxation, and specialty topics (e.g., nightmares, sleep apnea). Program completion was followed by the System Usability Scale (SUS), the mHealth App Usability Questionnaire (MAUQ), and a qualitative interview.
Results: Initial interviews highlighted the need for a comprehensive sleep survey, a preference for educational animated videos over text or lecture-style formats, and a desire for a personalized dashboard with sleep variables and practice points. The mean SUS score was 89.19, and mean MAUQ was 109, indicating "excellent" usability and a positive user experience with the app. Interviews revealed a desire for customization of content based on the type of sleep problems, visual tracking of MOUD adherence on the dashboard, and additional specialty topics (e.g., shift work).
Conclusion: Initial testing of RestBest indicates high usability and positive reception among users. The findings underscore the importance of customizable content addressing numerous types of sleep problems in creating effective mHealth interventions for sleep disorders in individuals receiving MOUD. Future directions include a randomized controlled trial with multidimensional measures of sleep to determine efficacy of the intervention on sleep quantity and quality.
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1258

ETHNIC DIFFERENCES IN SLEEP PATTERNS AMONG CANNABIS CONSUMERS IN THE HERBAL HEART STUDY

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Introduction: There is a dearth of research exploring sleep difficulties/satisfaction among ethnically-diverse younger cannabis consumers - a vulnerable population with increasing cannabis use. We examined self-reported sleep difficulties by cannabis use (CU) and Hispanic origin.
Methods: Data are from 18-to-35-year-olds in the Herbal Heart Study cohort (N=200). Cannabis was self-reported, confirmed via urine, and categorized as low-to-moderate (< 20-days/month) and high-frequency (>20-days/month). Self-reported difficulties were falling (DFA) and staying asleep (DSA) over the past month; "poor sleep" included those with either. Sleep satisfaction was measured via WHO Quality of Life and classified as satisfied, neutral, or unsatisfied. Differences by CU and ethnicity were assessed using Chi-squared/Fisher exact tests.
Results: Of participants (mean age: 25.2 years, SD=4.8; 65.0% female, 54.5% Hispanic), 63.0% were CUs; 74.6% of which were high-frequency CUs. Overall, 23.0% reported DFA, 16.5% DSA, 29.0% poor sleep and 23.0% reported sleep dissatisfaction. DSA was more prevalent among CUs vs non-CUs (20.6% vs. 9.5%, $p = 0.04$), particularly among Hispanics (24.0% vs. 8.6%, $p = 0.049$). Frequent CUs reported higher DSA than non-frequent CUs (26.0% vs. 3.1%, $p < 0.01$). There were no differences found by sex.
Conclusion: Frequent cannabis consumers had higher prevalence difficulty staying asleep, particularly among Hispanic/Latinos. These findings underscore the need in further investigating the relationship between frequent cannabis use, sleep disturbances, and racial/ethnic disparities.
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1259

SLEEP DISTURBANCE MEDIATES THE RELATIONSHIP BETWEEN PERCEIVED STRESS AND DRUG USE IN COLLEGE ATHLETES

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Introduction: Sleep difficulties are common among college student athletes and can significantly affect their physical and mental well-being. The Athlete Sleep Screening Questionnaire (ASSQ) is a screener for detecting sleep disturbances. Research has shown that poor sleep quality mediates the relationship between stress and maladaptive health behaviors like poor diet and alcohol misuse. The present study explores the mediating effect of sleep difficulties on perceived stress and drug use in college student athletes.
Methods: College students (N=1886; Mage=20.54 years, 57% female, 73.80% Caucasian) from two universities completed self-report questionnaires on the following domains: sleep disturbance (ASSQ-SDS), perceived stress (PSS), and drug use (CAGE-AID). Mediation analysis was used to investigate the effect of sleep disturbances on perceived stress and drug use.
Results: The overall regression model was significant, $F(3, 1352) = 21.9656$, $p < .001$, R-squared=.0465. Sleep disturbance severity significantly predicted drug use, $B = -.0834$, $SE = .0420$, $t = -1.9869$, $p = .047$. Perceived stress did not significantly predict drug use, $B = -.0102$, $SE = .0153$, $t = -.6654$, $p = .5059$. The

interaction between sleep disturbance severity and perceived stress significantly predicted drug use, B =.0056, SE =.0019, t = 2.9244, p =.0035, Delta R-Squared=.0060, F(1, 1352) = 8.5519.
Conclusion: The results of this analysis highlight the mediating role that sleep disturbance has on reported perceived stress and drug use. Additionally, higher levels of sleep disturbance are associated with increased drug use. Athletes experiencing more sleep difficulties may have a heightened vulnerability to drug use when exposed to stress. Previous research suggests that strategies like sleep hygiene education, relaxation techniques, mindfulness, and CBTi are effective in improving sleep. Improving sleep quality may mitigate the negative effects of stress on drug use behavior, a critical focus for student health initiatives.
Support (if any): Pacific-12 Conference Student-Athlete Health and Well-being Initiative Grant

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1260
HABITUAL INSUFFICIENT SLEEP ASSOCIATED WITH SUBSTANCE USE BEHAVIORS IN COLLEGE STUDENT ATHLETES

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Introduction: Sleep problems are common among student athletes, who are often over-scheduled while balancing responsibilities. Insufficient sleep may be a risk factor for substance use in this population.
Methods: Data were collected from 8,683 athletes using the National College Health Assessment conducted between 2011-2014. Insufficient sleep was assessed as number of nights students did not "get enough sleep so that you felt rested when you woke up," coded as <=2, 3-4, or >=5 nights per week. Students were asked whether they used the following in the past 30 days: cigarettes, hookahs, cigars/cloves, smokeless tobacco, alcohol, marijuana, cocaine, methamphetamine, other amphetamines, sedatives, hallucinogens, steroids, opiates, inhalants, ecstasy, club drugs, or other drugs and whether "the typical student at your school" used these substances in the past 30 days. Multinomial logistic regression analyses examined sleep variables relative to use (Past or Present vs None) and typical use (More or Less vs Same).
Results: Insufficient sleep at least 5 nights per week was associated with increased use of cigarettes in the past (RRR=1.46) and present (RRR=1.52), hookahs in the past (RRR=1.29) and present (RRR=1.43), cigars/cloves in the past (RRR=1.37) and present (RRR=1.40), smokeless tobacco in the past (RRR=1.36) and present (RRR=1.48), alcohol in the present (RRR=1.34), marijuana in the past (RRR=1.34) and present (RRR=1.35), amphetamines in the present (RRR=1.64), sedatives in the past (RRR=1.79) and present (RRR=2.35), and inhalants in the past (RRR=2.07). Student athletes who reported at least 5 nights per week of insufficient sleep were more likely to report less-than typical use of smokeless tobacco (RRR=1.14), cocaine (RRR=1.14), methamphetamine (RRR=1.14), amphetamines (RRR=1.19), sedatives (RRR=1.26), hallucinogens (RRR=1.26), steroids (RRR=1.27), opioids (RRR=1.23), inhalants (RRR=1.20), MDMA (RRR=1.28), other club drugs (RRR=1.31), and other drugs (RRR=1.23), and less likely to report that their alcohol use was less than typical (RRR=0.77). They were also more likely to report that their use of sedatives was more than typical (RRR=2.73).
Conclusion: Substance use among student athletes is linked to insufficient sleep. Addressing insufficient sleep through focused interventions should be evaluated to determine whether they decrease substance use in this population.
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1261
WITHDRAWN

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1262
ADVERSE CHILDHOOD EXPERIENCES ASSOCIATED WITH UNHEALTHY SLEEP IN THE SOUTHERN COMMUNITY COHORT STUDY

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Introduction: Adverse childhood experiences (ACEs) are potentially traumatic events that occur before age 18, including abuse, neglect or witnessing violence in the home or community. ACE exposure has been associated with poor sleep and chronic diseases in adulthood. Leveraging data from the Southern Community Cohort Study (SCCS), a large cohort of predominantly low-income adults, we investigated ACE exposure in childhood with sleep duration in adulthood.
Methods: The SCCS enrolled predominantly Black adults age 40-79 from 12 southeastern US states between 2002-2009. SCCS participants self-reported sleep duration at baseline. The follow-up survey conducted from 2012-2015 included a 10-item ACEs scale. Sleep duration was categorized as short (< 7 hours), healthy (7-9 hours), or long (>9 hours). Odds ratios (ORs) and confidence intervals (CIs) were calculated to estimate the association between ACEs and sleep duration, adjusting for age, sex, and income.
Results: Of 32,959 participants (mean age 52.9 years), 18,901 (57%) reported at least one ACE, 62% identified as Black, and 46% had income <$15,000/year. Compared to zero ACE exposure, exposure to at least one ACE was associated with short (1.19 [1.13, 1.25]) and long (1.15 [1.06, 1.24]) sleep at baseline. Individuals with 4 or more ACEs were 1.32 times more likely to report short sleep than those without ACEs (1.23, 1.42). Abuse-related ACEs were associated with lower odds of short sleep (0.84 [0.74, 0.94]), while ACEs related to household dysfunction were associated with increased odds of short (1.22 [1.16, 1.28]) and long sleep (1.16 [1.07, 1.25]).
Conclusion: Among over 30,000 predominately low-income adults in the southeastern US, ACE exposure was associated with short and long sleep in adulthood. Greater ACE exposure (4+) was associated with greater odds of short sleep than lower ACE exposure. This pattern could reflect a trend toward shorter sleep

with increasing ACEs. Further research should work to identify mechanisms connecting ACEs and abnormal sleep duration.

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1263

UNDERSTANDING BEDTIME PROCRASTINATION IN THE MILITARY POPULATION

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Introduction: Bedtime procrastination (BP) is considered a form of self-harm. BP contributes to insufficient sleep leading to multiple negative cognitive and physiologic sequelae. The prevalence of BP is not currently established among military service members (SMs), yet similar contributors to insufficient sleep such as insomnia are high, ranging from 27-74%. There are clinically validated tools that aid in the evaluation of factors contributing to BP, which are not currently employed in our clinic. This quality improvement project sought to incorporate phased Plan-Do-Study-Act (PDSA) cycles to improve the assessment and disposition of referred patients' sleep complaints by incorporating three BP questionnaires and educating clinic providers on their interpretation and implementation in routine patient care.

Methods: Our academic military sleep disorders center incorporated validated BP scales into standard new patient intake questionnaires. These included the Bedtime Procrastination Scale (BPS) (max score 45), While-in-Bed Procrastination Scale (WIBPS) (max score 35), While-in-Bed-Smartphone-use-Induced Sleep Procrastination Scale (WSPS) (max score 30) and 1 single-item measure: "Did you use smartphone in bed before sleep last night?". Responses were collected for two weeks as part of the initial PDSA cycle.

Results: The BP scales were successfully incorporated into our patient intake process. Surveys were collected from 112 (23 female (20.54%), mean age = 36.1 years, age range 18-62) SMs from all branches of the military. The average scores on the BPS, WIBPS and WSPS were 24.2± 6.8, 12.9±5.0, and 12.8± 4.8, respectively. A total of 67 (59.8%) respondents endorsed smartphone use in bed on the previous night.

Conclusion: Methods of evaluating patients who suffer sleep loss due to bedtime procrastination are not currently standardized or regularly implemented. We successfully implemented BP questionnaires with a high completion rate and found that BP and in-bed smartphone use is highly prevalent in our patient population. Better methods of characterizing the behavioral patterns and coping mechanisms which negatively impact soldier health and operational readiness can help providers achieve greater clinical success by targeting the barriers to sleep. Additional QI cycles will educate patients about BP and educate providers on using the responses for personalized interventions.

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1264

CHANGES IN ACTIGRAPHY-DERIVED SLEEP DURATION AND TIMING ARE ASSOCIATED WITH IMPROVED PTSD SYMPTOM SEVERITY DURING TREATMENT

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Introduction: Insomnia is highly co-occurring with posttraumatic stress disorder (PTSD) and is a major contributing factor to PTSD symptom severity. Research suggests insomnia also negatively impacts emotional processes, thus could reduce the efficacy of PTSD treatment. Sleep duration, timing and regularity likely contribute to PTSD symptom severity and PTSD treatment outcomes. This study aimed to examine whether changes in sleep duration, timing and regularity predicted improvement in PTSD symptom severity in a cohort of Veterans with PTSD (N=22) undergoing only the CBT-I part of an integrated treatment of Cognitive Behavioral Therapy for Insomnia and Prolonged Exposure Therapy (i.e., 2NITE protocol). We also explored whether emotional regulation mediated the relationship between sleep and PTSD.

Methods: PTSD symptom severity (PTSD Checklist; PCL-5) was assessed at baseline and during week 5, at the end of CBT-I, but before PE started. Participant sleep was monitored via actigraphy for one week at baseline and during week 5. Mean total sleep time (TST), mean sleep midpoint (mSM) and standard deviation of sleep midpoint (sdSM) were calculated at each time point. Emotional regulation (Difficulties in Emotion Regulation Scale; DERS) was assessed at baseline. A linear regression was performed using treatment condition and change in sleep variables (Week 5-Baseline) as the predictors and change in PCL-5 scores (dPCL) as the outcome variable.

Results: The overall model significantly predicted dPCL ($F(4,17)=4.27$, $p< 0.05$, $R2=0.38$). However, only TST (□ = 0.11, 95% CI = -0.05, 0.18, p =.001) and sdSM (□ = -0.12, 95% CI = -0.21, -0.02, p =.02) significantly contributed to the prediction model. Mediated regression analyses were performed using baseline DERS score as the mediating variable. Baseline DERS score did not significantly mediate the relationship between dPCL and change in sleep variables.

Conclusion: These results indicate that increases in sleep duration and regularity were associated with improvements in PTSD symptom severity. Baseline DERS scores were not observed to mediate the relationship between sleep and PTSD symptoms. Future analyses may explore the relationship specific domains of emotion regulation and other dimensions of sleep health.

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RELATIONSHIP BETWEEN SELF-REPORTED SLEEP DISTURBANCES AND COGNITION IN OLDER CHINESE AMERICANS: A PILOT MEDIATION ANALYSIS

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Introduction: Sleep disturbance/disorders are common among immigrants in the United States, yet few studies focus on older Chinese Americans and their link to Alzheimer's Disease and Alzheimer's Disease Related Dementias (AD/ADRD). While physical and mental health are known to affect cognition, it is unclear whether they mediate the relationship between sleep disturbances and cognition. This study aimed to: 1) investigate the association between self-reported sleep disturbances and both objective and subjective cognitive functions in older Chinese Americans; and 2) explore whether this relationship is mediated by immigration experiences or physical and mental health.

Methods: Data were extracted from a pilot study at the Mount Sinai's ADRC, which focused on community-based recruitment of older Chinese Americans. Ninety-five participants aged 72.1 years on average (± 6.7), with either normal cognition or mild cognitive impairment, completed the Pittsburgh Sleep Quality Index (PSQI). The cognitive test battery and cognitive function instrument (CFI) were used to evaluate objective and subjective cognitive functions, respectively. Information about immigration experiences, such as acculturation, age at immigration, were collected through questionnaires. Participants' physical (cardiovascular and cerebrovascular diseases) and mental health (depressive and anxiety disorders/symptoms) were assessed using the National Alzheimer's Coordinating Center Uniform Data Set version 3.0. Mediation analysis was conducted to investigate how immigration experiences and physical/mental health might mediate the relationship between sleep disturbances and cognition.

Results: The mean global PSQI score was 11.7±3.0, indicating poor sleep quality among older Chinese Americans. Higher global PSQI scores were associated with more subjective cognitive impairment (CFI scores: $\beta = 0.35$, $p = 0.01$) and poorer performance on the digit symbol substitution test ($\beta = -1.1$, $p = 0.011$). Mediation analysis showed that depressive symptoms, but not immigration experiences and physical health, mediated the relationship between self-reported sleep disturbances (global PSQI score) and subjective cognitive impairment (CFI score) ($p = 0.006$).

Conclusion: The findings from this pilot study highlight the need for further research to understand the contributory role of sleep disturbances and mental health in AD/ADRD risk in this historically underrepresented population to develop targeted preventions and improve health disparities.

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SLEEP TRAJECTORIES ACROSS THREE COGNITIVE-AGING PATHWAYS IN COMMUNITY DWELLING OLDER ADULTS

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Introduction: Comparing sleep and rest-activity rhythms (RARs) across the spectrum of cognitive aging can reveal novel risk factors and potential mechanisms underlying dementia disorders. However, our current understanding is restricted by differences in sleep measurement, limited longitudinal data, and heterogeneous cognitive aging processes. We aimed to determine (1) which sleep/RAR features exhibit meaningful changes within three distinct cognitive pathways; and (2) which sleep/RAR features differ between cognitive aging pathways prior to and after the onset of mild cognitive impairment (MCI) and/or dementia.

Methods: Longitudinal self-reported sleep and actigraphy data were obtained from 1,449 participants in the Rush Memory and Aging Project (mean age= 81.2±7.1 years, 75.2% female, 5.2% Black, 94.8% White). We applied flexible cubic spline models to quantify differences in the levels and trajectories of sleep amount (self-reported duration; actigraphy rest interval length and alpha), regularity (actigraphy interdaily stability, intradaily variability, and midpoint standard deviation), and timing (self-reported midpoint; actigraphy midpoint and acrophase) within and between three cognitive aging pathways over 12 years: Normal Cognitive Aging ('Normal'), Progression to MCI ('Stable MCI'), and Progression to Dementia ('Dementia'). Models were adjusted for key sociodemographic and health variables.

Results: Sleep amount was lowest in the Dementia pathway prior to MCI or dementia, but increased with age, most rapidly following dementia. The greatest effect was observed in self-reported duration (standardized mean change, d[95%CI]=0.912 [0.47, 1.36]. Regularity declined across all pathways, most rapidly after cognitive diagnoses, with the largest increases in intradaily variability occurring among the Stable MCI (d=0.97 [0.70, 1.23]) and Dementia paths (d=1.11 [0.84, 1.38). Shifts toward earlier sleep timing were observed in actigraphy measures across all three pathways ($-0.54 \leq d \leq -0.31$).

Conclusion: Shorter sleep amount in cognitively healthy older adults may be a risk factor or prodromal indicator of dementia, while longer sleep amounts and decreasing regularity following dementia may reflect neurodegeneration. Advances in sleep timing may be less useful as a clinical indicator of future cognitive impairment or decline. Differences between self-reported and actigraphy-measured sleep/RAR outcomes may reflect distinct underlying mechanisms, warranting further research.

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SLEEP DIFFERENCES ACROSS SUSPECTED TAUOPATHIES AND COGNITIVELY UNIMPAIRED OLDER ADULTS

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Introduction: Sleep disturbances are common in neurodegenerative diseases, yet their presentation across tauopathies remains unclear. Our previous work identified differing sleep/wake patterns in two tauopathies: progressive supranuclear palsy (PSP) and mild cognitive impairment (MCI)/Alzheimer's disease (AD) compared to cognitively unimpaired older adults (CU) using single-overnight EEG recordings. Our goal is to extend this research by studying 1) multiple nights in PSP, AD, and CU, and 2) two additional tauopathies: traumatic encephalopathy syndrome (TES) due to probable chronic traumatic encephalopathy (CTE), and corticobasal syndrome (CBS) due to probable corticobasal degeneration. We hypothesize that altered sleep characteristics will vary across tauopathies and CU.
Methods: Participants with PSP (n=20), AD (n=20), CBS (n=15), TES (n=20), and CU (n=22) wore a self-applied frontal-EEG device (Sleep Profiler, Advanced Brain Monitoring, Inc.) for 3 nights. Measures of interest included total sleep time (TST), sleep stages (N1, N2, N3, REM), wake after sleep onset (WASO), and EEG spectral power frequency bands (delta, theta, alpha, sigma, beta) during sleep. Data were analyzed using ANCOVA to control for age and sex.
Results: Building on our prior research, we found that PSP had less TST and less time in REM across multiple nights compared to CU, more N2 compared to MCI/AD and CU, and higher WASO compared to AD, CBS, TES and CU. Individuals with TES had more N1, lower alpha power, higher sigma power, and lower beta power compared to CU. CBS showed no significant differences, apart from having less WASO than PSP. No group differences were observed in N3.
Conclusion: Overall, we found different sleep/wake patterns and microstructure from spectral analysis across tauopathies and CU. PSP and TES (particularly in spectral power) show notable sleep alterations, while nighttime sleep is less affected in CBS and MCI/AD. Further research is needed to explore daytime sleep/wake differences and extend these findings in larger cohorts. Unique sleep characteristics may serve as potential biomarkers for identifying individuals at risk across tauopathies and help guide potential therapeutic interventions.
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1268

SLEEP IN SLOW AND FAST GENETIC CARRIERS OF PRION DISEASES

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Introduction: Genetic prion diseases (gPrD) are caused by more than 40 mutations in the prion protein gene (PRNP). Each mutation can generally be subdivided into two types, Fast vs. Slow gPrD, based on their average progression rate or disease duration. Fast mutation carriers (FAST) typically progress very rapidly (less than 2 years). Slow mutation carriers (SLOW) have a longer disease duration (usually greater than 3 years). Although sleep has been well characterized in the D178N-129M mutation causing fatal familial insomnia, it is unclear how sleep is affected in SLOW and other FAST.
Methods: We assessed sleep using a frontal EEG Sleep Profiler□ device in SLOW (n=4, all female, mean 47 years), FAST (n=8, 4 female, mean 47 years) and non-carrier gPrD controls (NC, n=7, 6 female, mean 50 years).
Results: In comparison to NC, SLOW spend significantly less time in REM sleep (REM, $p < 0.05$), whereas FAST had shorter latencies to REM ($p < 0.05$) though similar latencies to nonREM stage 3 sleep (N3). FAST had longer sleep duration ($p < 0.05$) and shorter REM latencies ($p < 0.05$) than SLOW with no difference in latency to N3. Overall, SLOW and FAST spent similar amounts of time in nonREM stage 1 sleep, nonREM stage 2 sleep and N3. SLOW, however, spent less time in REM than FAST ($p < 0.05$). To ensure the differences between FAST and SLOW were not driven by sex, we analyzed only females (4 FAST, 4 SLOW, 6 NC). Overall, the results were similar. In comparison to NC females, SLOW females spent less time in REM ($p < 0.05$), whereas FAST females tended to have shorter latencies to REM ($p=0.07$). SLOW females slept shorter amounts than FAST females ($p < 0.05$) and tended to take longer to enter REM ($p=0.06$).
Conclusion: Overall, our findings suggest that sleep/wake patterns differ between gPrD groups and with NCs. Larger cohorts are being studied to confirm these findings. Further research is needed to understand how these patterns change with disease progression.
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1269

SLEEP DEFICIENCIES AND THE SPEED OF COGNITIVE DECLINE IN INDIVIDUALS WITH MILD COGNITIVE IMPAIRMENT

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Introduction: Mild cognitive impairment (MCI) is a critical stage in the Alzheimer's Disease and Related Dementias (ADRD) continuum. The speed of cognitive decline from MCI to dementia is highly variable. Little is known, however, whether sleep deficiencies (e.g., short sleep duration, disturbed sleep) accelerate this decline process. This study aimed to examine whether individuals who experienced sleep deficiencies prior to the onset of MCI were at an increased risk of faster cognitive decline.
Methods: This retrospective cohort study utilizes survey data from the Health and Retirement Study of Americans aged 50 and older, a national representative, biennial survey from 2006 to 2020. Cognition was assessed using the validated Telephone Interview for Cognitive Status (TICS) and categorized as normal cognition (TICS ≥ 12), MCI (6 < TICS < 12), and ADRD (TICS ≤ 6). Onset of MCI was defined as the transition from normal cognition in the preceding wave to MCI in the index wave. The

speed of progression from MCI to ADRD was measured as the number of waves or years between the onset of MCI and the observation of ADRD. Sleep deficiencies was defined as experiencing sleep disturbance or reporting a sleep duration ≤3 hours frequently. Other variables include age, gender, race/ethnicity, and Carlson comorbidity index. Linear regression and survival analysis were employed.
Results: A total of 8,378 adults with MCI were included in the study, with approximately 40% experiencing sleep deficiency prior to the onset of MCI. There were 2,523 (31%) of these individuals progressing to ADRD during the study period. About 63% of those who progressed to ADRD experienced sleep deficiencies before onset of MCI, compared to 39% of those who did not progress. Moreover, the average number of years of ADRD progression was shorter for those with sleep deficiencies than those without sleep deficiency (4 years vs. 8 years).
Conclusion: Our preliminary analyses shed light on the important role sleep plays in the speed of cognitive decline. Ongoing confirmative analyses will confirm the results taking account of other relevant demographic and clinical factors, including obstructive sleep apnea and its treatment.
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1270

LOWER FREQUENCY OF HEADPULSE SLEEP BURSTS IN SUBJECTS WITH MILD COGNITIVE IMPAIRMENT

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Introduction: We discovered a novel signal termed "Headpulse Sleep Bursts" (HPSB) whereby the "headpulse" (HP, a phenomenon measurable in humans using highly sensitive accelerometers in contact with the head) transiently and periodically increases in amplitude for a few seconds during sleep attempts, independent of sleep stage. HPSB have been observed in all subjects tested we have measured. Human neurodegenerative disorders are hypothesized to be caused by lack of brain protein clearance during sleep. We report here on the frequency of sleep bursts in a cohort of subjects with Mild Cognitive Impairment (MCI) to see if HPSB are less frequent compared to controls.
Methods: 4 MCI individuals (1 female; median age 56 years (IQR 51-62)) did concomitant HP and SP recordings. HP was recorded using a UCSF-designed headband with force transducers on the right temporal scalp (analyzed through MATLAB). Sleep Profiler (Advanced Brain Monitoring Inc) was used to assess sleep in 30s epochs. The SP/HP data were aligned and analyzed in register.
Results: Five nights of concomitant recordings of at least 4hrs of sleep were recorded for a total of 39.2 hours. Like controls (n=22) all MCI patients (n=4) exhibited HPSB; however, the frequency and pattern during various sleep stages in MCI patients differed compared to controls. Compared to controls, HPSB in MCI were 26.5% ($P = 0.036$) less frequent compared to the awake state prior to sleep onset, and this difference was dominated by a 45.8% ($p = 0.044$) reduction in stage N2 sleep and 41.4% ($P = 0.063$) in stages N1-N3.
Conclusion: This is the first report of HPSB phenomenon in humans with a form of neurodegenerative disease. HPBS were observed in MCI patients and controls. However, MCI patients had fewer HPSB, and when they occurred were particularly suppressed in non-REM sleep. If HPSB are produced by an active glymphatic drainage system, the observation that fewer HPSB are found in MCI patients supports the hypothesis that neurodegeneration is associated with lesser glymphatic activity. We are continuing to record from a larger cohort of subjects with neurodegenerative diseases.
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COGNITIVE IMPAIRMENT AND SLEEP DISTURBANCES IN WORLD TRADE CENTER (WTC) RESCUE AND RECOVERY WORKERS AND VOLUNTEERS

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Introduction: World Trade Center rescue and recovery workers and volunteers (WTCRRWV) have elevated levels of poor sleep quality, insomnia symptoms and Obstructive Sleep Apnea (OSA). Increasing evidence of early onset of cognitive deficits in some of these workers highlights the importance of early identification of cognitive impairment. We aim to describe cognitive impairment in this heterogeneous population with a broad range of education levels using multiple assessment methods and investigate potential relationships between cognition and sleep disturbance.
Methods: 206 WTCRRWV completed sleep and mood questionnaires (Insomnia Severity Index, Epworth Sleepiness Scale, Functional Outcomes of Sleep Questionnaire), at-home or in-lab polysomnography and Montreal Cognitive Assessment (MoCA). Identification of cognitive impairment with sex, age, and education adjusted (SAE) MoCA norms (< 9th percentile) were compared to raw scores with 1 point added for ≤12 years education (raw score < 26 indicates impairment). Subset of 73 underwent UDS-3 Neuropsychological Battery (12% Spanish). UDS-3 norms were applied to 4 cognitive domains (memory, executive & visuospatial, attention and language) to investigate potential domain specific impairments. MoCA raw, SAE adjusted, and UDS-3 domain percentiles were investigated according to OSA, sleep macrostructure and symptoms of insomnia, sleepiness, and functional sleep outcomes.
Results: 50% of WTCRRWV (n=206, age=59±8 [37-77 years], 80% male, 67% white, 9% black, 29% Hispanic/Latino) demonstrated impairment using raw MoCA scores versus 12% with SAE norms. UDS-3 norms (n=73) indicated that 42% exhibited

low average performance (< 25th percentile) on memory and 16% on language domain [3% with mild impairment (< 9th percentile)]. 50% report symptoms of insomnia and 42% have OSA. No apparent association found between insomnia, sleepiness, OSA severity, sleep macrostructure and raw, adjusted MoCA or UDS-3 domain scores.
Conclusion: MoCA raw cut-off scores suggest widespread cognitive impairments in WTCRRWV compared to SAE norms and likely overestimate impairments. No associations were found between sleep and cognition as assessed here. Future work will examine this complex relationship using sleep-dependent emotional and spatial memory paradigms. AI models that combine symptomatology with physiology and include risk factors such as environmental exposure and social vulnerability may more accurately confer cognitive impairment in this cohort.
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1272

LONGITUDINAL EFFECT OF SLOW WAVE SLEEP ON PLASMA ALZHEIMER'S DISEASE BIOMARKERS IN COGNITIVELY NORMAL OLDER ADULTS

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Introduction: There has been emerging evidence on the bidirectional relationship between sleep and Alzheimer's disease (AD) pathology. However, there has been sparse data using plasma AD biomarkers despite its advantages of high accessibility and safety when sampling. This study aims to examine the longitudinal effect of slow wave sleep (SWS) on plasma beta-amyloid (Aβ) 42/40 ratio and phosphorylated-tau 217 (p-tau 217) in cognitively normal older adults.
Methods: Sixty-three community-dwelling cognitively normal adults aged between 55 and 90, with Mini-Mental State Exam scores of 25 or more, were recruited at the New York University Brain Aging & Sleep Center. All participants completed a baseline polysomnogram and had repeated plasma collections at least 2 years apart. Plasma Aβ 42 and 40 were measured via mass spectrometry (Araclon Biotech, Spain). Plasma p-tau 217 was measured in a subset of 22 subjects by the single-molecule array technology (Quanterix Corp., USA). Spearman's correlation analysis was performed. Multiple regression analyses were done with the dependent variable as log-transformed changes in plasma biomarkers divided by year interval (log [Δ Aβ42/40pre-post] or [Δ p-tau 217post-pre] / year interval), after adjusting for age, sex, and apolipoprotein ε4 (APOE4) status.
Results: Subjects were 66.3 ± 7.3 years old, 71.4 % female, and 41.5 % APOE4 positive. SWS duration was 73.6 ± 45.6 minutes (20.6 ± 13.1% of total sleep time). The mean follow-up interval was 3.3 ± 2.0 years. SWS duration and %SWS were associated with annualized log Δ Aβ42/40 ($t = -2.917$, $p = 0.005$; $t = -3.026$, $p = 0.004$). In 22 subjects who had repeated plasma p-tau 217, SWS duration and %SWS were correlated with annualized log Δ p-tau 217 ($\rho = -0.441$, $p = 0.040$; $\rho = -0.457$, $p = 0.032$), but not associated after adjusting for covariates ($t = -1.323$, $p = 0.210$; $t = -1.901$, $p = 0.082$).
Conclusion: In cognitively normal older adults, short SWS duration and low SWS percentage may predict faster annualized plasma Aβ42/40 ratio decline and p-tau 217 increase longitudinally, reflective of increased cortical amyloid plaque and tau tangle load respectively, in the preclinical stage of Alzheimer's disease.
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ATTENUATED MELANOPSIN-MEDIATED POST-ILLUMINATION PUPILLARY RESPONSE ACROSS THE ALPHA-SYNUCLEINOPATHY SPECTRUM

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Introduction: Circadian disruptions are common in patients with Parkinson's disease (PD). Degeneration and dysfunction in the melanopsin-containing intrinsically photosensitive retinal ganglion cells (ipRGCs) have been postulated as a potential mechanism. This study aims to investigate ipRGC function by chromatic pupillometry in healthy controls, patients with RBD (a prodromal stage of PD), and PD.
Methods: Patients with video-polysomnography confirmed RBD, PD, and age-matched healthy controls (HC) were recruited. Chromatic pupillometry was conducted using one-second of blue light (432nm) and one-second of red light (622nm) with continuous pupil tracking. The post-illumination pupillary response is defined as the pupil size at 6-second post-stimulus (PIPR6s) and the average pupil size for 30-second beginning 10-second after light stimulus (PIPR30s), both normalized to baseline pupil size. Net PIPR is calculated by subtracting the response to red from the response to blue. Group differences were compared by one-way ANOVA followed by post-hoc Tukey HSD tests. The effect of "group" on PIPR was further examined by ANCOVA adjusting for age, gender and visual acuity.
Results: A total of 135 participants (mean age ± SD=64.1 ± 5.8 years, Male =56%) were recruited with 45 in each of the HC, RBD and PD group, respectively. There was no significant difference in age and visual acuity. The PIPR6s to blue light was 22.5 ± 11.0%, 28.4 ± 11.6%, and 34.0 ± 10.6%, respectively, and was the most attenuated in PD, followed by RBD and HC ($p < 0.001$). Similar results were found with the Net PIPR6s (12.9 ± 9.5% vs 18.5 ± 10.8% vs 23.8 ± 9.4%, $p < 0.001$, post-hoc: PD< RBD< HC) and Net PIPR30s (3.3 ± 7.8% vs 4.7 ± 7.7% vs 7.5 ± 6.2%, P=0.026, post-hoc: PD< HC). The group effect on Net PIPR6s ($p < 0.001$) and Net PIPR30s (p=0.042) remained significant after adjusting for age, gender and visual acuity.
Conclusion: Our study demonstrated a progressive attenuation of PIPR across the spectrum of alpha-synucleinopathy,

suggesting ipRGC dysfunction occurs early and PIPR may represent a clinical advance for screening of prodromal PD.
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LONGITUDINAL CHANGES IN RESTING-STATE EEG IN ISOLATED REM SLEEP BEHAVIOR DISORDER

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Introduction: Patients with isolated REM sleep behavior disorder (iRBD), a prodromal alpha-synucleinopathy, has been reported to show electroencephalographic (EEG) slowing compared to healthy controls. However, longitudinal studies examining brain activity changes in iRBD are scarce. This study aimed to identify longitudinal changes in brain activity using resting-state quantitative EEG (qEEG) and their clinical significance in iRBD.
Methods: Patients diagnosed with iRBD between 2014 and 2015 who underwent waking 64-channel EEG at both baseline and 5-year follow-up were included. Patients with mild cognitive impairment (MCI) at baseline were excluded, and included patients were divided into two groups, based on cognitive status at 5 years (non-MCI and 5yr-MCI groups). EEG spectral analysis was conducted using fast Fourier transform, with relative power values calculated for five frequency bands (delta, theta, alpha, beta, and high-beta) across five cerebral regions (frontal, temporal, central, parietal, and occipital). Longitudinal qEEG analyses were performed using generalized estimating equations (GEE), adjusting for clonazepam use.
Results: Fifty-one iRBD patients without baseline MCI (72.5% male, mean age 65.9 ± 5.7 years) were analyzed. After five years, six patients (11.8%) developed MCI. At baseline, the non-MCI group had significantly higher high-beta power than the 5yr-MCI group (frontal, temporal and parietal: $p = 0.002$; central: $p = 0.025$; occipital: $p = 0.006$). Longitudinally, the 5yr-MCI group showed significant increases in theta (frontal, central, and occipital: $p < 0.001$; temporal: $p = 0.015$; parietal: $p = 0.005$), delta (parietal: $p = 0.021$; occipital: $p < 0.001$), and beta (temporal and central: $p < 0.001$) power and decreases in alpha power (all regions: $p < 0.001$) at follow-up compared to baseline. In contrast, the non-MCI group exhibited minimal changes in brain activity over time.
Conclusion: EEG slowing occurs in iRBD patients as cognitive decline develops. Reduced fast activity, such as high-beta power, may serve as a biomarker for predicting future cognitive impairment in iRBD.
Support (if any):

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1275

FREQUENCY AND LONGITUDINAL COURSE OF AUTONOMIC REFLEX TESTING ABNORMALITIES IN ISOLATED REM SLEEP BEHAVIOR DISORDER

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Introduction: Autonomic dysfunction is common across the α-synucleinopathies including isolated RBD (iRBD), however the presence, severity and distribution of autonomic dysfunction as a risk factor for phenoconversion in iRBD remains unclear. We aimed to characterize autonomic reflex testing (ART) abnormalities in a cohort of participants with iRBD and assess their potential as biomarkers for predicting phenoconversion risk.
Methods: We performed ART on 45 individuals with iRBD and evaluated the ability of individual ART components (sympathetic cholinergic, cardiovagal, sympathetic adrenergic) to predict phenoconversion using univariate and multivariate predictive models, both alone and combined with measures of olfaction, cognition, motor function, and skin biopsy assessment of dermal α-synuclein.
Results: Forty-one individuals with iRBD were enrolled (age 66.7 ± 7.4 yrs, 27% female), and followed annually for an average of 2.9 ± 2.4 yrs, with four participants lost to follow-up. Eight participants with iRBD phenoconverted during their follow-up period (3 Parkinson's disease, 4 dementia with Lewy bodies and 1 multiple system atrophy), yielding a phenoconversion rate of 6.6% per year. Eighty seven percent of iRBD participants had an abnormal baseline ART, and 100% had an abnormal follow-up ART. A combination of MDS-UPDRS III score and cardiovagal dysfunction (abnormal heart rate variability with deep breathing) best predicted phenoconversion (AUC = 0.77, 95% CI: 0.59–0.94).
Conclusion: ANS dysfunction was common and spanned all domains of autonomic function. Baseline cardiovagal dysfunction was most affected and predictive of phenoconversion, especially if combined with motor examination. Longitudinal studies with larger sample sizes are needed to confirm these findings.
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1276

THE SYN-SLEEP STUDY: DETECTION OF CUTANEOUS PHOSPHORYLATED ALPHA-SYNUCLEIN IN REM SLEEP BEHAVIOR DISORDER

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Introduction: REM sleep behavior disorder (RBD) is a prodromal neurodegenerative disease characterized by the deposition of phosphorylated alpha-synuclein (P-SYN) within the central and peripheral nervous system. RBD has a high risk of phenoconversion to a clinically apparent synucleinopathy (including Parkinson's disease (PD), multiple system atrophy (MSA) or dementia with Lewy bodies (DLB)) with >90% of patients converting over 15 years. The goals of this longitudinal, prospective study are 1) to determine rates of P-SYN deposition in RBD and quantify changes in PSYN deposition over time and 2) to determine if the pattern of P-SYN deposition is a predictor of phenoconversion to a central synucleinopathy.
Methods: After informed consent, detailed neurologic examinations, cognitive evaluation, orthostatic vital signs and questionnaires were completed. Medical history, ancillary testing and polysomnograms were reviewed. Skin biopsies at the distal leg, distal thigh and posterior cervical sites were performed. Dual immunohistochemical immunostaining of the skin biopsies for nerve fibers (protein gene product 9.5) and P-SYN was

completed using standard methodology. Quantitative measures of P-SYN and nerve fiber density were measured blinded to any clinical data.
Results: To date, 76 subjects (30% female) have been enrolled from 10 study sites across the United States with an anticipated total enrollment of 80 subjects. The mean age of the enrolled subjects is 67.8±8.9 years. Of the 76 enrolled subjects, 57/76 are P-SYN positive (75%). P-SYN positive subjects tended to be older (68.7±7.6 (P-SYN+) vs. 63.8±11.9 (P-SYN-). There were no differences in P-SYN positivity in patients who demonstrated REM sleep without atonia on polysomnogram (PSG) and those whose diagnosis was confirmed using the REM sleep behavior disorder questionnaire (RBDSQ) (30/41 with PSG [73%] vs 27/35 using the RBDSQ [77%]).
Conclusion: Skin biopsies are a simple, low-risk outpatient procedure to test for P-SYN as a diagnostic biomarker for prodromal synucleinopathies. At initial study visit, 75% of RBD cases contain P-SYN with equal rates of P-SYN positivity in those with and without polysomnography confirmed RBD. Longitudinal reassessment of these subjects is in progress to determine if quantification of P-SYN can serve as a biomarker of disease progression and phenoconversion.
Support (if any): Funding: NIH NINDS R44NS127696

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1277

OBSERVATIONAL STUDY OF HEADPULSE SLEEP BURSTS IN A LARGER COHORT OF NORMAL SUBJECTS

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Introduction: The "headpulse" (HP) is: a novel biological phenomenon; generated by cardiac contractile forces impacting the human head and dissipated by the brain; measurable using accelerometers with a time-domain varying signal; does not occur in sitting adults. Our goal was to characterize night-time HP patterns and to determine prevalence and occurrence during sleep (SP) stages.
Methods: Cognitively healthy subjects (N=22, 10 female) underwent 50 HP device recordings during sleep, with 25 simultaneous HP and SP recordings. HP was recorded using a UCSF-designed headband with force transducers on the right temporal scalp (analyzed through MATLAB). Sleep Profiler (Advanced Brain Monitoring Inc) was used to assess sleep in 30 sec epochs. The SP/HP data were aligned and analyzed in register.
Results: A total of 252 hours of combined HP and SP recordings were obtained from subjects (median age 45 years (IQR 25-68)). Transient increases in HP forces began just prior to sleep onset, with increased magnitudes over the sleep period now termed HeadPulse Sleep Bursts (HPSB). HPSB were present in all 22 subjects. The number of HPSB in subjects with at least 4hrs of sleep had a median range of 142 [92-220], a median frequency of 0.42 HPSB/min (IQR 0.31-0.62), or 0.007 Hz. Two subjects had remarkably periodic HPSB, occurring every 50 seconds or every 2 minutes. HPSB occurred at a differential rate of: 1 (laying down, wake prior to sleep onset): 1.30 (N1): 0.80 (N2): 0.92 (N3): 0.82 (N1-N3): 0.87 (REM); none of these differences were significant (t-test).
Conclusion: This is the second, but larger report of HPSB occurring in all cognitively healthy humans, independent of sleep stage. HPSB began during wake while attempting sleep n all subjects and are not present in awake, upright subjects not preparing for sleep. The relative low frequency of these bursts, 0.31 – 0.62/min range (0.005 – 0.01 HZ) has no parallel in human sleep but matches the MRI-assessed rate of CSF transient reversal flow in the cerebral aqueduct in sleeping humans. Thus HPSB could be a novel biomarker.
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1278

FEASIBILITY OF 48-H AMBULATORY BP ASSESSMENT IN LATINOS WITH DEMENTIA

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Introduction: Ambulatory blood pressure (BP) monitoring encapsulates 24-h BP patterns across the sleep-wake cycle and provides a comprehensive assessment of BP regulation with certain features, such as sleep-time dipping, that can better predict health outcomes than traditional office BP measurements. However, 24-h BP patterns remain understudied in Latino populations, especially older adults. This pilot study investigated the feasibility of continuously ambulatory BP monitoring blood pressure with portable devices in Latinos with dementia.
Methods: Eight participants (4 with Alzheimer's disease, 1 with Frontotemporal dementia, 3 controls; age range 45.8-80.3 years) from the ReDLat cohort (Multi-Partner Consortium to Expand Dementia Research in Latin America) were enrolled for a 48-h ambulatory BP assessment with hourly measurements using a portable arm-cuff device. Participants also answered six questions to evaluate: (1) device adaption, (2) measurement frequency tolerability, (3) study duration acceptability, (4) perceived value of the assessment, (5) willingness to perform the assessment again, and (6) likelihood of recommending the assessment to others.
Results: The study yielded high-quality recordings with minimal missing BP measurements (range: 0%-14.1%; mean: 8.9%). Device adaptation improved over time, with 75% (6/8) reporting better tolerance on the second day and 25% (2/8) reporting consistently good tolerance across both days. All participants reported that hourly BP measurement was tolerable, and majority (7/8, 87.5%) found 48-h monitoring acceptable. Seven participants (87.5%) believed that the assessment was valuable, were

willing to participate again, and likely recommend to others the assessment.
Conclusion: Our findings demonstrate that 48-hour ambulatory BP monitoring is feasible and well-tolerated among older Latino adults with mild to moderate dementia in Latin American settings. Further feasibility testing should be performed in large samples and other populations, including individuals at later stages of dementia and in different countries.
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1279
FEASIBILITY OF AMBULATORY SLEEP ASSESSMENT IN CHILDREN WITH LENNOX-GASTAUT SYNDROME

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Introduction: Disordered sleep is reportedly common in children with Lennox-Gastaut Syndrome (LGS), a severe and often intractable epilepsy syndrome. Despite the potentially severe sequelae, the sleep of children with LGS has not been systematically studied. To inform future study design, we conducted a pilot study to determine what methods of ambulatory sleep assessment are most feasible in this population.
Methods: Families were invited to participate in a polysomnogram, a home sleep apnea test (WatchPAT), use an Apple Watch nightly, and fill out daily sleep logs, for up to 4-weeks. Polysomnograms and WatchPATs were completed within a 1-month period. The Pediatric Sleep Questionnaire was administered at the beginning and end of the study. Participants rated convenience, ease of use, perceived accuracy, how time consuming a modality was, comfort, and their most preferred method on a Likert scale ('1' = strongly disagree and '5' = strongly agree for the listed domains; '1' = most preferred and '5' = least preferred for preference rating).
Results: 15 participants (mean age of child 12.2±3.1 years; 58% female) filled out the feasibility questionnaire. Participants remained in the study for 16.9±7.0 days and wore an Apple Watch for 13.8±9.1 days. Parents found questionnaires to be the most convenient option (4.1 ± 0.9), closely followed by the Apple Watch device (not the app; 3.7±1.6); whereas the WatchPAT and polysomnograms were considered the least convenient options (2.4±2.1 and 2.4±2.0 respectively). The Apple Watch device was the most preferred modality (1.6±1.0) and the polysomnogram was the least preferred modality (4.1±1.4). The WatchPAT was preferred (3.3±1.4) compared to the polysomnogram. Two out of three participants' sleep apnea tests yielded similar results (AHI 0.1; pRDI 2.8, AHI 26.5; pRDI 25) whereas one yielded dissimilar results (AHI 7, pRDI 26.5).
Conclusion: It may be feasible to conduct a longitudinal study of sleep in children with LGS over 2 weeks. WatchPATs might be a feasible alternative to a polysomnogram in appropriate scenarios. With optimization of the sleep measurement app, the Apple Watch device could be a highly preferred option for ambulatory sleep assessment.
Support (if any): Cure LGS 365 Research Grant, Lennox-Gastaut Syndrome Foundation; K12TR004374

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1280
CHARACTERISTICS OF SLEEP DISTURBANCE IN PATIENTS WITH MOYAMOYA

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Introduction: Moyamoya is characterized by idiopathic, progressive, large intracranial arterial steno-occlusion, affecting the anterior circulation of the brain. Common presentations include strokes, seizures, and headaches, which have been associated with poor sleep quality and sleep disorders in the general population. However, to our knowledge, sleep quality has not been previously investigated in Moyamoya disease. The aim of this study was to characterize self-reported sleep quality, sleepiness, sleep disorder diagnoses in patients with Moyamoya syndrome, and to explore possible association between sleep disturbance and quality of life in these patients.
Methods: We analyzed consecutive patients with Moyamoya evaluated at our institution who completed the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS). We also abstracted the Patient-Reported Outcomes Measurement Information System (PROMIS) to measure person-centered physical, mental and social wellbeing.
Results: We studied 23 patients with mean age 41.8 ± 12.1 years old having disease duration of 3 ± 4.4 years. 15 (65.2%) had ischemic strokes. Mean total PSQI score was 6.9 ± 2.9, and 17 (73.9%) had poor sleep quality (PSQI>5). Mean sleep efficiency was reduced at 80 ± 17%. Although Median ESS was 6 (IQR 3.25 – 8), most patients (91.3%) reported at least mild daytime dysfunction (Component 7≥1). Mean PSQI component scores (0 – 3 severity, 3 is worse) were 1.29 ± 0.62 (subjective quality), 1.1 ± 0.73 (sleep latency), 1.04 ± 0.83 (sleep duration), 0.87 ± 1.01 (sleep efficiency), 1.22 ± 0.52 (sleep disturbances), 0.3 ± 0.88 (sleep medication), and 1.1 ± 0.52 (daytime dysfunction). The total PSQI score was positively correlated with PROMIS score (r=0.47, p=0.044). Only one patient was diagnosed with obstructive sleep apnea and three with chronic insomnia.
Conclusion: Poor sleep quality appears to be a frequent problem in patients with Moyamoya disease. Sleep disturbance severity was similar to previous findings in clinical stroke populations. The apparent mismatch between subjective sleep disturbance and sleep disorder diagnoses suggest that sleep disorders are likely underdiagnosed in Moyamoya patients. The relationship between PSQI and PROMIS scores suggests that sleep disturbance may significantly affect quality of life in these patients.
Support (if any):

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1281
ASSOCIATION BETWEEN SLEEP DURATION AND PSYCHOMOTOR VIGILANCE TEST METRICS

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Introduction: Previous studies suggest an association between short and long sleep duration and adverse health outcomes, including impaired cognitive function. Using sleep diary and psychomotor vigilance test (PVT) data, we evaluated the relationship between sleep duration and vigilance/alertness.
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, sleep diaries, and a 3-minute PVT. Average sleep duration per night was calculated for each patient using sleep diary entries over two weeks. The primary outcomes from the PVT were the mean reciprocal of the response time (mean RRT) and the number of 355 msec lapses. Analysis of covariance (ANCOVA) was used to compare PVT outcomes among five groups based on average sleep duration: < 6 (n=33), 6-7 (n=100), 7-8 (n=272), 8-9 (n=254), and ≥ 9 (n=106) hours. Covariates included age, sex, body mass index (BMI), apnea-hypopnea index (AHI), Patient Health Questionnaire-9 (PHQ-9), time PVT was taken, and educational level.
Results: A total of 765 patients [44% male; age 45.2±14.6 years; BMI 31.3±9.10 kg/m2; AHI 16.2±22.0 events/hour; mean±SD] were included. The mean sleep duration was 7.88±1.12 hours/night. In covariate-adjusted analyses, both mean RRT (p=0.005) and number of 355 msec lapses (p=0.001) significantly differed based on average sleep duration. Slower response speed and more lapses occurred in patients with short (< 6 hours; mean [95% CI] of 3.16 [3.05, 3.27] 1/s and 13.6 [9.50, 17.8] lapses) and long (≥ 9 hours; 3.14 [3.08, 3.21] 1/s and 14.7 [12.3, 17.1] lapses) sleep duration, compared to those sleeping 6-7 (3.30 [3.24, 3.35] 1/s and 8.89 [7.28, 10.5] lapses), 7-8 (3.24 [3.20, 3.27] 1/s and 11.1 [9.92, 12.4] lapses) or 8-9 (3.24 [3.20, 3.27] 1/s and 10.5 [9.38, 11.6] lapses) hours.
Conclusion: These data suggest that individuals who report either short (< 6 hours) or long (≥ 9 hours) sleep duration have worse alertness and vigilance based on PVT. This is consistent with the "U-shaped" relationship reported between sleep duration and other health outcomes in prior studies.
Support (if any): NIH grant P01 HL160471

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1282

MORNING BRIGHT LIGHT THERAPY IMPROVES SLEEP AND SYSTEMIC INFLAMMATORY PROFILES IN VETERANS AND NON-VETERANS WITH OR WITHOUT TRAUMATIC BRAIN INJURY

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Introduction: Sleep-wake disturbances frequently present in Veterans with mild traumatic brain injury (mTBI). These TBI-related sleep impairments confer significant burden and commonly exacerbate other functional impairments. Therapies to improve sleep following mTBI are limited and studies in Veterans are even more scarce. In our previous pilot work, morning bright light therapy (MBLT) was found to be a feasible behavioral sleep intervention in Veterans with a history of mTBI; however, this was single-arm, open-label, and non-randomized, and therefore was not intended to establish efficacy. The present study extends this preliminary work as a fully powered, sham-controlled, participant-masked randomized controlled trial.
Methods: Veterans and non-Veterans with and without TBI were randomized in a 2:1 allocation ratio to: 1) active: MBLT (n=93), and 2) sham: deactivated negative ion generator (n=46); each with identical engagement parameters (60-min duration; within 2-hrs of waking; daily). Participant masking via deception balanced expectancy assumptions across arms. Assessments were completed following a 14-day baseline (pre-intervention), 28-days of device engagement (post-intervention), and 28-days after the post-intervention assessment (follow-up). Outcomes included self-reported sleep (validated questionnaires and a daily sleep diary), objective sleep via wrist-based actigraphy, and peripheral proteomic profiling examining 250 inflammatory and 120 neurodegenerative biomarkers via NUcleic acid Linked Immuno-Sandwich Assay (NULISA) with Next Generation Sequencing.
Results: MBLT was associated with significant improvements in self-reported sleep (insomnia severity index (14±20%), and increased actigraphy-derived total sleep time (47±65 min). This was associated with increased time in bed (59±67 min), an earlier bedtime (77±125 min) without change in wake time, and corresponding earlier mid-sleep time (37±72 min) consistent with a potential circadian phase advancement. Peripheral plasma assays demonstrate sweeping reductions in ~20 proinflammatory cytokines and several pro-thrombotic clotting factors, as well as relevant neurodegenerative markers (e.g., pTau-217). No changes were observed in the sham arm.
Conclusion: MBLT improved actigraphy-derived sleep outcomes in Veterans and non-Veterans with and without traumatic brain injury. Objective and subjective sleep, mood, pain management, and blood-based pro-inflammatory cytokines improved post-MBLT intervention. These results lead us to believe that MBLT could be used as a cost-effective and universal support therapy to those with disrupted sleep.
Support (if any): Military Traumatic Brain Injury Initiative (309698-7.01-65310), VA (I01RX004822)

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1283

SLEEPOVER PROTOCOL: A FULLY REMOTE, MULTIMODAL SLEEP PHENOTYPING PACKAGE TO BENCHMARK DISEASE PROGRESSION AND RESPONSE TO THERAPY

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Introduction: Previous work supports sleep disturbances as a benchmark of disease progression. To understand this relationship between sleep and health, efforts are emerging to observe sleep in clinical populations and to test sleep therapies. However, obtaining a detailed and long-term measure of sleep in human studies can prove challenging. Measuring sleep in a laboratory setting can provide a detailed description of sleep for short periods of time but interferes with natural sleep patterns, while

current remote approaches, such as sleep logs, can increase longitudinal feasibility but decrease the depth of data. To address this, we have developed SLEEp Phenotyping of Vitals, EEG, and Rhythms (SLEEPoVER), a protocol incorporating multiple measures to provide a detailed description of natural sleep patterns derived from months to years of remote data collection.
Methods: SLEEPoVER utilizes 5 measures concurrently in a single comprehensive package. Daily sleep diaries administered via text message and electronic questionnaires provide subjective measures of sleep, together with continuous wrist-based actigraphy, an under-the-mattress piezo-based sensor, and in-home unattended Type III polysomnography (PSG) provide objective sleep measures. Feasibility of this combined approach is presented from data collected within individuals over ~6 months.
Results: There were 94 participants. Sleep diaries had the highest overall data completeness of 93%, followed by PSG at 90%, subjective sleep questionnaires at 85%, mattress sensors at 62%, and actigraphy at 57%.
Conclusion: These findings demonstrate the feasibility of sleep diaries, questionnaires and in-home polysomnography to be used in conjunction for longitudinal and remote observation of sleep in clinical populations. Technical complications limited data completeness of actigraphy and mattress sensor devices independent from adherence to the protocol. Future work will utilize these multimodal sleep measures to generate comprehensive phenotypes for classification of disease progression and response to sleep therapies.
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1284

CAREGIVER RELATIONSHIP, BURDEN, AND SLEEP PROBLEMS: PATIENT SLEEP DISTURBANCES ON SPOUSE CAREGIVERS VS. CHILD CAREGIVERS

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Introduction: Caregiving for people living with cognitive impairment often imposes significant physical and emotional burdens on caregivers. These challenges are compounded when care recipients experience sleep problems, which can disrupt caregivers' sleep. This study aimed to explore the relationship between sleep problems in care recipients and caregivers, as well as caregiving characteristics.
Methods: Data were collected from 177 caregivers who participated in a phone screening for an ongoing clinical trial (NCT05452031) evaluating a dyadic sleep intervention for people with dementia and their caregivers. Sleep problems in care recipients were assessed using the Neuropsychiatric Inventory (NPI) sleep subscale. Caregiver sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI). Caregiver burden was assessed based on the number of activities of daily living (ADLs) and instrumental ADLs (IADLs) requiring assistance. Caregiver type (spouse, adult child, or other) was also collected. Data were analyzed using Pearson correlations and Student's t-tests.
Results: Caregivers of care recipients who experienced early morning awakenings (PSQI: 9.9 ± 4.5vs. 7.7 ± 3.7, $p = 0.027$) and nighttime behaviors (PSQI: 10.0 ± 3.2 vs. 7.5 ± 4.4) reported significantly poorer sleep quality, indicated by higher PSQI scores. The number of sleep problems reported by care recipients was positively correlated with ADL/IADL assistance ($r = 0.33$, $p < 0.001$), suggesting that caregivers managing frequent sleep disturbances face a heavier caregiving load. Adult child caregivers reported significantly more sleep problems in their care recipients compared to spousal caregivers (3.5 ± 2.0 vs. 2.9 ± 1.7 respectively, $p = 0.040$).
Conclusion: Sleep problems in care recipients are associated with poor sleep quality in caregivers, highlighting the importance of addressing sleep issues within the caregiving dyad. The findings also reveal the differential impact of sleep disturbances on caregiver burden, particularly based on the caregiver's relationship to the care recipient. Adult child caregivers report both more sleep disturbances in their care recipients and a higher caregiving load compared to spouses. These findings emphasize the need for tailored interventions to alleviate caregiver burden, especially for adult child caregivers.
Support (if any): Dr. Jennifer L. Martin is an AASM member. Dr. Yeonsu Song is a AASM and SRS member.

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1285

RATIONALE AND STUDY DESIGN OF SAMELISANT (SUVN-G3031) FOR THE TREATMENT OF CATAPLEXY IN TYPE 1 NARCOLEPSY PATIENTS

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Introduction: Samelisant (SUVN-G3031) is potent and selective histamine 3 receptor inverse agonist, which works by modulating the histamine system, a key part of the brain's sleep-wake regulation. Samelisant demonstrated wake-promoting and anticataplectic effects, in animal models relevant to narcolepsy.
Methods: Samelisant was evaluated in orexin knockout mice and orexin-B SAP lesioned rats for its effects on sleep/ wake and cataplexy using electroencephalography (EEG). Samelisant produced significant reduction in cataplectic like episodes in orexin knockout mice, similarly significant decrease in direct wake to REM sleep (DREM) episodes was observed in orexin-B SAP lesioned rats. Based on the evidence from animal studies, Samelisant is being evaluated in a Phase 2 proof-of-concept study in the USA and Canada to treat cataplexy in NT1 patients.
Results: This study is a placebo-controlled, double blind randomized, parallel-group study. The study will recruit about 129 NT1 patients with an established diagnosis of NT1 according to the ICSD-3 or DSM-5-TR. After a prescreening period of 4-weeks, eligible patients will follow a titration schedule to gradually increase their dose of the investigational product for initial three weeks followed by stable dose treatment for additional five weeks. The primary endpoint of the study will be to evaluate change from Baseline in weekly cataplexy rate on Day 56. Secondary endpoints will include change from Baseline in Clinical Global Impression Scale-Severity (CGI-S) score and Epworth Sleepiness Scale (ESS) score on Day 56.

Other exploratory endpoints will be change from Baseline in Clinical Global Impression of Change (CGI-C), Patient Global Impression of Change (PGI-C), Narcolepsy Severity Scale (NSS) score and 5-level EQ-5D version (EQ-5D-5L) on Day 56.
Conclusion: Outcomes from animal models of narcolepsy suggest that Samelisant may have anticataplectic effects. The Phase-2 study results may inform the therapeutic utility of Samelisant for the treatment cataplexy in NT1 patients.
Support (if any):

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1286

LONGITUDINAL SLEEP PHENOTYPING OF AUTISTIC INDIVIDUALS USING A NON-CONTACT BIOMOTION SENSOR IN THE HOME ENVIRONMENT

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Introduction: Sleep problems occur at a higher rate in autism spectrum disorder (ASD) than in typical development (TD). Polysomnography (PSG) is the gold-standard for collecting objective sleep data, but it is labor-intensive, intrusive, requires patients to stay overnight in an unfamiliar environment, and typically limited to one night of recording decreasing its validity and scalability to larger cohorts of ASD individuals. We tested a non-contact biomotion sensor, the SleepScore Max (SSM) to determine the acceptability of longitudinal use and feasibility of estimating sleep characteristics in ASD and TD youth in the home.
Methods: 7 ASD (M=13.0y, SD=2.2y, with community ASD diagnosis) and 6 TD (M=13.3y, SD=2.3 y) individuals completed 2 weeks of at-home sleep monitoring using the device. Participants were between age 8-15 years, living with a caregiver, sleeping alone, and >80lbs. Caregivers completed an acceptability questionnaire at the end of the study. Sleep metrics were analyzed using repeated-measures ANOVA with fixed effects of group (ASD vs TD), day, and their interaction. Pairwise comparisons of standard deviations determined differences in night-to-night variability between groups.
Results: The ASD group exhibited more deep sleep ($F=21.52$, $p<0.001$), longer sleep onset latency ($F=5.13$, $p=0.025$), and increased total wake time ($F=4.56$, $p=0.034$), whereas the TD group had more light sleep ($F=5.58$, $p=0.019$), and total interruptions ($F=12.79$, $p<0.001$). Pairwise comparisons determined that the ASD group had greater night-to-night variability in REM sleep ($t=-2.7$, $p=0.021$). Caregivers reported the device to be highly acceptable (M=6.44; SD=1), reasonable to use (M=6.31; SD=1) and causing little to no discomfort (M=1.7; SD=1.2) on a 1-7 Likert scale.
Conclusion: Our results agree with previous PSG studies showing an increase in sleep onset latency and an increase in deep sleep in autistic individuals. These results provide preliminary evidence that a non-contact biomotion sensor can accurately measure and differentiate sleep between ASD and NT individuals in a naturalistic and sensory friendly manner with high levels of acceptability and low participant burden. Non-contact sensors show great promise for long-term longitudinal characterization of sleep in the home to evaluate outcomes of sleep focused interventions.
Support (if any):

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1287

SLEEP QUALITY IN INPATIENTS HOSPITALIZED WITH AN ACQUIRED BRAIN INJURY: A QUALITATIVE EXPLORATION

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Introduction: Sleep is essential for recovery from severe medical conditions, yet disturbed sleep is a pervasive issue during hospitalization. Over half of inpatients with an Acquired Brain Injury (ABI) (Traumatic Brain Injury (TBI) or non-TBI, e.g., stroke) experience disturbed sleep while hospitalized, with insomnia and fragmented night-time sleep frequently reported. Sleep disturbances can delay neurorehabilitation and lead to excessive daytime sleepiness, presenting a significant barrier to ABI recovery and therapy engagement. Despite this, research regarding ABI and sleep quality among inpatients remains sparse, with more efforts needed to identify effective areas for intervention. A recommended first-step in intervention development is to conduct qualitative research with the target population. In inpatient ABI, this qualitative data is lacking. To address this, the current study aimed to explore inpatient perspectives of sleep quality during hospitalization for ABI.
Methods: As part of a broader qualitative project involving hospital staff and outpatients, N=13 inpatients with ABI (66±17y; 10 males) were recruited from a large rehabilitation hospital in Washington, USA. N=7 inpatients had ischemic stroke, N=4 had TBI, and N=2 had other non-TBI. On average, participants were 20 days post-ABI and 9 days post-admission, having received primary emergency care in other facilities. Semi-structured interviews were conducted to explore the nature and prevalence of sleep/wake disturbances, factors contributing to these disturbances, and current nighttime care practices.
Results: Reflexive thematic analysis revealed five key themes: Insomnia Symptoms; Nighttime Care Provision; Pain, Mental Health, and Other Comorbidities; The Hospital Environment; and Daytime Therapy Engagement.
Conclusion: Study findings can inform the future development of sleep interventions for inpatients with ABI. Interventions could include clustering nighttime care (e.g., conducting observations and administering medication simultaneously) to reduce nighttime disruptions and alleviate insomnia symptoms. Interventions should also look to address pain, mental health, and other comorbidities which influence sleep quality. The hospital environment (primarily, excessive noise and light) emerged as a significant concern, highlighting an inpatient-specific issue. A cyclical relationship between nighttime sleep quality and daytime therapy engagement was also explored. Ongoing data collection will provide further insights, with the results and conclusions presented here representing an early snapshot of the broader study.
Support (if any): N/A

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1288

MILD TRAUMATIC BRAIN INJURIES AND THE INTERACTION BETWEEN SLEEP AND COGNITIVE DYSFUNCTION

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Introduction: Mild Traumatic Brain Injuries (mTBIs) are associated with symptoms such as headaches, fatigue, mood changes, cognitive dysfunction, hindering executive functioning, attention, processing speed, and memory. Prior research has also implicated mTBIs in the development of sleep dysfunction and circadian rhythm disorders, and this has been associated with further neurocognitive degeneration. However, a lack of research exists examining how sleep dysfunction in individuals with mTBIs impacts specific cognitive domains. This study aims to examine the relationship and influence that sleep has on mTBI symptomology and cognitive dysfunction.
Methods: Adults with mTBIs (N= 167; Mage=24.41 years, 59% female) completed self-report questionnaires that assessed symptomology associated with mTBIs (RPCSQ), sleep (DSIQ), and personality (PAI; used to assess thought dysfunction). Participants also completed cognitive testing to assess executive functioning (D-KEFS). A multivariate analysis of variance assessed concussive symptomology's association with cognitive domains and sleep disturbance. Moderation analyses assessed sleep's influence on the relation between symptomology and cognitive dysfunction.
Results: There was a significant effect on cognitive dysfunction and sleep based on mTBI symptomology: PAI Thought dysfunction: $F(1, 42) = 2.015$, $p = .002$, partial $\eta 2 = .463$ D-KEFS Number-Letter Switching: $F(1, 42) = 2.129$, $p = .001$, partial $\eta 2 = .477$ D-KEFS Color Word Interference: $F(1, 42) = 2.115$, $p = .001$, partial $\eta 2 = .476$ Sleep disturbance: $F(1, 42) = 1.929$, $p = .004$, partial $\eta 2 = .453$ Sleep disturbance did not moderate the relationship between mTBI symptomology and cognitive task performance.
Conclusion: Results of this study replicate previous research that suggests mTBIs impact sleep and cognitive domains, like concentration, confusion, disorganization, and executive functioning. Despite previous literature on sleep and cognition, it indicates sleep does not moderate the relationship between mTBIs and cognitive dysfunction, suggesting an alternative relational mechanism. Future research should examine sleep's role in cognitive dysfunction in mTBIs given its potential neurodegenerative effects.
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1289

PRESENCE AND IMPACT OF BLAST-INDUCED TRAUMATIC BRAIN INJURY ON SLEEP HEALTH IN POST-9/11 VETERANS

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Introduction: In the post-9/11 conflicts in Southwest Asia and Afghanistan, traumatic brain injury (TBI) and blast exposure have been recognized as signature injuries. This is often accompanied by psychological health issues such a post traumatic stress disorder (PTSD). We have previously shown this group suffers from insufficient and disturbed sleep. The present study aims to examine the impact of blast-related TBI on sleep quality and psychological health.
Methods: Veterans enrolled in the Post-Deployment Cardiopulmonary Evaluation Network (PDCEN) underwent evaluation at five separate VA sites for unexplained dyspnea. Included in this in-depth evaluation were questionnaires inclusive of demographic information, the Brief Traumatic Brain Injury Scale (BTBIS), the Pittsburgh Sleep Quality Index (PSQI), and emotional health evaluations. The group was dichotomized based on the likely presence of blast-related TBI, defined as a positive BTBIS screen. Sleep dysfunction was defined as having a total PSQI score greater than or equal to 10. A multivariable logistic regression model was used to examine the association between TBI and sleep dysfunction, adjusted for age, sex, body mass index (BMI), race, anxiety, depression, and PTSD.
Results: A total of 301 veterans completed questionnaires. Respondents were aged 46 ± 9 years and mostly white males with an average BMI of 31.5 ± 7.1 kg/m2. Most veterans served in the Army or multiple branches of the military. Sleep quality was overall abnormal with 73% having PSQI >10, average PSQI 12.3 ± 4.4, and mean sleep duration of 5.2 ± 4.1 hours. Blast-related TBI was present in 86 veterans (28.6%) and associated with increased odds of having sleep dysfunction (aOR 2.8, 95% CI 1.2-6.8), with average PSQI 13.6 ± 4.0 among those with blast-related TBI and 11.8 ± 4.5 among those without ($p = 0.003$). Anxiety, depression, and PTSD were also more common when TBI was present, though only depression met significance.
Conclusion: In this group of post-9/11 veterans with exposure to burn pits and other airborne hazards, the presence of blast-induced TBI was associated with an increased risk of sleep disturbance and mood disorder. Future analysis will focus on the impact of blast-induced TBI on sleep disordered breathing.
Support (if any): US Department of Veterans Affairs

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1290

AMINO ACID SUPPLEMENTATION IMPROVES SLEEP IN OLDER ADULTS WITH TRAUMATIC BRAIN INJURY AT RISK FOR NEURODEGENERATION

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Introduction: Older adults with a history of traumatic brain injury (TBI) are more likely to experience chronic sleep disturbances and cognitive impairments, elevating their risk of future

neurodegeneration. Interventions to mitigate sleep and cognitive disturbances are critically needed. Our prior preclinical work demonstrated dietary supplementation with branched chain amino acids (BCAA: leucine, isoleucine, and valine), precursors to de novo glutamate production, restore orexin/hypocretin neuron function, sleep-wake regulation, and memory in rodent models of TBI. The present study aims to translate this potential therapeutic approach to humans with a history of TBI.

Methods: Veterans with TBI (n=157) were recruited (135 eligible, 115 enrolled, with 106 allocated 1:1:1:1), in this double-blind, placebo-controlled randomized clinical trial comparing dietary BCAA supplementation at three dosages (high: 60g/day, medium: 40g/day, and low: 20g/day) with placebo (rice protein, 60g/day) for 12-weeks. Primary outcomes included feasibility/acceptability metrics, sleep (self-report, wrist-based actigraphy, overnight polysomnography) and neuropsychological testing, which were collected at baseline and 4-, 8-, and 12-weeks of intervention. Follow-up questionnaire-based assessments were collected at 4 and 12-weeks post-intervention.

Results: Of the 106 Veterans allocated/randomized, 49 have completed data collection (13 high, 8 medium, 14 low, and 14 placebo), 29 have withdrawn, and 57 are presently active. This interim analysis considers only the 78 who have completed or withdrawn (i.e., 65% of the 120 target sample). We demonstrate overall retention of 63%, with most attrition by week 4 (15.7%; no difference across study arms). Protocol compliance was 95% for full adherence to intervention (5-7 days/week), and ~98% reported being very to extremely satisfied, with most complaints attributed to gastrointestinal discomfort. In the high dose group, pre vs. post BCAA supplementation showed improved self-reported sleep (insomnia severity index scores, 13.6±2.8 to 8.9±2.9, $p < 0.05$) and actigraphy measures: total sleep time (6:23±1:04 vs. 7:04±1:08 hh:mm, $p < 0.05$), sleep onset latency (19.5±16.1 vs. 6.0±9.1 minutes, $p < 0.05$), and wake-after-sleep onset (65.7±26.0 vs. 47.8±23.1 minutes, $p < 0.05$).

Conclusion: Dietary BCAA supplementation is a feasible and acceptable home-based intervention to improve sleep in older adults with a history of TBI. Ongoing work will yield effectiveness data related cognitive function, BCAA dosing and treatment duration.

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1291

IMPROVING EQUITABLE ACCESS TO OSA CARE FOR HOSPITALIZED TRAUMATIC BRAIN INJURY VIA STAKEHOLDER-IDENTIFIED DETERMINANTS TO IMPLEMENTATION

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Introduction: Despite high obstructive sleep apnea (OSA) prevalence (68%) during a time of critical neural repair following hospitalized traumatic brain injury (TBI), OSA screening and diagnosis is uncommon in TBI healthcare settings. Unrecognized OSA is problematic given its association with increased morbidity and early mortality. A recent multicenter comparativeness effectiveness trial (NCT 03033901) identified the best screening and diagnostic approach for use during inpatient rehabilitation following TBI. To support access to OSA management for a disabled population that experiences healthcare disparity, the study team leveraged stakeholder engagement to identify determinants (factors that facilitate or hinder) clinical translation of findings (OSA screening, diagnosis).

Methods: Stakeholders involved in the trial (n = 37) comprising individuals with lived experience of TBI; providers (rehabilitation, sleep medicine), researchers, industry representatives, healthcare administrators and policy professionals were asked to identify key considerations for translating findings into real-world practice. At trial conclusion, respondents were asked to answer, "What are the key things we need to consider to move the study results into real-world practice?" via a graffiti wall technique. Rapid content analysis was used to generate themes and validated by a third rater with TBI and OSA expertise.

Results: Responses resulted in the identification of seven determinants to OSA screening and diagnostic tool implementation during inpatient rehabilitation. Thematic analysis revealed the following needs: 1) Improve societal understanding of the importance of sleep, 2) Increase motivation/understanding of the need for OSA identification and treatment, 3) Research to identify the impact of OSA on TBI outcomes; 4) Understanding the cost to implementation of OSA management in inpatient settings, 5) Improve reimbursement for OSA management during inpatient rehabilitation, 6) Address logistical considerations of implementing screening, diagnosis, and treatment during hospitalization, and 7) Develop/adapt interventions to improve positive airway pressure compliance in a disabled population (hospitalized TBI) at risk for healthcare disparity.

Conclusion: This study identified determinants of clinical translation of screening and diagnostic tools for OSA in TBI from multiple stakeholder perspectives. These findings will inform future patient-, provider-, system-, and policy-level interventions to reduce healthcare disparity in TBI by improving access to high-quality OSA care.

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1292

IMPACT ON PATIENTS' PERCEIVED SLEEP QUALITY BY BED LOCATION IN THE INPATIENT NEUROLOGY UNIT

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Introduction: While sleep plays a critical role in restoration of health and wellbeing, sleep disruptions during hospitalization prolong the recovery period and increase mortality. Our recent survey-based observational study revealed differences in perspectives on sleep disruptions in the neurology unit between patients and staff. In this study, we will further investigate how patients' sleep quality is affected by bed location in the inpatient neurology unit.

Methods: We analyzed the data from a previously performed survey-based observational study on a 25-bed inpatient neurology unit at an academic medical center from April 2021 to October 2022. The unit was analyzed in three main areas: corridor, front, and back. Questionnaires used to assess patients' previous night's sleep included the Consensus Sleep Diary (CSD), the Karolinska Sleep Diary (KSD), and the Potential Hospital Sleep Disruptions and Noises Questionnaire (PHSDNQ). Nurses were asked which rooms they perceived to have the most disruptions. We used unpaired t-tests for statistical analysis.

Results: 224 out of 256 responses were analyzed. Of the 112 patients in shared rooms, 58 stayed in beds by the door while 54

were in beds by the window. Patients in shared rooms perceived their sleep to be more disrupted by medical interventions (vital signs, tests, and neurologic checks) compared to those in private rooms (1.971 ± 0.1.057, 1.58 ± 0.938, p = 0.004). Overall, there were no significant differences in sleep quality between shared and private rooms. Although nurses reported the front rooms closest to the nursing station to be the most disrupted, patients perceived no differences between the corridor, front, or back rooms. Interestingly, in the front shared rooms, patients perceived better sleep quality based on the KSD (sleep quality, restorative, restful, sleep throughout) in the bed by the door than by the window (3.356 ± 1.278, 2.553 ±1.079, p = 0.028). Additionally, perceived total sleep time (minutes) was higher for those by the door than window (417.69 ± 174.71, 304.74 ±146.38, p = 0.023).
Conclusion: There continues to be differences between perceived disruptions between the staff and the patients in the inpatient neurology unit. Further studies are needed to improve sleep quality in the neurology unit.
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1293
PREVALENCE OF STROKE AND TIA IN INSOMNIACS AND SLEEP EVALUATION DIFFERENCES: A TERTIARY CENTER PERSPECTIVE

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Introduction: Sleep is essential for neuronal, metabolic and vascular health. Insomnia increases stroke risk through development of hypertension, diabetes mellitus and hyperlipidemia. Stroke causes insomnia by altering sleep architecture. Insomniacs had a 54% stroke risk with a prevalence of 2.71% over 4 years in the community. About 50% of stroke patients have insomnia and only 7% undergo appropriate evaluation.
Methods: To evaluate the prevalence of stroke and Transient Ischemic Attack (TIA) in insomniacs and differences in sleep evaluation in those with cerebrovascular events, we performed a retrospective chart review. ICD 10 codes were utilized to identify insomniacs over last 6 years, aged 18 to 89 years. Based on reported prevalence of stroke in insomniacs, 651 patient charts were randomly selected from the 7000 identified.
Results: Prevalence of any stroke and TIA was 9.98%, 95% CI [7.7%-12.4%]. Ischemic stroke and TIA were the common cerebrovascular events (92%). Pre-stroke insomnia was present in 55% patients. Insomniacs with any cerebrovascular event were older (69 (56,80) vs 59 (42,69), p< 0.001). Sleep study was done in 76% insomniacs seen in a sleep clinic compared to 0.3% who were only seen by a primary care provider. Insomniacs with elevated BMI (p< 0.001), atrial fibrillation (p< 0.001), hypertension (p=0.011), diabetes mellitus (p< 0.001), hyperlipidemia (p< 0.001) or a cerebrovascular event (p=0.03) were frequently evaluated with a sleep study. About 71% of insomniacs with any cerebrovascular event were evaluated by sleep specialist and 54% underwent a sleep study. About 13% of insomniacs with an additional sleep disorder had a cerebrovascular event. About 31% with any stroke or TIA had both sleep apnea and insomnia disorder. The odds of having any stroke or TIA did not significantly increase by having an additional sleep disorder (OR 1.71, 95% CI [0.95, 3.08]).
Conclusion: Prevalence of stroke and TIA is higher in insomniacs at tertiary centers. They are more often evaluated by sleep specialists and undergo a sleep study. This may be due to better access to sleep clinics and increased awareness of the negative effects of insomnia on vascular health amongst primary care providers resulting in higher sleep disorder screening, especially in stroke survivors.
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1294
WHAT FACTORS INFLUENCE SLEEP HEALTH DURING RECOVERY AFTER STROKE?

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Introduction: People post stroke (PPS) exhibit a variety of sleep disorders. PPS with poor sleep health (SH) often have worse outcomes. However, the factors that may contribute to poor SH in PPS are poorly understood. The purpose of study was to explore factors that influence SH after stroke.
Methods: Data were collected at 10- (in the hospital), 60-, and 90-days post stroke. SH was assessed based on the components of the Ru-SATED scale by combining data from actigraphy: regularity, timing, efficiency, and duration of sleep; and self-report of satisfaction and alertness. This provided a surrogate Ru-SATED (S-Ru-SATED) SH score between 0 and 12, with higher scores indicating better SH. Common stroke outcomes were taken at each time point: Montreal Cognitive Assessment (MOCA), Barthel Index (BI), Patient Health Questionnaire 9 (PHQ-9), and self-selected gait speed (GS). To assess the relationship between the S-RU-SATED and potentially predictive covariates, we used a cumulative link mixed model. This method combines features of ordinal regression with mixed effects modeling. We estimated the cumulative probabilities of the response falling into or below each category of the S-Ru-SATED as a function of fixed effects (fixed predictive covariates included PHQ-9, BI, GS, MOCA, sex, age, and time post-stroke), and subject-specific random effects which captures the variability across subjects accounting for time dependencies in the data.
Results: Data from 90 PPS were used in the analysis. For the fixed effects, PHQ-9 had a significant negative estimate of -0.1327 (p < 0.001), indicating that for each unit increase in PHQ-9, the odds of being in a higher category of S-Ru-SATED decreased by approximately 12.4% holding other variables constant. The other predictors were not statistically significant.
Conclusion: Our findings suggest that people with greater levels of depression may have poorer sleep health during the first 3 months after stroke. Interestingly, differences between 60/90 days versus inpatient periods did not significantly influence SH. We would expect that SH would improve once participants were out of the hospital. Addressing depression early after stroke may be an important to improve SH in people who are recovering after stroke.
Support (if any): National Institutes of Health NINR, Award Number R01NR018979.

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1295
COMPOSITIONAL DATA ANALYSIS TO EXPLORE THE ASSOCIATION BETWEEN SLEEP, ACTIVITY, AND SEDENTARY BEHAVIOR AFTER STROKE

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Introduction: People post stroke (PPS) often exhibit impaired sleep, lower levels of activity, and high levels of sedentary behavior. The impact of these behaviors on stroke outcomes has traditionally been explored singularly. Compositional data analysis (CoDA) offers a unique method that combines 24-hour behaviors into a composition, which then can used for analysis. The purpose of this study was to use CoDA to analyze the composition of sleep, active, and sedentary behaviors and to explore its association with stroke related quality of life (S-QOL).
Methods: This was a cross-sectional study at 60 days post stroke. Participants wore an activity monitor (AM) for 7 days that measured time in sleep, active, and sedentary behaviors. Participants reported their S-QOL using the Stroke Impact Scale-16 (SIS-16). Depression (PHQ-9), gait speed (GS), and age were also measured as potential confounding covariates. CoDA was used to explore the composition of sleep, activity, and sedentary behaviors and the association between the composition of these behaviors and S-QOL. Multiple linear regression (MLR) analyses were performed using the transformed isometric log-ratios of the composition of behaviors with depression, gait speed, and age as covariates to explore the association between S-QOL and the composition.
Results: 58 participants wore an AM for 5.4 (1.4) days. The compositional mean of sleep, active, and sedentary behaviors in a 24-hour period was 36.4% in sleep, 8.3% in active, and 55.3% in sedentary behaviors. The composition of behaviors was significantly associated with S-QOL (p=0.0004), r2 of 0.69. Gait speed (p=0.0002) and depression (p=0.0003) were significant co-variates.
Conclusion: Participants spent most of their day in sedentary behaviors. CoDA provides a unique method to assess the composition of behaviors across a 24-hour period in people with stroke that may be more appropriate than examining each individual behavior because changing time in one behavior necessitates change in one of the other two behaviors across a 24-hour period. The composition of sleep, activity, and sedentary behaviors was significantly associated with S-QOL. Developing interventions to improve sleep and increase time in active behaviors may improve S-QOL
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1296

SEVERITY OF OBSTRUCTIVE SLEEP APNEA SEVERITY AND EARLY CPAP USE IS ASSOCIATED WITH CPAP ADHERENCE IN A STROKE REHABILITATION POPULATION

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Introduction: Continuous Positive Airway Pressure (CPAP) therapy is a common and effective treatment for obstructive sleep apnea (OSA). Among patients with stroke and OSA, CPAP therapy is associated with reduced stroke risk and improved recovery but is limited by generally poor adherence. We aimed to explore the association between clinical factors and the first 3 months of CPAP use within a stroke rehabilitation population who were provided with enhanced CPAP support.
Methods: Stroke patients admitted to inpatient rehabilitation (IPR) were enrolled and tested for OSA with a portable sleep apnea test. Eligible participants were provided CPAP for 3 months along with a multicomponent CPAP adherence intervention, including technical support, motivational interviewing, and mobile health interventions. Associations between demographics, stroke severity, and OSA-related factors and average CPAP use over 3 months were evaluated using t-tests.
Results: Thirty-three of 36 participants met criteria for OSA [mean age= 58 ± 11 years, 67% male, 52% non-Hispanic white (NHW)]. The mean respiratory event index (REI) was 21/hour and mean NIH Stroke Scale score was 6. Three participants withdrew from the study during IPR. Among the 30 remaining participants, mean nightly CPAP use over 3 months was 3.1 hours. Mean nightly CPAP use during IPR (3.3 ± 0.9 hours over a mean of 12.6 ± 2.4 days) was predictive of mean CPAP use after IPR (3.0 ± 1.1 hours), p = 0.01 (linear model). Mean nightly CPAP use was 4.8 hours among those with REI ≥ 30 compared to 2.4 hours among participants with REI< 30 (p=0.04). Mean CPAP use did not differ by stroke severity, oxygen desaturation index, age, gender or obesity.
Conclusion: In this study of enhanced CPAP support initiated during stroke IPR, OSA severity, but not stroke severity, was associated with CPAP use over a 3-month period. CPAP use during IPR was associated with CPAP use after IPR. Further investigations regarding the relationships of stroke, sleep apnea, and CPAP adherence are warranted to improve outcomes for patients with these common, and often comorbid, conditions.
Support (if any):

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1297

OSA IS ASSOCIATED WITH INCREASED INCIDENCE OF PARKINSON'S DISEASE AND IS MITIGATED BY CPAP TREATMENT

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Introduction: Prior work has demonstrated an association between Obstructive Sleep Apnea (OSA) and development of Parkinson's Disease (PD), but these studies were limited by small sample size, limited duration, confounding by large-effect covariates (e.g. age, race, smoking, comorbidities), and an inaccurate ICD-code-based definition of PD with positive predictive values below 50%. Herein we measure the impact of OSA and OSA treatment on subsequent incidence of PD by using the nationwide records of the US Department of Veterans Affairs, which spans 20+ years, includes 20+ million veterans, allows for adjustment of important covariates, and leverages accurate and validated definitions of PD.
Methods: OSA was defined by ICD-10 code G47.33 (OSA+) along with two validated PD diagnosis case definitions (PPV 76% and 90%). Outcomes included PD and death from any cause. CPAP use was captured in a free-text health record field called the HealthFactor. "CPAP+ Early" was defined as mentions of CPAP within 2 years of OSA diagnosis; "CPAP+ Late" indicated >2 years since OSA diagnosis.
Results: 1,552,505 OSA+ and 9,759,246 OSA- Veterans were identified. After weighting analysis and controlling for confounders (balancing of birthyear/age, sex, smoking status, race,

ethnicity, pseudo-randomization by covariates, and adjustment for competing risk of death) we found that OSA significantly increased the incidence of PD with 1.8 [1.4, 2.3] 95% CI, $p < 0.001$) extra cases of PD per 1000 people at 5 years after OSA onset. "CPAP+ Late" had a similar incidence of PD to CPAP-. In contrast, "CPAP+ Early" had lower incidence of PD, with a reduction of 2.3 cases of PD ($p < 0.001$) 5 years after OSA.
Conclusion: OSA may be a modifiable risk factor for the development of PD and potentially other synucleinopathies. Future work will involve optimizing and validating ascertainment of OSA diagnosis and CPAP usage.
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1298

ELECTROCARDIOGRAPHIC MEASURES OF AUTONOMIC FUNCTION AND HEART-BRAIN SYNCHRONIZATION DURING SLEEP AND RISK OF INCIDENT PARKINSON'S DISEASE

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Introduction: Sleep disruptions and autonomic dysfunction are common in prodromal Parkinson's disease (PD). Evidence suggests a possible breakdown of heart-brain communication in PD. It remains unclear whether electrocardiographic measures of autonomic function, autonomic balance, and heart-brain synchronization during sleep are associated with PD risk.
Methods: We examined 5864 Massachusetts General Hospital patients (median [range] age=49.0 [18-97] years; 51.9% female) without PD, dopaminergic medication use, or REM sleep behavior disorder who underwent polysomnography. Incident PD was determined using natural language processing of medical notes. From the polysomnography-electrocardiogram, we calculated average whole-night, REM-specific, and NREM-specific five-minute heart rate variability (HRV; SDNN, RMSSD, PNN50, HF, LF, VLF, and LF/HF) and cardiopulmonary coupling (CPC; synchronization between HRV and electrocardiogram-derived respiration; log high [HFC], low [LFC], and very low [VLFC] frequency coupling power) metrics. Metrics are influenced differentially by overall autonomic function, parasympathetic activity, and long-term dynamics (sympathetic, baroreflex, and other activity). Some (e.g. REM VLFC) are associated with specific sleep stages in health, reflecting heart-brain synchronization. We performed principal component (PC) analysis to quantify underlying influences on HRV/CPC. We examined associations between tertiles of PCs and incident PD using Fine-Gray and Cox models with death as a competing risk.
Results: Across a median (IQR) follow-up time of 8.9 (5.5) years, 360 (6.1%) adults developed PD. After adjustment for age, sex, race, education, body mass index, and smoking, the lowest tertile of PC1 (overall autonomic function; 53.3% variance explained; strong positive loadings for all metrics except LF/HF [not influenced by overall HRV]; HR [95% CI]=1.32 [1.01,1.71]), PC2 (autonomic balance; 13.4% variance explained; strong positive loadings for long-term dynamics metrics, small loadings for overall HRV metrics, and negative loadings for parasympathetic metrics; HR [95% CI]=1.37 [1.04,1.80]), and PC4 (heart-brain synchronization in REM; 4.9% variance explained; strong positive loadings for REM-specific versions of metrics associated with healthy REM, including VLFC; HR [95% CI]=1.30 [1.01,1.68]) showed increased PD risk relative to the highest tertile.
Conclusion: Adults with decreased overall autonomic function, reduced sympathetic, baroreflex, or other activity relative to parasympathetic activity during sleep, or heart-brain desynchronization in REM may exhibit increased PD risk.
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1299

REM SLEEP APNEA AND PARKINSON'S DISEASE RISK: INSIGHTS FROM A RETROSPECTIVE SLEEP CLINIC COHORT

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Introduction: Sleep apnea is common in Parkinson's disease (PD), but its role in incident PD remains unclear. Preclinical studies suggest intermittent mild hypoxia may have neuroprotective effects, whereas severe hypoxia could exacerbate neurodegeneration. Rapid Eye Movement (REM) and non-REM (NREM) sleep apnea may have distinct effects on PD risk or be influenced by PD pathophysiology differently. This study examines the associations between overall, REM, and NREM sleep apnea and PD risk.
Methods: This retrospective cohort included individuals aged ≥30 years who underwent polysomnography (PSG) at Massachusetts General Hospital. Participants had no PD diagnosis at baseline and met quality criteria (total sleep time ≥4 hours, REM and NREM ≥30 minutes). Sleep apnea, measured using the apnea hypopnea index (AHI), was stratified into REM and NREM stages and categorized as normal (AHI< 5), mild (5≤AHI< 15), moderate (15≤AHI< 30), and severe (AHI≥30). Demographics, comorbidities, and PD diagnoses were extracted from electronic medical records using natural language processing. Cox regression with death as a competing risk was used to examine associations between AHI and PD risk, adjusting for age, sex, race, body mass index, smoking, diabetes, and hypertension. Sensitivity analyses excluded participants with REM sleep behavior disorder (RBD) or diagnosed with PD within five years of PSG.
Results: Among 4,661 individuals (age 52.2 ± 12.9 years, 2390 [51.3%] female, 878 [18.8%] non-White) followed for 8.88 ± 3.62 years, 305 (6.55%) developed PD. After full adjustment, mild REM sleep apnea was associated with a reduced risk of PD compared to normal REM AHI (HR = 0.492, 95% CI: 0.312–0.774, P = 0.002). Moderate (HR = 0.690, 95% CI: 0.454–1.048, P = 0.082) and severe REM sleep apnea (HR = 0.718, 95% CI: 0.508–1.016, P = 0.062) showed trends toward reduced PD risk but were not statistically significant. These findings remained robust in sensitivity analyses. NREM and overall AHI showed no significant associations with PD risk.

Conclusion: Our observation suggests that mild REM sleep apnea may trigger neuroprotective responses. Further studies are needed to validate these findings and explore the underlying mechanisms.

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1300

ALTERED THETA-DELTA TEMPORAL RELATIONSHIP REVEALS IMPAIRED NREM ARCHITECTURE AND DISTINCT SPECTRAL PATTERNS IN PARKINSON'S DISEASE COGNITIVE SUBTYPES

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Introduction: Conventional, discretized quantitative electroencephalography (qEEG) analyses fail to capture disruptions in the continuous oscillatory dynamics of sleep homeostasis. Recent studies have observed abnormal anterior theta rhythms superimposed on delta during deeper stages of NREM in Parkinson's Disease (PD) reflecting altered sleep architecture, however, the temporal theta-delta relationship has not been characterized. Here we characterize sleep architecture by exploring relevant bandpower time course relationships that underlie the altered sleep spectrum in PD. We also explored their potential to distinguish PD cognitive subtypes.

Methods: Polysomnography electroencephalography (EEG) data were collected from 51 participants (PD=36, controls=15; mean ages PD: 68 ± 6, controls: 64 ± 8; sex PD: 17M/19F, controls: 5M/10F) as part of a broader study evaluating alterations to sleep architecture in PD. PD subtypes included mild cognitive impairment (PD-MCI, n=12) and PD with normal cognition (PD-NC, n=24). EEG (F3-M2) was preprocessed in MATLAB, temporally aligned with hypnogram data, and assessed using multitaper analysis to compute bandpower per sleep stage (N2, N3, N2+N3) across 30-second epochs. Spearman's correlation coefficients for the theta-delta time course relationship were calculated across sleep stages. Stage-based bandpower time-course plots were created to visualize sleep architecture oscillatory dynamics. Group differences were evaluated with Wilcoxon rank-sum tests with Benjamini-Hochberg correction for multiple comparisons (adjusted $p < 0.05$).

Results: In controls, bandpower time-course plots reflect a positive theta-delta relationship and progressive cyclic dissipation over NREM, indicating preserved oscillatory homeostasis. A significant negative (inverse) theta-delta relationship during N2 (p=0.007), N3 (p=0.015), and N2+N3 (p=0.015) was found in PD compared to controls. Exploratory analyses of PD subtypes compared to controls revealed negative theta-delta relationship during N2 (PD-MCI: p=0.003; PD-NC: p=0.030), N3 (PD-NC: p=0.036), and N2+N3 (PD-MCI: p=0.009).

Conclusion: Findings reveal an abnormal theta-delta relationship during deeper NREM, supporting the presence of a distinct mechanism of disrupted sleep time-course dynamics. A negative theta-delta correlation in PD reflects altered oscillatory homeostasis and distinguishes subtypes: N3 dominance in PD-NC and N2 dominance in PD-MCI. Future work will assess regional theta-delta relationships and associations with disease severity measures to enhance diagnostic utility.

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1301

MULTITAPER SPECTRAL ANALYSIS REVEALS ALTERED OSCILLATORY HOMEOSTASIS AND DISTINCT SPECTRAL PATTERNS IN PARKINSON'S DISEASE COGNITIVE SUBTYPES

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Introduction: Sleep disturbances and cognitive decline in Parkinson's disease (PD) are common, yet the neurophysiological mechanisms linking both remain unclear. Notably, EEG bandpower ratios characterize the inter-bandpower relationships reflecting sleep homeostasis and potential reliable EEG biomarkers of neurological disorders. We utilized an optimized multitaper spectral analysis of deeper NREM sleep, with a focus on bandpower ratios, to elucidate potential underlying neurophysiological sleep oscillatory homeostatic mechanisms in PD cognitive decline.

Methods: Polysomnography electroencephalography (EEG) data were collected from 51 participants (PD=36, controls=15; mean ages PD: 68 ± 6, controls: 64 ± 8; sex PD: 17M/19F, controls: 5M/10F) as part of a broader study evaluating alterations to sleep architecture in PD. PD subtypes included mild cognitive impairment (PD-MCI, n=12) and PD with normal cognition (PD-NC, n=24). EEG (F3-M2, C3-M2) was preprocessed in MATLAB, temporally aligned with hypnogram data, and assessed using multitaper analysis to compute bandpower per sleep stage (N2, N3, N2+N3) in 30-second epochs. Group differences were evaluated with Wilcoxon rank-sum tests with Benjamini-Hochberg correction for multiple comparisons (adjusted $p < 0.05$).

Results: Overall, bandpower differences were observed during N3 in PD compared to controls, with reduced delta (frontal: p=0.012; central: p=0.019), increased theta (frontal: p=0.007; central: p=0.009), increased sigma (frontal: p=0.025), and increased beta (frontal: p=0.025; central: p=0.028). Bandpower ratios in N3 revealed increased theta/delta (frontal: p=0.009; central: p=0.022) and reduced delta/sigma (frontal: p=0.022). PD subtypes' analyses showed that PD-MCI and PD-NC compared to controls (frontal) had reduced delta during N3 in both groups (PD-MCI: p=0.019; PD-NC: p=0.009). Theta was increased in PD-MCI during N2 (p=0.002), N3 (p=0.001), and N2+N3 (p=0.0006), and in PD-NC during N3 (p=0.009). Sigma was reduced in PD-MCI during N2 (p=0.015) but increased in PD-NC during N3 (p=0.009).

Conclusion: Significant stage-specific bandpower alterations in PD-sleep reveal disrupted oscillatory homeostasis in sleep EEG features (delta, theta, sigma) exemplified by spectral ratios during N3. Subtype analyses suggest distinct spectral patterns: increased theta and reduced sigma during N2 (PD-MCI) and reduced delta, increased theta and sigma in N3 (PD-NC). These findings highlight distinct bandpower features potentially underlying neurophysiological sleep oscillatory homeostatic mechanisms in PD cognitive decline.

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1302

REM-SLEEP BEHAVIOR DISORDER AND COGNITIVE CHANGES IN PARKINSON'S DISEASE AND ROLE OF DOPAMINE TRANSPORTER BINDING

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Introduction: REM-sleep behavior disorder (RBD) is a robust prodromal marker of Parkinson's disease (PD) and is strongly predictive of worse progression and outcome of non-motor symptoms, including cognitive impairment. Nonetheless, little is known about the RBD's interaction with striatal dopamine transporter binding, a key neurobiological mechanism in PD. The current study used epidemiologic dataset of PD and examined the association between RBD, dopamine transporter binding, and changes in cognitive performance with the aim of elucidating the potential interaction between RBD and dopamine system on cognition.
Methods: Sample included 1,143 individuals (mean age 62.72 □9.5, 38% female, 32% with RBD) with PD from the Parkinson's Progression Markers Initiative (PPMI), a large-scale dataset focusing on PD progression and underlying mechanisms. The presence of RBD was determined using the 10-item RBD Screening Questionnaire. Dopamine transporter (DaT) single-photon emission computed tomography were extracted for the putamen and the caudate to measure dopamine transporter availability. Cognitive outcomes included the measures of memory, attention, working memory, and executive functions. The regression analyses were performed to determine the effect of RBD on cognitive performance, and RBD x DaT interaction term was added to test the moderating role of DaT.
Results: RBD was significantly associated with the Symbol Digit Modalities Test (SDMT, B= -1.8, P=0.002) but not with other cognitive measures (Ps□0.13), after adjusting for age, sex, education level, and PD duration. While there was no significant interaction between RBD and DaT measure from any observed regions on SDMT (Ps □ 0.20), RBD's association with SDMT remained significant after adding DaT in the analytic model.
Conclusion: RBD was significantly associated with a measure of working memory and processing speed, independently from dopamine transporter activity. No interaction between RBD and striatal dopamine binding was observed. Our findings indicate that RBD alone is a robust and strong predictor of cognitive decline in PD, regardless of dopaminergic uptake in the striatum. Early detection and management of RBD would be important to slow the progression of PD and related cognitive impairment.
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1303

SLEEPINESS IN PARKINSON'S DISEASE: A RETROSPECTIVE ANALYSIS OF POLYSOMNOGRAM FINDINGS

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Introduction: Patients with Parkinson's disease (PD) have a variety of sleep problems, including excessive daytime sleepiness (EDS). EDS, is one of the prominent non-motor symptoms in PD that has impact on the quality of life. While several factors contribute to sleepiness in Parkinson's disease, in this study, we examine sleep characteristics seen on polysomnograms (PSG) to see if these contribute to the perceived daytime sleepiness in PD.
Methods: 43 patients with PD were identified in the UNC sleep database with having PSG data for review. Subjective daytime sleepiness was assessed with the use of the Epworth Sleepiness Scale (ESS) defined as ≥ 10. Sleep characteristics including total sleep time (TST), sleep efficiency (SE), sleep latency (SOL), REM latency, wake after sleep onset (WASO), and sleep stage percentages as well as findings of AHI, periodic limb movements (PLMS), and excessive EMG in REM sleep were compared between the groups with EDS versus no EDS. Groups were compared using t-test for continuous variables and Chi square test for categorical variables.
Results: Subjects with EDS (n = 23) had mean ESS of 12.78 and those without EDS (n = 20) had mean ESS of 4.95. TST, SE, SOL, WASO, AHI, PLMS, and the finding of excessive EMG in REM sleep were not different between groups. When sleep stages were evaluated, there was no significant difference between groups, except, those with EDS ≥10 had greater time in Stage N3 (52.5 vs 17.8 minutes) (p=0.043).
Conclusion: In our Parkinson's Disease patients, those with EDS had greater number of minutes in stage N3 sleep. Although this is not a large sample, the findings could suggest that for some patients with PD and excessive daytime sleepiness the homeostatic drive may be involved in the symptoms. Yet, further investigation is needed to confirm this possible relationship.
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1304

EFFECTS OF TDCS ON SLEEP DISTURBANCES, MOOD, AND AROUSAL LEVELS IN PARKINSON'S DISEASE: INSIGHTS FROM SMART DEVICE MONITORING

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Introduction: This study aims to investigate the effects of sequential transcranial direct current stimulation (tDCS) treatments on sleep disturbances and their interplay with mood and motor symptoms in Parkinson's disease (PD) patients, with smart devices used to objectively monitor sleep patterns and activity levels.
Methods: Twenty PD patients with depressive symptoms participated in ten sessions of tDCS treatment. Clinical assessments included the Unified Parkinson's Disease Rating Scale (UPDRS), Montgomery-Åsberg Depression Rating Scale (MADRS), State-Trait Anxiety Inventory (STAI), Apathy Scale (AS), and Parkinson's Disease Questionnaire-39 items (PDQ-39). Smart devices recorded sleep duration, patterns, and daily activity levels. Pre- and post-tDCS data were analyzed using paired t-tests, Pearson's correlation, and regression analyses to evaluate changes in sleep, mood, and motor outcomes.
Results: Although smart device data indicated no significant changes in total sleep duration post-tDCS, there was a significant increase in step counts (p = 0.012), suggesting an elevation in arousal levels. This increased arousal was correlated with mood improvements, as demonstrated by changes in MADRS scores (r = -0.47, p = 0.04). Regression analysis showed that changes in depressive symptoms explained 21.8% of the variance in step count (R^2 = 0.218, p = 0.04). However, no direct relationship

was found between motor symptom improvements (UPDRS) and sleep duration.
Conclusion: While tDCS did not extend total sleep duration, the observed increase in step counts implies heightened arousal levels, potentially driven by improved mood. Smart device monitoring provided objective data on activity and sleep, supporting its use in comprehensive PD management. These findings underscore the importance of evaluating arousal levels and mood as interconnected components influencing sleep and daily activity in PD patients.
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1305
VALIDATION OF A NOVEL METHOD FOR IDENTIFYING SLEEP-DISORDERED BREATHING IN SPINAL CORD INJURY

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Introduction: Spinal cord injury (SCI) is associated with complex health outcomes and can result in wide-ranging autonomic dysfunctions, many of which may complicate sleep. Indeed, most individuals with SCI experience poor sleep and some form of symptomatic sleep-disordered breathing (SDB: involuntary breath-holds during sleep causing transient hypoxia). Unmanaged SDB can progressively worsen functions of daily living and overall health, and there remains significant need for improved SDB evaluation in populations with SCI. Clinical sleep disorder diagnoses are necessary for treatment, but current assessments are prohibitive and require specialized in-laboratory testing that can be uncomfortable, impractical, and inaccessible for individuals with SCI.
Methods: We aimed to develop an at-home sleep testing protocol to assess SDB using two novel wearable technologies which noninvasively record overnight vital signs and sleep staging. Our validations compared Astroskin (form-fitting vest and headband) monitoring to simultaneous recordings using relevant gold-standard criteria. We then paired this with Fitbit (smartwatch) sleep staging to enable alignment of vital signs and sleep stages. Our design was initially evaluated in overnight sleep recordings from matched pairs of four individuals with SCI and four healthy controls.
Results: In healthy controls, the monitoring technology shows promise in providing dynamic readings of nocturnal blood oxygen saturation (SpO2; bias -2.95±2.7%; r=0.943; p< 0.0001), skin temperature (bias -0.3±0.4°C; r=0.997; p< 0.0001), respiration (r=0.967; p< 0.0001), 3-lead ECG, and body position. Over longer duration recordings, baseline blood pressure values met industry standards (bias -4.46±7.7mmHg; r=0.117; p=0.004), but dynamic blood pressure responses were captured poorly. In a case series examining preliminary results of one night of sleep in matched pairs, participants with SCI spent a greater proportion of their sleep in desaturated states (SpO2 ≤94%) compared to their matched controls. Interestingly, these nocturnal desaturations did not culminate in differences in time spent in varying sleep stages.
Conclusion: This study provides valuable insight into the use of novel wearable technologies to address known challenges and limitations of current home sleep apnea assessment methods. Our preliminary findings successfully track nocturnal desaturations and changes in sleep staging. These data show the utility of providing more accessible at-home evaluation of SDB in people with SCI.
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1306
SLEEP ROUTINES AND SLEEP DISTURBANCES AFTER SPINAL CORD INJURY: INSIGHTS FROM A COMMUNITY SURVEY

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Introduction: Many individuals with spinal cord injury (SCI) face a constellation of sleep disturbances that interfere with sleep initiation and/or continuity. While poor sleep is widely documented post-SCI, sleep management is often deprioritized for clinical attention. Given the potential for reciprocal impacts between sleep disturbances and additive effects on sleep outcomes, we aimed to characterise sleep routines and elucidate relationships between sleep disturbances and sleep outcomes in individuals living with SCI.
Methods: We conducted an online survey with community partner SCI British Columbia for Canadians (≥19 years old) living with SCI, inclusive of all lesion levels and sensorimotor-completeness. Survey questions pertained to sleep routines, support, and disturbances assessed by frequency, severity, and management. Established questionnaires evaluated poor sleep quality (Pittsburg Sleep Quality Index [PSQI]; score≥5), daytime sleepiness (Epworth Sleepiness Scale [ESS]; score≥10), and fatigue (Fatigue Severity Score [FSS]; score≥36).
Results: We report responses from 170 individuals with SCI (aged 43.4±13.6 years, 122 male, 14.5±11.8 years injured). Most (74%) participants manage their sleep independently. However, 28.8% use non-prescription substances to support sleep, which may reflect that 67.1% of participants have not reviewed their sleep care with a healthcare provider since initial discharge. In the past 6 months, 73.5% experienced ≥1 regular sleep disturbance, 55.2% of whom reported ≥3 disturbances. These included nociceptive pain (45.6%), anxiety (44.8%), bladder care (40.0%), spasticity (37.6%), turn routines (34.4%), neuropathic pain (30.4%), thermal discomfort (29.6%), autonomic dysreflexia (episodic hypertension; 23.1%), sleep apnea (20.8%), and bowel care (19.2%). Poor quality sleep was reported by 75.3% of respondents (PSQI 8.3±4.1), with 37.7% experiencing high fatigue (FSS 30.4±15.3), and 29.4% experiencing excessive daytime sleepiness (ESS 7.1±4.6). Compared to those without, individuals with ≥1 sleep disturbance reported higher PSQI (OR=14.9, p< 0.001), FSS (OR=6.0, p< 0.001), and ESS (OR=2.0, p< 0.05) scores, with all scores highly correlated with each other, with sleep duration, and the number of sleep disturbances experienced (p< 0.005).
Conclusion: Sleep disturbances post-SCI are highly prevalent, often occur in combination, and emerge as a determinant of global sleep health. Thus, sleep care presents as a clinical and research target with potential to improve quality of life for those living with SCI.
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1307
EXTERNAL VALIDATION OF ACTIGRAPHY-BASED IRBD CLASSIFIER USING A DIFFERENT ACTIGRAPH

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Introduction: Wrist-worn actigraphs have shown significant promise in detecting isolated REM sleep behavior disorder (iRBD). We previously developed a fully automated classifier for iRBD in the Stanford cohort using the AX-6 device (1-s epochs), which achieved a sensitivity of 95.2% and specificity of 85.7% by analyzing motion data during the sleep period. However, its generalizability across populations and other actigraphy devices remains unclear. Therefore, this study aimed to externally validate the Stanford iRBD classifier in the larger Hong Kong cohort using the Philips Actiwatch device (60-s epochs) (Actiwatch Spectrum Plus).

Methods: Eight healthy volunteers (28.4 ± 3.8 years, 62.5% female) were recruited to develop a conversion pipeline between Actiwatch and AX-6. They wore both devices continuously for three days on their nondominant hand. Activity counts were mapped from Actiwatch to AX-6 and optimized using linear and nonlinear regression models. The best mapping was evaluated using leave-one-out cross validation. The Stanford iRBD classifier was then applied to the Hong Kong dataset comprising 234 video-polysomnography confirmed iRBD patients and 123 control subjects. Olfactory function was assessed using an objective olfactory test on the subjects in Hong Kong dataset.

Results: We found strong correlations between the converted activity counts of Actiwatch (both linear and nonlinear) and AX-6 (ρ: 0.917–0.921). The linear regression model provided the best nighttime correlation of activity counts ($\rho = 0.833$) and the lowest mean absolute error in iRBD prediction scores. After conversion of the activity counts, the Stanford iRBD classifier achieved a sensitivity of 63.2%, a specificity of 90.2%, and an AUC of 0.86 in the Hong Kong cohort. Adding objective evidence of hyposmia to the actigraphy-based iRBD prediction reduced sensitivity to 46.5% (95% CI: 39.6%, 53.4%) but improved specificity to 99.0% (95% CI: 97.2%, 100%).

Conclusion: Our original iRBD classifier performed satisfactorily on a fully independent dataset with reduced sensitivity but increased specificity, despite the differences in both population and device used. This finding supports the generalizability of our iRBD classifier, which could serve as a useful screening tool for iRBD worldwide.

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1308

SLEEP HEALTH DISPARITY: FINDINGS FROM A RETROSPECTIVE ANALYSIS WITH ENGLISH- VERSUS SPANISH-SPEAKING OSA PATIENTS

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Introduction: Hispanics comprise the largest minority in the U.S., with a higher prevalence of obstructive sleep apnea (OSA). Social and sleep determinants of health in Hispanics, such as shift work, low income, and language barrier, increase the risk of poor health outcomes. Despite its clinical relevance, there is scant data on sleep health disparities in Spanish-speaking OSA patients, leaving a gap in the sleep research. This comparative study aimed to determine whether Spanish-speaking patients have higher rates of OSA, missed follow-up visits, and associated comorbidities, and to identify sleep health disparity while proposing mitigation efforts.
Methods: This single-center retrospective study was conducted on 200 patients who underwent polysomnography in 2022 at a large academic center in the U.S. The patients were categorized based on self-reported ethnicity and primary language.
Results: One hundred Spanish-speaking patients (SSP) (61 women, mean age 53.6, +/- 17.6 years, mean BMI 31.8 +/- 6.6) and 100 English-speaking patients (ESP) (47 women, mean age 53.4, +/- 17.8 years, mean BMI 35.9, +/- 8.4). OSA was diagnosed in 77 SSP and 72 ESP. The mean apnea-hypopnea index (AHI) was 19.0 +/-23.9 in SSP and 18.0 +/- 23.6 in ESP. SSP had significantly higher rates of OSA-associated comorbidities, including heart failure, hypertension, diabetes mellitus, and stroke (OR 0.424, 95% CI). Missed follow-up rates were markedly higher among SSP (65.2%) compared to ESP (34.8%) (OR 0.231). Among the Spanish-speaking patients (SSP), 29 had Medicare, 47 had Medicaid, and 24 had commercial insurance. Among the ESP, 26 had Medicare, 21 had Medicaid, and 53 had commercial insurance.
Conclusion: Spanish-speaking patients demonstrated worse OSA, worse follow-up rates, and higher OSA-related comorbidities compared to English-speaking patients. The observed disparities suggest that language barriers may significantly impact patient outcomes in obstructive sleep apnea, underscoring the importance of enhanced communication strategies to improve care for Spanish-speaking OSA patients.
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1309

IMPLEMENTABILITY OF A PERINATAL SLEEP CLINIC

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Introduction: Sleep problems have been historically viewed as a normal feature of pregnancy, but a burgeoning literature highlights the high prevalence and morbidity of prenatal insomnia. Half of pregnant women report speaking to their prenatal care provider about their sleep problems. However, care access is severely limited as most health systems do not have clearly identified clinics in which prenatal insomnia is managed. In 2023, Henry Ford Health (HFH) implemented the Perinatal Sleep Clinic (PSC), a telemedicine clinic co-directed by a clinical psychologist and obstetrician. As pregnant women with sleep disorders are not routinely treated in the HFH sleep clinic or behavioral health clinic, the PSC was intended to address an unmet patient need. The present study evaluated the implementability of the PSC in a large health system.
Methods: ~10,000 live births occur annually at HFH. The PSC launched to treat pregnant women with insomnia. We reviewed electronic medical records to describe patient throughput from January 2023 through November 2024. We surveyed 53 stakeholders within and outside of HFH who had roles in health system leadership and/or clinical care in the areas of obstetrics-gynecology, maternal-fetal medicine, perinatal mental health, and/or sleep medicine. Surveys included the Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM). Scale scores range from 1-5 with higher scores indicating more favorable implementation ratings.
Results: In 2 years, the PSC treated 110 pregnant women with insomnia. Among our surveyed stakeholders, 74.5% were employed by HFH. Stakeholders rated the PSC as highly acceptable (AIM: 4.52±.67), highly appropriate (IAM: 4.61±.57), and highly feasible at HFH (FIM: 4.23±.68). Additionally, stakeholders rated the clinic favorably for providing an unmet clinical need (4.65±.52) and providing an important clinical service (4.65±.59). Most stakeholders (82.4%) indicated that the clinic should be hybrid, offering both telemedicine and in-person care options.
Conclusion: As women increasingly seek help for their sleep during pregnancy, clinic resources must be made available for these patients. Leadership and provider stakeholders supported the acceptability, appropriateness, and feasibility of the PSC (ideally, as a hybrid clinic), thereby supporting its implementation in a large health system.
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1310

RECEIPT OF GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONISTS AMONG RURAL PATIENTS WITH OBSTRUCTIVE SLEEP APNEA AND EXCESS WEIGHT

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Introduction: Patients living in rural areas have a greater burden of obstructive sleep apnea (OSA) and other weight-related comorbidities. Simultaneously, highly effective services for weight management (e.g., bariatric surgery) are resource intensive and limited to urban centers. New Glucagon-Like Peptide-1

Receptor Agonists (GLP-1RAs) are highly effective for weight loss, decrease OSA severity, and comprise a scalable solution to potentially meet the needs of rural areas. We aimed to test the association of rurality with the initiation of GLP-1RAs among patients with OSA and excess weight.
Methods: We used electronic health record data from the Veterans Health Administration to identify patients meeting the following criteria: 1) sleep study between October 1, 2017 and May 1, 2023, 2) diagnosis of OSA, 3) body mass index ≥ 27 kg/m2, and 4) participation in a lifestyle-based weight management program. We defined rurality by Rural Urban Commuting Area Codes, census tract-based codes that we collapsed into a binary variable of rural vs urban. The outcome was the receipt of a GLP-1RA approved for chronic weight loss (liraglutide, semaglutide, or tirzepatide) within one year of meeting inclusion criteria. We performed a mixed effects logistic regression accounting for patient and site level factors including demographics, comorbidities, and drive time to care.
Results: 68,862 patients met the inclusion criteria, and 17,929 (26.0%) lived in rural areas. Overall, 8.7% of patients living in rural areas received a GLP-1RA, relative to 7.8% of urban peers. However, after accounting for patient and site level confounders, patients living in rural areas had ~10% lower odds of receipt of a GLP-1RA (OR 0.91, 95%CI 0.83-0.98). This trend remained similar in sensitivity analyses which 1) stratify data by diabetes diagnoses and 2) considered receipt of other weight management medications.
Conclusion: Among patients with OSA and excess weight, after adjustment for confounding variables, those living in rural areas appear to be less likely to receive GLP-1RAs relative to urban peers. Gaps in the delivery of these promising medications may potentiate disparities in health-related outcomes. New strategies are needed to overcome barriers to the delivery of GLP-1RAs to patients with OSA and excess weight.
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1311
TIME OF DAY AND SUICIDE RISK SCREENING OUTCOMES IN VETERANS HEALTH ADMINISTRATION EMERGENCY DEPARTMENTS

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Introduction: Nocturnal wakefulness is a risk factor for suicide. After adjusting for the proportion of the population awake at each given hour, Veterans are most likely to die by suicide between 12-3 am. It is unclear if self-reported suicidal thoughts and behaviors also follow such a daily rhythm in healthcare settings. The present study examined the relationship between time of day and positive suicide risk screens in emergency departments within the Veterans Health Administration (VHA).
Methods: This was an analysis of VHA medical record data from calendar year 2023. Responses on the Columbia-Suicide Severity Rating Scale (C-SSRS) screener were extracted for all veterans who completed their first screen of the year in a VHA emergency department. Risk of a positive suicide screen was modeled using Poisson regression with robust errors. Time of day was modeled using either cyclic b-splines and cosinor harmonic terms, with the model fit of the different approaches compared using the Bayesian Information Criterion.
Results: Data were available for 708,256 veterans, of whom 4,630 (0.7%) had a positive C-SSRS screen. Modeling time-of-day with cosinor harmonic terms (24-, 12-, and 8-hour harmonics) demonstrated better model fit than with cyclic b-splines (ΔBIC = -13.03). Risk of a positive C-SSRS screen was strongly associated with the time of day ($\chi 2$ = 429.4, df = 6, p <.001), with the lowest risk observed at 7:48 am (0.28%) and the highest risk observed at 1:30 am (1.02%; relative risk = 3.60).
Conclusion: Consistent with suicide rate data, risk of a positive suicide screen demonstrated a clear daily rhythm, with a nadir in the morning and a peak in the late nighttime. A steady rise in positive screening risk was observed from morning through night. These findings provide further support that nocturnal wakefulness is a risk factor for suicidal thoughts and behaviors. Addressing sleep difficulties among veterans may therefore help reduce suicide risk.
Support (if any): This study is based on work supported by the US Department of Veterans Affairs and the Rocky Mountain Mental Illness Research, Education, and Clinical Center

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1312
TECHNOLOGY-ENABLED SCREENING TARGETING OBSTRUCTIVE SLEEP APNEA (TEST-OSA) IN PRIMARY CARE OLDER PATIENTS

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Introduction: Undiagnosed obstructive Sleep Apnea (OSA) is prevalent among older adults and poses health risks. The feasibility and effectiveness of routine OSA screening in primary care remain underexplored.
Methods: We developed and pilot-tested an electronic health record (EHR)-embedded OSA screening strategy across 10 primary care clinics within a large health system (9/6/2023-6/30/2024). Patients aged 65+ without prior OSA diagnosis were invited to complete an OSA screener ('STOP') via patient portal before Medicare Annual Wellness Visits. Screening results and next-step recommendations were auto-populated in the EHR for clinician review. Fidelity data were extracted from EHR through 12/16/2024 to allow sleep study completion. Acceptability, feasibility, and implementation barriers were examined via semi-structured interviews (21 high-risk patients and 7 clinicians), supplemented by a clinician close-out survey.
Results: Of 1105 eligible patients, 48.1% (n=532; age 73.5±6.1; 49.4% female; 86.3% non-Hispanic White; BMI 27.3±5.2) completed the screener, with 30.1% (n=160/532) identified as high-risk for OSA. High-risk patients had higher BMI (28.2 [IQR 25.1-31.7] vs. 26.4 [23.6-29.2], p< 0.001) and more comorbidities (4 [3-6] vs. 3 [2-5], p< 0.001) than low-risk patients. Sleep studies were ordered for 35.6% (n=57/160) of high-risk patients, with 52.6% (30/57) completing them at a median of 60 days (range: 8-153). Clinicians reported consistently discussing screening results but cited patient refusal as the main barrier to ordering studies. Barriers for patients included limited awareness of OSA significance and misconceptions about diagnostic procedures and treatments. Among patients who completed sleep studies, 76.7% (n=23/30) received new diagnoses, including OSA (n=20 overall; n=10 moderate-to-severe), periodic limb movement disorder (n=4), and non-obstructive hypoxia (n=3). Treatment

recommendations included specialty referral (n=20), positive airway pressure therapy (n=13), and positional therapy (n=3). Overall, 14.4% of high-risk patients (n=23/160) and 4.3% of all screened patients (n=23/532) received new diagnoses prompting clinical intervention. Both clinicians and patients reported minimal burden from the process.
Conclusion: An EHR-integrated OSA screening strategy for older adults was feasible in primary care, diagnosing one OSA case per 27 patients screened. Future studies should focus on strategies to promote screening among non-portal users and to improve patient education about the health impacts, diagnostic procedures, and treatment options of OSA.
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1313
EFFECTS OF MORNING AND EVENING ACUTE EXERCISES ON OBJECTIVE SLEEP QUALITY AND NOCTURNAL BLOOD PRESSURE IN YOUNG MEN

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Introduction: Elevated blood pressure (BP) during sleep is an independent risk factor for cardiovascular disease (Kario et al., 2017). Although morning exercise has shown to improve sleep quality than evening exercise (Yamanaka et al., 2015), but the effects of acute morning and evening aerobic exercise on sleep quality and nocturnal BP have not been fully characterized. This study aimed to examine the effects of morning and evening acute aerobic exercises on sleep quality and nocturnal BP in healthy young men.
Methods: This randomized controlled crossover study included 15 young men (age; 24.4 ± 4 years, height; 172 ± 6 cm, weight; 63 ± 8 kg) who underwent three sessions; a morning acute exercise (ME) condition (cycling at 65% of preliminary heart rate for 30 min starting at 9:30 AM), an evening acute exercise (EE) condition (the same exercise as the ME condition starting at 5:30 PM), and a no exercise control (CON) condition. BP (oscillometric method), autonomic function (spectral analysis of heart rate variability), and sleep quality (zero-cross method) were assessed.
Results: Systolic BP, wake time after sleep onset, sleep efficiency during nighttime sleep, and frequency of nighttime sleep were lower in the ME condition than in the CON condition ($P < 0.05$), with no difference in the EE condition. The high-frequency component (parasympathetic activity index) of nocturnal sleep was higher in the ME condition than in the CON condition ($P < 0.05$), with no difference in the EE condition.
Conclusion: The findings suggest that acute morning aerobic exercise improves sleep quality, increases parasympathetic nervous system activity, and decreases nocturnal BP. The study results may help sustain the public's willingness to exercise in clinical settings to improve sleep quality and prevent hypertension.
Support (if any):

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1314
WHAT INFLUENCES SLEEP STUDY COMPLETION AMONG PEOPLE WITH HIV IN CARE?

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Introduction: People with HIV (PWH) face a substantially higher prevalence of obstructive sleep apnea (OSA) than the general population, with rates ranging from 20% to 70% in PWH compared to 9% to 38% in the general population. Fatigue, also highly prevalent in PWH, can be caused by OSA. Despite its high prevalence and potential impact on quality of life, OSA is underdiagnosed in PWH and sleep studies to diagnose OSA are underutilized. We investigated characteristics associated with sleep study performance among PWH engaged in care.
Methods: Demographic and clinical characteristics, comorbidities, and patient-reported outcomes (e.g., fatigue) were compared between PWH at Madison Clinic at the University of Washington who underwent sleep studies between 2008 and 2023 and those who did not. We used relative risk regression models to estimate associations between HIV factors (CD4 count and viral load) and fatigue and having received a sleep study, adjusted for demographic and clinical characteristics and comorbidities.
Results: Among 3,977 PWH, 165 (4%) completed a sleep study. Compared to those who did not receive sleep studies, PWH who underwent sleep studies were slightly older (mean age 50 vs. 48), had higher BMI, and better immunity, with higher mean CD4 cell counts (635 vs. 568) and greater HIV viral suppression (97% suppressed vs. 85%). PWH who received a sleep study had a greater prevalence of comorbidities such as diabetes (16% vs. 11%), dyslipidemia (41% vs. 27%), and hypertension (47% vs. 32%), as well as self-reported bothersome fatigue (79% vs. 55%). In adjusted models, we observed a 2.90-times (95% CI: 1.90-4.43) greater likelihood of having received a sleep study among PWH with bothersome fatigue, compared to those without.
Conclusion: We observed that PWH who received a sleep study had better HIV control (higher CD4 count and viral suppression), and a greater burden of fatigue and comorbidities often associated with OSA, than PWH who did not receive a sleep study. This suggests that healthcare providers and patients are more likely to prioritize evaluation of OSA in this context
Support (if any):

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1315
IMPROVING ACCESS TO NIGHTMARE THERAPY: A QI INITIATIVE FOR VETERANS

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Introduction: One in ten US Veterans endorse trauma-related nightmares in their lifetime. Imagery rehearsal therapy is an effective and time-efficient therapy which is not widely accessible. We sought to evaluate if a group format could improve access to treatment.
Methods: This quality improvement project utilized Plan-Do-Study-Act methodology to evaluate impact on access to care by creating a group format for narrative-enhanced imagery rehearsal therapy (N-IRT). Retrospective review of administrative data identified trends in wait times and clinic utilization. To explore contributors to low group utilization, we performed a secondary root-cause analysis using stakeholder brainstorming sessions and chart review.
Results: N-IRT group was first offered in July 2023. In January 2024, we revised our triage workflow, including N-IRT group eligibility criteria, to encourage group enrollment and improve wait times for individual appointments. After these updates, wait time

for an individual sleep psychologist appointment decreased from 79.3 days in January 2024 to 28.9 days by March 2024. Between January and October 2024, median N-IRT group size was 3 patients. We achieved our target of 4+ patients enrolled in N-IRT group for 5 out of 10 months (50%). Between 09/01/24-10/31/2024, 20 referrals for N-IRT were received, yet only 4 patients (20%) attended N-IRT group. Of the sixteen patients who did not attend N-IRT group, 5 had scheduling issues and 11 were excluded at nurse triage. Nurse triage notes cited a variety of reasons for exclusion from group, including patient preference for individual care (N=3), request for multiple services (N=2), pending sleep medicine evaluation (N=2), medical complexity (N=1), inability to reach the patient (N=2), or lack of dream recall (N=1).
Conclusion: Multiple interventions were necessary to achieve target wait times for nightmare therapy. Barriers to group-based nightmare therapy included scheduling issues, medical complexity/contraindications, and patient preference for individual care. Tackling these barriers will likely require a multifactorial approach that includes patient and referring provider education.
Support (if any): This non-research operations project was conducted in accordance with VHA Program Guide 1200.21. The views expressed are solely those of the authors and do not represent the views of the US Department of Veterans Affairs or the US Government.

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1316
SLEEP AND PILLOWS: A NEW APPROACH TO IMPROVE NECK PAIN WITH SOMATIC SYMPTOMS USING STRICTLY ADJUSTED-HEIGHT PILLOWS

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Introduction: Neck pain causes significant negative physical and psychological effects and has a high prevalence worldwide. Cervical spine alignment is strongly associated with neck pain. It is suggested that improper pillow usage induces neck pain during sleep and awakeness and poor sleep quality by changing cervical spine alignment. Some orthopedic surgeons research the relationship between cervical alignment and pillows but have not determined the best requirements of pillows, such as materials, height, and shape, to improve neck pain and sleep. This study tries to longitudinally analyze whether strictly adjusted-height pillows improve clinical outcomes including neck pain and somatic symptoms assessed by the SSS-8. Moreover, we identify any factors related to neck pain improvement and treatment satisfaction.
Methods: A total of 84 participants with chief complaints of neck pain with somatic symptoms were evaluated using the numerical rating scale (NRS) and the Somatic Symptom Scale-8 (SSS-8). The SSS-8 is a self-administered questionnaire to assess the levels of somatic symptoms such as stomach or bowel problems, back pain, pain in the limbs or joints, headaches, chest pain or shortness of breath, dizziness, feeling tired or having low energy, and having trouble sleeping. We adjusted the height of customized pillows to fit each individual patient by millimeters using the SSS-Method and collected data at the baseline, after two weeks, and after three months. The SSS-Method determines only one optimal pillow height common to the three positions, supine, lateral, and turning over.
Results: Forty-two participants (50%) achieved the minimal clinically important difference for neck pain with a decrease of three points or higher in the NRS. The baseline neck pain scores were significantly higher in the group that achieved the minimal clinically important difference. The three-month change in the NRS and SSS-8 was significantly greater in participants who were satisfied with treatment. A significant positive association existed between improvement in the NRS and the SSS-8 at three months.
Conclusion: Strictly adjusted-height pillows using the SSS method significantly improved both physical neck pain and somatic symptoms. Adjusting pillow height for individuals is a potentially important requirement of pillow parameters.
Support (if any):

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1317
ADDRESSING OSA CARE IN RURAL COMMUNITIES: DEVELOPMENT OF THE WEST VIRGINIA OSA ACADEMIC MENTORING PARTNERSHIP

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Introduction: This study used implementation science and community engaged research methods to address a significant care gap for obstructive sleep apnea (OSA) in West Virginia (WV). To this end, we designed an intervention to support primary care providers (PCPs) who treat patients in rural WV. Our overall project is grounded in context-sensitive approaches to address the unique challenges of OSA management in the rural primary care setting. Here we describe the pre-implementation work that identified the determinants of implementation in rural settings and the selection of strategies that led to the initial program; these strategies will inform our prospective implementation effectiveness study.
Methods: We used the VA Quality and Enhancement and Research Initiative (QUERI) Implementation Roadmap to inform program development. Barriers and facilitators identified in our previous research were mapped to the domains of the Consolidated Framework for Implementation Research (CFIR) to inform our implementation plan. We derived Expert Recommendations for Implementing Change (ERIC) strategies from the CFIR mapping exercise to identify the strategies that would improve implementation outcomes in rural primary care.
Results: Themes identified from our previous mixed methods community engagement study with PCPs were reviewed and mapped to CFIR domains and coded as implementation barriers or facilitators. Based on this work we identified ERIC strategies that were most likely to facilitate implementation of our intervention. The implementation strategy category identified as most important for the OSA care program implementation was "Develop stakeholder interrelationships." Other important

strategy categories included "Provide interactive assistance" and "Support for clinicians" in the targeted rural communities.
Conclusion: Leveraging a community-engaged approach and using implementation science informed the development of a novel program to support PCPs in OSA management that is tailored to the realities of rural primary care. This program, the West Virginia Obstructive Sleep Apnea Academic Mentoring Partnership (WV OSA AMP), is well-positioned to address the care disparity for OSA in rural communities in a sustainable way. More information on WV OSA AMP is available at: https://wvrha.org/wvosaamp/.
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1318

INITIAL IMPLEMENTATION OUTCOMES OF THE WEST VIRGINIA OBSTRUCTIVE SLEEP APNEA ACADEMIC MENTORING PARTNERSHIP

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Introduction: There is a critical need to create sustainable interventions for the nearly 80% of patients with undiagnosed obstructive sleep apnea (OSA), particularly in rural communities where notable health disparities exist. The West Virginia OSA Academic Mentoring Partnership (WV OSA AMP) was developed to address this care gap and sustainably engage rural primary care providers in the management of OSA. This study analyzed acceptability and feasibility outcomes from the initial cohort of providers enrolled in WV OSA AMP.
Methods: WV OSA AMP was developed from implementation science/community engagement methodologies utilizing the VA Quality Enhancement Initiative to develop a roadmap for implementation of the training and support intervention. This study assessed initial feasibility and acceptability outcomes of the WV OSA AMP based on post-training questionnaires. The Feasibility of Implementation Measure (FIM) and the Acceptability of Implementation Measure (AIM) are validated measures that use a 5-point Likert scale to assess agreement across participant perspectives on the feasibility and acceptability of the program.
Results: Of the 14 participants, seven have completed the post training surveys. Analysis of the AIM revealed an average score of 4.7 out of 5 across all domains. No respondents disagreed or completely disagreed with items relating to the acceptability of the intervention. Analysis of the FIM revealed an average score of 4.7 in the domains of: 1) the intervention seems implementable, 2) the intervention seems possible, and 3) the intervention seems doable. An average score of 4.6 was recorded in the domain 'this intervention seems easy to use'.
Conclusion: Our results demonstrate high levels of acceptability and feasibility in the initial cohort of WV OSA AMP participants. These findings support the notion that community engagement and implementation science can lead to effective programs that address care disparity for sleep disorders in disadvantaged areas. The next WV OSA AMP sessions are scheduled for January 30 and April 30, 2025. We plan to repeat these assessments and be able to analyze outcomes in a larger sample. We will also perform a qualitative analysis of semi-structured interviews with participants.
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1319

LINKING ELECTRONIC HEALTH RECORD METRICS TO PATIENT-REPORTED SLEEP QUALITY IN HOSPITAL SETTINGS: A NOVEL APPROACH

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Introduction: Sleep disruptions are common in hospitalized patients, often caused by patient-staff interactions (PSIs) like vital sign checks and testing. While outpatient sleep is commonly assessed using polysomnography and patient-reported outcomes (PROs), these methods are impractical in inpatient settings. Consequently, inpatient sleep disturbances are typically inferred rather than directly measured. To address this gap, we developed two electronic health record (EHR)-derived metrics—the longest uninterrupted sleep opportunity (LUSO) and interruptive episodes—to quantify sleep disruptions from PSIs. This study evaluates whether these metrics correlate with sleep PROs.
Methods: Sleep PROs were obtained via the Consensus Sleep Diary and the Potential Hospital Sleep Disruptions and Noises Questionnaire for 247 inpatient nights from a neurology unit (April 2021–October 2022). Using established methods, we calculated LUSO and interruptive episode counts for each surveyed night. Associations between EHR-derived metrics and PROs were analyzed using univariate and multivariable models, adjusting for age, gender, and race.
Results: Longer LUSO was associated with fewer patient-reported disruptions from medical interventions ($\beta=-0.16$, 95% CI: −0.24, −0.09, $p< 0.0001$) and increased total sleep time (TST; $\beta=18.28$ minutes, 95% CI: 7.19, 29.37, $p=0.001$). Higher interruptive episode counts were associated with greater perceived disruptions ($\beta=0.18$, 95% CI: 0.10, 0.27, $p< 0.0001$) and shorter TST ($\beta=-23.10$ minutes, 95% CI: −36.00, −10.50, $p=0.0004$). Multivariate analysis confirmed these associations, with longer LUSO linked to lower perceived disruptions ($\beta=-0.19$, 95% CI: −0.29, −0.10, $p=0.008$) and higher episode counts linked to greater disruptions ($\beta=0.21$, 95% CI: 0.09, 0.32, $p=0.003$). A trend toward greater patient-reported medical disruption was observed among stroke patients ($\beta=0.50$, 95% CI: −0.01, 1.01, $p=0.054$). However, the association between episode count and patient-reported medical interventions did not differ significantly between stroke and non-stroke patients.
Conclusion: EHR-derived metrics, LUSO, and interruptive episodes are significantly associated with sleep PROs, suggesting their potential as proxies for inpatient sleep quality. Additionally, a trend toward greater perceived medical disruption was observed among stroke patients, though the association between LUSO and interruptive episodes did not differ by stroke status. These findings underscore the need for targeted strategies to address vulnerable populations, such as stroke patients.
Support (if any): University of Rochester Medical Center Department of Medicine Pilot Award

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1320
DOES SLEEP QUALITY AND DURATION HAVE ANY EFFECT ON THE RECOVERY OF HOSPITALIZED PATIENTS- USING THE NHANES DATA SET

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[1] LECOM

Introduction: This study aims to explore the relationship between sleep quality and duration and the recovery outcomes of hospitalized patients. Data was sourced from the National Health and Nutrition Examination Survey (NHANES) for the years 2005-2020.
Methods: Seven NHANES datasets(2005-2006, 2007-2008, 2009-2010, 2011-2012, 2013-2014, 2015-2016, and 2017-2020) were compiled, focusing on sleep disorders, hospital utilization, medical conditions, body measures, and demographics. The data was pre-processed using Python, filtering study IDs to ensure consistency across datasets. The final dataset included 931 rows and 19 columns after excluding incomplete responses and focusing on patients with overnight hospital stays. Recovery was defined as a binary variable based on self-reported general health condition, categorized as "Recovered" (Good, Very Good, Excellent) or "Not Recovered" (Poor, Fair).
Results: Logistic regression was employed to assess the impact of average sleep duration on recovery. An initial model using only sleep duration as the predictor showed an accuracy of 56.68%. A more comprehensive model incorporating additional variables (e.g., sleep quality, number of hospital nights, age, ethnicity) improved accuracy to 66.31%. However, this model exhibited a high false positive rate, indicating it often incorrectly predicted recovery. The model's sensitivity (true positive rate) was 86.8%, accurately predicting recovery in 86.8% of cases within the test data. Specificity (true negative rate) was 39.5%, indicating a high rate of false positives. Key predictors identified through recursive feature elimination included sleep quality, number of hospital nights, age, and ethnicity. Average sleep duration did not significantly impact recovery ($p = 0.66$).
Conclusion: The study found that while sleep quality and certain demographic factors significantly influence recovery, average sleep duration alone is not a strong predictor. The logistic regression model requires further refinement to reduce false positives and improve specificity before it can be effectively used in clinical practice.
Support (if any): None

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1321
WITHDRAWN

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1322
TEN-YEARS' HEALTH CARE UTILIZATIONS DUE TO OBESITY HYPOVENTILATION SYNDROME AMONG HIGH-RISK MORTALITY IN U.S. HOSPITALS

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Introduction: Only the top 5% of health-care utilizations account for 60% of health-care expenditures in the U.S., with most costs occurring in the last year of life from hospital inpatient services for example, obesity hypoventilation syndrome (OHS). This study aims at examining (1) health care utilization trends among OHS admission with high-risk mortality group and (2) associated factors of health care utilizations over the past decade.
Methods: This was a retrospective study that analyzed the National Inpatient Sample between 2012 and 2021. Adults 18+ years with OHS and high-risk mortality were identified. OHS was defined as International Classification of Diseases, 9th/10th revisions. High-risk mortality was defined as the All-Patient Refined Diagnosis-Related Group (APR-DRG) Risk of Mortality ("rating of 3-4 subclasses). Total charges were the main measurement of health care utilizations and were adjusted by applying for the Consumer Price Index (CPI) rate since 2012. We performed multivariate regression analyses by treating total charges as a dependent variable, respectively as well as year as an independent variable.
Results: A total of 279,067 hospital admissions were identified. Rate of OHS with high-risk mortality per total 100,000 hospital admissions were increased from 960.4 in 2012 to 1,445.7 in 2021 ($p < .001$). Although mean hospital LOS had been shorter from 11.8 days in 2012 to 7.4 days, mean total charges had been remarkably uptrends from $65,846.0 in 2012 to $118,121.39 in 2021. Younger age (estimate $191.3 per year-old), more severe APR-DRG (estimate $32,720.1), Hispanics ($20,877.7) compared to Whites, private insurance holder ($6,959.4) compared to government insurance holder, and prolonged hospital length of stay (estimate $9,549.6 per day), and year 2021 (estimate $30,205.5) compared to year 2012 were associated with higher total charges (all $p < .001$; R-square 0.43; coefficient variance 124.3).
Conclusion: Health care utilizations of hospital care for OHS with high-risk mortality are uptrends along with more frequent hospital admission encounters. Workforce education for non-sleep special professionals is urgently warranted to advance quality and efficiency of care. Especially, health care professionals serving racial and ethnic minorities are prioritized to enhance their competencies of managing OHS individuals with high-risk mortality.
Support (if any): U.S. DHHS HRSA U1QHP53032

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1323
SUSTAINED USE AND PERCEIVED BENEFITS OF THE CBT FOR NIGHTMARES TRAINING PROGRAM AMONG VHA PROVIDERS

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Introduction: Chronic nightmares significantly impact Veterans' sleep, trauma symptoms, and quality of life. Training and consultation in Cognitive Behavioral Therapy for Nightmares (CBT-N) were introduced within the United States Veterans Health Administration (VHA) to mitigate Veterans' nightmare severity and to improve overall functioning. This study aims to determine the long-term viability of the CBT-N training program within VHA by evaluating the trained providers' sustained delivery of CBT-N, along with their perceptions of benefits and barriers to implementation.

Methods: An online survey was administered to VHA providers (N = 100) who had completed the CBT-N training program at least six months prior to the study. The survey assessed providers' continued use of CBT-N, perceptions of its clinical impact, and barriers to implementation. A response rate of 65% was achieved, with quantitative and qualitative responses analyzed to identify trends and themes.
Results: Ninety-five percent of providers reported continued delivery of CBT-N, and 100% indicated intent to use it in the future. Providers reported overall positive perceptions of CBT-N's effectiveness, with improvements noted in Veterans' nightmare frequency and/or severity, and related domains, including sleep health, trauma symptoms, and quality of life. A quarter of providers identified no barriers to use. Reported barriers stemmed primarily from facility-related constraints (e.g., session length/frequency issues, patient population appropriateness) and Veteran-related factors (e.g., scheduling conflicts, Veterans' shared decision-making preferences).
Conclusion: CBT-N training within the VHA demonstrates high rates of sustained use and generally positive provider perceptions of its clinical impact. Barriers related to inner facility settings and Veteran-specific factors highlight the need for adaptive strategies to optimize implementation while maintaining treatment fidelity. Recommendations include tailoring session protocols to fit facility constraints and enhancing training to address shared decision-making scenarios. Tracking direct Veteran outcomes and refining implementation supports could further expand the reach and impact of the CBT-N training program.
Support (if any): Time for this research was supported in part by the US Department of Veterans Affairs, Veterans Health Administration, Clinical Research and Development Service-IK2CX001874-PI: Katherine Miller.

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1324
INFLUENCE OF SOCIAL MEDIA ON PROMOTING HEALTHY SCHOOL HOURS FOR ADOLESCENTS

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Introduction: Misaligned sleep-wake schedules in adolescents, largely due to inappropriately early school start times, are associated with significant consequences including attention problems, mental health symptoms, and motor vehicle crashes. To date, however, most U.S. secondary schools still start before 8:30 a.m., and only California and Florida have enacted legislation to ensure developmentally appropriate school start times. Social media's potential to shape public opinion and influence policy decisions (Ausat, 2023) led us to use frame analysis (Entman, 1993) to examine social media discourse surrounding adolescent sleep health and to compare use of anecdotal and scientific evidence (Borgida & Nisbett, 1977).
Methods: We reviewed 395 social media posts across 6 social media platforms (i.e., Facebook, Instagram, TikTok, X/Twitter, YouTube, and LinkedIn) using key words such as "school start time" and "later school start." A coding scheme was developed to include basic social media analytics, identity of the post creator, and whether the content included anecdotal and/or scientific evidence. For the frame analysis, coders looked for posts concerning impact on student health, student learning, teachers, safety, economics, transportation, extracurriculars, and/or other topics. Coders were trained to ensure inter-rater reliability (κ =.62).
Results: Over half the posts (59%) were from accounts owned by news organizations or media professionals (i.e., journalists, podcasters, or bloggers), followed by celebrities or influencers (9%). While 62% of posts suggested support for starting school later, 24% explicitly supported and 4% explicitly opposed it. Impact on students' health (69%) and learning (45%) were the frames most frequently employed by post creators. Nearly a quarter (24%) of posts used anecdotal evidence, 33% included a scientific explanation (however brief), and 31% cited or included a link to a research study.
Conclusion: Social media analysis can be a powerful tool to understand public discourse surrounding adolescent sleep health, including who is driving the conversation, what frames are being used, and types of evidence presented. Sleep scientists and clinicians might similarly use social media to play a larger role in educating the public and influencing public opinion regarding adolescent sleep health and healthy school hours.
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1325
IMPROVING EFFICIENCY OF HOME SLEEP APNEA TESTING PATHWAY TO ENHANCE ACCESS AND SLEEP CARE DELIVERY

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Introduction: A high volume of sleep apnea referrals requiring home sleep apnea studies (HSAT) can result in significant operational expenses, creating a need to explore cost-effective solutions. Due to disproportionate resources, some patients were diverted to external facilities in community clinics. In the context of understaffing, increased expenditure, and the high volume of need for HSATs, it was essential to streamline the process of timely delivery of HSTs.
Methods: Baseline data for HSAT completion time and cost spent on external HSAT was obtained over one quarter of the Fiscal year. A process of vendor-based distribution & delivery service of the HSAT was created and implemented. Post-intervention data collection was done after the subsequent quarter.
Results: The total cost of completing external HSATs in the pre-intervention quarter was $463,708.55, which included expense of community HSAT referrals of $391,253, and overtime for processing HSATs of $15,741.44. With the vendor-based distribution of HSATs to patients in the next quarter, the total cost was reduced to $57,884 solely for community HSAT referrals. In addition to this, the wait time for patients to complete an HST was reduced from 6-8 months to 4-6 weeks, despite the same FTE resources in the sleep clinic. The process resulted in a reduction of the cost and burden of time on staff members, to fulfill the need of high-volume testing without compromising quality. The improved work process helped the Registered Polysomnographic Technologists/ Respiratory Therapists focus on sleep patients' clinical needs.
Conclusion: The implementation of vendor-based delivery for home sleep apnea testing studies can significantly enhance patient care and operational efficiency by reducing costs spent on external testing, sleep testing time, free clinical staff time, and expediting the delivery of care and ultimately the sleep for our patients. This QI project demonstrates the operational advantage of implementation of a vendor-based HSAT distribution model resulting in reduced expense, faster turnaround times, and improved resource allocation.
Support (if any):

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1326

A MAIL-BASED CAMPAIGN TO PROMOTE DIGITAL CBT-I AMONG VETERANS IN RURAL AREAS WITH COMORBIDITIES

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Introduction: Insomnia is common among Veterans, and Insomnia Coach, a Veterans Affairs (VA)-developed mobile app for cognitive behavioral therapy for insomnia (CBT-I), may be useful for Veterans with limited access to provider-delivered care. Increasing awareness of Insomnia Coach could improve access among Veterans most vulnerable to care inequities. This project aimed to evaluate the impact of a mail-based campaign to inform Veterans about Insomnia Coach, with targeted outreach to Veterans with insomnia living in rural areas and with comorbid psychiatric and medical comorbidities.
Methods: Using the VA Corporate Data Warehouse, we identified VA Medical Centers (VAMCs) with high proportions of Veterans living in rural areas. In collaboration with the VA Office of Connected Care, we also identified VAMCs with active Virtual Health Resource Centers, which were established to assist Veterans to successfully engage in telehealth services. For participating VAMCs, letters introducing Insomnia Coach and containing a unique access code were sent to eligible Veterans with insomnia (based on ICD-10 codes and/or prescription sleep medications), depression, COPD and/or asthma, and no engagement with CBT-I in the past year.
Results: Thirteen VAMCs were identified as serving a high proportion of Veterans living in rural areas and having an active Virtual Health Resource Center. Of those, seven VAMCs (54%) agreed to participate in the project and have letters sent to eligible Veterans (n=4,903). Letters were mailed to Veterans from May through December 2024. Seventy-two Veterans (1.7%) used their their unique code to activate and access the Insomnia Coach mobile app. At each of the seven sites, Veterans accessing the Insomnia Coach app ranged from 1% to 3%.
Conclusion: A mail-based approach to inform Veterans with insomnia and comorbid disorders and with potentially inequitable access to care resulted in minimal use of Insomnia Coach, an evidence-based CBT-I mobile app. However, still to be determined is the potential impact of our approach resulting in Veterans seeking other care options, including provider-delivered CBT-I. While Insomnia Coach use was low, this project will help inform future pragmatic approaches to inform Veterans about insomnia-related care and improve engagement.
Support (if any): VA Office of Connected Care/Virtual Care CORE (OCC-24-09; PIs Bramoweth/Luyster)

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1327

AWAKENING THE SLEEPING GIANT: A PROCESS-BASED MODEL FOR SLEEP CARE COORDINATION AT A PEDIATRIC HEALTHCARE SYSTEM

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Introduction: With growing pediatric sleep inequities, it is essential that pediatric healthcare systems optimize sleep care through a system-wide, collaborative, and integrated approach across various programs and departments. Our commUNITY SLEEP Initiative (CSI) aimed to asset map the sleep care continuum – encompassing awareness, screening, referral, and management- to better understand how community-based programs and healthcare clinics intersect system-wide and identify opportunities for quality improvement.
Methods: CSI is designed to foster greater awareness of roles and responsibilities, close existing sleep care gaps, and develop a comprehensive process-based model for sleep care coordination (SCC) that ensures cohesive patient-centered care delivery. Information was gathered through unstructured interviews with clinic and program leadership knowledgeable about how sleep currently fits into their routine practice. An email was sent to departments to identify the appropriate contacts. During unstructured interviews, notes were taken on clinic activities.
Results: During unstructured interviews, notes were taken on clinic activities: sleep documentation in EPIC, screening tools, and clinic specific steps for managing identified patients' sleep problems and disordered sleep (e.g. referrals, provision of sleep resources or brief education, and direct intervention). Unstructured interviews identified key barriers and opportunities for enhancing SCC across the spectrum of clinics (e.g., specialty clinics; inpatient; primary care settings) and community-based programs (e.g., community well; school-based health). Discussions helped assess each department's role within the sleep care continuum and revealed system-wide quality improvement opportunities for SCC. There is a need for Targeted Universalism framework to apply both universal (e.g., universal dissemination of family sleep health awareness content; interprofessional education on sleep health) and targeted (e.g., culturally responsive and trauma informed adaptations; target sleep care navigation support to underserved patient populations). Following review and approval by the Sleep Center Director, a system-wide visual summary of the sleep care continuum and relevant SCC resources (e.g., sleep care navigators; inpatient sleep consultant) were shared with departmental leaders.
Conclusion: Addressing these barriers and opportunities through a more integrated, system-wide approach to SCC can enhance patient outcomes. Improving screening, referrals, and management of sleep problems and disordered sleep, and leveraging interdisciplinary resources will improve the accessibility, quality, and impact of SCC across departments.
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1328

EXPEDITING CARE FOR NONSURGICAL PEDIATRIC PATIENTS IN A LARGE HEALTHCARE SYSTEM: A QUALITY IMPROVEMENT PROJECT

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Introduction: Sleep services are increasing in demand resulting in expansion of pediatric sleep programs. With the decline in number of board-certified sleep physicians, programs are utilizing advanced practice providers (APPs) to bridge this gap. Conducting more diagnostic polysomnography has led to more

children being identified with obstructive sleep apnea (OSA). Otolaryngology surgical intervention is the first line of therapy; however, if surgery is not indicated or if those children have postoperative residual OSA, positive airway pressure (PAP) therapy is warranted. Timely care with PAP therapy is essential to prevent negative clinical consequences. Currently, there is no literature describing workflow initiatives to promote access to PAP therapy initiation while utilizing APPs in the pediatric population. Objectives: 1. Report access challenges to sleep appointments for initiation of PAP therapy; 2. Describe workflow processes to increase access for referring otolaryngologists; 3: Summarize access outcomes and patient satisfaction rates
Methods: Narrative review of the workflow processes. Retrospective review of sleep clinic referrals, third next available appointment (TNAA) data, and clinician Press Ganey scores.
Results: Our pediatric sleep center conducts 23 sleep studies per night and the healthcare provider team consists of 11 physicians and 5 APPs. From 2022 to 2023, otolaryngologists submitted 247 sleep clinic referrals (~ 5/week) for management of OSA after it was determined that surgery was not indicated. Average wait time from referral to scheduled visit was 72 days in April 2024. In October, 1 appointment per week was reserved with each APP for otolaryngologists to schedule patients who need PAP initiation. Preliminary results conclude that wait times for PAP initiation decreased from 72 to 16 days (-56 days). Press Ganey overall APP provider top box scores were 88 with a high likelihood of recommending care (top box: 92). No safety concerns related to APP care delivery have been identified during performance evaluations.
Conclusion: We identify strategies using scheduling metrics and APPs to meet the demand and expedite care for children with OSA needing PAP. APPs additionally provide safe and high-quality care. Institutions facing barriers to access should consider restructuring clinic schedules while utilizing APPS to ensure timely treatment of OSA in pediatric patients.
Support (if any):

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1329

HARNESSING AI TO BETTER UNDERSTAND PATIENT PERSPECTIVES ON THE ROLE OF THE HEALTHCARE PROVIDER IN PAP THERAPY

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Introduction: In obstructive sleep apnea (OSA), adherence to positive airway pressure (PAP) therapy is influenced by many factors, including the relationship between patients and their healthcare provider (HCP). Exploring patient perspectives on the facilitators and barriers to initiating and persisting with PAP therapy may help inform PAP promotion strategies.
Methods: Adult PAP therapy users (aged 18+; ResMed, San Diego) living with OSA were invited to participate in a one-time survey regarding their therapy experience and behaviors. Two open-ended questions asked about the user's pathway to diagnosis, and opportunities to improve the PAP therapy experience. Guided by an inductive-deductive thematic approach, de-identified qualitative responses were analyzed using a large language model (Enterprise ChatGPT) to better understand PAP users' interactions and experience with their HCPs. Prompt engineering was employed to optimize classification performance. All task outputs (theme identification) were reviewed by two researchers to ensure contextual relevance and accuracy. Redundant subthemes were collapsed into appropriate parent themes, and irrelevant content removed.
Results: Responses from 2,145 PAP therapy users were considered for analyses, with 98 respondents (4.6%) commenting on the HCP experience (mean (SD) age: 63 (12) years, 62% male). Fourteen sub-themes emerged which were then grouped into three main categories: 1) deepening HCP knowledge of OSA presentation, 2) addressing gaps in care, and 3) patient-centric needs. Respondents sought greater OSA awareness among their HCPs, articulated in responses around early identification of OSA signs and symptoms in order to shorten prolonged diagnostic pathways, sometimes spanning years. Responses also highlighted the need to better understand gender-specific differences in symptom presentation. Gaps in care highlighted user desire for better care coordination between specialists and primary care providers, improved follow-up after formal diagnosis and initiation of therapy, and more resources on therapy options. Finally, patient-centric needs included patient-first information on early symptom identification, and greater HCP empathy related to therapy challenges following diagnosis.
Conclusion: Building awareness around OSA symptoms (including gender-specific symptoms), care coordination, and patient-centered support, may help streamline OSA diagnosis, improve therapy outcomes, and enhance patient experiences. Leveraging AI-informed models to better understand user experience may further refine PAP promotion strategies.
Support (if any): ResMed

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1330

IMPLEMENTATION OF BSM ORIENTATION GROUP AND CONTINUED CLINIC EFFICIENCY

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Introduction: High rates of sleep disorders in Veterans increases demand for behavioral sleep medicine (BSM) services and clinical efficiency is essential to improving access to care. An ongoing quality improvement project assessing the utility of a clinic orientation group reduced intake no-show rates within a large Department of Veterans Affairs (VA) BSM clinic and revealed that some Veterans declined services after learning more about the treatment offerings. The goal of this analysis was to see if time from consult placed to time of formal diagnostic assessment (wait time) has decreased since implementing the orientation group.
Methods: Data were collected using electronic medical record review and included demographic information about Veterans seeking BSM services, dates of consults placed, and dates consults were completed. A t-test was conducted to compare wait times from one year prior to the orientation group versus during the 2nd year of group implementation (September 2023-September 2024).
Results: A one-tailed t-test revealed no statistical difference between wait times prior to the implementation of the orientation group (mean = 186 days) and during year 2 of the

orientation group (mean = 182 days; t(704)= -0.32, p= 1.65). However, time from consult to first contact with a BSM provider was faster during year 2 of the orientation group (mean = 72 days). Interestingly, 27% of less Veterans opted out of to participating in BSM services after attending the orientation group.
Conclusion: Although implementation of a BSM orientation group did not reduce overall wait time from consult to clinic intake, inclusion of the orientation group as part of the clinic referral process did reduce time to first contact with a BSM provider. This may improve overall engagement with BSM services and continue to improve clinic efficiency. The orientation group also continues to successfully identify Veterans who are most likely to engage in BSM services as over one quarter of Veterans referred to a BSM orientation group declined BSM services after learning more about services offered. Future projects should examine if reduced time to contact increases treatment adherence as well as if no show rates have continued to improve clinic efficiency.
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1331
ONE MAN'S TRASH, ANOTHER WOMAN'S RESEARCH: THE STUDY AND REDUCTION OF WASTE IN SLEEP MEDICINE

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Introduction: Healthcare practices in the US contribute to the climate crisis and plastic pollution through greenhouse gas emissions and reliance on single-use plastic materials. The healthcare sector is responsible for 8.5% of US emissions and produces two million tons of solid waste per year (Eckelman et al, PLOS One 2016; Practice Greenhealth). There is limited current literature examining the contribution of sleep medicine practices to US healthcare emissions and waste production. The purpose of this study was to quantify and categorize the waste generated by laboratory-based sleep studies and to identify targetable areas for waste reduction.
Methods: A comprehensive waste audit was conducted over a three-day period in an urban academic sleep laboratory. Each piece of waste generated by patient care during this time was collected, weighed and separated by individual study. The weight of waste attributed to all home sleep apnea tests (HSATs) completed during this period was estimated by weighing sample test components available in the lab. In addition to calculation of total waste produced, sub-analyses were conducted to determine average waste produced by study type and expected reductions in waste output based on different proposed practices.
Results: The 24 in-lab sleep studies (6 diagnostic PSGs, 11 split night PSGs, 6 titration studies, 1 inpatient NOMAD split night study) completed during the three-day period generated 24.18 kg of solid waste. The 75 WatchPAT HSATs and one home NOMAD test generated an estimated 9.97 kg of solid waste. On average, diagnostic PSGs produced 381.33 g of waste, split night PSGs 708.8 g of waste, and titration studies 752.6 g of waste. When applied to the total studies conducted during 2023, we estimate 885.77 kg of waste produced by in-lab studies annually (1596 kg if including HSATs).
Conclusion: Sleep medicine testing, including laboratory-based sleep studies and HSATs, produce a significant amount of waste. An important factor in reducing waste produced by sleep studies is by minimizing the use of single use items when feasible. Based on our lab's practices, waste can be reduced by switching to reusable EEG leads, sanitizing and reusing PAP water reservoirs, and replacing individual soap/lotion containers with large volume dispensers.
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1332
EVALUATING PATIENT CHARACTERISTICS INFLUENCING THE PREDICTIVE ACCURACY OF SLEEP DISORDER QUESTIONNAIRES

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Introduction: Previously machine-learning algorithm, SimpLe quEstionnairE Predicting Sleep disorders (SLEEPS) was developed to predict obstructive sleep apnea (OSA), combined insomnia and sleep apnea (COMISA), or INSOMNIA (chronic insomnia disorder) with a few information of demographics and questions. This study aimed to validate the algorithm and to discern the characteristics associated with correct and incorrect predictions for each sleep disorder.
Methods: Patient data were collected from two sleep clinics affiliated with a university hospital. Diagnoses of OSA, COMISA, and INSOMNIA were determined through medical examinations, demographic data, polysomnography, and various questionnaires. Using this information, SLEEPS algorithm calculated the probability of each condition—OSA, COMISA, and INSOMNIA. The diagnostic accuracy was evaluated using the area under the receiver operating characteristic (AUROC) curve. The characteristics of patients with correct and incorrect predictions were analyzed for each sleep disorder using cutoff probabilities.
Results: A total of 4,526 patients were analyzed, with the AUROC values reported as 0.976 for OSA, 0.909 for COMISA, and 0.922 for INSOMNIA. The algorithm accurately predicted diagnoses in 91.6% of OSA, 79.7% of COMISA, and 81.4% of INSOMNIA. In the OSA group with incorrect predictions, patients were predominantly female($p< 0.001$) and younger(median 44 vs. 54; $p< 0.001$). This group had higher ISI scores(median 13 vs. 8; $p< 0.001$), lower AHI scores(median 27.4 vs. 38.2; $p< 0.001$), and lower body indices($p< 0.001$). In the COMISA group with incorrect predictions, patients were predominantly female($p< 0.001$) and younger(median 49 vs. 58; $p< 0.001$). They exhibited lower body indices($p< 0.05$), lower AHI(median 28.6 vs. 33.5; $p< 0.05$) and ISI scores(median 16 vs. 18; $p< 0.001$). In contrast, the INSOMNIA group with incorrect predictions was predominantly male($p< 0.001$). These patients had lower ISI scores(median 16 vs. 19; $p< 0.001$) but higher body indices and total AHI scores compared to those with correct predictions($p< 0.001$).
Conclusion: This study confirmed that SLEEPS algorithm demonstrates high and consistent accuracy in predicting sleep disorders. The identified cutoff values for sleep disorders can help alert undiagnosed individuals who may not recognize symptoms of sleep disturbances. Understanding the characteristics of individuals with correct or incorrect predictions provides valuable insights into the diagnostic performance of the algorithm.
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1333

IMPACT OF THE DISTANCE FROM A SLEEP CENTER ON TELEHEALTH RATES AND COMPLIANCE WITH OSA THERAPY

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Introduction: Compliance with therapy for obstructive sleep apnea (OSA) is critical for achieving optimal patient outcomes. Factors such as the distance from a sleep center and the mode of consultation (in-person vs. telehealth) may influence compliance rates, no-show rates, and patient preferences. With the growing adoption of telehealth, a better understanding of factors driving patient preferences and how they affect outcomes is vital to delivering optimal care. This study aims to explore how demographic and geographic factors shape patient behavior and adherence.
Methods: We retrospectively analyzed data from all patients presenting to our clinic over a three month period. Patients were categorized based on visit type (in-person, video, telephone) and selected based on a diagnosis of OSA. This cohort of 296 patients were then further categorized on visit status (completed vs no-show). Distance from the sleep center was calculated using patient zip codes and an online mapping tool. Compliance was defined as ≥4 hours of PAP use per night on ≥70% of nights and we accepted subjective reporting of patient compliance. Patients with a hypoglossal nerve stimulator (HNS) were excluded from compliance analysis. Additional demographic variables were gathered through chart review.
Results: The cohort had a mean age of 51.8 (±15.6) years, with a male predominance (52.4%) and a mean BMI of 37.3 (±11.0). The average pretreatment apnea-hypopnea index (AHI) was 28.8 (±26.1). No-show rates were lower for telehealth visits (18%, 23/126) compared to in-person visits (40%, 68/170). Patients utilizing telehealth lived farther from the sleep center (69.5 ± 54.6 miles) compared to in-person patients (36.6 ± 42.7 miles). Compliance rates were highest for in-person visits (51.0%, 52/102), followed by telephone (47.2%, 25/53) and video (40.0%, 20/50) visits.
Conclusion: Distance from the sleep center and telehealth availability impact patient behavior, including no-show rates and compliance with OSA therapy. Telehealth reduces barriers to care for patients living farther from sleep centers, but in-person visits are associated with higher compliance rates. This is particularly salient for patients that may otherwise be unable to seek treatment and highlights the need for targeted strategies to improve care delivery across all visit types.
Support (if any):

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1334

SHARED MEDICAL APPOINTMENT, A NEW MODEL OF CARE IN A SLEEP MEDICINE CLINIC

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Introduction: There is shortage of sleep medicine specialists with a typical sleep clinic visit starts with one patient spending 60 minutes with a single provider (physician or APP). This traditional model of care limits access. One of the biggest hurdles in our sleep clinic is seeing patients for the required 31–90-day CPAP compliance visit, which is required by insurance carriers to keep their CPAP. Shared medical appointment (SMA) can increase access and still provide individualized care in group settings. After initial new patient visit with single provider, SMAs is used for CPAP compliance follow-ups. This pilot trial aims to improve access while maintaining patient satisfaction with a SMA for CPAP therapy through multi-disciplinary approach.
Methods: We initiated a SMA in our sleep medicine clinic. A single provider worked with a sleep technician and nurse familiar with a typical CPAP journey to provide individualized care for a group of patients. Each patient signed a consent form prior to the SMA. Each SMA included 6-8 patients with obstructive sleep apnea (OSA) in a 60-minute group session. We started with a PowerPoint presentation to provide education about OSA and included CPAP therapy with details about airflow, mask issues, and oropharyngeal dryness. We reviewed each patient's data download and adjusted CPAP settings as needed. We encouraged patients to interact with each other and with providers.
Results: In 2023 (N=12), the average follow up time for a CPAP compliance visit was 104 days. After the recent implementation of the SMA in 2024 (N=13), the average follow- up time dropped to 68 days. Patient feedback about the SMA has been extremely positive.
Conclusion: Based on preliminary data, the SMA model is an innovative way to improve patient access by opening up more slots for new patients while accommodating follow up visits for CPAP compliance.
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1335

OPTIMIZING POST-HOSPITALIZATION CARE: A RETROSPECTIVE ANALYSIS OF PAP THERAPY FOLLOW-UP IN DISCHARGED PATIENTS

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Introduction: Patients with hypoventilation syndrome often experience frequent hospitalizations due to delayed initiation of positive airway pressure (PAP) therapy. These same patients also often experience frequent readmissions due to suboptimal management of their underlying condition. While PAP therapy is effective in reducing complications, the role of timely outpatient follow-up in preventing readmissions remains insufficiently understood.
Methods: This retrospective study analyzed patients who were newly started and discharged with PAP therapy from a large tertiary care center between December 2022 and December 2024. Hospital records were reviewed for demographics, prior hospitalization history, outpatient follow-up within one month, and readmissions within six months. The primary outcome was the association between early outpatient follow-up and 180-day readmission rates. Differences were assessed using independent t- tests.
Results: Of 56 patients discharged with PAP therapy, 43% (n = 24) had at least one prior hospitalization in the preceding year, with a median of 2 admissions and average of 2.5 admissions. Only 38% (n = 21) completed outpatient follow-up within one month of hospital discharge. Patients without 1 month follow-up were significantly more likely to experience readmission within six months (34% versus 18%, P value = 0.049). Further analysis revealed an odds ratio of 2.35, thus patients without follow up

were approximately 2.35 times more likely to be readmitted compared to those that had follow up.
Conclusion: A significant proportion of patients discharged with positive airway pressure (PAP) therapy for hypoventilation syndrome do not receive timely outpatient follow-up, a gap in care that is strongly associated with an elevated risk of early hospital readmissions. This observation underscores the critical importance of implementing structured and comprehensive discharge planning protocols, as well as enhancing post-hospitalization care pathways. By prioritizing timely follow-up appointments and coordinated support, healthcare systems can better address this vulnerable population's needs, potentially reducing preventable readmissions and improving overall patient outcomes.
Support (if any):

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1336
THE CRITICAL IMPORTANCE OF QUALITY AND PURITY MANAGEMENT IN MELATONIN SUPPLEMENT MANUFACTURING

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Introduction: Melatonin supplements are widely used in the United States to manage sleep disorders. However, concerns have been raised regarding the accuracy of labeled dosages and the presence of impurities in these over-the-counter products. In the U.S., melatonin is regulated as a dietary supplement, which means it is not subject to the stringent quality control standards applied to pharmaceutical products. This regulatory gap can lead to significant variability in product quality, potentially impacting consumer safety and therapeutic efficacy.
Methods: We evaluated ten commercially available melatonin supplements in the U.S. Each sample was prepared by dissolving a quantity equivalent to approximately 6 mg of melatonin in 10 mL of water, followed by sonication to ensure complete dissolution. Subsequently, 300 mL of a methanol/water mixture (7:3) was added, and the solution was sonicated for 20 minutes and vigorously shaken for an additional 20 minutes. The final volume was adjusted to 500 mL with the methanol/water mixture, filtered through a 0.45-micron membrane, discarding the initial 4 mL, and the filtrate was analyzed. Quantitative analysis and impurity profiling were conducted using high-performance liquid chromatography (HPLC) methods adapted from our quality assurance standards.
Results: Among the ten products analyzed, four exhibited melatonin content deviating beyond the acceptable range of 90–110% of the labeled amount, indicating substantial discrepancies. Impurity testing revealed that, while all products met the specific impurity thresholds for known related substances (e.g., 5-methoxytryptamine ≤0.5%), several products contained higher overall levels of unidentified impurities, with some approaching 1% of the total content.
Conclusion: The findings highlight significant quality control issues in commercially available melatonin supplements in the U.S., with 40% of products failing to meet acceptable content standards and several exhibiting elevated impurity levels. These inconsistencies may compromise therapeutic efficacy and pose safety risks to consumers. There is an urgent need for enhanced regulatory oversight and stringent quality assurance protocols in the manufacturing of melatonin supplements to ensure product consistency, efficacy, and consumer safety. Healthcare providers should be aware of these quality variations when recommending melatonin and consider advocating for products that have undergone rigorous third-party testing.
Support (if any):

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1337
SLEEP APNEA AND DRIVING: CURRENT LEGAL ISSUES IN SWITZERLAND

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Introduction: Severe obstructive sleep apnea is considered a risk factor for possible road accidents. In switzerland, all license holders have to fulfill medical minimum requirements by law. Medical conditions conflicting with them may lead the authotities to temporarily revoke the driving license based on the results of the fitness-to-drive medical assessment. According to the current Swiss guidelines, not all drivers who have caused a presumed sleep accident have to undergo a full fitness-to-drive medical assessment. This is mandatory, for instance, in all situatione where it is not possible to determine whether the accident was truly caused by falling asleep or a transient loss of consciousness. The objective of this study was therefore to retrospectively investigate the cases observed in our facility during a period of four years (January 2021 - December 2024), for which the cause of the road accident was probably traced back to the presence of an undiagnosed or inadequately treated severe obstructive sleep apnea.
Methods: We reviewed all the cases that underwent a fitness-to-drive medical assessment in our facility during the period January 2021 - December 2024 following a road accident for the dynamics of which a possible temporary and inexplicable loss of consciousness (and therefore an obstructive sleep apnea problem) could not be ruled out.
Results: 44 cases of transient loss of consciousness, of undetermined origin, were taken into consideration (36 men, 8 women, aged between 24 and 69 years). All cases underwent a complete fitness-to-drive medical assessment, including ophthalmological, diabetological, cardiological, neurological, and pneumological evaluation. In 6 cases, a previously undiagnosed, untreated, or inadequately treated severe obstructive sleep apnea was considered the only factor potentially able to explain the dynamics of the road accident.
Conclusion: The systematic search for severe obstructive sleep apnea as a possible cause of a transient loss of consciousness and sometimes of a road accident must remain a priority in the medical assessment of fitness-to-drive. An important role must be played by general practitioners, who must direct patients at risk to sleep medicine centers, so that the diagnoses and adequate treatments can be implemented promptly, in order to prevent possible risks for road traffic
Support (if any): none

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1338
LEVERAGING ARTIFICIAL INTELLIGENCE ENHANCED PATIENT EDUCATION TO OPTIMIZE PAP TREATMENT ADHERENCE

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Introduction: Artificial intelligence (AI) will inevitably be used in healthcare settings, and it has a significant impact on patient education. We aim to study how to leverage existing AI platforms and improve patient efficacy in treating obstructive sleep apnea (OSA) patients starting with positive airway pressure (PAP) therapy.
Methods: Nine sleep physicians employed ChatGPT and Gemini to acquire responses to a specific set of questions. Two introductory inputs (patient primer and physician primer) were supplied to prepare the AI platforms for analyzing patient and physician perspectives. Three categories of questions were presented concerning masks and pressure, equipment maintenance, and clinical outcomes during the commencement of PAP therapy. The readability of the outcomes was assessed using Flesch-Kincaid (FK) score. The raters used visual analog scales to score from 1-10 the accuracy and relevance of responses in each model.
Results: Primer 1 (patient role) answers: there was no significant difference between platforms in FK scores. The average FK scores for ChatGPT (57.15) and Gemini (55.58) are rated at a 10th-12th school grade reading level indicating difficult to read. The ChatGPT answers had significantly higher accuracy ratings for group 1 (8.36 vs 7.14) and group 3 (8.46 vs 6.98) questions. The ChatGPT answers had significantly higher relevance ratings for group 1 questions (8.81 vs 7.51). Primer 2 (physician role) answers: There was no significant difference between platforms' accuracy and relevance ratings. ChatGPT had an accuracy of 8.11 and a relevance of 8.49 to Gemini's 7.32 and 7.77. The validity and relevance ratings of the supporting evidence were all very low (≤2.1) because the platforms either cited unverifiable sources or did not cite.
Conclusion: Both platforms' answers to patient questions were objectively difficult to read. ChatGPT provided more accurate and relevant answers to patient questions in selective question groups and remained equivocal to Gemini otherwise. These pilot projects will help guide us in designing patient education materials which is the next step in utilizing these results.
Support (if any):

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1339

ASSESSING THE FEASIBILITY OF A MULTIMODAL SLEEP INTERVENTION FOR COMMUNITY-DWELLING DYADS OF PEOPLE LIVING WITH DEMENTIA AND THEIR CARE PARTNERS

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Introduction: People living with dementia frequently experience sleep disturbances, and their informal care partners are also at high risk of poor sleep. Few sleep interventions consider the unique sleep interplay and challenges within caregiver-care-recipient dyads. This study evaluated the feasibility and preliminary efficacy of co-designed multimodal intervention to address sleep disturbances in dyads of people living with dementia and their care partners in Australia and New Zealand.
Methods: Dyads of people living with dementia and their care partner were recruited from the community via social media and Dementia Support services. Eligible dyads completed the Dementia, Sleep and Wellbeing Program, a co-designed, six-week online sleep intervention. The program included a mix of group-based and personalised sessions, which combined Cognitive Behavioural Therapy for Insomnia, mindfulness, activity, and light delivered by registered psychologists. Feasibility was evaluated by attrition, attendance, and satisfaction. Sleep was assessed using the Pittsburgh Sleep Quality Index, the Insomnia Severity Index, and the Sleep Disturbance Inventory. Psychological wellbeing was assessed via the Depression Anxiety Stress Scale-2. Feasibility outcomes were summarised using descriptive statistics, and sleep/mood outcomes were analysed using linear mixed models.
Results: Twenty-three dyads were assessed for the study. Four dyads withdrew before the intervention, and one dyad withdrew during intervention, resulting in 18 dyads who completed the study (Mage=67.34 years, SDage=10.76). Attendance rates were high, with seven care partners attending all sessions. Both people living with dementia and care partners reported high satisfaction with the intervention. For care partners, significant reductions were observed in insomnia severity (p=.006) and improvements in sleep quality (p=.042). Significant improvements in insomnia severity (p=.006), depression (p=.002) and stress symptoms (p=.006) were observed for people living with dementia.
Conclusion: These findings provide support for a multimodal, dyadic approach to reducing sleep disturbances among community-dwelling people with dementia and their carer, demonstrating high engagement and satisfaction, and early indications of improved subjective sleep and wellbeing. These results highlight the potential efficacy of online interventions to address sleep issues in this population.
Support (if any): Dementia Centre for Research Collaboration – Pilot Grant Scheme 2020 and the Turner Institute Sleep and Circadian Theme Consumer and Community Involvement Grant.

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1340

AMERICAN ACADEMY OF SLEEP MEDICINE ADVOCACY: ANALYSIS OF GOALS AND ACHIEVEMENTS IN 2024

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Introduction: The American Academy of Sleep Medicine (AASM) Advocacy committee provides nonpartisan guidance and support for ASSM policy implementation. The committee develops strategies to engage efforts from members at the local and national levels, advancing these initiatives with elected officials and federal agencies. The committee meets regularly to discuss strategies on a wide variety of sleep health initiatives with seven key goals, including: 1)building legislative relationships to strengthen grassroot efforts; 2)reviewing and proposing AASM

resources/communications; 3)collaborating with the AASM Executive Board on setting advocacy priorities; 4)preparation and participation in Hill day- a visit to Capitol Hill for in-person advocacy efforts with national Congress representatives; 5) recruiting additional AASM member/stakeholders; 6)working with staff and lobbyists to identify speakers for Congressional Sleep Health Caucus; and 7)collaborating with other organizations to amplify our voice. These goals ensure policy support for sleep health. This analysis reviews how advocacy work achieved these goals in 2024.
Methods: A descriptive analysis of all activities in the prior year as they related to each of the seven advocacy committee goals, objectives and action items was performed. Committee members participated in reviewing of prior work of the committee and brainstorming new ideas annually. Analyses included information of activities in 2024, using historical information from committee monthly agendas, electronic and social communications, publications and other public activities. Each activity was evaluated and categorized to assess the success of achieving stated goals.
Results: The committee addressed numerous initiatives across nine key themes: telehealth, permanent standard time, physician payment, health equity, school start time, sleep research, the Sleep Health Caucus, current sleep-related events(e.g. CPAP recall), and AASM-advocacy collaboration both within and outside the organization. Within these themes, all 28 identified activities aligned 100% with the AASM-Advocacy Committee goals. The majority(64%) met ≥3 committee goals. Four total publications were published, including an AASM position statement on telehealth permanency; and formal letters to address relevant initiatives.
Conclusion: The AASM advocacy committee achieved all major goals in 2024. Activities addressed multiple committee priorities and successfully aligned with advocacy efforts. Future directions include increasing advocacy efforts and expanding collaboration with multidisciplinary organizations to advance sleep health.
Support (if any):

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1341

SIMPLIFIED ML MODELS FOR AUTO-SCORING SLEEP STAGES AND EVENT-BASED DETECTION OF AROUSALS AND RESPIRATORY EVENTS: EVALUATION WITH EXPERT CONSENSUS

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Introduction: Accurate scoring of sleep stages, arousal responses, and respiratory events is critical for diagnosing sleep disorders but remains labor-intensive and variable across experts. Simplified machine learning approaches offer efficient and interpretable alternatives to complex models. This study evaluates a machine learning model by comparing its predictions to consensus data created by experts.
Methods: Polysomnographic (PSG) data from healthy participants and patients with sleep apnea syndrome (SAS) were analyzed. After data quality assessment, 473 nights of healthy data and 244 nights of SAS data were used for sleep classification, 412 nights of healthy data and 179 nights of SAS data for arousal detection, and 179 nights of SAS data for respiratory event detection. Features for sleep classification were generated for 30-second epochs using data from surrounding intervals. Arousal and respiratory event detection relied on features generated for each second. Post-processing merged closely spaced events and removed brief events. Experts conducted discussions to resolve ambiguities and establish consistent criteria, improving annotation quality. Following this, they divided the dataset for annotation. A subset of data was annotated by all experts simultaneously to create consensus data, enabling comparisons between inter-expert agreement and model performance.
Results: The model achieved an accuracy of 0.86 and a Cohen's Kappa of 0.81 for sleep stage classification, with F1 scores of 0.89, 0.66, 0.87, 0.87, and 0.91 for Wake, N1, N2, N3, and REM. For arousal detection, recall and precision were 0.81 and 0.77, and for respiratory event detection, recall and precision were 0.88 and 0.83. For sleep classification, 27 nights annotated by four experts showed an average accuracy and Cohen's Kappa of 0.91 and 0.87 when compared to consensus annotations. The model achieved an accuracy of 0.90 and a Cohen's Kappa of 0.86, demonstrating comparable performance to the experts. Similarly, for arousal and respiratory events, the model matched inter-expert agreement, supporting its reliability.
Conclusion: Simplified machine learning models demonstrated expert-level performance in auto-scoring sleep stages and detecting arousal and respiratory events. These results highlight their potential for efficient, reliable sleep assessment solutions.
Support (if any):

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1342

THE EFFECT OF ICU DIARY ON CAREGIVER STRESS, SLEEP DISTURBANCES AND FATIGUE: AN ONGOING STUDY

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Introduction: Family caregivers of patients admitted to the intensive care unit (ICU) often experience high stress, sleep disturbances, and fatigue. This study aimed to examine the impact of an ICU diary on reducing stress, improving sleep, and alleviating fatigue among primary family caregivers in the ICU.
Methods: This ongoing pilot experimental study was conducted in four adult ICUs at a teaching hospital in central Taiwan, using 1:1 randomization. The experimental group used an ICU diary comprising closed-ended sections for documenting essential medical information and open-ended sections for emotional support from physicians, nurses, patients, and caregivers. The diary was used for up to one week or until the day before ICU discharge. Both the experimental group and control groups received a stress management and sleep hygiene booklet. Eligible participants were (1) unpaid primary family caregivers (2) family members of ICU patients on mechanical ventilation for over 48 hours. The participants completed the Impact of Event Scale-Revised (IES-R), the General Sleep Disturbance Scale (GSDS), and the Lee's Fatigue Scale (LFS) at the time of recruitment and again either one week later or before the patient's discharge from the ICU.
Results: Sixty-two primary family caregivers were randomized to the experimental (n=30) or the control group (n=32). The ICU diary intervention showed no statistically significant effects

on stress, sleep disturbances, or fatigue (all p >.05). However, fatigue severity increased significantly in the control group over the study period (3.79±1.9 to 4.33±2.1, p <.05). The ICU diary had a 66.8% completion rate, primarily documenting patient updates (95.8%), with nurses more frequently offering caregiver encouragement (57.1%) than physicians or nurse practitioners (16.0%).

Conclusion: This study found that the ICU diary intervention did not significantly reduce stress, sleep disturbances, or fatigue among family caregivers. These findings may be due to the preliminary nature of the data. Future research should explore strategies to improve ICU diary completion rates and investigate caregiver satisfaction with communication and their perceived support from the diary.

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1343

ENHANCING CULTURAL AND LINGUISTIC RELEVANCE OF A PAP TELEMANAGEMENT INTERVENTION

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Introduction: Hispanic adults experience lower positive airway pressure (PAP) usage and higher rates of obstructive sleep apnea (OSA)-related comorbidities. This study linguistically and culturally adapted a tele-delivered self-management support intervention (TeleSMS) for Spanish-speaking Hispanic adults with OSA. TeleSMS is comprised of a text messaging library and health-literacy aligned animated videos.

Methods: Adaptations followed the 11-step Participatory and Iterative Process Framework for Language Adaptation (PIPFLA), including translations, review panels, and harmonization. Panels consisted of 12, 60-minute meetings with Hispanic, Spanish-fluent adults with positive airway pressure (PAP) treated OSA and 12 sessions with providers experienced in caring for Hispanic patients with OSA. Literacy demand assessments of the message library preceded adaptation.

Results: The original library's median readability was 9.7 (9.3 [min]-13.4[max]) (goal: grade <= 8) and complex language score was 23.2% (18.9-29.5) (goal: < 20%). After literacy editing, these improved to 8 (7.7-10.7) and 12.5% (7.5-17.2). Forward and back translation was completed by three individuals with iterative review by panel participants (N=12) originally from Mexico (33.3%), US (33.3%), or other Latin American countries (33.3%). Separate panels included 7 patients (71.4% female; 71.4% <= post-secondary education; 85.7% Spanish preferred language) and 5 providers (60% sleep physician; 40% staff; 60% English preferred language). Across 24 sessions, priority adaptations pertained to: (1) 'content' (e.g., simplified messages [defining concepts, breaking down long messages into shorter/simpler ones]; adding PAP parts/features photos; (2) 'culture' (adjusting terms/images [e.g., "rumble of a thunderstorm" to "relaxing nature sounds", "partner" to be more inclusive of additional household members "personas a su alrededor- people around you", add Hispanic emoticons); (3) 'wording' (e.g., too long/not catchy post-translation; incompatible translation "empujoncito" [nudge in English] considered odd; "white noise" not common in Spanish, instead "musica suave" [i.e., soft music] or "ruido blanco o de fondo" [i.e., white or background noise]; PAP parts, supplies and settings should be presented in English and Spanish due to internet searches and English language setting on machines).

Conclusion: Adapting a Spanish language intervention in collaboration with Latino stakeholders can enhance acceptability and appropriateness of TeleSMS to potentially enhance usability and adoption among Latinos.

Support (if any): American Academy of Sleep Medicine Foundation

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1344

ASSESSING THE DIAGNOSTIC ACCURACY OF LLM (CHATGPT-4) IN SLEEP MEDICINE CASES

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Introduction: Large language models (LLMs), such as ChatGPT-4, have demonstrated promising potential as diagnostic tools across various medical disciplines. In sleep medicine, artificial intelligence tools are already used to analyze physiological sleep data and are being studied for their potential in phenotyping, endotyping, and predicting treatment responses. However, the effectiveness of LLMs in accurately diagnosing sleep disorders based on clinical history has not yet been studied. This study evaluates ChatGPT-4's diagnostic performance using clinical vignettes.

Methods: Nineteen clinical cases were selected from the Case Book of Sleep Medicine, Third Edition (AASM, 2019). Each case included patient history, examination findings, and test results. The vignettes were input into ChatGPT-4 using the following standardized prompt: "Based on the provided case details, generate the top 5 differential diagnoses and identify the most likely final diagnosis: (copy and paste clinical vignette)." The model was tasked with generating both differential diagnoses and a final diagnosis for each case. The AI's results were compared to reference diagnoses from the case book. Differential diagnoses were measured as the number of matches, and accuracy was reported as a percentage. Final diagnoses were scored as 0 (no match), 1 (partial match), or 2 (full match).

Results: The mean number of AI-generated differential diagnoses matching the AASM case differential diagnoses was 2.79 ± 0.71 (95% CI: 2.45–3.13). The mean accuracy percentage for differential diagnoses was 63.27% ± 15.61% (95% CI: 55.75%–70.79%), with scores ranging from 33.33% to 100%. For final diagnoses, ChatGPT-4 scored a total of 30 out of a possible 38, with a mean score was 1.58 ± 0.61 (95% CI: 1.29–1.87) out of 2, with 74% of cases achieving a full match. Performance was higher in cases with fewer differential diagnoses, whereas accuracy decreased in more complex cases.

Conclusion: ChatGPT-4 showed moderate to high accuracy in generating both differential and final diagnoses for sleep disorders. These findings suggest that AI could become a valuable clinical decision-support tool in sleep medicine. However, its

inconsistent performance in complex cases highlights the need for further refinement and clinical testing.
Support (if any):

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1345

CONTEXTUAL PREDICTORS OF SLEEP COACHING PROGRAM ACCEPTABILITY AMONG FIRE SERVICE WORKERS

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Introduction: Sleep disorders are common in the fire service, yet few agencies have adopted evidence-based sleep health workplace wellness programs to address them. As part of the pre-implementation formative assessment, this project aimed to identify theoretically informed contextual factors that predict the acceptability of a new sleep health coaching wellness program among workers in approximately 20 Arizona fire agencies.
Methods: Cross-sectional survey data were analyzed from non-manager fire service personnel (n=145). Program acceptability was measured via the Acceptability of Intervention Measure. Contextual factors were measured using the Organizational Readiness for Change Assessment (ORCA) subscales, which include culture among captains, culture among senior leadership, leadership, measurement, readiness for change among opinion leaders, and resources. The ORCA instrument aligns with the integrated Promoting Action on Research Implementation in Health Services (i-PARIHS) framework for implementation. Linear regression was used to examine which contextual factors predicted intervention acceptability.
Results: A total of 145 firefighters and paramedics participated in the survey (M age = 38.89 years, SD = 9.35 years); the average time worked at the current place of employment was 10.17 years (SD = 9.35). Findings indicated that higher readiness for change among opinion leaders was significantly associated with greater program acceptability ratings (β= 0.05, SE = 0.02, $p < 0.001$). Leadership contextual factors generally did not predict program acceptability, except for culture among senior leadership. Worse evaluations of culture among senior leadership were associated with higher ratings of program acceptability (β = -0.06, SE = 0.03, $p < 0.05$).
Conclusion: Opinion leaders, including union members, are key champions for promoting the adoption of sleep health coaching in the fire service. There was no relationship between intervention acceptability and resources or other leadership variables, except for the negative culture of senior leadership. These findings highlight the importance of using measures, such as ORCA, that align with theory-informed implementation frameworks like i-PARIHS, to identify key facilitators and potential barriers to successful implementation in occupational settings.
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1346

SWEET DREAMS OR SLEEPLESS NIGHTS? COMPARING PATIENT SATISFACTION IN INTEGRATED VS. TRADITIONAL SLEEP CARE MODELS

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Introduction: Advances in telehealth and technology have created opportunities for a more comprehensive care approach for patients with OSA. However, it is unclear if these comprehensive care models translate to improved treatment adherence and patient satisfaction compared to their traditional sleep clinic counterparts. This study aims to evaluate self-reported patient experience and treatment outcome data between a traditional sleep care approach and a clinically integrated, comprehensive sleep care program.
Methods: To better understand the patient experience within these models of care, this study compares outcomes between a traditional sleep care approach and a clinically integrated, comprehensive sleep care program. The study analyzed survey responses from 206 patients with sleep apnea (n=102, traditional care model and n=104, comprehensive care model) with items evaluating patient satisfaction, CPAP adoption and adherence, and quality of life, with descriptive statistics, chi-square analyses, and t-tests conducted to compare outcomes between the two groups.
Results: A significantly higher proportion of patients ($p<.05$) in the comprehensive model (85%) were satisfied at all measured points along the patient's journey compared to the traditional care model (51%). Notably, significantly more patients in the comprehensive model were very satisfied with the ease of navigating the testing process (83% vs. 38%, $p<.05$), time between diagnosis and CPAP adoption (91% vs. 49%, $p<.05$), and availability and level of ongoing CPAP support (79% vs. 39%, $p<.05$). Comprehensive care patients experienced significantly fewer work disruptions due to sleep apnea, with 7% missing work in the past 3 months compared to 58% in the traditional model ($p<.05$).
Conclusion: The findings underscore the advantages of a comprehensive care model that improves patient satisfaction, streamlines the sleep apnea treatment journey, and enhances quality of life. These results, paired with prior evidence from the same model, highlight the benefits of removing obstacles to care, which increases patient satisfaction, improves adherence to therapy, and reduces overall healthcare costs, warranting further investigation into these relationships.
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1347

IMPACT OF COMORBID OBSTRUCTIVE SLEEP APNEA ON PHARMACOLOGICAL TREATMENT SELECTION FOR TYPE 2 DIABETES MELLITUS

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Introduction: Obstructive sleep apnea (OSA) is highly comorbid with type-2 diabetes mellitus (T2DM). Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) and sodium-glucose cotransporter 2 inhibitors (SGLT2is) are both considered first-line options (usually together with metformin) for T2DM, especially in patients with chronic kidney disease (CKD) or cardiovascular disease. While both classes show benefits in OSA, the evidence base for GLP-1 RA's role in reducing OSA severity is more robust to date. We hypothesized comorbid OSA is associated with preferential treatment with GLP-1 RAs vs SGLT2is (as add-on therapy to metformin) in Medicare beneficiaries with T2DM.
Methods: We used a random 15% national sample of Medicare administrative claims data (10/1/2016-12/31/2020). We identified individuals aged ≥65 years with T2DM (≥2 outpatient or ≥1 inpatient claim with ICD-10-CM for T2DM) who newly initiated a GLP-1 RA or SGLT2i. Index date was first date prescribed GLP-1 RA or SGLT2i. Patients were required to have ≥1 year of continuous enrollment and ≥1 metformin prescription within 90 days before index date. OSA was defined as ≥2 outpatient or ≥1 inpatient OSA claims. We excluded patients with CKD stage 4/5 or end-stage renal disease in 1-year baseline period. We constructed logistic regression models to estimate odds of being prescribed GLP-1 RA vs. SGLT2i, comparing those with and without OSA. In adjusted models, we controlled for age, race, sex, acute myocardial infarction, stroke, heart failure, obesity, CKD, insulin use, and index year (to account for changing prescribing patterns).
Results: Of 60,548 patients with T2DM treated with metformin (mean age=72.6 [±5.33] years, 47.5% female), 45.2% were GLP-1 RA new users and 54.8% SGLT2i new users. Compared to those without OSA, patients with OSA had 27% increased odds of being prescribed GLP-1 RA vs. SGLT2i (OR=1.27, 95% CI=1.21-1.32). After adjustment, OSA remained a significant predictor of GLP-1 RA vs. SGLT2i prescribing (aOR=1.17, 95% CI=1.11-1.22).
Conclusion: Patients with comorbid T2DM and OSA were preferentially prescribed GLP-1 RAs vs. SGLT2is as add-on to metformin. Given the potential of GLP-1 RAs in reducing OSA severity, future research should incorporate clinicians' perspectives and prescribing experiences when investigating the long-term effectiveness and safety of these agents.
Support (if any): NIA (R01AG079391, K01AG061239).

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1348

EXPLORATORY ANALYSIS OF PATIENT OPINIONS, PREFERENCES, AND EXPERIENCES WITH INSOMNIA TREATMENT

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Introduction: Little is known about patient beliefs and preferences regarding treatment approaches for insomnia. Understanding of such inclinations will allow clinicians to better address these perspectives, and in so doing improve treatment adherence. In the present study, patient beliefs about the relevance of evidence-based treatment and preferences for and experiences with over-the-counter (OTCs), prescriptive medications (RXs), and behavioral treatments (BTs), were surveyed.
Methods: Four items were added to the Penn Behavioral Sleep Medicine online screener (sleeplessinphilly.com), which profiles sleep and general health of individuals seeking to participate in research. Two questions asked about the importance of safety and effectiveness information for OTCs and RXs (on a 0-5 scale, 0=not important, 5=very important). One question asked respondents to rank which of the treatment approaches (OTCs, RXs, BTs) were most and least preferable. One question asked respondents to indicate which of these treatments they had tried, and in what order. Examples were given for each treatment (e.g., BT was parenthetically defined as "4-10 week cognitive behavioral therapy for insomnia").
Results: 181 patients completed the survey (82.3% female, mean±SD age of 48.2±12.2 years). The mean Insomnia Severity Index (ISI) for the group was 16.8±5.1. Roughly 80% of respondents scored evidence and safety information as important (responses of 4 or 5) for both OTCs (82.3%, 4.3±1.2) and RXs (80.7%, 4.3±1.2). The most frequently preferred first, second, and third choices were BTs (45.9%), OTCs (43.6%), and RXs (50.3%), respectively. Despite this stated preference, 71.8% of respondents tried OTCs first, 33.7% tried RXs second and 8.3% tried BTs third. Overall, just 8.8% tried BTs first, and 25.4% ever tried BTs.
Conclusion: Survey findings highlight that patients consider information on safety and effectiveness of insomnia treatment as important (equally so for Rx and OTC treatments), that they prefer behavioral and OTC care as compared to prescriptive medications. Interestingly, although the most patients stated a preference for behavioral therapies first, most reported trying OTCs first and only 8.8% had tried BTs first. This likely reflects the limited availability of BTs, particularly compared to the ease at which patients can access OTC therapies.
Support (if any):

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1349

EXPLORATORY ANALYSIS OF PRIMARY CARE CLINICIANS' ATTITUDES, PREFERENCES, AND PRACTICE PATTERNS REGARDING THE TREATMENT OF INSOMNIA IN PRIMARY CARE

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Introduction: Little is known about primary care providers' (PCPs') attitudes, preferences, and practice regarding the management of insomnia. More information on how PCP's manage insomnia patients may enhance the implementation of evidence-based practice. This study surveyed PCPs with respect to their insomnia treatment preferences and practices.
Methods: An 8-item survey on managing insomnia in primary care was completed by 64 PCPs in the University of Pennsylvania Health System. The survey asked: "How important is it to address insomnia in primary care?"; "How important is it to limit this care to primary insomnia?"; "How important

is it to know which medications (over-the-counter [OTCs] and prescription [RX]) are safest/most effective?" (each on a 0-5 scale, 0=not important, 5=very important); and two additional questions regarding preferences and practice for three treatment options (OTCs, RXs, and behavioral treatments [BTs]).
Results: Over 90% of respondents indicated that managing insomnia in primary care is important (90.6% responded 4 or 5, mean±SD score of 4.5±0.7), and 25% rated the importance of limiting such care to "primary insomnia" as important (2.4±1.7). Most rated effectiveness/safety information as important for OTCs (87.5%, 4.6 + 0.7) and RXs (95.3%, 4.8 + 0.5). Most PCPs preferred BTs as first-line treatment (68.8%), followed by OTCs (28.1%), and RXs (3.1%), although the most common category prescribed/referred for first was OTCs (46.9%), followed by BTs (39.1%) and RXs (15.6%). Among those prescribing OTCs, Melatonin was most common (92.2% [73.4% IR; 18.8% XR]), followed by doxylamine (4.7%) and diphenhydramine (3.1%). Among those prescribing RXs, trazodone was most common (75%), followed by doxepin and zolpidem IR (both 10.9%).
Conclusion: The PCPs in this survey indicated that addressing insomnia in primary care is important, as is knowing which OTCs and RXs are safest/most effective. The most preferred treatment category was BTs, followed by OTCs, then RXs. The unexpected preference for recommending OTCs over RXs underscores the need for comparative effectiveness research on OTCs. The discordance between preference and practice is also noteworthy; despite preferring BTs, OTCs appear to be the go-to therapy. This may reflect both the lower availability of BTs and patient preferences influencing practice.
Support (if any):

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1350

TYPES OF NONCONFORMANCE IN THE ACCREDITATION OF HOME SLEEP APNEA TESTING IN BRITISH COLUMBIA, CANADA

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Introduction: British Columbia is one of only two provinces in Canada that mandate accreditation for HSAT facilities. After achieving provisional accreditation by passing a desktop audit, 151 facilities became eligible to obtain full accreditation. This study examines the types of nonconformance identified during the full on-site assessment process.
Methods: Between 2022 and 2024, 95 facilities (62.9%) underwent on-site visits, which involved formal interviews with management and staff, evidence review, patient set-up observation, evaluation of ten clinical cases (final report packages), assessments of physical space, safety measures, and scoring quality. The process followed a standardized protocol based on 329 standards published in 2021 (1). The assessment results identified areas of nonconformance that facilities needed to address to achieve full accreditation.
Results: By December 2024, 95 out of 151 facilities in British Columbia (62.9%) had completed the accreditation process, with a total of 916 nonconformance issues identified during on-site assessments. These nonconformance issues were categorized as follows: procedural and documentation areas: 219 (23.8%); human resources standards: 139 (15.2%); medical director's duties: 114 (12.5%); ethical standards: 76 (8.3%); HSAT equipment evaluation and maintenance: 66 (7.2%); reporting standards: 54 (5.9%); scoring and Interpretation: 46 (5.0%); client complaints and; feedback requirements: 45 (4.9%); safety and privacy: 38 (4.2%); patient communication: 32 (3.5%); technical HSAT Issues: 26 (2.8%); test appropriateness, infection prevention, and information management: 61 (6.7%) combined. This analysis shows that procedural and documentation issues were the most common area of nonconformance, followed by human resources standards and the medical director's duties. We found that 10 out of 95 HSAT facilities (10.5%) fully met the current HSAT accreditation standards without any outstanding requirements.
Conclusion: Independent HSAT facilities are still essential in delivering diagnostic sleep services in British Columbia. These facilities have continuously embraced the accreditation process to enhance patient care and safety. This study, which presents the initial experience with the HSAT accreditation process, aims to pave the way for future research into the positive impact of accreditation programs on public health outcomes.
Support (if any): Reference: 1. College of Physicians and Surgeons of British Columbia. (2021). Home Sleep Apnea Testing. Accreditation Standards, Version 1.0. https://www.cpsbc.ca/files/pdf/DAP-AS-Home-Sleep-Apnea-Testing-V1.0.pdf

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1351

SLEEP HEALTH AMONG CIVILIANS IN THE GAZA STRIP DURING ONGOING ARMED CONFLICT

Bilal Irfan[1], Mohammed Al-Hasan[2], Abdulwhhab Abu Alamrain[3], Majd Abualnour[4], Abdallah Abu Shammala[5], Izzeddin Lulu[6], Nour Alshaer[7], Hrayr Attarian[8]
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Introduction: Sleep disturbances are common during periods of armed conflict, yet limited data exist on the sleep health of civilians living in conflict zones. Previous investigations in other regional populations such as Ukraine, and of Israeli adults amid the ongoing conflict, suggest that exposure to violence and uncertainty can adversely affect sleep. To address this gap, this pilot study examined self-reported sleep quality among Palestinians in the Gaza Strip during the current conflict.
Methods: A cross-sectional survey was conducted in multiple governorates of the Gaza Strip during the current hostilities at the beginning of December 2024. Participants completed the Pittsburgh Sleep Quality Index (PSQI), which yields a global sleep quality score. Demographic data, including gender, educational attainment, and geographic location, was collected. Mean PSQI scores were compared between men and women, between university and non-university graduates, and between northern (North Gaza and Gaza) and southern governorates (Deir Al-Balah, Khan Yunis, and Rafah). Statistical comparisons were conducted using t-tests; a p-value < 0.05 was considered significant.
Results: A total of 183 individuals participated (47 men, 136 women; 108 non-university graduates, 75 university graduates; 63 from the north, 120 from the south). The overall mean PSQI score was 11.05 (SD=4.11), and 92% (168/183) had scores >6, indicating poor sleep quality. Mean PSQI scores were similar for men (10.77±3.64) and women (11.15±4.26, p=0.58),

and for non-university (10.71±4.28) and university graduates (11.55±3.81, p=0.18). Northern residents reported significantly poorer sleep (11.95±4.19) than southern residents (10.58±4.00, p=0.03).
Conclusion: High levels of poor sleep quality were observed among civilians in the Gaza Strip, with minimal differences by gender or educational attainment. These findings show an increase from 52.8% reported poor sleep quality in 2022, highlighting the importance of targeted interventions to improve sleep health in populations amid armed conflict. Individuals in the north of Gaza, where attacks and hostilities have been more frequent and intense in the preceding few weeks, experienced significantly worse sleep quality compared to those in the south.
Support (if any):

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1352
ASSOCIATIONS BETWEEN SLEEP DURATION AND RECEIPT OF MENTAL HEALTH CARE BEFORE AND AFTER THE COVID-19 PANDEMIC IN THE US: NHANES DATA (2017-2023)

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Introduction: Short and long sleep duration (SD) have been associated with mental health risks. During the COVID-19 pandemic, US adolescents and adults experienced changes in SD and an increased mental health burden. Due to pandemic-related social isolation measures, many experienced barriers to accessing healthcare services. This study aimed to determine the associations of SD to mental health care utilization and changes in utilization pre and post COVID-19.
Methods: This study utilized NHANES pre- and post-pandemic questionnaire data, 2017-March 2020 and August 2021-August 2023 from a nationally-representative sample of adolescents (ages 13-18) and adults (≥19 years) reporting SD weekdays or workdays, categorized as short, long, and recommended, using AASM's age-specific recommended hours nightly: 8-10 hours for adolescents 13-18; 7-9 hours for adults. Mental health care utilization was defined as receiving care from a mental health provider (last 12 months). Weighted chi-square and multiple logistic regressions assessed mental health care utilization odds by SD. Regressions for adolescent and adult populations adjusted for age, gender, race/ethnicity, health insurance status, and depression symptom presence (defined as PHQ-9 score of ≥4, with 'trouble sleeping' excluded from score calculations).
Results: This study utilized NHANES pre- and post-pandemic questionnaire data, 2017-March 2020 and August 2021-August 2023 from a nationally-representative sample of adolescents (ages 13-18) and adults (≥19 years) reporting SD weekdays or workdays, categorized as short, long, and recommended, using AASM's age-specific recommended hours nightly: 8-10 hours for adolescents 13-18; 7-9 hours for adults. Mental health care utilization was defined as receiving care from a mental health provider in the last 12 months. Weighted chi-square and multiple logistic regressions assessed mental health care utilization odds by SD. Regressions for adolescent and adult populations adjusted for age, gender, race/ethnicity, health insurance status, and depression symptom presence (defined as PHQ-9 score of ≥4, with 'trouble sleeping' excluded from score calculations).
Conclusion: In adults, reporting long sleep was associated with a 1.7-fold significantly higher odds of receiving mental health care during pre-and post-pandemic periods. Findings regarding long sleep's relationship to increased mental health utilization extend the literature on adverse outcomes associated with long sleep to the health services utilization domain and warrant further investigation.
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1353
RELATIONSHIPS OF OSA SYMPTOMS AND PRESCRIPTION MEDICATION USE FOR INSOMNIA TO HEALTHCARE UTILIZATION AMONG US ADULTS, NHANES 2017–MARCH 2020

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Introduction: Obstructive sleep apnea (OSA) and insomnia are two of the most prevalent sleep disorders in US adults and have been linked to increased healthcare utilization (e.g., emergency care visits, hospitalizations, outpatient visits) in various population subgroups (e.g., older adults, veterans, those with cardiovascular disease). This study aimed to assess relationships between OSA symptoms or prescription medications commonly used for insomnia (MCUFI) and healthcare utilization among a nationally representative sample of US adults.
Methods: Cross-sectional study of US adults (≥18 years) reporting OSA symptoms or MCUFI from NHANES pre-pandemic data (2017-March 2020). Adults with OSA were identified using Zhou et al.'s (2024) methodology and adults with MCUFI were identified using the prescription list methodology in Bertisch et al. (2014), excluding trazodone, doxepin, or quetiapine which were used as adjustment factors. Outcomes were overnight hospitalization and above-average (≥3) outpatient visits reported (past 12 months). Weighted multiple logistic regressions estimated odds for hospitalization and above-average outpatient visits by OSA and MCUFI, adjusted for age, gender, race/ethnicity, marital status, health insurance, education level, comorbidity status (arthritis, heart disease, COPD, diabetes, cancer, kidney disease, depressive symptoms).
Results: 8,005 adults were identified for inclusion, of whom 3,958 reported OSA symptoms, 202 reported MCUFI, 917 reported overnight hospitalization, and 2,824 reported above-average outpatient visits. Higher odds for overnight hospitalization was observed in those reporting OSA symptoms (OR=1.35, 95% CI=1.08-1.69) versus not, and no significant difference in those reporting MCUFI versus not. Higher odds for above-average outpatient visits were observed in those reporting MCUFI (OR=3.20, 95% CI=1.61-6.38) versus not, and no significant difference in those reporting OSA symptoms versus not. A significant interaction between OSA symptoms and health insurance status was found for overnight hospitalization. Hospitalization odds were increased for OSA without (OR=1.40 95% CI=1.10-1.79) versus with (OR= 0.94, 95% CI=0.55-1.60) health insurance.
Conclusion: Using a nationally representative US data set, higher odds of overnight hospitalization were found in adults reporting OSA symptoms and higher odds of above-average visits were found in adults reporting MCUFI. Further research is needed to understand the etiology of increased hospitalizations and outpatient visits among adults reporting OSA symptoms or MCUFI, respectively.
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1354

SLEEP QUALITY AMONG WEST BANK CIVILIANS DURING THE ONGOING ISRAEL-GAZA CONFLICT

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Introduction: Armed conflict is associated with significant sleep disturbances among civilian populations. Limited data exist on sleep health in Palestinians living under the conditions of the current Israel-Gaza War, particularly in the West Bank where armed violence is commonplace, but to a lesser extent than in the Gaza Strip. A study on Israeli adults with data up till January 2024 found that 61% experienced poor sleep quality (PSQI > 5). Understanding the extent of sleep disruptions during active hostilities is crucial to guiding interventions that may mitigate long-term health consequences.
Methods: A cross-sectional survey was administered to individuals residing in the West Bank during ongoing hostilities in December 2024. Participants completed the Pittsburgh Sleep Quality Index (PSQI), which yields a global sleep quality score. Demographic data, including gender, education, and residential area classification (Area A vs. Area B, C, and East Jerusalem), was collected. Statistical analyses included t-tests to compare mean PSQI scores across groups, with $p < 0.05$ considered significant.
Results: A total of 207 participants (43 men, 164 women; 113 non-university graduates, 94 university graduates; 123 from Area A, 84 from other areas) were surveyed. The overall mean PSQI score was 9.13 (SD=3.64), and 84% (174/207) had scores >5, indicating poor sleep quality. University graduates reported significantly higher mean PSQI scores (9.99±3.68) than non-university graduates (8.42±3.46, p=0.0018). Women reported significantly higher scores (9.45±3.52) than men (7.93±3.86, p=0.0147). No significant difference was found between Area A residents (8.80±3.51) and those living elsewhere (9.61±3.78, p=0.12).
Conclusion: West Bank civilians experienced poor sleep quality during the current conflict. Women and individuals with higher educational attainment reported significantly greater sleep disruptions. No significant difference was found among participants living in different legal & administrative enclaves of the West Bank, indicating that the impact of the conflict may be an overarching factor.
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1355

A SYSTEMATIC TRANSITION FOR COMPLEX PEDIATRIC SLEEP PATIENTS TO ADULT SERVICES

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Introduction: Patients in pediatric sleep clinics can be medically complex, making the transition from pediatric to adult sleep medicine daunting for both patients and health care providers. In Calgary, Canada, a transition clinic was established to facilitate the transfer to new providers while mitigating disruption in care and poor outcomes. The purpose of this study was to describe the model's key structures and processes.
Methods: We conducted a retrospective chart review of all patients attending the transition sleep clinic. Data sources included electronic medical records and paper charting. We used Donabedian's structure-process-outcome framework to describe core elements of the transition clinic model.
Results: From 2017 to 2024, 30 patients (14 female) participated in the clinic. The most common diagnoses were obstructive sleep apnea (n=23, 77%), and narcolepsy (n=4, 13%). Patients with narcolepsy were included until 2022 when pediatric and adult patients were transferred to a sleep neurologist. The mean age at the first pediatric sleep encounter was 8.4 years, and mean age at transition was 17.8 years. 26 patients used NIV with 18/26 using BPAP, 6/26 using CPAP and 2/26 using AVAPS. Prior to transition, mean diagnostic AHI was 39 events/hour and mean oxygen saturation of 91.6%. The average number of comorbidities at transition was 5. Structure: Transition clinics were held at the pediatric sleep center in Alberta Children's Hospital. Health care providers (HCPs) included the pediatric sleep physician, adult sleep physician, and NIV coordinators from both centers. Process:. A pre- and post-clinic discussion was conducted for each patient amongst the HCPs. Transition summaries were prepared by the pediatric team for the EMR. Within each summary, a discussion between the HCPs was documented in 90% of visits, and a discussion with the patient about transition was documented in 87% of visits.
Conclusion: Preliminary findings suggest that a strong foundation of structures and processes can enable safe and effective transition from pediatric to adult sleep care. Further analysis of outcomes can support the rationale for establishing similar transition clinics in other jurisdictions.
Support (if any): This study is unfunded.

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1356

FEASIBILITY AND QUALITY EVALUATION OF A WEB-BASED PSYCHOMOTOR VIGILANCE TEST (PVT) SYSTEM FOR SLEEP DISORDER PATIENTS: A PILOT STUDY

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Introduction: The Psychomotor Vigilance Test (PVT) is an established tool for assessing sleep deprivation or sleep loss related impairments in daytime function (i.e., fluctuations in attention and concentration that allow for inferences about sleepiness). With the wide adoption of mobile devices, text messaging and smart phone apps have emerged as a potential medium for delivering cognitive and human function tasks. A smart phone accessible, web-based PVT was developed (compatible with Apple and Android devices) to test the utility of PVT assessments as part of routine clinical care. Specifically, we will evaluate the feasibility of deploying a digital PVT via text messages and will monitor completion rates and solicit feedback about the experience. The study is ongoing.
Methods: Ten participants have been enrolled in the ongoing pilot study. Protocol: Send invitations (text messages) to complete a 3-minute PVT along with the Karolinska Sleepiness Scale (single

item) for a period of three months. The PVT and KSS are completed once a week during the first month and monthly for two months. As a feasibility study, the key metrics include completion rates, number of reminders administered per assessment day, and participant feedback on usability, clarity, and satisfaction.
Results: While the study is ongoing, during the first 2 weeks, all participants completed the PVT. Week 1: 80% completed the PVT after the first text message, 20% completed the PVT after the second text message. Week 2: 70% completed the PVT after the first text message, 20% completed the PVT after the second text message.
Conclusion: This pilot study will provide insights into the feasibility and potential challenges of using a text message-based PVT and KSS assessments in a clinical setting. Results will inform future implementation strategies for integrating PVT into clinical workflows. By providing a scalable and easily accessible PVT and KSS assessment tool, this system has the potential to improve patient monitoring, enhance clinical decision-making, and support personalized care for individuals with sleep disorders.
Support (if any):

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1357

SLEEP APNEA IN HOSPITALIZED PATIENTS IN A RURAL COHORT: A 5 YEAR EXPERIENCE (SAHARA STUDY)

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Introduction: Introduction Hospital sleep medicine is a novel and growing field. At our tertiary care center, patients are screened by a dedicated respiratory therapist with STOP BANG if BMI > 30 and admitted to internal medicine or cardiology services. All admitting services within the hospital may also request sleep screening studies. Patients are evaluated by a multi-disciplinary team.
Methods: Methods All patients seen by the inpatient sleep medicine consult service who undergo sleep screening testing are retrospectively added to a secure database (REDCAP). Patients who screen positive undergo a level III unattended polysomnography (PSG). PSG results are recorded in the database along with demographics, comorbidities, mortality, 30 day readmissions, discharge medications, and health care literacy scores.
Results: Results The database includes 2,728 patients of which 1449 underwent level III PSG. 530 patients had AHI < 5 whereas 387 had AHI > 5 but < 14. Next, 582 (40%) had suggested moderate – severe sleep apnea with AHI >15. The mean AHI was 16 with a standard deviation of 18.23. The mean age of the cohort was 59 years, of which 56.5% were males (n= 819), with mean BMI of 38.4. Most common comorbidities were congestive heart failure (48%), chronic obstructive pulmonary disease or asthma (36.5%), hypertension (79.7%), diabetes mellitus (46.4%) and atrial fibrillation (29.9%).
Conclusion: Conclusion Sleep apnea poses a significant burden among rural hospitalized patients. Screening for this condition is valuable as it aids in identifying clinically relevant cases and helps address healthcare disparities.
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1358

THE CLEVELAND CLINIC HYPERSOMNIA CAREPATH: PRELIMINARY RESULTS OF ADHERENCE AND SAFETY MONITORING

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Introduction: Patients with CNS disorders of hypersomnolence (CDH) are at increased risk of cardiovascular and other health comorbidities that require frequent monitoring, particularly in the setting of controlled substance use. A 2019-2021 market analysis of patients treated for CDH at Cleveland Clinic found only 27% of patient encounters were clinic visits; others, phone calls or electronic refill requests. Follow-up and safety assessments were not standardized. We piloted a Hypersomnia CarePath that standardizes access and quality and safety monitoring for a growing CDH population aligned with organizational and state regulations. Here, we report pilot phase results of adherence and safety assessments.
Methods: CDH patients on stable pharmacotherapy were enrolled in a follow-up CarePath based on pharmacotherapy type (3-month visits for traditional stimulants; 6-month visits for all other medications). All required one in-person and one physician visit (vs. midlevel provider) per year. Visit compliance was defined as the percent of required visits completed. Annual EKG and UTOX were performed in the 3-month pathway and by physician request for others.
Results: A total of 121 patients were enrolled since July 2022, mean age 42.8 (SD 15.3) yr, 79.3% female, 78.3% Caucasian, 8.3% Black, 5.0% Asian, 8.3% Other. Of these, 81 (67%) were in Q3 and 40 (33%) in Q6 pathways. Age, gender, and race were similar between groups. Visit compliance was 91% overall, 97% for Q3 and 74% Q6. A total of 67 EKGs and 40 UTOX assessments were completed. Abnormal and unexpected UTOX results were found in 4 (10%) cases. Abnormal EKGs were observed in 24 (35.8%) cases including 6 (46.1%) males and 18 (33.3%) females. Patient and caregiver acceptance and satisfaction were highly favorable.
Conclusion: Our novel Hypersomnia CarePath for CDH established standardized follow-up and safety assessments with high visit adherence and patient and caregiver satisfaction. Over one third of EKGs at enrollment (males more than females) and 10% of UTOX studies at the time of enrollment were abnormal. These findings support the need for routine quality and safety monitoring given the known risk of cardiovascular and psychiatric comorbidities in CDH.
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1359

UTILIZATION OF ELECTRONIC CONSULTS TO REDUCE WAIT TIMES FOR AN ACADEMIC SLEEP MEDICINE PROGRAM AND IMPROVE TIMELY DIAGNOSIS OF OBSTRUCTIVE SLEEP APNEA

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Introduction: Approximately 29.4 million adults in the United States have obstructive sleep apnea (OSA) and prevalence continues to rise. At Oregon Health & Science University (OHSU), access to sleep medicine is limited and clinic wait times are long, often upwards of 90 days, creating significant barriers to timely diagnosis and treatment. This necessitates innovation in the diagnostic process. The electronic consult (eConsult) program at OHSU allows primary care providers to request an asynchronous chart review from a specialist to receive preliminary recommendations without a traditional in-person consultation. We aim to evaluate utilization of the eConsult program and its role in reducing wait times and increasing access to sleep medicine services at OHSU.
Methods: A retrospective review of the electronic health record was conducted on eConsult referrals made to the OHSU sleep medicine clinic for undiagnosed sleep apnea from January 1, 2017 through September 1, 2024. We reviewed data regarding latency between eConsult requests to sleep provider response.
Results: There were 3,631 eConsults for undiagnosed sleep apnea. We found that undiagnosed sleep apnea is the primary reason for eConsults, making up 57% of eConsults placed to sleep medicine. There was a 521% increase in eConsults for undiagnosed sleep apnea when comparing 2017 to 2024 and an average annual increase in eConsult volume of 450% per year. On average, 80% of eConsults received a response from a sleep provider within 72 hours (mean response latency = 1.7 days).
Conclusion: The volume of eConsult referrals for undiagnosed sleep apnea submitted to the OHSU sleep medicine clinic has increased steadily since its inception in 2017. This mirrors the increasing prevalence and awareness of OSA in the general population. eConsults drastically reduce latency between initial referral and sleep provider response, with the majority of recommendations provided within 72 hours. With actionable recommendations more quickly accessible, diagnostic testing can be more expeditiously ordered. This streamlined process enables more efficient triage of straightforward patients with strong suspicion for undiagnosed OSA, which can improve access to treatment and overall health outcomes.
Support (if any):

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1360

THE ROLE OF AGE, GENDER, AND DAYTIME SLEEPINESS IN PREDICTING CPAP ADHERENCE FOLLOWING BARIATRIC SURGERY

Claire Belevender[1], Serene Ozeir[1], Seif Bugazia[2], Ankita Badhwar[1], Dania Shakaroun[2], Arthur Carlin[2], Timothy Roehrs[2], Virginia Skiba[2]
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Introduction: Obstructive sleep apnea (OSA) is a common comorbidity in bariatric surgery patients, with continuous positive airway pressure (CPAP) serving as a primary treatment. While bariatric surgery often results in significant weight loss and improvement in apnea severity, the roles of age, gender, and baseline daytime sleepiness—measured by the Epworth Sleepiness Scale (ESS)—in predicting CPAP adherence remain unclear.
Methods: This retrospective chart study reviewed 140 patients evaluated at the Henry Ford Bariatric Clinic and referred to the Henry Ford Sleep Disorders and Research Center for preoperative sleep testing between April and August 2023. CPAP adherence, defined as any reported usage, was analyzed in relation to ESS scores, age, and gender.
Results: Preliminary analyses revealed positive correlation between ESS scores and CPAP adherence, suggesting patients with higher daytime sleepiness are more likely to adhere to CPAP therapy. Older patients demonstrated higher adherence rates. Significant differences in adherence were also observed between genders, with male patients showing consistently higher adherence across all follow-up points.
Conclusion: Age, gender, and baseline ESS appear to play significant roles in predicting CPAP adherence following bariatric surgery. These findings highlight the importance of tailoring postoperative CPAP management to demographic factors, with particular attention to younger and female patients who may benefit from additional adherence support.
Support (if any): None

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1361

PREDICTORS OF PAP ADHERENCE FOLLOWING BARIATRIC SURGERY IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

Serene Ozeir[1], Claire Belevender[2], Seif Bugazia[1], Ankita Badhwar[1], Dania Shakaroun[1], Arthur Carlin[1], Timothy Roehrs[1], Virginia Skiba[1]
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Introduction: Obstructive sleep apnea (OSA) frequently coexists with obesity, and positive airway pressure (PAP) therapy remains the gold standard for its treatment. Bariatric surgery is an effective intervention for significant weight loss, which can alter OSA severity and PAP adherence. This study investigates predictors of PAP adherence post-surgery, focusing on pre- and post-surgery sleep clinic visits, apnea-hypopnea index (AHI), and referral source.
Methods: A retrospective chart review was conducted on 140 patients evaluated at the Henry Ford Bariatric Clinic and referred to the Henry Ford Sleep Disorders and Research Center for sleep testing from April 2023 to August 2023. Data analysis included pre- and post-surgery PAP usage, number of sleep clinic visits, AHI, and referral source. Statistical methods, including ANOVA and correlation analysis, assessed the relationship between these factors and PAP adherence across 3, 6, 9, and 12 months post-operatively.
Results: Significant predictors of PAP adherence included the number of post-operative sleep clinic visits and referral source. Patients with higher baseline AHI were more likely to adhere to PAP therapy at month 12. In addition, more frequent sleep medicine clinic showed evidence of increased PAP therapy adherence. Referral source significantly influenced adherence patterns, with patients referred directly from bariatric clinics exhibiting greater compliance compared to referrals from primary care providers or other sources.
Conclusion: Post-operative sleep clinic visits, referral source, and AHI are significant predictors of PAP adherence following bariatric surgery. These findings underscore the importance of structured follow-up care and referral pathways in promoting PAP adherence and improving long-term outcomes in OSA management.
Support (if any): None.

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1362

SUCCESS RATE OF OBSTRUCTIVE SLEEP APNEA DIAGNOSIS IN A DIRECT REFERRAL PROGRAM VERSUS STANDARD CARE

Claire Belevender[1], Serene Ozeir[1], Pranay Korpole[2], Miriam Jaziri[2], Anthony Reffi[3], Beth Mclellan[2], Luisa Bazan[2]

[1] Henry Ford Hospital, [2] Henry Ford Health, [3] Henry Ford Health System

Introduction: Henry Ford Health implemented a Direct Referral program in 2015 to streamline access to sleep testing for obstructive sleep apnea (OSA). This study evaluates the success rate of establishing an OSA diagnosis in the Direct Referral program compared to standard care.

Methods: A retrospective chart review was conducted for patients referred for diagnostic sleep studies between September and December 2022 via a direct referral pathway versus the standard care pathway. Patients aged 18 years or older were included. Exclusion criteria included patients younger than 18 years and those participating in both pathways. Success was defined as completing all required sleep testing to confirm or exclude an OSA diagnosis.

Results: A total of 342 patients in the Direct Referral cohort and 509 in the standard care cohort were reviewed, with 250 and 500 patients completing workup to exclude or confirm OSA diagnosis respectively. The success rate for OSA diagnosis was 60.4% (151/250) in the Direct Referral cohort and 77.4% (387/500) in the standard care cohort (p <.001). Among those completing evaluation, OSA was diagnosed in 141 patients in the Direct Referral cohort and 365 patients in the standard care cohort.

Conclusion: The success rate for OSA diagnosis was significantly higher in the standard care cohort compared to the Direct Referral cohort. Enhanced counseling from sleep specialists in the standard care pathway may contribute to this difference. Efforts to improve compliance within the Direct Referral program are necessary to optimize its effectiveness.

Support (if any): none

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1363

COMPARISON OF TIME INTERVAL TO OBSTRUCTIVE SLEEP APNEA DIAGNOSIS IN A DIRECT REFERRAL PROGRAM VERSUS STANDARD CARE

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[1] Henry Ford Health, [2] Henry Ford Hospital, [3] HENRY FORD HEALTH SYSTEM

Introduction: A Direct Referral program was initiated at Henry Ford Health in 2015 to facilitate easier access and expedite sleep testing. The effectiveness of the Direct Referral program in comparison to standard care is unclear in terms of time interval to establish Obstructive Sleep Apnea (OSA) diagnosis.

Methods: A retrospective chart review was conducted for patients referred for diagnostic sleep studies between September and December 2022 via the Direct Referral pathway versus a standard sleep clinic consult. Patients aged 18 years or older were included. Exclusion criteria included patients younger than 18 years and those participating in both pathways.

Results: A total of 342 patients were evaluated for inclusion in the Direct Referral cohort, and 509 patients were assessed for the standard care cohort. Ultimately, 147 patients were included in the Direct Referral cohort, while 268 patients were included in the standard care cohort for final analysis. The mean time to confirm or rule out an OSA diagnosis was significantly shorter in the Direct Referral group compared to the standard care group (51 days vs. 105.6 days; p <.001).

Conclusion: Time to inclusion or exclusion of OSA diagnosis was significantly shorter in the Direct Referral cohort compared to the standard care cohort.

Support (if any): None

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1364

SLEEP QUALITY IN MEDICAL STUDENTS AT A UNIVERSITY IN VENEZUELA AND ITS RELATIONSHIP WITH ACADEMIC PERFORMANCE

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Introduction: The demands of a medical career can affect the quality of sleep of students, which could affect their academic performance, but also, those who dedicate more time to their studies and sleep less, could have better grades. The aim of this study was to determine the sleep quality of medical students at a university in Venezuela and its relationship with academic performance.
Methods: Observational, descriptive, cross-sectional study. All first, second and fourth year medical students of the Universidad de Los Andes in San Cristóbal, Venezuela were invited to participate. After signing the informed consent, the Pittsburgh Sleep Quality Index was applied and related to their academic performance. Statistical analysis was performed with SPSS 22 and significance was considered less than 0.05. Chi-square was used for categorical variables and Pearson correlation for numerical variables. The study was approved by the Ethics Committee of the Universidad de Los Andes.
Results: Ninety students were included. The mean age was 23.70 years (SD: 3.17; min: 20 and max: 35), 57.8% were female. The mean grade point average was 15.75 out of 20 (SD: 2.20; min: 10 and max: 20). The mean PSQI was 8.46 (SD: 3.47; min: 2 and max: 17), (23.3% good, 56.7% moderate and 20% poor). Sleep latency was 21.94 minutes (SD: 17.21; min: 1 and max: 90) and hours of sleep 5.23 (SD: 1.04; min: 2 and max: 8). Students with better academic performance had higher PSQI scores (Pearson 0.027; P=NS). 0% of students with excellent academic performance reported good sleep quality and 26.7% poor, compared to students with fair academic performance, with 33.3% good and 20% poor sleep quality (P=NS). No significance was found in any of the other study variables.
Conclusion: The sleep quality of medical students tends to be poor. Those with better academic performance present worse sleep quality, probably because they dedicate more study hours at the expense of their sleep hours.
Support (if any):

Abstract citation ID: zsaf090.1365

1365

LET'S TALK ABOUT SLEEP!

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Introduction: Exposure to sleep medicine education in ACGME accredited parent specialties of sleep medicine is scarce and varied. Literature states sleep-related didactics average 4.75 hours per year; less than 10% of programs have graduates pursuing sleep medicine fellowship. In the last five y ears at University of Kentucky's Family and Community Medicine residency (UK FM), only 4 of 1200 hours of didactics (less than 1%) have been dedicated to sleep. Lack of sleep education during residency leads to patient care gaps, and deficiency of exposure to this field dissuades trainees from pursuing sleep fellowship. To understand UK FM residents' opinions of sleep medicine, a survey was distributed before and after a formal lecture series.
Methods: Google surveys were disseminated via text message to residents. Submissions remained anonymous. The pre- and post-lecture surveys had congruent questions about sleep education, sleep disorder management, and tested knowledge about sleep disorders. The lecture series had three one-hour lectures during didactics. One week after the last lecture, the post-survey was disseminated. Results were then compared.
Results: The current cohort is comprised of 17 residents. Response rate was 94% for the pre-survey and 76% for the post-survey. After lectures, 46% agreed they had adequate education and understanding of sleep medicine compared to 0% before. Regarding managing specific disorders, more residents answered they had higher comfort after the lectures. Majority of the residents (>50%) answered 2/3 knowledge questions correctly after the lecture series. Overall trends indicated increased confidence and knowledge after the lectures.
Conclusion: By simply increasing sleep education didactics by 3 hours through this project, the total percentage of sleep didactics in resident education was tripled. This increased confidence and competency of resident s in sleep education. Our study highlights the current gaps in resident education related to sleep, the need to increase sleep didactics in sleep medicine feeder residencies, and ultimately how this education increases resident confidence and competency in sleep management.
Support (if any):

Abstract citation ID: zsaf090.1366

1366

EPIC MYCHART SLEEP CARE PLAN' TO IMPROVE CONTINUOUS POSITIVE AIRWAY PRESSURE ADHERENCE IN PATIENTS WITH NEWLY DIAGNOSED OBSTRUCTIVE SLEEP APNEA

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Introduction: CPAP therapy is the gold-standard therapy for treatment of OSA. Adherence rates at UConn Health in the past 7 years range from 70 – 81%. Patients on CPAP require support and education to ensure ongoing adherence. A major limitation in the care of patients with OSA requiring CPAP is the lack of novel educational resources. This quality improvement (QI) project aims to improve this via an innovative tool delivered to patients via the Electronic Medical Records (EMR) portal.
Methods: The EMR tool, entitled "MyChart Sleep Care Plan" was designed by the authors with technical support from EMR staff. Briefly, the tool allows newly diagnosed patients with OSA requiring CPAP to enroll and choose their specific device and mask model and type. Our aim is to enroll fifty patients who has familiarity with EPIC MyChart. Patients are provided information on CPAP set up, maintenance, troubleshooting and mask fitting via brief audio/video formats. Sleep hygiene education, reminders and monthly sleep quality questionnaires are also included. The plan is accessible for the first 90 days of CPAP usage, targeting early adherence. Efforts to increase enrollment included emails to CPAP prescribing providers and in-person announcements. The data was analyzed to determine feasibility and further improvements in the tool.

Results: Sixteen patients were enrolled within 7 months with adherence data available for 15 patients to date. The median age was 48 years; 63% were female. 69% of patients had body mass index (BMI) > 30kg/m2. Regarding racial distribution, 44% white, 13% black, 38% Asian, 5% unknown with majority (88%) non-Hispanic in ethnicity. 60% of patients met adherence criteria as defined by US Centers for Medicare and Medicaid Services (CMS). Average 30-day adherence rate was 68%. Average engagement with assigned tasks was 45%. The tasks which were least engaged by patients were reminders for CPAP tubing/ mask cleaning (0-33%) and sleep questionnaires (25-50%).
Conclusion: "MyChart Sleep Care Plan" is a novel tool designed to improve CPAP adherence and provide effective patient education. While the tool is feasible, changes need to be made on an ongoing basis to improve the design and increase patient engagement.
Support (if any):

Abstract citation ID: zsaf090.1367

1367
LONGITUDINAL EFFECTS OF SLEEP EDUCATION ON UNDERGRADUATES AND GRADUATES STUDENTS: INSIGHTS FROM STANFORD UNIVERSITY'S DEMENT'S SLEEP AND DREAMS

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Introduction: Sleep disorders have become a significant concern among university students. The demanding nature of higher education, coupled with lifestyle factors such as stress, irregular sleep schedules, and academic pressures, exacerbates sleep disturbances and contributes to a range of psychological and physical health problems, including depression, anxiety, and impaired cognitive function. This study aimed to assess the impact of sleep education on university students' sleep-related symptoms.
Methods: Students enrolled in Stanford University's Dement's Sleep and Dreams course were completed the Alliance Sleep Questionnaire (ASQ), a validated tool for measuring sleep quality and disturbances, at the start and end of the course. This college level-course, provides comprehensive education on sleep health and science. The ASQ assesses various self-reported sleep-related issues, including insomnia, daytime sleepiness, circadian rhythm disorders, and the impact of sleep problems on mental health, with scales such as the Epworth Sleepiness Scale (ESS) and the Patient Health Questionnaire (PHQ-9) for depression.
Results: A total of 914 students completed the ASQ from 2016-2024. Students reported significant improvements in sleep-related symptoms over the 10-week course, including reductions in difficulty falling asleep, staying asleep, and waking up too early. Additionally, there was a marked decrease in daytime sleepiness and fatigue, as well as improvements in memory and concentration.
Conclusion: These findings show that a college level course can improve the sleep of students. This study highlights the potential benefits of sleep science courses as a valuable tool for promoting sleep health and well-being.
Support (if any): none

Abstract citation ID: zsaf090.1368

1368
PREDICTORS OF SLEEP IMPROVEMENTS FROM THE SLEEP EDUCATION FOR EVERYONE PROGRAM (SLEEP)

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Introduction: Poor sleep is prevalent among older adults. Sleep issues can lead to reduced quality of life and increased risk of developing chronic diseases. Behavioral interventions have been shown to improve sleep quality and duration. Predictors of success were explored in the SLeep Education for Everyone Program (SLEEP).
Methods: 131 adults participated. The Pittsburg Sleep Quality Index (PSQI) assessed sleep quality and duration; the Sleep Hygiene Index (SHI) measured undesirable sleep behaviors. Median income data based on zip code was obtained from the 2022 American Community Survey 5-Year estimates. BMI was calculated from self-reported height and weight and categorized into lean, overweight, and obese. A linear regression model determined predictors. Group differences were assessed utilizing one-way ANOVA.
Results: Participants were 64.9□13.4 years with an average BMI of 30.0□7.8 kg/m2. Older adults demonstrated greater improvement in SHI scores; less improvement was observed with worse initial SHI scores (adjusted R2=0.30, df=122, F=27.28, p< 0.001). Better sleep quality and greater sleep duration at baseline predicted more improvement in sleep quality (adjusted R2=0.32, df=118, F=57.36, p< 0.001) and duration (adjusted R2=0.43, df=113, F=84.81, p< 0.001) post-program. SHI scores for participants with lean BMI were better at baseline and post-program than overweight and obese BMI (p=0.005, p=0.010 and p=0.031, p=0.042, respectively). PSQI scores at baseline were better for lean participants compared to participants with obesity (p=0.033). Group differences were absent post-program, suggesting participants with obesity improved more (p=0.148). While no differences were present at baseline (p=0.695), sleep duration increased post-program in lean BMI participants compared to those with obesity (p=0.012). Race, education, employment, number of chronic conditions, and income did not predict post-intervention outcomes.
Conclusion: Older age and more favorable initial sleep scores were the best predictors for improvement after completing SLEEP. Individuals with obesity experienced greater gains in sleep quality than those who were lean but less improvement in sleep duration.
Support (if any):

Abstract citation ID: zsaf090.1369

1369
ENHANCING PRIMARY CARE PROVIDERS' COMPETENCE IN IDENTIFYING AND MANAGING BEHAVIORAL SLEEP DISORDERS

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Introduction: Sleep complaints are common in primary care in both adult and pediatric populations, yet provider training in identifying sleep disorders is limited. The UCI Train New Trainers (TNT) Fellowship addresses this gap by delivering sleep-specific content at their annual conference, designed to improve awareness and diagnostic accuracy of considering sleep disorders such as insomnia and circadian rhythm disorders while formulating differential diagnoses of cases with vague or multiple clinical symptoms.
Methods: Vague case vignettes including symptoms of depression, poor motivation, difficulty with concentration along with sleep concerns were presented several hours prior to (pre-) and one day after the delivery of sleep-specific content (post-) to the fellows from the General (n=172, Myears since degree=10.5±9.0, 66.9% females) and the Child and Adolescent Psychiatry (CAP; n=79, Myears since degree=12.0±9.6, 82.3% females) tracks at the in-person TNT Fellowship's Mid-Year Conference. Cases were specific to each track, with balanced case genders presented at pre- and post-assessment (gender changes, but symptoms remained consistent). Paired t-tests were conducted to analyze pre- to post-lecture differences, with effect sizes calculated using Cohen's h.
Results: Fellows demonstrated significant improvements in their competence in identifying sleep disorders as a possible diagnosis. In the General track, the inclusion of insomnia disorder in differential diagnoses increased from 55.6% at baseline to 85.3% post-lecture (p=0.0019, Cohen's h=0.67). In the CAP track, recognition of circadian rhythm disorders improved from 17.0% to 35.3% (p=0.033, Cohen's h=0.42).
Conclusion: The sleep lecture significantly improved PCPs' diagnostic accuracy in identifying sleep disorders such as insomnia in the General track and circadian rhythm disorders in the CAP track, consistent with the appropriate track-specific content that were covered. Continued training in structured assessments and behavioral sleep interventions is recommended to build on these gains.
Support (if any): State of California Award #21-20115, NICHD K08 HD107161

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1370

SCHOOL-BASED SLEEP EDUCATION AND SCREENING PROGRAM AS PREVENTION TOOL AGAINST SLEEP WAKE DISORDERS

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Introduction: The World Health Organization (WHO) outlines characteristics of conditions that should be screened in schools: the conditions should be prevalent, screenable and actionable. In Pennsylvania, vision, hearing, scoliosis, and growth screenings are required at certain grade levels. In children and adolescents under 18 years of age approximately 6.8% have a diagnosed eye and vision condition, 15-20% with hearing loss, and 2-4% with scoliosis. The 2021 Youth Risk Behavior Survey found 71% - 84% of high school students get less than the recommended 8-10 hours of sleep per, with female students (80%), 12th grade students (84%) and black students (84%) being particularly sleep-deprived.
Methods: A school-based sleep education and screening program was initiated in a rural Pennsylvania school (7th – 12th grades) in December 2020. Sleep education resources were available to students, staff and families throughout the year. Students completed the Epworth Sleepiness Scale - Children and Adolescents and Childhood Sleep Habits Questionnaire during school hours twice per year (fall and spring). Students received immediate feedback on their sleep (healthy or room for improvement). More extensive assessment is offered to families of students with likely sleep pathology, providing information which can be shared with the student's health care provider.
Results: Over 4.5 years, a significant decrease in the percentage of students with sleep pathology based on screening scores has been observed (-30.2%) while participation rates remain consistent. A previously identified trend of 10th – 12th grades reporting significantly less weekday sleep hours than 7th – 9th grades is no longer apparent, with the most recent data showing the average reported weekday sleep hours for every grade within the recommended range for adolescents and an overall mean = 8.4 hours/night, N = 396. Students reporting less than 8 hours of sleep per weeknight decreased from 45.5% in 2020 to 28% in Fall 2024 (-17.5%).
Conclusion: School-based sleep education and screening is a feasible, cost-effective way to promote sleep hygiene and prevent sleep wake disorders among secondary students and is in line with WHO recommendations for school-based screenings.
Support (if any): Philanthropic support from Geisinger's Janet Weis Children's Hospital, Jazz Pharmaceuticals, Coverys Community Healthcare Foundation and ResMed Foundation.

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1371

REST, RESILIENCE, AND RESULTS: THE IMPACT OF SLEEP ON MEDICAL STUDENT HAPPINESS AND ACADEMIC PERFORMANCE

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Introduction: Medical students face intense demands that often compromise sleep. Adequate sleep has been shown to improve cognitive functioning and emotional regulation, yet its impact on medical student happiness and performance remains underexplored. This study aimed to evaluate the relationship between sleep duration, academic performance, and happiness to identify opportunities for improving student wellness.
Methods: This IRB-approved prospective study enrolled 49 second-year medical students at UNC Chapel Hill from October to December 2023. Participants tracked daily sleep duration and logged self-reported happiness ratings (scale 1-100). Academic performance data were collected via midterms, finals, and USMLE Step 1 practice test scores. Descriptive statistics and correlation analyses were performed using SAS software.
Results: Analysis revealed significant positive correlation between hours of nightly sleep and happiness ($\beta = 0.5286$, $p = 0.0061$). Average weekly sleep duration in top performers (scores of 90%-99%) was 53.48 hours SD 3.70 vs 44.33 hours SD 26.39 in lowest performers (60%-69%). Performance did not differ in students sleeping < 5 hours (83.54) vs ≥5 hours (84.98) the night before exams ($p = 0.72$). Average sleep duration the night before tests vs

all other nights was 6.53±1.98 and 6.66 SD 1.76 hours (p = 0.41), respectively. Sub analysis of sleep before midterms (6.10 SD 2.65) and finals (6.38 SD 1.87) showed no difference compared to non-test days (p = 0.09, p = 0.15). Average nightly sleep time in test weeks vs non-test weeks was 6.65 SD 1.78 vs 6.63 SD 1.78 (p = 0.83).
Conclusion: This study highlights the positive relationship between sleep and happiness while suggesting that high performers sleep more on average with less cohort variability compared to lower performing peers. This suggests institutional interventions like educational workshops or flexible scheduling promoting healthy sleep habits could potentially improve academic performance. Confounding variables potentially impacting performance include differing study routines or baseline fund of knowledge. Further study is warranted to better characterize how sleep habits impact happiness and academic performance.
Support (if any):

Abstract citation ID: zsaf090.1372

1372
IMPLEMENTING SLEEP MEDICINE EDUCATION IN MEDICAL SCHOOL CURRICULUM; CHALLENGES AND TRIUMPHS

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Introduction: Sleep medicine education is poorly incorporated in existing medical school curriculum with average education ranging between 0-2 hours in a 4–6-year medical school curriculum. Students are sleep deprived, and ignorant about the importance of sleep medicine and sleep related breathing disorders impacting both their own and their future. Improving knowledge among medical students about sleep related disorders through asynchronous learning was planned and implemented for medical students over one year and impact evaluated.
Methods: 13 medical students M2 and M3 were enrolled in a hybrid sleep medicine education program. 20 hours of Inhouse lectures as well as curated lectures from AASM website were shared with students for online learning and 14 hours of in person lectures were provided. 30 hours of practicum in form of working with sleep physician were added. Students completed a survey on impact of the program on knowledge measures of sleep medicine. Data expressed as percentage.
Results: Improve understanding of fundamental concepts of sleep and the effect of sleep on health- 100% Improved understanding of Sleep Apnea- 100% Understand pertinent history questions and examination for diagnosing and evaluating sleep related disorders- 100% Developed a more informed view of health concerns related to sleep- 100% Improved understanding of Insomnia and its management- 100% Usefulness of the program to your future field of practice- 100% Usefulness of the program to your future field of practice- 100% Quality and effectiveness of teaching- 100%
Conclusion: Sleep medicine knowledge is important for future physicians and our results showed that even though our program was done as co curricular activity, based on over 34 hours exposure in medical knowledge and 30 hour exposure in practicum, overall impact of the program was significant. Sleep medicine should be integrated in medical school curriculum in some form, curricular or co curricular activity are both impactful
Support (if any): None

Abstract citation ID: zsaf090.1373

1373
UNDERSTANDING KNOWLEDGE, ATTITUDES, AND SKILLS OF HOSPITALISTS' CARE OF THE PATIENT WITH OSA

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Introduction: An estimated 24 million people in the United States (U.S.) have undiagnosed obstructive sleep apnea (OSA). Untreated OSA is associated with an increased risk of multiple health conditions including atrial fibrillation, hypertension, and stroke. These common disorders often require hospitalization. Research in primary care physicians demonstrates lack of knowledge regarding OSA and risk stratification. Although educational interventions for health care workers (HCWs) demonstrate improved outcomes for patients with OSA, the application of these materials on the in-patient setting is unknown. No study to date has investigated knowledge, attitudes, and skills of caring for sleep disorders, namely OSA by the in-hospital care team.
Methods: A self-selection survey for hospitalists was distributed to ten institutions across the United States via email. Following survey completion, participants were able to register for several incentive drawings. The online survey consisted of 65 questions about knowledge, attitudes, and skills, and took approximately 8 minutes to complete.
Results: Ninety hospitalists at academic and community hospitals responded to the survey. Of respondents, most (88%, n=80) practiced at academic hospitals. While almost half of respondents (42%, n=38) were in the Midwest, nearly a quarter of respondents represented the Northeast (23%, n=21) and the West 32% (n=29), while few (2%, n=2) represented the South. Nearly all (92%, n=83) of the hospitalists knew the gold standard for diagnosing OSA was polysomnogram; however, only one-third (36%, n=32) felt confident in their ability to discuss treatment options for OSA. One quarter (29%, n=26) of the hospitalists knew the purpose of the STOP-BANG Questionnaire in predicting risk of OSA. Less than half (42%, n=38) of hospitalists felt confident in their ability to administer the STOP-BANG for risk stratification.
Conclusion: Our study is the first study to evaluate hospitalists across the nation and their knowledge, attitudes, and skills in obstructive sleep apnea care. This study provides general insight into the current state of some U.S. hospitalists regarding important topics in Sleep Medicine. Additionally, this study identifies specific areas to target future education on OSA for hospitalists.
Support (if any):

Abstract citation ID: zsaf090.1374

1374
FINDING THE RIGHT MATCH: THE MORE THE MERRIER?

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Introduction: The Sleep Fellowship application process has undergone several major changes, including a shift to virtual interviews since the 2020 interview season and alignment of the sleep fellowship match date with the American Medical Board Specialties match for the 2021 interview season. Our study evaluates their effects on applicants and match success.
Methods: We collected and analyzed aggregate deidentified sleep applicant rank list and match data from the National Resident Matching Program (NRMP) for the sleep match for academic years from 2012 to 2025. Data tracked over this period included applicant numbers, preferred and alternative specialties and positions offered.
Results: The number of applicants have increased since the implementation of these changes to the sleep match from 187 applicants in 2021 to 227 applicants in 2024. The ratio of applicants to positions increased over 1.0 for the first time in 2021 and has remained over 1.0 since then. For the first two years after the unification of match dates (2022 and 2023), the rise in applicants was entirely driven by those who ranked sleep as their non-preferred specialty (constituting 9% and 18% of total applicants, respectively). From the 2022 - 2025 appointment dates, those who matched into sleep as their non-preferred specialty was 5%, 6%, 3% and 2%.
Conclusion: The advent of virtual interviews has allowed applicants to apply to more programs. The alignment of the sleep fellowship match further increased the number of applicants. Initially, more physicians ranked and matched sleep as their non-preferred specialty. However, this trend reversed in the last two application cycles with improving match success for those who ranked sleep as a preferred specialty.
Support (if any):

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1375

MULTI-NIGHT VALIDATION OF A SMART BED FOR APNEA DETECTION AND AHI ESTIMATION

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Introduction: Traditional sleep apnea diagnosis typically relies on single-night assessments, which may overlook night-to-night variations in respiratory events. Accurate estimation of the apnea-hypopnea index (AHI) requires multi-night monitoring, preferably leveraging unobtrusive monitoring methods. This study validates the Sleep Number smart bed's apnea detection algorithm against CerebraTM level 3 In-home Sleep Apnea Testing (HSAT) device for single-night monitoring and introduces and extends its application to multi-night K-AHI estimation. Instead of using smoothing or filtering methods on single night AHIs which generally overlook AHI weights for different nights, we propose the K-AHI index: count of all detected apneic events divided by total sleep hours in K sessions. We also examine the number of nights (K) necessary for reliable AHI assessment, using the HSAT device as a reference. The study received Institutional Review Board (IRB) approval (#P20220412, Allendale IRB), with all team members properly certified.
Methods: Data were collected for 93 nights using both the HSAT device and Sleep Number beds and 990 nights with only Sleep Number bed's ballistocardiograph (BCG) sensor from 11 participants (Age: mean 46.3 ± 6.5 years, Male/Female ratio 7/4, AHI mean 17.86 ± 12.1). Only six nights with missing or short sleep data were excluded from the analysis. Apnea episodes were detected every second by a BCG-processing deep neural network, marking an episode as apneic if it lasted at least 10 seconds. The K-AHI was then calculated for K = 1,..., 31. The HSAT device showed an average nightly AHI standard deviation of 5.8 across participants.
Results: The smart bed's ability to detect AHI > 10 showed a sensitivity of 88% and specificity of 67% and Receiver Operating Characteristic Area Under the Curve (ROC-AUC) of.80 across the 87 nights when compared to the HSAT device on single night. Aggregating data over 14 nights, the smart bed achieved the highest (ROC-AUC) of 0.85 for detecting AHI > 10, with sensitivity and specificity of 94% and 73% respectively.
Conclusion: The smart bed's apnea detection and KAHI metric show promising potential for seamless apnea risk monitoring, serving as an effective early indicator for undiagnosed individuals and enhancing early detection and intervention.
Support (if any):

Abstract citation ID: zsaf090.1376

1376

EFFECTS OF REAL-TIME MATTRESS TEMPERATURE ADJUSTMENT BASED ON SLEEP STAGES ON SLEEP QUALITY DURING THE SUMMER SEASON

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Introduction: There is a wealth of research showing that tropical nights during the summer season can negatively affect sleep quality. As a result, many people resort to sleeping with the air conditioner on throughout the night. Studies have shown that a person's body temperature gradually decreases after falling asleep, reaching its lowest point during deep sleep. Based on this, we aimed to investigate how providing an ideal mattress temperature during the summer affects sleep quality. Specifically, we proposed adjusting the mattress temperature in real-time—raising it during detected deep sleep and lowering it during other sleep stages.
Methods: Over a 10-day period, 30 participants underwent three polysomnography sessions (IRB No.P01-202408-01-035): one for natural sleep, one for constant temperature control (CTC), and another for real-time temperature adjustment (RTA). For both CTC and RTA, the default temperature was set to 28°C, Korea's preferred cooling mat temperature. During deep sleep (N3), RTA raised the temperature to 30°C in real time to prevent awakening caused by body temperature drops. For other sleep stages, including Light (N1, N2), and REM, the temperature returned to 28°C. Meanwhile, CTC consistently maintained 28°C as a control condition to compare the effects of static versus adaptive temperature control on sleep structure.
Results: Our results show significant changes in sleep architecture between Nature, CTC and RTA. Total sleep time (TST) increased from 6h41min, 6h44min to 7h13min (p<. 015, 023) and sleep efficiency (SE) from 83.35%, 83.83% to 89.77% (p<.019,.025). Wake after sleep onset (WASO) decreased from 79min, 78min to 49 minutes (p<.019,.024), REM Sleep extended from 87min, 93min to 106 minutes (p<.015, 018), and Duration of Deep sleep showed a significant difference only in the Nature between RTA. 41min to 56min (p<.047).
Conclusion: The results showed that, compared to the Nature sleep condition, CTC and RTA led to statistically significant improvements in objective indicators of polysomnography: increased TST, SE, increased REM sleep time and deep sleep time, and higher proportions of REM and deep sleep stage. This study confirmed that providing mattress temperature adjustments based on sleep stages during summer can improve sleep quality.
Support (if any):

Abstract citation ID: zsaf090.1377

1377

USE OF A HYBRID MATTRESS IMPROVES PERCEIVED SLEEP BUT NOT OBJECTIVE SLEEP

Duvia Lara Ledesma[1], Sharon Danoff-Burg[1], Holly Rus[1], Aislinn Beam[1], Morgan Weaver[1], Kiara Carmon[2], Sophia Markowitz[1]

[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: Previous research has shown that comfort, including comfort of the mattress, is essential to sleep quality. In addition to comfort, temperature regulation plays an important role in sleep quality. This study compared sleep on a mattress designed to help the sleeper feel cool to participants' prior sleep on their original mattress.
Methods: Healthy adults (56% female; ages 22-73, mean age=44) who reported sleeping hot, hot flashes, or night sweats, as well as difficulties with frequent awakenings or time spent awake at night, participated in a 10-week field study, using a pre-post

intervention design. During the 4-week baseline period, participants used their regular mattress at home. During the 4-week intervention period, which occurred following a 2-week adjustment period, participants slept on a Serta iSeries Hybrid 2.0 mattress. Sleep was measured objectively using a PSG-validated, non-contact biomotion device, SleepScore Max, every night and by daily and pre-post self-report. Multilevel regression and paired t-tests were used to test for statistical significance.
Results: There were 1,420 nights of tracked sleep across 36 participants. Compared to baseline, objective sleep measurements did not show significant sleep improvement or sleep disruption. Self-report measures revealed improvements in perceived coolness, comfort, support, pressure relief, sleep quality, amount of tossing and turning, sleep satisfaction, and feeling well-rested in the morning (all ps<.001).
Conclusion: Participants reported better sleep quality in numerous ways, when using the mattress being tested compared to baseline, although no objective improvements were seen.
Support (if any): Mattress Firm INC

Abstract citation ID: zsaf090.1378

1378
ADJUSTABLE BASE IMPROVES PERCEIVED SLEEP AND PERCEIVED BACK PAIN

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Introduction: Previous research has shown that comfort is important for sleep quality. Adjustment of sleep positions to alleviate pressure can potentially lead to better sleep and less discomfort, including back pain. The current study examined an adjustable base with changeable positions compared to sleeping flat, in a general sample and a subsample with back pain.
Methods: Adults without sleep disorders (M age=47, 72% female) participated in a 6-week pre-post intervention field study. For a three-week baseline period, participants slept flat on their usual bed. For the next three weeks, participants slept on their own mattress using Sleepy's Signature Adjustable Base with adjustable settings (head/feet inclined). Sleep was measured using a PSG-validated, non-contact biomotion device, SleepScore Max, and daily questionnaires. A subset of participants reporting back pain at baseline was also examined. Multilevel regression was used to test for statistical significance.
Results: In the full sample (n=1298 nights; n=42 participants), there were no changes in objective sleep when switching from sleeping flat to using the adjustable base. However, participants reported having better perceived sleep quality (+15%, p<.001), feeling more well-rested in the morning (+18%, p<.001), and less back pain (-28%, p<.001). In the back pain subsample (n=938 nights; n=30 participants), there were no changes in objective sleep, but participants reported better perceived sleep quality (+16%, p<.001), feeling more well-rested in the morning (+20%, p<.001), and less back pain (-27%, p<.001), when using the adjustable base compared to sleeping flat.
Conclusion: When using the adjustable base, objective sleep did not change but perceived sleep and back pain improved, in both a general sample and a subsample reporting back pain.
Support (if any): Mattress Firm

Abstract citation ID: zsaf090.1379

1379
EFFECTS OF USING AN ADAPTIVE MATTRESS ON OBJECTIVELY MEASURED SLEEP AND SELF-REPORTED SLEEP

Kiara Carmon[1], Sharon Danoff-Burg[2], Holly Rus[2], Aislinn Beam[2], Morgan Weaver[2], Devanshi Upadhyaya[2], Duvia Lara Ledesma[2]
[1] SleepScore Labs LLC, [2] SleepScore Labs

Introduction: Previous research has shown that comfort, including comfort of the sleep surface, is essential to sleep quality. In addition to comfort, temperature regulation plays an important role in sleep quality. This study compared sleep on a mattress designed to adapt to the body and help the sleeper feel cool to participants' prior sleep on their original mattress.
Methods: Healthy adults (53% female; M age=48) who reported difficulties with frequent awakenings or time spent awake at night, and sleeping hot or night sweats, participated in a 10-week field study, using a pre-post intervention design. During the 4-week baseline period, participants used their regular mattress at home. During the 4-week intervention period, which occurred following a 2-week adjustment period, participants slept on a TEMPUR-Adapt Hybrid mattress. Sleep was measured objectively using a PSG-validated, non-contact biomotion device, SleepScore Max, every night and by pre-post self-report. Multilevel regression and paired t-tests were used to test for statistical significance.
Results: There were 1,412 nights of tracked sleep across 35 participants. Compared to baseline, objective sleep showed no statistically significant improvements nor disruptions when using the adaptive mattress compared to the original mattress. Self-report measures revealed increases in perceived comfort (+62%), coolness (+103%), pressure relief (+120%), and support (+68%). Increases were also seen in perceived sleep quality (+69%), sleep satisfaction (+70%), and feeling well-rested upon waking (+85%) (all ps<.001).
Conclusion: Participants perceived many improvements in their comfort and sleep when using the adaptive mattress compared to baseline sleep on their original mattress; however, no changes in objectively measured sleep were observed.
Support (if any): Mattress Firm

Abstract citation ID: zsaf090.1380

1380
USE OF A COOL TOUCH MATTRESS IMPROVES OBJECTIVE SLEEP AND PERCEIVED SLEEP

Duvia Lara Ledesma[1], Sharon Danoff-Burg[1], Holly Rus[1], Aislinn Beam[1], Morgan Weaver[1], Kiara Carmon[2], Sophia Markowitz[1]
[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: Previous research has shown that comfort, including comfort of the sleep surface, is essential to sleep quality. In addition to comfort, temperature regulation plays an important role in sleep quality. This study compared sleep on a mattress designed to help the sleeper feel cool to participants' prior sleep on their original mattress.
Methods: Healthy adults (60% female; ages 24-67, mean age=42) who reported sleeping hot or night sweats, as well as difficulties with frequent awakenings or time spent awake at night,

participated in a 10-week field study, using a pre-post intervention design. During the 4-week baseline period, participants used their regular mattress at home. During the 4-week intervention period, which occurred following a 2-week adjustment period, participants slept on a Purple Restore Cool Touch mattress. Sleep was measured objectively using a PSG-validated, non-contact biomotion device, SleepScore Max, every night and by daily and pre-post self-report. Multilevel regression and paired t-tests were used to test for statistical significance.
Results: There were 1,347 nights of tracked sleep across 34 participants. Compared to baseline, objective sleep measurements showed increases in time spent in bed (+19 minutes, p< 0.001), total sleep time (+21 minutes, p< 0.001) and deep sleep (+5%, p=.025). Significant improvements were seen in SleepScore, an overall sleep quality metric (+4%, p< 0.001) BodyScore (+2%, p=.016) and MindScore (+3%, p=.035). Self-report measures revealed improvements in perceived coolness, comfort, pressure relief, sleep quality, and feeling well-rested in the morning (all ps<.001).
Conclusion: Participants experienced improved sleep quality, sleep duration, and more deep sleep when using the mattress being tested compared to baseline. In turn, they spent more time in bed and slept longer. Additional improvements were seen in self-reported outcomes such as feeling cool, comfortable, more satisfied with sleep, and feeling more well-rested in the morning.
Support (if any): Mattress Firm INC

Abstract citation ID: zsaf090.1381

1381
MULTI-FEATURE ADJUSTABLE BASE IMPROVES OBJECTIVE SLEEP, PERCEIVED SLEEP, AND PERCEIVED BACK PAIN

Aislinn Beam[1], Sharon Danoff-Burg[1], Holly Rus[1], Morgan Weaver[1], Kiara Carmon[2], Duvia Lara Ledesma[1], Sophia Markowitz[1]
[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: Research has shown that comfort is essential to sleep quality. Adjustment of sleep positions to alleviate pressure can potentially lead to better sleep and less discomfort, including back pain. The current study examined a multi-feature adjustable base compared to sleeping flat, in a general sample and a subsample with back pain.
Methods: Healthy adults (M age=45, 64% female) participated in a 6-week field study using a pre-post intervention design. For a three-week baseline period, participants slept flat on their usual bed. For the next three weeks, participants slept on their own mattress using Sleepy's Elite Adjustable Base with adjustable settings (head/feet inclined, lumbar support, massage, pillow tilt). Sleep was measured using a PSG-validated, non-contact biomotion device, SleepScore Max, and daily questionnaires. A subset of participants reporting back pain at baseline was also examined. Multilevel regression was used to test for statistical significance.
Results: In the full sample (n=1267 nights; n=44 participants), objective sleep improved when using the base, compared to baseline. Participants spent more time in bed (+8 minutes, +2%, p =.027) and scored higher on SleepScore, a sleep quality metric (+2%, p=.011). Participants reported increased perceived sleep quality (+26%, p<.001), less back pain (-45%, p <.001), and feeling more well-rested upon waking (+29%, p<.001). In the back pain subsample (n=536 nights; n=20 participants), participants spent more time in bed (+14 minutes, +3%, p=.025), slept longer (+15 minutes, +4%; p=.027), and spent more time in light sleep (+5.5%; p=.012). Subsample participants also reported increased perceived sleep quality (+31%, p<.001), less back pain (-45%, p <.001), and feeling more well-rested in the morning (+34%, p<.001).
Conclusion: When using a multi-feature adjustable bed base, participants in both a general sample and subsample reporting back pain showed improvements in objective sleep, perceived sleep, and perceived back pain.
Support (if any): Mattress Firm

Abstract citation ID: zsaf090.1382

1382
INVESTIGATIONAL SLEEP PAD DEVICE INCREASES DEEP SLEEP OF MIDLIFE ADULTS WITH INSOMNIA SYMPTOMS: A RANDOMIZED CLINICAL TRIAL

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Introduction: Insomnia is a prevalent sleep disorder affecting millions of adults in the U.S. There is a need for nonpharmacologic, accessible insomnia treatments. This pilot clinical trial (NCT05908344) evaluated a consumer-grade emerging technology for its effects on sleep and insomnia symptoms.
Methods: Eligible adults (40-65yrs) with Insomnia Severity Index (ISI) ≥8 completed an 8-week at-home, randomized, double-blind, cross-over intervention study with an investigational 'sleep pad' device. After Week 1 (Baseline), participants were randomized to sleep at home atop either a Sham or Active sleep pad for 3 continuous weeks. When Active, the sleep pad emitted a low-intensity radiofrequency gradient. After Washout (1-4.5 weeks), participants used a sleep pad with the alternate settings (Active or Sham). Sleep data were collected using polysomnography (PSG; staged with AASM criteria) and daily diaries. ISI was collected at the end of Baseline, first intervention period, Washout, and second intervention period. Linear Mixed Effects Models with random intercepts estimated differences between Active and Sham interventions, accounting for randomization order and measurement period. One night of PSG from each intervention period was compared. For self-reported sleep onset latency and ISI, changes from Baseline to the first intervention period were compared with changes from Washout to the second intervention period.
Results: Ten participants completed the protocol (55.2 ±6.0yrs; 8F; 90% Non-Hispanic White). Compared to Sham, NREM3 duration (+5.6 ±2.0mins, p=.025) and proportion (+1.4 ±0.5%, p=.029) were greater with the Active pad. The density of interruptions during NREM3 was lower (-4.1 ±1.6/hr, p=.036) with the Active pad than with Sham. Other PSG sleep stages, sleep duration, and sleep efficiency did not change (p>.05). Neither self-reported sleep onset latency nor ISI (n=8) differed (p>.05).
Conclusion: Sleep pad use deepened and consolidated sleep but did not ameliorate insomnia symptoms. NREM3 improvement may have implications for cognitive, cardiovascular, and immune health in aging. Future research should evaluate the underlying mechanisms and downstream effects of improving sleep with the radiofrequency gradient.
Support (if any): This study was supported by funding to the Pennsylvania State University by Kunasan, Inc. and by the National Center for Advancing Translational Sciences, Grant U54 TR002014-05A1.

Abstract citation ID: zsaf090.1383

1383

TEMPERATURE PROGRAMS TO ENHANCE SLEEP QUALITY IN WOMEN EXPERIENCING MENOPAUSE SYMPTOMS

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[1] Sleep Number, [2] Sleep Number Labs, [3] Sleep Number Corporation, [4] GlobalLogic, [5] GlobalLogic Spain, [6] Nanami

Introduction: Frequent awakenings from sleep increase as women transition through menopause. Vasomotor symptoms (VMS) cause about 30 percent of objective wake-after-sleep-onset. Prior research indicates that inducing cooling sensations may alleviate VMS and improve sleep. Leveraging the ability of a smart bed platform to control the temperature of the in-bed microclimate, this study aimed at identifying temperature settings that enhance sleep quality in women experiencing menopause symptoms. Temperature settings include heating or cooling at three different intensities (low, medium, high). The platform includes validated ballistocardiography-based algorithms to quantify movement and cardiorespiratory metrics during sleep. Using these, a compounded metric (sleep score from 1 to 100) was derived which quantifies sleep quality. The score significantly correlates (positively) with total sleep time, REM and slow wave sleep duration; and (negatively) with sleep latency and wake-after-sleep-onset duration.
Methods: An IRB approved survey was presented to a cohort of Sleep Number customers. The survey included questions about menopause symptoms, severity, and onset date. Out of 483 women reporting menopause symptoms, 62 (mean age 51.8 [SD: 5.2] years-old) owned temperature-controllable smart beds. This analysis considered 183'318 sleep sessions (mean duration 8.3 [SD: 2.3] hours) recorded between October-2022 and October-2024. Each sleep session was subdivided into four 2-hour-long segments starting from 30 minutes before sleep onset. The sequence of temperature settings for each of these segments defines a temperature program. Linear mixed effect models (LMEM) having the sleep quality score as dependent variable, the temperature setting in each segment as fixed factors, and the user identifier as random factor, were fitted to the data.
Results: LMEM results suggest that sleep quality in this population significantly improves by a temperature program consisting in starting with cooling at high intensity, followed by heating at high intensity, and then cooling at low intensity. Sleep quality ~ 71.9 + 6.98×High cooling + 1.83× High heating + 1.00 × Low Cooling + Off All coefficients are significant ($p < 0.05$) and the largest improvement (~10%) is associated with the first setting.
Conclusion: Sleep quality in women experiencing menopause symptoms, may be enhanced through temperature programs. This hypothesis will be tested in an interventional study.
Support (if any):

Abstract citation ID: zsaf090.1384

1384

TEMPERATURE PROGRAMS TO ENHANCE SLEEP QUALITY: GENDER DEPENDENCY CONSIDERATIONS

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Introduction: The ability of a smart bed platform to control the temperature of the in-bed microclimate was leveraged to identify temperature programs that enhance sleep quality. A temperature program consists of four 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 (cooling) results from pushing (pulling) warm air into (from) the in-bed microclimate. The smart bed includes validated ballistocardiography-based algorithms to quantify movement and cardiorespiratory metrics during sleep. Using these, a compounded metric (sleep score from 1 to 100) was derived which quantifies sleep quality. The sleep score significantly correlates (positively) with total sleep time, REM and slow wave sleep duration; and (negatively) with sleep latency and wake-after-sleep-onset duration.
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 at different intensities. 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 enhance sleep quality.
Results: Controlled study For women and men, heating in the first segment followed by cooling in the second segment significantly increased sleep quality by 13.2 and 7.2 percent respectively. Field data The large amount of data allowed us to identify the temperature setting and intensity for each segment. Sleep quality (women) ~ 65.3 + 6.2×Low Heating + 1.9×Medium Cooling + 1.2×Low Cooling + Off Sleep quality (men) ~ 64.3 + 5.6×Low Heating + 2.2×Low Cooling + 0.92×Medium Cooling + 0.43×Low Cooling The optimal temperature program increases sleep quality by 14% in both women and men.
Conclusion: The results using the controlled study and field data are consistent and suggest that starting with low heating and following with colder settings can enhance sleep quality.
Support (if any):

Abstract citation ID: zsaf090.1385

1385

IMPACT OF SMART BED TEMPERATURE PROGRAMS ON FALLING ASLEEP PROCESS: AN EEG-BASED DELTA-BETA RATIO ANALYSIS

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Introduction: The transition from wakefulness to sleep occurs when the core body temperature decreases. The latter is facilitated by an increase in the cutaneous blood flow, which dissipates internal heat into the micro-environment surrounding the sleeper's body. We leveraged the ability of a smart bed platform to

change the temperature of the in-bed microclimate to assess its effect on the process of falling asleep. The smart bed can either heat-up or cool-down the microclimate by respectively pushing warm air into the bed microclimate or pulling air from it.
Methods: Eighteen participants (9F/9M, mean age 44.5 (SD: 6.7) years-old), spent two nights in the sleep lab. In balanced order, they were exposed to six possible bed temperature settings: cooling at high, medium and low intensity, off, and heating at low and medium intensity. Each setting was applied for three hours starting at the time of lights-off. Polysomnography (PSG), skin temperature, and smart bed logs were recorded each night. PSG data were manually staged into 30-second epochs according to AASM rules. For each sleep epoch, EEG spectra were calculated. As a correlate of sleep depth, the ratio of the power in the delta band (0.5 to 4 Hz) over power in the beta band (15 to 30 Hz) was calculated (DBR) and averaged over 10-min windows starting at sleep onset.
Results: Microclimate temperature settings did not significantly affect the duration of sleep stages. For the DBR analyses, we combined all heating and all cooling conditions to gain statistical power. Heating is significantly associated with deeper sleep compared to cooling in the time intervals [0 to 70] and [120 to 180] minutes. Heating is significantly associated with deeper sleep compared to Off for [0 to 10[, [40 to 60], and [140 to 180] minutes. DBR curves for cooling and Off were not significantly different.
Conclusion: Earlier sleep deepening and deeper sleep are associated with a warmer in-bed microclimate during the first 3 hours after lights-off.
Support (if any):

Abstract citation ID: zsaf090.1386

1386
USE OF COOLING BEDDING SET IMPROVES PERCEIVED SLEEP

Kiara Carmon[1], Aislinn Beam[2], Duvia Lara Ledesma[2], Holly Rus[2], Morgan Weaver[2], Sophia Markowitz[2], Sharon Danoff-Burg[2]
[1] SleepScore Labs LLC, [2] SleepScore Labs

Introduction: Research has shown that comfort and temperature regulation are essential to sleep quality. This study investigated whether use of a cooling bedding set would improve sleep in women experiencing temperature-related sleep difficulties. More empirical studies are needed to establish the impact of sleep products, including bedding, on both objective and self-reported measures of sleep quality.
Methods: Healthy adult women ages 40-60 (M=50) who reported difficulty falling asleep or staying asleep, and experiencing disrupted sleep due to sleeping hot, night sweats, or hot flashes, participated in a 6-week field study using a within-subjects, pre-post intervention design. For a 3-week baseline period, participants slept with their usual, non-cooling bedding. For the next 3 weeks, participants slept using Rest bedding (comforter, flat sheet, and two pillowcases). Sleep was measured objectively using a PSG-validated, non-contact biomotion device, SleepScore Max, and perceived sleep was measured with pre-post questionnaires. Multilevel regression and paired t-tests were used to test for statistical significance.
Results: There were 924 nights of tracked sleep across 30 participants. While objectively measured sleep did not change, pre-post analysis revealed increases when using the cooling bedding, compared to baseline, in self-reported sleep quality (+74%; p<.001), satisfaction with sleep (+80%; p<.001), and feeling well rested in the morning (+91%; p<.001). Perceived comfort in bed increased (+87%; p<.001), as did the feeling that the bedding temperature was cooler (+185%; p<.001). Also, the perceived intensity of sleeping hot (-51%; p<.001) and night sweats (-61%; p<.001) were reduced when using the cooling bedding.
Conclusion: No objective sleep improvements or disruptions were observed; however, numerous aspects of perceived sleep improved when sleeping with the cooling bedding, likely because the intervention was perceived as feeling cooler and more comfortable compared to participants' original bedding.
Support (if any): Rest Ltd.

Abstract citation ID: zsaf090.1387

1387
EFFECTS OF A VIBRATING SLEEP MASK ON OBJECTIVELY MEASURED SLEEP: A CONTROLLED, AT-HOME STUDY

Sharon Danoff-Burg[1], Holly Rus[1], Aislinn Beam[1], Morgan Weaver[1], Kiara Carmon[2], Sophia Markowitz[1], Duvia Lara Ledesma[1]
[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: Previous research has shown that vibration can increase relaxation, induce drowsiness, and support sleep. The current study examined the effects of gentle vibration delivered via a light-blocking mask on objectively measured sleep outcomes compared to a non-vibrating, light-blocking mask.
Methods: Healthy adults with subclinical threshold sleep problems (M age = 45, 69% female) participated in a 6-week field study comparing Therabody® SleepMask to a non-vibrating control mask. For the first two weeks (baseline), participants tracked their sleep at home as usual, wearing no mask. For the next two weeks, the first group put on the vibrating mask when going to sleep, and the mask vibrated for 15 minutes with gradually decreasing intensity, while the second group wore the non-vibrating control mask to sleep. For the last two weeks, the groups crossed over to wear the other mask. Sleep was measured objectively using a PSG-validated non-contact biomotion device, SleepScore Max. Multilevel regression analyses compared nights when using the vibrating sleep mask to nights when using the control mask, controlling for baseline sleep.
Results: Objective sleep analyses included 2851 nights across 91 participants. Results showed that using the vibrating sleep mask was associated with improvements in objective sleep compared to when using the control mask: more time in bed (+12 minutes, 3% difference, p =.024) and increased sleep duration (+11 minutes, 3% difference, p =.032); lower proportion of light sleep during the night (2% relative difference, p =.035); more time in deep sleep (+3 minutes, 4% difference, p =.007); and higher BodyScore (1% difference, p =.048).
Conclusion: When comparing a gently vibrating, light-blocking mask to a non-vibrating, light-blocking mask, the vibrating mask showed better objective sleep outcomes.
Support (if any): Therabody, Inc

Abstract citation ID: zsaf090.1388

1388
EFFECTS OF A BLUE LIGHT PHONE SCREEN PROTECTOR ON OBJECTIVE SLEEP AND PERCEIVED SLEEP, EYE STRAIN, AND PRODUCTIVITY

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[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: A growing body of research has shown associations between exposure to light at night and negative impacts on health, in part due to suppressing the release of melatonin. People who use electronic devices before bed may increase their exposure to blue light, carrying consequences such as increasing the likelihood of poorer sleep. This study examined effects of a blue light filtering screen protector on sleep.
Methods: Healthy adults (79% female, M age = 39) reporting eye strain and regular light exposure after sunset from their iPhone for greater than 1 hour participated in a 9-week study (baseline sleep measurement at home with no screen protector, followed by using either Eyesafe CPF70 blue light filtering screen protector or a comparison screen protector, followed by crossing over to the other screen protector). Objective sleep was measured using a PSG-validated, non-contact biomotion device, SleepScore Max, and perceived sleep, eye strain, and productivity were measured using questionnaires. Multilevel regression and paired t-tests tested for statistical significance.
Results: There were 1088 nights of data across 36 participants. This abstract reports results of analyses comparing sleep after using the blue light filtering screen protector to sleep after using no screen protector. Compared to baseline, using the blue light screen protector was associated with improved SleepScore, an age- and gender-normalized measure of overall sleep quality (3% increase; p=.026) and improved BodyScore, an age- and gender-normalized measure of deep sleep (2% increase; p=.010). Self-report results showed that participants perceived less severe eye strain, felt productive more days per week, were more satisfied with their sleep, and woke feeling more well-rested (all ps<.05).
Conclusion: Objectively measured sleep quality improved when using a blue light filtering phone screen protector compared to baseline. In addition, participants reported improvements in perceived sleep, eye strain, and productivity.
Support (if any): Eyesafe

Abstract citation ID: zsaf090.1389

1389

EFFECTS OF A SUPPLEMENT SYSTEM ON OBJECTIVELY MEASURED SLEEP: A SINGLE-BLIND, RANDOMIZED CONTROLLED STUDY

Holly Rus[1], Sharon Danoff-Burg[1], Aislinn Beam[1], Duvia Lara Ledesma[1], Morgan Weaver[1], Kiara Carmon[2], Sophia Markowitz[1]
[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: Supplements have been shown to improve sleep, specifically supplements including melatonin, zinc, and vitamin D. The aim of this study was to evaluate a supplement system on objective sleep outcomes in adults without sleep disorders.
Methods: Adults (55% female, mean age=51) who reported being in good health and screened for physical and lifestyle factors that could affect sleep, participated in a controlled 12-week field study. During the 4-week baseline period, participants slept at home in their usual environment without use of a supplement. For the next four weeks, participants were randomly assigned to use either a supplement or control product. Then they crossed over to use the other product (either supplement or control) for four weeks. The supplement period used Rebalance Health Anxiety System, a three-part supplement system that contains multiple vitamins and dietary nutrients with enhanced absorption. The control was also taken three times a day, and only contained vitamin B2 as an active ingredient. Sleep was measured objectively using a PSG-validated, non-contact biomotion device, SleepScore Max, every night. Multilevel regression was used to test for statistical significance.
Results: There were 1987 nights of data across 35 participants. Compared to control, controlling for baseline sleep, using Rebalance resulted in multiple objective sleep improvements including: decreased sleep onset latency (-4 minutes; 18% difference; p=.003), decreased number of awakenings (6% difference; p=.044), less time awake after sleep onset (13% difference; p=.001), a smaller proportion of the night spent awake after initially falling asleep (p<.001), improved sleep efficiency (p<.001), and improved sleep maintenance (p<.001).
Conclusion: Compared to a control, the supplement system was associated with falling asleep faster, waking up less often, spending less time awake during the night, and better sleep efficiency and sleep maintenance.
Support (if any): Rebalance

Abstract citation ID: zsaf090.1390

1390

SMALL SPACE AIR TREATMENT SYSTEM IMPROVES OBJECTIVE AND PERCEIVED SLEEP OUTCOMES

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[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: Previous research has shown that air quality can negatively affect sleep, specifically through irritating nasal passages and affecting allergies. This study examined the effect of an air purifier designed for rooms up to 200 square feet on objective and perceived sleep outcomes.
Methods: Healthy adults living in the US (69% female, M age = 48), who reported sleeping in a bedroom up to 200 square feet participated in an 8-week field study using a pre-post study design. For a four-week baseline period, participants slept as usual, tracking objective and perceived sleep. For the next four weeks, participants were instructed to use Amway Atmosphere Mini ™ Air Treatment System in their bedroom starting 20 minutes before bedtime and running throughout the night. Objective sleep was measured using a PSG-validated, non-contact biomotion device, SleepScore Max, and perceived sleep was measured using daily questionnaires. Multilevel regression was used to test for statistical significance.
Results: There were 1187 nights of data across 28 participants. Compared to baseline, nights using the air purifier showed multiple improvements on objective sleep including: more deep sleep (+3 minutes, 4% increase; p =.020), more REM sleep (+4 minutes, 6% increase; p =.010), higher proportion of REM sleep during the night (6% relative increase; p =.031), higher SleepScore (1% increase; p =.049), higher BodyScore (2% increase; p =.010), and higher MindScore (2% increase; p =.018). When using the air purifier, participants also reported higher perceived sleep quality (p <.001; 17% increase), and feeling more well-rested in the morning (p <.001; 16% increase) compared to baseline.
Conclusion: Objectively measured sleep and perceived sleep improved when using an air purifier in bedrooms up to 200 square feet before and during sleep compared to baseline.
Support (if any): Amway

Abstract citation ID: zsaf090.1391

1391

EFFECTS OF AN AIR PURIFIER ON OBJECTIVE SLEEP, PERCEIVED SLEEP, AND PERCEIVED ALLERGY SYMPTOMS

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[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: Allergy symptoms can negatively impact sleep quality and quality of life. Exposure to allergens at night can make breathing more difficult by irritating the nasal passages and worsening nasal congestion. This study examined the effectiveness of an air purifier in the bedroom environment to alleviate allergy symptoms during sleep.
Methods: Healthy adults (55% female, M age = 53) reporting difficulty falling or staying asleep, and allergy symptoms that disrupt sleep, participated in a 6-week study (3-week baseline sleep measurement at home with no air purifier, followed by using PuroAir 240 in the bedroom for 3 weeks). Objective sleep was measured using a PSG-validated, non-contact biomotion device, SleepScore Max, and perceived sleep and perceived allergy severity were measured using questionnaires. Multilevel regression and paired t-tests tested for statistical significance.
Results: There were 878 nights of data across 35 participants. Compared to baseline, using the air purifier was associated with increases in minutes of deep sleep (6% increase; p=.036), deep sleep as a proportion of the night (6% relative increase; p=.015), and BodyScore, an age- and gender-normalized measure of deep sleep (2% increase; p=.026). Also, participants experienced fewer awakenings (8% decrease; p=.013). Self-report results showed that participants perceived less severe allergy severity during the night, felt they had better overall sleep quality, were more satisfied with their sleep, and woke feeling more well-rested (all ps<.05).
Conclusion: Objectively measured sleep showed improvement in deep sleep metrics and reduced nighttime awakenings improved when using the air purifier compared to baseline sleep. In addition, participants reported improvements in perceived sleep and allergy symptoms.
Support (if any): PuroAir

Abstract citation ID: zsaf090.1392

1392

LARGE SPACE AIR TREATMENT SYSTEM IMPROVES OBJECTIVE AND PERCEIVED SLEEP OUTCOMES

Holly Rus[1], Sharon Danoff-Burg[1], Aislinn Beam[1], Morgan Weaver[1], Kiara Carmon[2], Sophia Markowitz[1], Duvia Lara Ledesma[1]

[1] SleepScore Labs, [2] SleepScore Labs LLC

Introduction: Previous research has shown that air quality can negatively affect sleep, specifically through irritating nasal passages and affecting allergies. This study examined the effect of an air purifier designed for rooms up to 465 square feet on objective and perceived sleep outcomes.
Methods: Healthy adults living in the U.S. (68% female, M age = 50), who reported sleeping in a bedroom up to 465 square feet participated in an 8-week field study using a pre-post study design. For a four-week baseline period, participants slept as usual, tracking objective and perceived sleep. For the next four weeks, participants were instructed to use Amway Atmosphere Sky™ Air Treatment System in their bedroom starting 20 minutes before bedtime and running throughout the night. Objective sleep was measured using a PSG-validated, non-contact biomotion device, SleepScore Max, and perceived sleep was measured using daily questionnaires. Multilevel regression was used to test for statistical significance.
Results: There were 1284 nights of data across 31 participants. Results indicated that nights using the air purifier showed multiple improvements compared to baseline: longer sleep duration per night on average (+6 minutes; 2% increase; p =.043), better sleep efficiency (1% relative increase; p =.022), more deep sleep in minutes per night (+6 minutes; 7% increase; p <.001), more deep sleep as a proportion of the night (6% relative increase; p =.009), higher SleepScore (1% increase; p =.048), and higher BodyScore (3% increase; p <.001). Participants also reported higher perceived sleep quality (11% increase; p <.001), and feeling more well-rested in the morning (11% increase; p <.001) on nights using the air purifier compared to baseline.
Conclusion: Objectively measured sleep and perceived sleep improved when using an air purifier in bedrooms up to 465 square feet before and during sleep compared to baseline.
Support (if any): Amway

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1393

SENSITIVITY OF OVERNIGHT HEART RATE VARIABILITY TO DAILY BEHAVIORS AND EXPERIENCES IN A LARGE, REAL-WORLD SAMPLE

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Introduction: Heart rate variability (HRV) is a marker of autonomic function. It is unclear, particularly in real-world settings, whether overnight HRV is sensitive to daily activities and experiences.
Methods: From 9/1/2023-9/30/2024, we measured HRV (SDNN [overall HRV] and RMSSD [parasympathetic activity]) using a commercially available, noninvasive, at-home device (Sleeptracker-AI Monitor, Fullpower Technologies Inc., California, USA) that monitors overnight HRV continuously using under-mattress piezo-electric sensors. Participants answered daily questions addressing alcohol use, caffeine use, smoking, stress, exercise, eating, and sleep quality. We compared HRV across responses using mixed linear models (with participant as a random effect), calculated estimated marginal means (EMMs), and performed pairwise comparisons. Further analyses included age/gender adjustment and exclusion of participants who answered questions the same way every time (completely within-subjects).
Results: Sample size differed by analysis (largest [SDNN by exercise]: 73,009 participants, 1,177,699 nights; smallest [RMSSD by smoking]: 1,145 participants, 2,519 nights; mean of all analyses: 30,906.8 participants, 484,500.6 nights), as did sample characteristics (overall mean age=47.9±12.9 years; 47.4% female). SDNN and RMSSD were lower (p< 0.001 for

all pairwise comparisons) on nights after which individuals reported alcohol use (SDNN/RMSSD EMM=37.3/28.6 ms) vs. non-use (SDNN/RMSSD EMM=40.6/31.9 ms), caffeine non-use (SDNN/RMSSD EMM=39.3/31.0 ms) vs. use (SDNN/RMSSD EMM=39.7/31.4 ms), smoking (SDNN/RMSSD EMM=38.1/32.1 ms) vs. not (SDNN/RMSSD EMM=41.4/34.7 ms), having a stressful (SDNN/RMSSD EMM=39.4/31.1 ms) vs. normal (SDNN/RMSSD EMM=39.8/31.5 ms) vs. stress-free day (SDNN/RMSSD EMM=40.0/31.7 ms), exercising at high intensity (SDNN/RMSSD EMM=39.1/30.8 ms) vs. leisurely (SDNN/RMSSD EMM=39.6/31.4 ms) vs. not exercising (SDNN/RMSSD EMM=40.0/31.6 ms), eating a meal (SDNN/RMSSD EMM=38.7/30.5 ms) vs. a snack (SDNN/RMSSD EMM=39.6/31.3 ms) vs. not eating within two hours of bedtime (SDNN/RMSSD EMM=40.2/31.9 ms), and sleeping not well (SDNN/RMSSD EMM=38.8/30.6 ms) vs. normally (SDNN/RMSSD EMM=39.1/31.0 ms) vs. well (SDNN/RMSSD EMM=39.5/31.2 ms). All comparisons remained significant with similar effect sizes after age/gender adjustment and after exclusion of participants who answered only one way.
Conclusion: In a large, real-world sample, alcohol use, caffeine non-use, smoking, stress, exercise, eating before bedtime, and self-reported poor sleep were associated with decreased overnight HRV. Innovative sleep technologies may help elucidate the link between daily behaviors and experiences and overnight autonomic function.
Support (if any): Fullpower Technologies.

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1394
MONTHLY CHANGES IN SLEEP PATTERNS IN KOREANS: A MOBILE SLEEP TRACKING DATA ANALYSIS

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Introduction: Korea experiences significant seasonal variations in sunlight, temperature, and humidity, which are expected to influence sleep patterns. However, studies on the effects of these changes on sleep patterns in the Korean population are limited. This preliminary study uses consumer sleep trackers to observe monthly changes in sleep patterns by analyzing data collected from active users of Sleep Routine, a mobile, contactless sleep tracking service.
Methods: Data were collected from December 1, 2023, to November 30, 2024, from users in Korea who used the sleep tracker at least once per month. This service requires users to manually start and stop measurement. Using this data, the following metrics were calculated: measurement time (time in bed), total sleep time, sleep onset time, wake time, sleep onset latency, and wakeup latency. These metrics were observed on a monthly basis to examine changes across different seasons.
Results: A total of 237,190 sessions from 1,067 users were analyzed, with an average of 19,765.8 sessions per month (ranging from 17,321 in December to 21,544 in March). The average number of measurements per user was 222.3 (SD = 74.21, range: 24-358). The average time in bed was 424.7 minutes, and the average total sleep time was 364.9 minutes, with the longest time in December (369.7 minutes) and the shortest in June (358.8 minutes) ($p < 0.001$). Average sleep onset occurred at 12:42 AM, and wake time at 6:39 AM, with the earliest wake time in June (6:34 AM) and the latest in October (6:43 AM). The average sleep latency was 17.85 minutes, and wakeup latency was 7.64 minutes, with the longest latency in August (9.03 minutes) and the shortest in December (6.38 minutes).
Conclusion: Monthly changes in sleep patterns were observed on a significant scale, with notable fluctuations. Specifically, wake time appears to be more influenced by seasonal changes. A limitation of this study is the accuracy of the sleep tracking service, which is expected to improve with ongoing advancements in AI models and further validation studies.
Support (if any):

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1395
SOCIODEMOGRAPHICS AND MOTIVATIONS PREDICT WEARABLE DATA SHARING WITH HEALTHCARE PROVIDERS

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Introduction: Consumer wearables provide personalized insights into health behaviors that can be used to enhance care management for many chronic conditions including sleep health. However, sharing these unique data insights with healthcare providers (HCPs) varies widely. This study investigates predictors of data-sharing among wearable device users.
Methods: Employees of a multinational corporation participated in an e-survey on wearable device usage and behavior between July and August 2024. A weighted logistic regression model assessed the likelihood of a user sharing wearable data with their HCP. Predictors included: sociodemographic factors (age, gender, global region, race, ethnicity, perceived financial security, and self-reported OSA status), data confidence, and sleep tracking motivation. Odds ratios (OR [95% confidence interval]) are reported.
Results: Responses from 1,589 people were assessed (mean (SD) age: 42 (10) years, 46% female), with most respondents reporting current use of a wearable device (64%) and having high confidence in device data accuracy (85%). Users with high data confidence (vs. low confidence) were 2.4 times more likely to share data with their HCPs (2.44 [1.54, 3.96]; $p < 0.001$), and those motivated by sleep tracking (vs. not) were twice as likely to share their data with HCPs (2.01 [1.61, 2.51]; $p < 0.001$). Compared to North American users, users from Europe (0.25 [0.18, 0.34]; $p < 0.001$), Australia & New Zealand (0.54 [0.40, 0.71]; $p < 0.001$), and Asia (0.40 [0.24, 0.65]; $p < 0.001$) were significantly less likely to share their data with HCPs. Hispanic (vs. non-Hispanic) users were 50% less likely to share their data with HCPs (0.51 [0.26, 0.98]; $p < 0.05$). Finally, users who indicated some financial security (vs. no financial security) were significantly less likely to share their data (slightly secure: 0.41, [0.17, 0.97], $p < 0.05$; mostly secure: 0.43, [0.19, 0.94], $p < 0.05$).
Conclusion: Greater data confidence, being motivated by sleep tracking, residing in North America, identifying as non-Hispanic, and lower perceived financial security were important predictors of data sharing with HCPs. Tailoring interventions on sociodemographic factors and user behaviors may help promote

data sharing with HCPs, which may further support chronic disease management.
Support (if any):

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1396

RELIABILITY OF BRIEF ACCELEROMETER-BASED SLEEP MEASUREMENTS FOR CAPTURING LONG-TERM SLEEP DURATION AND VARIABILITY

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Introduction: Existing epidemiologic studies examining the associations of sleep quantity and/or variability with incident chronic disease using accelerometers have predominantly focused on short-term measurements, typically spanning several days to one week. Quantitative evidence is lacking on whether these brief sleep assessments accurately reflect longer-term sleep patterns.
Methods: Our study included 6,320 participants (mean age: 52.4 years) from the All of Us Research Program who had a main sleep period recorded by Fitbit on ≥300 days within a calendar year. To simulate sleep studies in real-world settings, we randomly selected one week of data for each participant and calculated the mean and standard deviation (SD) of their sleep duration for that week. We then extended these calculations to the corresponding month and year from which the week was sampled, as well as across all days contributed by the participants (median: 1,368 days; range: 308–3,836). Pearson correlations were calculated among weekly, monthly, yearly and all-available sleep measures. Multiple linear regression was used to examine the associations of mean and SD of sleep duration with sociodemographic factors, evaluating whether these associations differed by the duration of sleep monitoring.
Results: The sample average of mean sleep duration was 412.7, 412.8, 411.7 and 410.5 minutes for the weekly, monthly, yearly and all-available timeframes, respectively. The corresponding average for sleep duration SD was 61.8, 64.6, 68.1, and 72.3 minutes, respectively. The weekly sleep duration means had a correlation of 0.89 with monthly means, 0.83 with yearly means, and 0.77 with all-available means. The corresponding correlation for sleep duration SD was 0.70, 0.60, and 0.54, respectively. Older age, being male, and employment were associated with shorter and less variable sleep duration, whereas racial minority status was associated with shorter and more variable sleep duration. Higher education, being married/partnered, and higher income were only associated with less variable sleep duration. These associations were generally consistent across measures based on different monitoring periods.
Conclusion: One-week accelerometer-based sleep assessment reliably captures longer-term average sleep duration, but accurately characterizing sleep variability may require a longer monitoring period. Our findings provide important evidence that could inform the study design and interpretation in future research.
Support (if any):

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1397

SLEEP QUALITY IMPROVES AFTER EXERCISE FOR CHRONIC OROFACIAL PAIN: A 4-WEEK ECOLOGICAL MOMENTARY ASSESSMENT STUDY

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Introduction: Sleep plays a vital role in human health, with its functions linked to immunity, metabolism, mood, attention, and memory consolidation. Recent research has elucidated a bidirectional relationship between sleep and chronic pain, in that pain often impairs sleep quality which further exacerbates pain. There is a critical need for studies using objective measurements to validate sleep data as they are not subject to limitations inherent in subjective methods (i.e. recall bias). This study incorporated an Ecological Momentary Assessment (EMA) approach to examine the effect of exercise on chronic pain-related outcomes compared to non-exercise standard-of-care in 40 temporomandibular disorder (TMD) patients.
Methods: 40 TMD participants were randomly assigned to an exercise or control group for 30 days. The exercise intervention consisted of daily oral facial muscle movements and general muscle stretching, while the control group continued their standard care. Participants also completed sleep and activity monitoring using a wrist actigraphy watch (CamNTech). Linear mixed models were used to compare exercise and control groups in physical activity and sleep quality.
Results: Of 40 patients, 31 completed the study—16 in exercise, 15 in control—with both groups showing similar baseline chronic pain intensity ((t29=-9,82, p=.421) and pain-related interference (t29=-9,82, p=.421). The exercise group demonstrated significant improvement compared to their non-exercise counterparts in higher sleep efficiency (F1,222.65=187.08; p<.001), lower sleep fragmentation (F1,444.72=4.73; p=.03), longer actual sleep time (F 1,442.65=144.61; p<.001), and reduced sleep latency (F1,606.60=32.52; p<.001). Moreover, actigraphy data confirmed that the exercise group performed longer continuous vigorous activity and shorter sedentary activity than the control group.
Conclusion: These findings highlight the significant role of exercise in enhancing sleep quality among chronic pain patients, particularly by improving sleep duration, efficiency, fragmentation, and latency. However, larger cohorts are warranted to further explore exercise's potential therapeutic role as a mediator to improve pain outcomes through sleep.
Support (if any): This research is supported by P30 (AD) and UM School of Nursing (start-up to the PI, LC).

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1398

REAL-WORLD SLEEP PATTERNS SURROUNDING THE SPRING DAYLIGHT SAVING TIME CLOCK CHANGE IN A LARGE LONGITUDINAL COHORT

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Introduction: Daylight saving time is a roughly 8 month period framed by one-hour changes in clock time, forward in the spring, and backward in the fall. Although the spring clock change is often described as "losing an hour" of sleep, objective changes in sleep duration and related metrics remain incompletely understood.
Methods: We analyzed objective sleep tracking data from a validated wrist-based sleep tracking feature in over 14,000 adult participants who provided informed consent and opted in to share health and sleep data as part of the IRB-approved Apple Heart and Movement Study.
Results: The average change in sleep duration on the night of the spring shift ("forward") was 22.8 minutes (SD 75.9 minutes) lower compared to the trailing month of weekend sleep. At the individual level, n=3,885 participants (27.5%) lost at least 60 minutes compared to their trailing weekends, while n=4,783 participants (33.9%) were within 30 minutes of their trailing weekends. Comparing those who lost at least one hour of sleep duration to the most consistent group (within 15 minutes of their trailing average), the average age was within 2 years, and the male/female proportions were within 5%. The sub-group means for sleep duration, sleep start time, and nightly variability (SD) of sleep duration were similar (within 10 minutes in each case). Of note, N=1,652 participants (11.9% of the cohort) gained at least 60 minutes on the night of the spring shift. These individuals showed earlier sleep start times than their baseline by a mean of 29.7 minutes.
Conclusion: While the population average showed 23 minutes lower sleep duration on the night of the spring shift, the within-participant sleep changes showed a broad distribution, ranging from >=1 hour loss to >=1 hour gain. This heterogeneity may reflect a combination of vulnerability to clock changes and/or compensatory sleep behaviors, e.g., the earlier sleep start time among those with relatively preserved sleep duration on the night of spring clock change.
Support (if any): The authors are employees of Apple Inc.

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1399

ANALYZING SLEEP TIPS ACROSS FOUR MAJOR SOCIAL MEDIA PLATFORMS

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Introduction: The undisputed power of social media facilitates the dissemination of all information, factual or otherwise. Sleep tips are no exception. This is especially true because of the high prevalence of sleep disorders and poor access to specialists, magnifying public demand for solutions. Our study aims to analyze sleep 'hacks' on four popular social media platforms. We characterized them by categories [scheduling tips, consumables, environmental aids, and relaxation techniques] and supportive literature.
Methods: Data was collected from four social media platforms: YouTube, TikTok, Instagram, and X (formerly known as Twitter), including 200 videos posted on each platform [except-100 on TikTok] over 2022-24. Variables extracted included user demographic, how many likes the post had, the number of shares (except for YouTube; does not show shares), the number of comments, the number of views (except where not specified; likes were used in this case), content, and research evidence.
Results: 7.6, 3.5, 12.5, and 7.3% tips across X, YouTube, Instagram, and TikTok pertained to sleep scheduling. 40, 59, 13.5, and 33.6% of videos across the four respective platforms related to consumables like food and supplements. Again, across the platforms above, 18, 3.5, 10, and 15.5% of the videos advised environmental solutions. 34, 27, 34, and 41% across the four platforms alluded to habitual relaxation techniques. 30% of Instagram videos incorporated multiple categories of advice. Overall, 59% of videos on X, 26% on YouTube, 20% on Instagram, and 35% on TikTok had evidentiary support in literature.
Conclusion: Consistent sleep scheduling, supported extensively by scientific literature in treating insomnia, receives very little attention on social media platforms. The more popular trends circulate around consumables like food and supplements to help sleep. Relaxation techniques also seem to be popular across these platforms, although there is very little uniformity in the type of relaxation advised. Of concern, only a fraction of "sleep hacks" advertised had any supportive evidence. While it is nearly impossible to analyze every single sleep tip circulating in the media, our research is intended to convince the lay public to seek reliable care and inform providers of the measures their patients are likely to experiment with.
Support (if any):

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1400

SOUND-BASED AI MODEL FOR ESTIMATING APNEA-HYPOPNEA INDEX IN SLEEP APNEA DETECTION

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Introduction: Obstructive sleep apnea (OSA) is a common sleep disorder associated with numerous health outcomes. Accurate diagnosis and severity assessment typically rely on the Apnea-Hypopnea Index (AHI), a standard metric obtained from polysomnography (PSG). However, PSG is costly and impractical for multi-night monitoring. This study validates a sound-based AI model to estimate AHI, exploring its potential as a convenient, contactless monitoring tool for long-term OSA management.
Methods: The AI model simultaneously predicts OSA events, sleep stages and snoring events. Performance was enhanced by improving data quality, extending the attention range, and augmenting Mel spectrogram data. The training dataset included 2,973 nights of sleep recordings collected between 2013 and 2024, using either PSG microphones or smartphone microphones. All recordings were annotated with PSG for both OSA and sleep stages. The model predicts apnea or hypopnea events in 6-second intervals and uses a simple linear regression on their

distribution across the predicted sleep stages to estimate the AHI. Performance was assessed by comparing the estimated AHI with the manually scored AHI from PSG.
Results: On a separate test set of 1,492 nights, the model's estimated AHI strongly correlated with the PSG reference (r=0.97) and showed a mean estimation error of -0.74 events/hour (95% CI: -0.74 ± 11.02). As a screening tool at different AHI thresholds (≥5, ≥15, and ≥30), the model achieved accuracies of 92%, 93%, and 94%; sensitivities of 0.94, 0.94, and 0.93; specificities of 0.88, 0.91, and 0.95; and ROC AUCs of 0.97, 0.98, and 0.98, respectively. When classifying OSA severity into four categories (AHI 0 to < 5, 5 to < 15, 15 to < 30 and ≥ 30), it attained 81% accuracy and a macro F1 score of 0.80.
Conclusion: This sound-based AI model accurately estimates AHI using only audio data, providing a low-cost and contactless approach to OSA screening and management. Its ability to enable home-based, long-term monitoring can greatly improve patient access to diagnosis and care. Future research will focus on enhancing robustness across diverse sleep environments and varying noise conditions.
Support (if any):

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1401

BRINGING MEDICINE EXPERTISE TO YOUR SCREEN: A NEW FRONTIER IN CURBSIDE SLEEP CONSULTATION LEVERAGING LARGE LANGUAGE MODELS?

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Introduction: Advances in large language models (LLMs) have opened new avenues for healthcare applications. Recently, ChatGPT-4 successfully achieved the pass mark >80% in 5 of 10 sleep medicine examination domains, indicating a strong foundational knowledge of sleep medicine. However, the ability to answer USMLE-type multiple-choice questions may not equate to the capacity to offer accurate and comprehensive answers to clinical queries or real-world case scenarios. Current literature exhibits a significant gap in validation research examining the clinical utility of LLMs in evidence-based medicine practice. This investigation aims to evaluate the potential usefulness and reliability of LLMs as adjunctive clinical decision-support tools (namely, "curbside consultants") in sleep medicine.
Methods: Six clinical sleep queries and six case scenarios were presented to 6 LLMs including 3 general-purpose LLMs (ChatGPT-4o, Gemini-1.5-Pro, and Llama-3.1-405B) and 3 medical-specialized LLMs (OpenEvidence, Clara AI, and MediGPT). Performance assessment was conducted independently utilizing two independently developed 5-point Likert scales evaluating two primary domains: answer content (accuracy, relevance, comprehensiveness/depth, clarity/coherence, and unique insightfulness) and reference quality (accuracy, relevance, currentness, comprehensiveness/depth, and searchability). Benchmark answers were established through consensus among four sleep medicine specialists. Analysis of variance was used to compare the performance of the LLMs.
Results: The medical LLMs demonstrated superior overall performance compared to the general LLMs (P< 0.001). The primary distinction was observed in reference quality metrics, where medical LLMs significantly outperformed general LLMs across all parameters: accuracy, relevance, and searchability (p< 0.001), currentness (p=0.001), and comprehensiveness/depth (p=0.010). Notably, Open Evidence achieved the highest reference quality (p< 0.001). In contrast, the answer content analysis revealed no significant overall differences between medical and general LLMs (p=0.659). Most answer content-related metrics, including accuracy, relevance, or unique insightfulness, did not differ significantly (p>0.050). An exception was clarify/coherence, where medical LLMs were superior to general LLMs (p=0.030). Furthermore, MediGPT and ChatGPT-4o displayed better content comprehensiveness/depth relative to other LLMs (p< 0.001). These two LLMs exhibited comparable performance in overall metrics (p=0.615), answer contents (p=0.922), and reference quality (p=0.621).
Conclusion: Both medical-specialized and general-purpose LLMs show promise as adjunctive decision-support tools in clinical practice. However, substantial improvements in reference quality are critically needed across most LLM platforms.
Support (if any):

Abstract citation ID: zsaf090.1402

1402

EXPLORING THE POTENTIAL OF WAKE PROBABILITY IN HYPNODENSITY FROM A SOUND-BASED AI MODEL AS A MEASURE OF SLEEP DEPTH

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Introduction: Conventional sleep staging classifies every 30-second epoch into discrete states, often missing ambiguous states. Hypnodensity, which provides probabilistic estimates of all stages, has shown potential in addressing these ambiguities. In this study, we focused on the wake probability (WP) component of hypnodensity to evaluate its potential as a continuous index of sleep depth, analogous to the Odds Ratio Product (ORP) derived from EEG signals. By integrating WP into a sound-based AI model that uses only audio recordings, we aimed to offer a novel metric for assessing sleep depth without polysomnography (PSG).
Methods: A sound-based AI model was trained on a dataset including 2,973 nights of sleep recordings collected from 2013 to 2024, using PSG or smartphone microphones. Each recording was annotated with PSG for sleep stages. WP was derived by applying a softmax function to the wake-class logit for each 30-second epoch, generating values between 0 and 1. This study evaluated whether WP reflects sleep depth by analyzing its correlation with sleep stages, arousability (likelihood of arousal or awakening), and transitions within individual sleep cycles.
Results: On a separate test set of 1,492 nights, WP effectively predicted sleep/wake states, with a WP < 0.1 and > 0.9 achieving 97% and 93% accuracy for sleep and wake states, respectively. WP values progressively decrease with deeper sleep stages, reflecting increased sleep depth, as mean WP values (±SD) for PSG-defined stages were: W (0.72 ± 0.16), N1 (0.18 ± 0.13), N2 (0.04 ± 0.05), N3 (0.01 ± 0.03), and REM (0.03 ± 0.06). Binning epochs by WP into 20 intervals revealed a strong linear correlation (r = 0.96) with arousability in the subsequent 30-second epoch. In individual sessions, higher WP values consistently matched wake epochs, while small peaks or nonzero WP values frequently coincided with arousals.

Conclusion: WP derived from hypnodensity in a sound-based AI model could offer insights into sleep depth and transitions, complementing conventional sleep staging. Future work will seek additional evidence to support the use of WP as a continuous measure of sleep depth.
Support (if any):

Abstract citation ID: zsaf090.1403

1403

THE EFFECT OF EXTENDING TOTAL BEDTIME ON VIDEO GAME PERFORMANCE IN HIGH SCHOOL STUDENTS

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Introduction: The effect of video games (VG) on school performance has been studied thoroughly. The majority of researchers concluded that video games have a negative effect on cognition. Yet we were unable to find a study evaluating the effect of improved sleep and extended bedtime on VG performance and cognition in teenagers during school days. This study investigates the effects of sleep extension on VG performance and cognition, as well as daytime sleepiness in teenagers during school days.
Methods: Using an open label prospective approach, the pilot study investigated students' VG performance, cognitive test (ZZTest), sleep activity tracker findings and daytime sleepiness with daily sleep extension. 30 healthy teenage students (grade 8-12) were asked to participate. They maintained their habitual sleep-wake schedule for a one-week baseline period followed by a one-week sleep extension period. Parental consents were obtained prior to participation in the study.
Results: 26 participants had available data at the end of the study. 9 (35%) females and 17 (65%) males. During the first week, the Mean (SD) bedtime for the participants was 22:40 (0.83), mean wake up time was 6:40 (0.89). Mean wake up time on non-school days was 8:40. During the second week (intervention) the students improved their mean bedtime to 19:10 (8.2) P=0.01. mean wake up time during the second week was not significantly different 7:00 Performance on the subway server game improved significantly between the first week and second of the study (total mean time of ability to stay in the game improved significantly from 151/113 to 478/125 during the second week P=0.001). Further analysis of cognitive test ZZTest is underway.
Conclusion: Improving sleep time and bedtime in teenage students significantly improved their performance on video games. This is the first study to evaluate the effect of improved sleep on video games, rather than the effect of video games on sleep in teenagers.
Support (if any):

Abstract citation ID: zsaf090.1404

1404

EXAMINING THE RELATIONSHIP BETWEEN SLEEP AND COVID-19 STATUS IN A US NATIONAL SAMPLE

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Introduction: Despite increasing awareness of COVID-19's long-term effects, its specific impact on sleep remains unclear. This study investigates the relationship between COVID-19 status and sleep quality and duration using a nationally representative dataset.

Methods: Data from 26,260 adults surveyed in the 2022 National Health Interview Survey were analyzed to assess the relationship between sleep duration and quality and COVID-19 status. Sleep duration was assessed by asking participants "On average, how many hours of sleep do you get in 24 hours?" Sleep quality was evaluated based on four indicators of the frequency (4-point scale from never to every day) of sleep disturbances in the past 30 days, including (1) need for medication to help sleep, (2) experiencing trouble falling asleep, (3) experiencing trouble staying asleep, and (4) not feeling well rested. A composite variable was recorded by summing the frequency scores of each indicator, with the highest values indicating poorer sleep quality. Linear regression models were conducted to assess the associations between each sleep outcome and COVID status (1. long COVID or COVID-19-related symptoms lasting 3 months or longer, 2. positive COVID-19 test, 3. no COVID-19), while holding constant the effect of potential confounders (e.g., age, sex, race-ethnicity, education, anxiety in the past two weeks). Analyses accounted for the complex sample design.

Results: Approximately 7% of the sample reported experiencing long COVID, 32% had COVID-19 confirmed by a positive test, and 61% had no history of COVID-19. Compared to those without COVID-19, individuals with long COVID-19 slept approximately 0.3 hours less per night on average (β = -0.27, 95% C.I. = -0.36 to -0.19, $p < 0.001$). Similarly, individuals reporting long COVID demonstrated an approximate 0.4-point increase in poor sleep quality scores compared to those without COVID (β = 0.44, 95% C.I. = 0.31 to 0.58, $p < 0.001$). No significant differences in sleep patterns or quality were observed between individuals with and without COVID (excluding long COVID).

Conclusion: Long COVID was associated with shorter sleep and poor sleep quality. These findings highlight the need to examine the mechanisms involved in sleep disturbances and the role of sleep as a prognostic factor.

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1405

SEX, AGE, RACE: MODERATORS OF THE ASSOCIATION BETWEEN SLEEP HEALTH AND MENTAL HEALTH DURING THE COVID-19 PANDEMIC

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Introduction: The COVID-19 pandemic created unprecedented disruptions to daily life, altering health behaviors, including sleep. Sleep health plays a critical role in emotional well-being, with disturbances linked to increased anxiety, depression, stress. COVID-19 offered a unique opportunity to examine how sleep health changes impacted mental health and whether these effects varied across sex, age, race. Understanding these dynamics can inform interventions to mitigate sleep and mental health challenges during global crises.

Methods: These data were drawn from a study examining associations among COVID-related stress, health behaviors, and mental health in May 2020 (Coiro et al., 2021). Participants self-reported 10 changes in sleep health pre- to post-lockdown, including sleep duration, quality, difficulty waking. The 21-item DASS-21 questionnaire (Lovibond & Lovibond, 1995) was used to measure mental health symptoms. Bivariate analyses explored the association between sleep health changes and DASS-21 scores, while moderation analyses examined the influence of sex, age, race on these associations.

Results: Participants (n = 567) were diverse in age (M = 35.7 years, SD = 12.4), sex (54% female), race (35% non-White). Sleep health declines were significantly correlated with higher DASS-21 scores ($r = .51$, $p < .01$). Males reported significantly more mental health symptoms (M = 17.3, SD = 8.4) vs. females (M = 15.6, SD = 7.9); however, females exhibited a stronger association between sleep health declines and mental health vs. males. Non-White individuals and younger adults reported significantly more mental health symptoms than their counterparts, though race and age didn't moderate the association among sleep health declines and DASS-21.

Conclusion: Although women reported stronger associations between sleep health declines and mental health symptoms, men reported worse overall mental health. This suggests that women may be uniquely impaired by disrupted sleep, potentially reflecting differences in gender roles, stress processing, or symptom presentation. Although Non-Whites and younger adults reported greater sleep disruptions, race and age didn't moderate the association between sleep declines and DASS-21. Public health strategies should prioritize accessible sleep health interventions to mitigate mental health risks and build resilience across diverse populations during global crises.

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1406

PREDICTORS OF POST-COVID CLINICAL AND COGNITIVE CONSEQUENCES: AN UPDATE

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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 goal of this pilot study is to assess if sleep disturbances and sleep apnea severity contribute to PASC.

Methods: We prospectively collected sleep, quality of life (QoL) and neurocognitive data in patients with PASC and control participants with OSA but without past COVID-19 infection. Questionnaires were administered at baseline and after 3 months to evaluate sleepiness, fatigue, sleep disturbance, and QoL.

Cognitive testing included Trail Making Test (TMT) A and B, Paced Auditory Serial Addition Test (PASAT), Stroop Task, Digit Coding, Hopkins Verbal Learning Test-R (HVLT-R), Weschler Abbreviated Scale Intelligence II (WASI), Weschler Memory Scale IV (WMS), and Psychomotor Vigilance Test (PVT), respectively. COVID-infection related data was also collected.

Results: We have enrolled 104 total participants thus far; 47 patients with PASC (39 males, 8 females; age: 60.0±12.9 years, BMI: 31.6±5.6 kg/m2, AHI: 36.6±27.8 events/hr, Education: 14.5±2.1 years) and 57 controls (48 males, 9 females; age: 64.6±11.9 years, BMI: 32.1±8.5 kg/m2, AHI: 41.4±27.5 events/hr, Education: 14.3±2.6 years). Baseline data in PASC vs. controls are given as: FSS Total Score: 39.0±13.4 vs. 33.4±14.9.4(p=0.06), ESS: 10.4±4.6 vs.9.0±5.5, PROMISE Sleep Impairment Score: 22.6±9.3 vs.18.7±8.3 (p< 0.05), 6-Minute Walk Test Total Distance Walked: 467.7±102.5 vs. 420.4±84.4 meters, FOSQ Total Score: 16.1±3.0 vs. 15.8±3.9, TMT-A 93.6±16.5 vs. 105.0±14.8 (p< 0.01), TMT-B: 92.9±21.1 vs. 101.6±17.8 (p=0.07), HVLTR Total Recall: 82.8±17.3 vs. 86.6±15.7, WMSIV Visual Reproduction Delayed Recall: 99.0±18.2 vs. 103.8±18.7, Stroop Color-Word Score: 92.0±15.5 vs. 94.8±13.2, WASI-II FISQ4 Score: 93.9±14.9 vs. 94.5±14.8, PASAT Rate 2 Correct: 31.8±24.1% vs. 34.4±14.8%, PVT Mean Reaction Time: 392.9±376.4 vs. 346.7±245.9 ms, PVT lapses 9.5±26.7 vs 1.5±3.2.

Conclusion: Sleep impairment, reduced attention span and increased lapses in vigilance were noted in patients with PASC vs controls. Additional analyses will delineate the associations between post-COVID symptoms, sleep disturbances and cognitive consequences following SARS-CoV-2 infection.

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1407

LONG COVID SLEEP DISTURBANCES: PHENOTYPES AND RISK FACTORS FROM A SAFETY-NET HOSPITAL STUDY

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Introduction: Millions globally suffer from long-term functional and cognitive impairment from post-acute-SARS-CoV-2 infection (PASC), or "Long COVID." Sleep disturbances (SDs), either new or exacerbated, are common but under-researched in this population despite their impact on immune function, chronic organ illness, and quality of life.

Methods: Retrospective chart review of patients seen at Boston Medical Center's Long COVID Clinic (01/2022-12/2023). SDs experienced during PASC were classified into four phenotypes: insomnia, hypersomnia, mixed, and other. Binomial and multinomial regression identified predictors, with no SD as the reference and Area Deprivation Index (ADI) as the covariate. P-values were adjusted for multiplicity using the Benjamini-Hochberg method.

Results: Among 452 PASC patients (median age 47, 70.4% Female, 46% White), 28.1% had no SD, while 34.7% reported insomnia, 9.3% hypersomnia, 20.8% mixed insomnia/hypersomnia, and 6.9% other SDs. ADI was the only significant demographic predictor of SD (p=.016); vaccination status, number of infections, and hospitalizations were not predictive. Comorbidities strongly linked to SD-Insomnia included pre-existing insomnia (OR=3.97, p<.01), chronic pain (OR=2.75, p<.01), anxiety (OR=2.24, p<.01), and depression (OR=1.98, p=.024). These also predicted SD-Mixed insomnia/hypersomnia. Additionally, chronic heart disease (OR=5.02, p=.024), OSA (OR=3.16, p=.022), and chronic pulmonary disease (OR=2.76, p<.01) were specifically associated with SD-Mixed. No comorbidities predicted hypersomnia. PASC symptom predictors (all p<.01) included fatigue, post-exertional malaise (PEM), brain fog, anxiety, depression, and POTS/dysautonomia. SD-Hypersomnia was notably associated with PEM (OR=10.39, p<.01), gait instability (OR=9.12, p=.012), and POTS/dysautonomia (OR=8.09, p<.01). SD-Mixed was especially defined by fatigue (OR=18.5, p<.01) and PEM (OR=10.93, p<.01). Notable medication risk factors for SD-Insomnia included benzodiazepines (OR=3.53, p<.01) and PPIs (OR=2.22, p=.033). Beta-blockers (OR=3.46, p=.024) and albuterol (OR=3.40, p<.01) were stronger predictors of SD-Mixed but also significant for SD-Insomnia.

Conclusion: SD-Insomnia and SD-Mixed were strongly linked to pre-existing comorbidities, PASC symptoms, and medications, while SD-Hypersomnia was primarily driven by PASC-related symptoms. Treatment strategies should be tailored based on SD phenotypes: addressing comorbidities and minimizing iatrogenic effects for SD-Insomnia and SD-Mixed, while targeting PASC symptoms of autonomic dysfunction, PEM, and gait instability for SD-Hypersomnia. Recognizing these distinct patterns may improve personalized management of sleep disturbances in PASC.

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1408

ASSESSMENTS OF SLEEP AND HOME SLEEP TESTING REFERRALS FROM A LONG COVID CLINIC IN NORTHEAST OHIO

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Introduction: In September 2021, one Northeast Ohio hospital system created a Long Haul COVID referral clinic for primary care providers to refer adults with any new or worsening health problems 3 or more months following an acute COVID 19 infection (99.3% PCR documented; 25% post-hospital). A standardized face-to-face clinical evaluation also included current symptoms of fatigue and sleep health, and a prior pre-COVID clinical history, and intake patient-based questionnaires for new or chronic insomnia, excessive daytime sleepiness, regular loud snoring, choking, or a suspicion of sleep apnea.

Methods: Of the initial 287 patients to April 2022, 277 (96.5%) had complete data (61% women, 54 yrs: range 18-90 yrs) Presenting 10 months (range 3-20) after the acute infection. The clinical history and presenting questionnaire data on those with a primary or co-primary complaint of fatigue.

Results: 209 patients (64% women) presented with fatigue as a primary symptom. 109/209 (52%) had one or more sleep symptoms with new-onset insomnia (63/109 or 58%), excessive

sleepiness (44%), heavy snoring and/or suspected sleep apnea (32%), and sleep choking (8%). No demographics nor sleep satisfaction explained this. 87/109 (80%) completed home monitoring with an AHI 4% 10±11/hr (M±SD), heart rate of 68±12 bpm, baseline saturation 95±2%, and percent time < 90% 11±2%. Of these 14/87 (16%) individuals had an AHI >15 (range 15-57/hr), and 36/87 (41%) had an AHI 4% < 5/hr. A higher BMI was associated with an AHI >15/hr (p< 0.001). Neither AHI findings nor symptoms differentiated those with or without fatigue.
Conclusion: Sleep complaints were not unique to fatigue. Those with fatigue accepting home sleep testing could have moderate or severe OSA, but many did not. As recently reviewed (Ely et al 2024), post-COVID fatigue is a collection of frustrating neurocognitive and non-specific traits, but no specific sleep endotypes.
Support (if any): University Hospitals Medical System, TEAMS institutional award from the Department of Medicine, University Hospitals of Cleveland; Northeast Ohio CTSC; NIH RECOVER Sleep

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1409

EXERCISE MODALITY AND SLEEP-RELATED INTERFERENCE OF DAILY FUNCTIONING IN COVID-19: COMPARATIVE EFFECTS OF CARDIO AND STRENGTH TRAINING

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Introduction: Individuals with COVID-19 commonly experience mild to severe sleep disturbances, and impaired sleep can worsen daytime functioning. Cardiovascular exercise can improve immune health and thus, we explored the relationship between self-reported exercise and daytime dysfunction, examining the effects of cardiovascular exercise and strength training. We hypothesized that cardiovascular exercise would have a greater impact on daytime dysfunction than strength training in individuals with COVID-19.
Methods: A total of 13,313 adults completed online surveys between April 2020 and April 2021. We collected data using online surveys during the first thirteen months of the pandemic. Sleep-related interference of daily functioning was measured using a subscale of the Pittsburgh Sleep Quality Index with higher scores indicating greater sleep disturbance. Additionally, participants indicated the number of hours of physical exercise completed each week and to indicate what percent of exercise devoted to cardiovascular training, strength training, or light exercise/stretching. From the larger sample, 743 individuals endorsed that they had been diagnosed with a case of COVID-19. Of these, 725 had usable data on all variables of interest. The final sample include 339 were males (M age=34.17, SD= 9.48), 383 females (M age=35.12, SD=10.59) and 3 did not report sex. A multiple linear regression with simultaneous entry was conducted to determine which exercise modality predicted sleep-related interference with daily functioning in the context of the others.
Results: The combination of exercises accounted for 1.8% of the variance in sleep-related daytime dysfunction (R^2=0.018,F(3,721)=4.45). There was a significant negative association between cardiovascular exercise and the interference of sleep problems with daily functioning (β=-0.175, p< 0.031), and a positive association between light exercise and sleep-related daytime dysfunction (β=0.225, p< 0.002). There was no statistically significant correlation between strength training and the interference of sleep problems with daily functioning (β=0.051, p=0.358).
Conclusion: Individuals diagnosed with COVID-19 and who performed more cardiovascular exercise, and less stretching/light exercise reported fewer problems with daily functioning due to sleep issues. This underscores the need for cardiovascular exercise-related interventions in the treatment of COVID-19 and potentially other respiratory infections.
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1410

EFFECT OF CPAP ON COGNITIVE FOG IN POST COVID PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction: Cognitive fog is a frequent complaint among patients suffering from post-COVID Condition, reported in up to 60% of patients. Obstructive sleep apnea (OSA) commonly co-occurs in post-COVID Condition and may exacerbate symptoms. We sought to evaluate if treatment of OSA with continuous positive airway pressure (CPAP)decreases cognitive fog in post-COVID patients with OSA.
Methods: Patients with post COVID Condition, as per World Health Organization criteria, with self-reported symptoms of cognitive fog and diagnosed with OSA were recruited. They underwent neuropsychological testing to evaluate processing speed with Trail-Making Task A and Digit Symbol Substitution; executive function with the Stroop, Trail Making Task B, and digit span; semantic and categorical fluency; spatial memory assessed with the Benson complex figure task; and global cognition assessed with the Montreal Cognitive Assessment (MoCA) at baseline and 4±2 weeks after starting CPAP.
Results: Among 14 patients who completed the study, the mean age was 48.5 ±14.5 yrs, 57% were women, 14% were Black, median AHI was 12 (12;27), mean BMI was 34.3±10.1, and the mean nightly CPAP use was 5.8±2.6 hours. Cognitive function improved with CPAP on the following tests: Digit Symbol Substitution (post CPAP 60.9±2.7 vs baseline 53.6±2.9, p=0.01), Stroop color test (75.2±3.6 vs 66.9±2.1, p< 0.01), Stroop color-word test (46.9±3.3 vs 41.6±3.0, p< 0.01), Benson complex figure-delayed (13.9±0.6 vs 12.3±0.5, p=0.047). In addition, patients reported improvements on PROMIS cognitive function (26.7±2.1 vs 17±1.6, p< 0.01), Epworth Sleepiness Scale (ESS) (5.9±1.2 vs 10.5±1.1, p< 0.01), Insomnia Severity Index (ISI) (12.4±1.5 vs 18.9±1.2, p< 0.01), and the stress (12.6±2.3 vs 18.3±3.1, p< 0.01) and depression (10.3±1.9 vs 14.7±1.9, p=0.01) subscales of the Depression and Anxiety Stress Scale-21. Changes in PROMIS cognitive score (r=0.63, p=0.02) and Trial Making test A (r=-0.58, p=0.048) were correlated to the duration of nightly CPAP use.
Conclusion: Our findings suggest screening and treating comorbid OSA among patients with post-COVID Condition can improve cognitive fog.
Support (if any): This study is supported by the Breathe Pennsylvania Foundation.

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1411

PRAZOSIN INDUCED PARESTHESIA: A REFRACTORY RESTLESS LEGS MIMICKER

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Introduction: Restless Legs Syndrome (RLS) is a clinical syndrome characterized by an urge to move the legs while at rest that occurs primarily at nighttime and improves with movement. RLS is a clinical diagnosis as no objective testing is available to confirm the diagnosis. Other conditions may impact patients' extremities during sleep, potentially leading to a misdiagnosis of RLS. We describe the case of a patient who had prazosin induced paresthesia that was mistakenly diagnosed as refractory RLS.
Report of case: A 32-year-old man with post-traumatic stress disorder and a body mass index of 49 kg/m2 presented in 2014 with snoring. He was diagnosed with severe obstructive sleep apnea (OSA) on a home sleep apnea test, respiratory event index of 36.4 events/hour. He started auto-adjusting positive airway pressure (APAP) therapy. He presented for follow up at four and eight months after starting APAP without any lower extremity symptoms. However, he did report nightmares and was started on prazosin 2 mg nightly. At his follow up visit 5 months later, he noted partial improvement of his nightmares on prazosin, but new onset of lower extremity discomfort at nighttime. He was diagnosed with RLS and started on gabapentin. His ferritin level was 429 ng/mL and transferrin saturation was 32%. Over the ensuing follow up visits, his prazosin was titrated to 12 mg nightly with only partial improvement in his nightmares. Meanwhile, his lower extremity symptoms proved to be severe and refractory to high doses of gabapentin, ropinirole, pregabalin and acetaminophen with codeine. In 2023, his diagnosis of RLS was called into question given his atypical symptoms of sharp, 'pins and needles' lower extremity pain and refractoriness to treatment. After chart review revealed a temporal correlation between symptom onset and prazosin initiation, prazosin induced paresthesia was considered. His lower extremity symptoms resolved shortly after prazosin discontinuation.
Conclusion: RLS is a common sleep disorder, however many conditions present with nighttime lower extremity symptoms creating a diagnostic challenge for clinicians. Clinicians must carefully consider whether a patient's symptoms are consistent with RLS or a mimicker. Our case highlights a rare RLS mimicker of prazosin induced paresthesia.
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1412

AN "EYE-CLOSING" EXPERIENCE: A RARE CASE OF POST-COVID HYPERSOMNIA

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Introduction: Idiopathic hypersomnia (IH) is a central disorder of hypersomnolence characterized by excessive daytime sleepiness, long unrefreshing naps and morning inertia. Some triggers may include abrupt shifts in sleep-wake cycles, viral illnesses, anesthesia, and head trauma. Age of onset is usually 15 to 30 years. We report a case of post-COVID late onset IH.
Report of case: An otherwise healthy 54-year-old male presents with daytime sleepiness for two years. He had no sleep complaints prior to that. In 2022 he noticed his productivity decline and fell asleep behind the wheel. He reported cognitive difficulties including trouble with word finding, remembering names, and loss of fluency since 2020, after he had COVID. He had no vaccines except for the shingrex vaccine three months before the onset of sleepiness. Epworth sleepiness score was 20 and he reported long unrefreshing naps. Neurological exam and testing including blood work, neuropsychological testing, MRI Brain, and PET brain scan were all normal. He had a normal polysomnogram and the MSLT the next day showed a MSL of 2.5 minutes with no SOREMPs.
Conclusion: There have been four cases of primary hypersomnias reported following COVID-19 infections, three IH, and one narcolepsy type 2. All three cases of IH were below age 35. The narcolepsy type 2 case was a 54-year-old male with a history of hypertension and OSA who reportedly had improvement 20 months after the infection (Morelli-Zaher et al 2024). Biologically active agents, including vaccines, may cause hypersomnia in vulnerable individuals. A sudden increase in the incidence of narcolepsy was reported in several European countries following the influenza A (H1N1) vaccination campaign with Pandemrix (Mignot 2020). In addition, prior studies have noted up to 62.5% cases of sleepiness after the administration of COVID-19 vaccines (Sakinah et al 2021). There has also been a case report of hypersomnia relapse, possibly due to COVID-19 vaccination (Wu 2021). There have been no reported cases of hypersomnia following shingrex vaccine. Our case may represent a manifestation of long-COVID, or a rare reaction to shingrex.
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1413

SUCCESSFUL TREATMENT OF BIOT'S CENTRAL SLEEP APNEA WITH PHRENIC NERVE STIMULATOR IN A PATIENT WITH RHEUMATOID ARTHRITIS AND CHRONIC OPIOID USE

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Introduction: Central sleep apnea (CSA) is characterized by recurrent episodes of apnea due to a lack of respiratory effort, often associated with heart failure. This case discusses an instance of Biot's central sleep apnea exacerbated by chronic opioid use secondary to rheumatoid arthritis (RA), highlighting the successful use of a phrenic nerve stimulator (PNS) as a treatment modality in this patient.
Report of case: A 52-year-old male with RA presented to our sleep center with complaints of excessive daytime sleepiness, frequent nocturnal arousals, and snoring. The patient had been on chronic opioids for pain management. Given these symptoms, a polysomnography (PSG) study was conducted. The AHI (Apnea-Hypopnea Index) was 37 events per hour, with a total of 164 respiratory events consisting of 137 central apneas (Biot's central apneas), 7 obstructive apneas, and 20 hypopneas. The oxygen saturation nadir was 85%. The arousal index consisted of

50 events per hour, and the patient exhibited mild snoring during the study. These polysomnography findings indicated severe CSA likely exacerbated by opioid use. An attempt was made to taper opioid use to improve central event burden; however, this led to inadequate pain control, profoundly impacting the patient's activities of daily living (ADLs). The patient could not tolerate bilevel positive airway pressure (BPAP) therapy due to claustrophobia and hand deformities from rheumatoid arthritis, which hindered independent mask usage. Considering the challenges of traditional therapies in this patient and the severe nature of his CSA, a phrenic nerve stimulator was recommended. The device successfully implanted and was activated six weeks post-implantation. At 12-week follow-up, a repeat PSG was performed, demonstrating an AHI of 7 events per hour, consisting primarily of hypopneas. The patient reported enhanced sleep quality and increased daytime alertness.
Conclusion: Currently, PNS is employed primarily for CSA due to heart failure. However, this case expands its application to opioid-induced CSA, demonstrating PNS to be an effective treatment that leads to significant improvements in both sleep quality and daytime functioning. This case underscores the importance of individualized treatment strategies in complex sleep disorders and highlights the need for further research into the applications of PNS in diverse patient populations.
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1414

TIRZEPATIDE TREATMENT OF OBESITY HYPOVENTILATION SYNDROME

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Introduction: Individuals with an elevated body-mass-index (BMI) are at higher risk for obstructive sleep apnea (OSA), and those with a BMI above 30 may develop obesity hypoventilation syndrome (OHS). Mechanisms of hypoventilation include increased respiratory workload, decreased diaphragmatic excursion, and changes in respiratory drive and lung compliance. New classes of medications such as glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide-1 (GLP-1) agents have been approved for diabetes and weight loss. More recently, in the SURMOUNT-OSA trial, Tirzepatide was shown to treat moderate to severe sleep apnea in obese patients1. There is a paucity of data on using these medications in patients with OHS.
Report of case: A 68-year-old female with obesity (BMI 38) was diagnosed with OSA with an apnea-hypopnea index (AHI) of 23. She was started on automatic positive airway pressure (APAP) with excellent compliance but persistent elevation in serum bicarbonate. Arterial blood gas showed paCO2 of 49, with a normal pH. A polysomnogram titration to CPAP of 13 resolved respiratory events, but TcCO2 levels were 53-56 with borderline low oxygen levels. Pulmonary function testing showed mild restriction. Chest imaging excluded underlying lung disease. She was started on intelligent volume-assured pressure support (iVAPs) but experienced pressure intolerance and transitioned to spontaneous bilevel positive airway pressure with normalization of her paCO2. She was started on Tirzepatide for weight loss and achieved significant reduction of BMI to 27. Given her difficulty tolerating BPAP, a repeat PSG was done which showed AHI of 12 without hypoventilation. She transitioned back to APAP with improvement in tolerance and symptoms.
Conclusion: Obese patients with sleep apnea and elevated serum bicarbonate should be evaluated for OHS. For patients with OHS, weight loss is a vital part of management. Our case demonstrates successful treatment of OHS through weight loss assisted by a GLP-1 medication.
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1415

WHEN NORMAL IS NOT PERMANENT: LATE-ONSET CONGENITAL CENTRAL HYPOVENTILATION SYNDROME IN A CHILD WITH PHOX2B NPARM MUTATION

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Introduction: Congenital Central Hypoventilation Syndrome (CCHS) is a rare disorder caused by mutations in the PHOX2B gene, leading to impaired autonomic control of respiration. Non-polyalanine repeat expansion mutations (NPARM) account for approximately 10% of CCHS cases and are often associated with neural crest tumors. Classic CCHS symptoms typically present at birth with alveolar hypoventilation during sleep. Here, we present a rare case of a pediatric patient with a PHOX2B NPARM mutation who developed central hypoventilation at 6 years of age.
Report of case: An 18-month-old male with a PHOX2B: c.234_240del (p.Tyr78)* NPARM mutation was referred for respiratory evaluation. He had a history of stage IV neuroblastoma at 9 months of age, which was in remission after treatment with chemotherapy and surgical resection. No respiratory insufficiency was noted at birth, during anesthesia, or with respiratory infections. Initial polysomnography at 19 months of age showed severe obstructive sleep apnea (OSA) with an Apnea-Hypopnea Index (AHI) of 14/hr, no central apneas, and no hypoxemia. The end-tidal CO_2 ($EtCO_2$) maximum was 59 torr, with 53% of total sleep time (TST) spent >50 torr. An ENT evaluation revealed no airway obstruction. A CPAP titration study effectively eliminated all hypopneas at 7 cmH_2O while maintaining a transcutaneous CO_2 ($TcCO_2$) maximum < 50 torr. Subsequent CPAP titration studies at 3 and 4 years of age demonstrated effective resolution of hypopneas at CPAP 9 cmH_2O. The $TcCO_2$ maximum values were 49 torr and 51 torr, respectively. At 6 years of age, a split-night polysomnography was performed to reassess his baseline respiratory status. The diagnostic portion of the study showed resolution of OSA (AHI 0/hr) but revealed significant hypoventilation with $EtCO_2$ maximum 56 torr and 60% of TST spent >50 torr. Thus, the patient was diagnosed with late-onset CCHS. BPAP 15/7 cmH_2O with a backup rate effectively maintained CO_2 < 50 torr.
Conclusion: This case highlights the importance of serial polysomnography in children with PHOX2B mutations as delayed onset of hypoventilation can occur in childhood or adulthood. Early detection and timely escalation of therapy to support ventilation are crucial in preventing long-term complications, including cognitive and developmental impairments resulting from prolonged hypoxia and hypercapnia.
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1416
MICRONIZED PROGESTERONE INDUCED SLEEP PARASOMNIAS: A RARE ASSOCIATION

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Introduction: Progesterone-induced sleep parasomnia is a rare neuropsychological condition that can manifest as somnambulism and sleep-related eating disorder (SRED) in women. The precise mechanism underlying this phenomenon remains unclear. Discontinuing the offending agent, micronized progesterone, is typically the treatment of choice.
Report of case: A 48-year-old female presents to the sleep clinic with complaints of hypersomnia, sleep walking and nocturnal eating episodes.. She described episodes occurring a few hours after falling asleep, during which she would leave her bed, walk around, and eat from the refrigerator, with no recall of the events upon waking. Medications on presentation included Prometrium (micronized progesterone), Singulair, Albuterol, and Ferrex. Both EEG and brain imaging were unremarkable, and a previous polysomnogram (performed 10 years ago) had been negative for sleep-disordered breathing. Initially, the treatment plan involved watchful waiting, and a repeat polysomnogram was considered. At a follow-up visit four months later, the patient reported undergoing an elective hysterectomy, after which Prometrium was discontinued. Following the discontinuation of micronized progesterone, the parasomnia episodes resolved.
Conclusion: In this case, micronized progesterone was identified as the likely cause of sleep parasomnias. No better explanation could be identified, as the episodes ceased after discontinuation of the medication. While progesterone analogs may enhance overall sleep quality and reduce sleep movements through positive allosteric modulation of the GABA type A receptor, and also help in increasing NREM sleep, a direct relationship with progesterone and sleep parasomnias remains unclear. Further research is needed to determine a definitive connection between progesterone and sleep parasomnias.
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1417
WORSENING OF SLEEP APNEA WITH HYPOGLOSSAL NERVE STIMULATION OVER-TITRATION

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Introduction: Hypoglossal nerve stimulation (HGNS) is a treatment for obstructive sleep apnea. Through stimulation of the hypoglossal nerve, genioglossus activation causes the tongue to protrude and subsequent airway enlargement. After implant and a period of self-adjustment, a HGNS titration polysomnogram is typically performed to determine optimal settings. We describe a case of over-titration, leading to worsening sleep-disordered breathing (SDB).
Report of case: A 67-year-old woman with snoring and witnessed apneas initially underwent a baseline home sleep study with a respiratory event index of 45.5/h. She was unable to tolerate positive airway pressure and subsequently underwent HGNS implant. At her HGNS activation visit, she was sent home on an outgoing setting of 0.8V (functional threshold), patient control range 0.6-1.6V, + - + electrode configuration, 90/33 pulse width/rate. At her follow up, she was on 1.5V, had good usage at an average of 7.9 hours/night, and reported improved snoring and resolution of witnessed apneas. A HGNS titration study was then performed on electrode configuration + - +, 90/33 pulse width/rate, and amplitudes 1.3-1.9V. Her SDB was well controlled in the lateral position in NREM sleep on 1.3 and 1.4V with an apnea-hypopnea index (AHI) < 10/h; however, frequent events were seen in the supine position. On settings 1.7V and higher, increasing events were seen in the lateral position with an AHI >30/h and sleep became more disrupted. A trial of lowering to 1.3 or 1.4V with positional therapy was recommended.
Conclusion: This case demonstrates that over-titration of HGNS can lead to worsening of SDB. Limited data is currently available on HGNS over-titration. The mechanism for this worsening is not well understood. Possible causes include increased sleep disruption with higher stimulation and subsequent respiratory instability. Another postulated cause is that higher voltages could activate muscles that not only cause tongue protrusion, but also those that cause tongue retraction. An alternative explanation suggests that high voltages increase fatiguability of the genioglossus muscle. With the rising use of HGNS, providers should be aware of this potential adverse effect. When SDB continues to worsen with advancing amplitudes, lower voltages should be considered.
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1418
DRUG-INDUCED SLEEP ENDOSCOPY FOR EVALUATION OF HYPOGLOSSAL NERVE STIMULATOR EFFICACY: A CASE REPORT

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Introduction: Drug-induced sleep endoscopy (DISE) is a crucial step for determining hypoglossal nerve stimulator (HNS) therapy candidacy in the treatment of obstructive sleep apnea (OSA). Currently, DISE is not routinely used to evaluate efficacy of therapy following HNS implantation. We present the case of a patient with OSA who underwent DISE for evaluation of HNS therapy following implantation and titration.
Report of case: A 54 year old man with a prior medical history including class I obesity and systemic hypertension was seen in follow-up of longstanding OSA. He initially trialed positive airway pressure (PAP) therapy, of which he was intolerant, and subsequently underwent HNS implantation and titration. Home sleep apnea test with HNS therapy demonstrated residual severe OSA. He then attempted to resume use of PAP in addition to HNS, however he remained unable to adhere to PAP. He was then fitted for a mandibular advancement device (MAD) to use in conjunction with HNS. Subsequently, he had difficulty tolerating MAD due to headaches. At that point, the decision was made to perform a drug-induced sleep endoscopy (DISE) with use of both HNS and MAD to visually evaluate the residual obstructive respiratory events and assess for possible alternative treatment options. During DISE, complete velopharyngeal collapse was observed with and without use of optimally-titrated HNS and concurrent MAD. Additionally, near-continuous obstructive apneas were observed with both therapies in use, with prolonged,

severe oxygen desaturations. The procedure was terminated, and treatment options were discussed with the patient with recommendation for tracheostomy if still unable to tolerate PAP therapy, with consideration of possible upper airway surgeries.
Conclusion: DISE currently has a clearly defined role in the evaluation of candidacy for HNS for OSA. The above case illustrates a possible additional role for DISE in the evaluation of HNS treatment efficacy.
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1419

OVERCOMING TREATMENT-EMERGENT CENTRAL SLEEP APNEA: A CASE OF DUAL NEUROMODULATION WITH HYPOGLOSSAL AND PHRENIC NERVE STIMULATOR

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Introduction: Central and obstructive sleep apnea (CSA/OSA) are typically managed with positive airway pressure (PAP) therapy. For patients unable to tolerate PAP, novel implantable devices, such as hypoglossal nerve stimulation (HNS) for OSA and phrenic nerve stimulation (PNS) for CSA, provide alternative treatment options. While treatment-emergent central sleep apnea (TeCSA) is a recognized phenomenon in OSA patients transitioning to a central apnea pattern under PAP therapy, recent studies have also anecdotally associated persistent TeCSA with HNS. TeCSA presents a significant challenge, as PAP intolerance impacts both CSA and OSA patients in a similar manner. This case report describes the successful management of TeCSA following HNS implantation for OSA, leading to the resolution of CSA with the use of PNS.
Report of case: A 57-year-old male with class I obesity (BMI: 32 kg/m^2) presented with excessive daytime sleepiness (ESS 16). Polysomnography (PSG) demonstrated severe OSA with an Apnea-Hypopnea Index (AHI) of 35, without significant central events. The patient was unable to tolerate Continuous Positive Airway Pressure trial due to claustrophobia and frequent mask leaks. A drug-induced sleep endoscopy revealed >75% tongue-related obstruction and absence of complete concentric collapse at the velum, confirming the patient as an appropriate candidate for HNS. The patient underwent HNS implantation, followed by PSG titrations and sleep endoscopies with adjustment in voltage settings. At lower voltages, persistent OSA was observed, while at higher voltages, the patient developed TeCSA. A PSG conducted at the higher voltage setting revealed an AHI of 38 with central apnea index (CAI) of 34. Echocardiography ruled out heart failure as a contributing factor. Due to persistent symptoms (ESS 17), a PNS was implanted and after appropriate titration of HNS and PNS systems, the patient experienced significant improvement in his symptoms and severity of sleep apnea with resolution of CSA (AHI 16, CAI 1).
Conclusion: As HNS use for treating OSA in patients with PAP intolerance becomes more prevalent, TeCSA may emerge as a significant therapeutic challenge due to the limitations of using NIV for its treatment. In carefully selected patients, neuromodulation with PNS may offer a safe and effective alternative for managing persistent TeCSA.
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1420

BUPRENORPHINE-NALOXONE FOR THE TREATMENT OF MEDICALLY REFRACTORY RESTLESS LEGS SYNDROME: A CASE SERIES

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Introduction: Restless Legs Syndrome (RLS) affects up to 3% of the adult population in the United States, with approximately one-third of these individuals experiencing medically refractory disease. Historically, treatments for RLS have included iron replacement, dopamine agonists, and alpha-2-delta ligands. However, dopamine agonists are often associated with augmentation, a phenomenon in which RLS symptoms worsen. This includes increased severity, earlier onset, spread of symptoms to other parts of the body, and the need for higher doses of medications. Over the past decade, the use of opioid therapy for refractory RLS has become more widely accepted. Buprenorphine-naloxone, a combination medication, includes buprenorphine, a partial agonist at the mu-opioid receptor, which is less likely to cause respiratory depression, overdose, or euphoria compared to full agonists. Naloxone, an opioid antagonist, is included to deter misuse. Here, we share the treatment responses of three patients with refractory RLS who were treated with buprenorphine-naloxone.
Report of case: Pre- and post-treatment IRLS were compared in three Sleep Medicine patients (two females, aged 70, and one male, aged 72) on therapeutic doses of buprenorphine-naloxone. Patient charts were reviewed for medication side effects. Previous treatments included dopamine agonists, alpha-2-delta ligands, iron supplementation, benzodiazepines, methadone, and melatonin. Pre-treatment IRLS scores were 13, 13, and 24, classified as moderate to severe. The formulations used included buprenorphine-naloxone 2-0.5 mg sublingual tablets and buprenorphine-naloxone 2-0.5 mg 1/8 films. Therapeutic daily doses of buprenorphine-naloxone ranged from 7.5 to 60 morphine milligram equivalents (MME) per day. Post-treatment IRLS scores were 0, 2, and 3, representing an average reduction of over 15 points on the IRLS. Average time between pre- and post-treatment IRLS was 29 months. Side effects were reported by one patient, including fatigue, depressive symptoms, and reflux, but none of the patients experienced side effects that limited the use of the medication.
Conclusion: In this case series, we demonstrate the positive impact of buprenorphine-naloxone in managing refractory RLS, as evidenced by substantial reductions in IRLS scores from moderate to severe levels. We hope to encourage clinicians to consider buprenorphine-naloxone as an effective and well-tolerated treatment option for patients with refractory RLS.
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1421

EARLY-ONSET RESTLESS LEG SYNDROME WITH RAPID PROGRESSION AND GABAPENTIN-INDUCED AUGMENTATION: A CASE OF COMPLEX MANAGEMENT IN A PEDIATRIC PATIENT

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Introduction: Restless leg syndrome (RLS) is a neurological disorder linked to various medical, psychiatric, and sleep conditions, including mood disorders and Attention Deficit Hyperactivity Disorder (ADHD). Early-onset RLS occurs before age 35, usually with gradual symptom progression. Iron deficiency plays a key role in its pathophysiology. First-line treatments include alpha2-delta calcium channel ligands like gabapentin, while dopamine agonists (DA) are second-line. This report discusses a case of rapid symptom progression and response to combination therapy with gabapentin and pramipexole.
Report of case: An 11-year-old male with a history of Anxiety, and ADHD who had been experiencing RLS for two years. Symptoms started as an urge to move his legs while in bed at night and significant bilateral leg paresthesia, relieved by leg movement; the sensation progressed to his abdomen and chest over time. At the time of the initial diagnosis, Ferritin levels were within normal limits, and a polysomnogram (PSG) was done with no evidence of sleep-disordered breathing or periodic limb movement disorder. He was started on Gabapentin 100 mg at night at the time of the initial diagnosis and the dose was increased over time as he experienced symptom recurrence and worsening despite initial improvement. Currently, he is on Gabapentin 700 mg, and Guanfacine 1 mg, which was also added during previous visits for ADHD management. Pramipexole 0.125 mg was started 18 months after the initial diagnosis, with adequate control of symptoms. Irritability and behavioral issues were noted shortly after, which the mother attributed to the combination of Guanfacine and Pramipexole, with discontinuation of Guanfacine and recurrence of mild RLS symptoms, with the patient having approximately 4 episodes per week at the moment.
Conclusion: Augmentation, a dose-related iatrogenic worsening of RLS symptoms, is commonly associated with long-term use of DA. This report depicts a rare case of possible RLS augmentation from alpha2-delta calcium channel ligand use, and interval improvement of symptoms when combination therapy was started. Behavioral changes were noted shortly after the initiation of Pramipexole. Impulse control disorder and Irritability have been reported as common adverse effects of DA use, which highlights the importance of adequately tailoring therapy according to each patient's comorbidities.
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1422

HIGH-DOSE RIVASTIGMINE IN REM BEHAVIOR DISORDER - A THERAPEUTIC COINCIDENCE OR STROKE OF LUCK?

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Introduction: Stiff Person Syndrome (SPS) is an autoimmune neurological disorder associated with anti-GAD65 antibodies where stiffness and spasms of axial and limb muscles are the common manifestations. Other atypical features now being recognized are cranial neuropathies, sensory ataxia, and REM sleep behavior disorder (RBD).
Report of case: A 62-year-old woman with seronegative rheumatoid arthritis and positive GAD65 antibody presented with gait instability in 2015 and was given the diagnosis of SPS. Her diseased progressed to include cranial neuropathies (dysarthria, dysphagia, diplopia), sensory ataxia, torso stiffness, autonomic instability (syncope, nausea, sweating), and REM sleep behavior disorder. Immunosuppressive treatments rituximab, methotrexate and hydroxychloroquine showed some improvement in symptoms. Rituximab was stopped in 2020 because of the pandemic and regarding immune suppression. Her stiffness, and RBD worsened. In 2024 the patient received IVIG therapy every 3 weeks and noticed improvement in some symptoms but continued to have bothersome RBD. However, the RBD improved after being placed on rivastigmine. This case demonstrates how SPS with atypical multi-system symptoms can be difficult to manage. Cranial neuropathies, RBD, autonomic symptoms and sensory ataxia are not common but have been described more frequently in SPS and might be associated with neuroinflammation. IVIG was effective in reducing muscle spasticity and, improving the quality of sleep and minimizing the number of medications currently being administered. Its action might be explained by the regulation of neuroinflammation and the immune response. However, cranial neuropathies, autonomic symptoms and RBD remained challenging the patient, suggesting the non-reversible damage which is not uncommon with autonomic dysfunction.
Conclusion: This case shows the complexity of treating symptoms associated with SPS. Further studies are required to determine the treatment's effectiveness overall and to define its role in the management of cranial and autonomic symptoms. Multiple disciplines must be involved in managing SPS patients with atypical features to ensure the best outcome.
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1423

JOLTING AWAKE: EXPLORING THE IMPACT OF SLEEP-RELATED NECK MYOCLONUS

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Introduction: Sleep-related neck myoclonus (SRNM) consists of brief motor events that primarily occur during REM sleep. Although typically considered physiological, SRNM can significantly impair sleep quality. We retrospectively reviewed three cases of SRNM presenting with non-restorative sleep.
Report of case: Case 1: A 26-year-old female with bruxism and temporomandibular joint dysfunction presented with chronic daytime fatigue. Her initial Epworth Sleepiness Score (ESS) was 17. Polysomnography (PSG) excluded obstructive sleep apnea (OSA) but revealed frequent neck myoclonus during REM sleep (SRNM-Index 34.64/hour). Treatment with a single dose of Clonazepam 0.5 mg was discontinued due to headaches. Botulinum-toxin-type-A (20 Units total) was injected into the masseter and splenius capitis muscles. The patient reported reduced head-neck tension, fewer nighttime awakenings, and the ESS improved to 8. Case 2: A 24-year-old female with fibromyalgia and POTS presented with non-restorative sleep. Her initial ESS was 17. PSG revealed mild OSA (AHI 8.9/hour, REM-AHI 21.7/hour) and frequent neck myoclonus during REM sleep (SRNM-index 30.3/hour), some triggered by airflow obstruction. Auto-PAP therapy improved sleep, reducing ESS to 8. Clonazepam 0.5 mg at bedtime further enhanced sleep, but she discontinued it due to dependence concerns. Botulinum-toxin-type-A (10 Units total) was injected into the

splenius capitis muscle, resulting in significantly improved sleep quality, and further reduction of the ESS to 4. She was able to discontinue Modafinil, which she previously took for disabling daytime fatigue. Case 3: A 42-year-old male presented with non-restorative sleep. He was diagnosed with severe OSA (AHI 35/hour, REM-AHI 57/hour) and frequent neck myoclonus during REM sleep (SRNM-index 62/hour). Auto-PAP therapy was initiated, leading to improved sleep. Treatment with Gabapentin 300-600 mg or Gabapentin ER 300-600 mg at bedtime partially improved sleep. Clonazepam 0.125 mg at bedtime further enhanced sleep, but he discontinued it due to concerns about dependence. Botulinum-toxin-type-A (20 Units total) was injected into the splenius capitis muscle, reducing head-neck tension and improving sleep quality. The patient's ESS ranged from 2 to 5 at baseline and follow-up visits.
Conclusion: From this case series, we can deduce that targeted therapy with Botulinum-toxin can be beneficial in cases of SRNM with non-restorative sleep.
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1424
EPAP EMERGENT CENTRAL SLEEP APNEA: INSIGHTS FROM A NOVEL PRESSURE TRANSDUCER FLOW CANNULA

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Introduction: Nasal Expiratory positive airway pressure (EPAP) therapy represents a therapeutic alternative to continuous positive airway pressure therapy (CPAP) in managing obstructive sleep apnea (OSA). Established OSA interventions, including CPAP therapy, mandibular advancement devices, tracheostomy, and hypoglossal nerve stimulation, have demonstrated the potential to induce or unmask central sleep apnea (CSA). A systematic literature review identified a single documented case of EPAP-emergent CSA associated with the Provent device (discontinued 2020). Contemporary FDA-cleared EPAP devices, specifically Bongo Rx and ULTepap, have had no reported cases of treatment-emergent CSA in the literature. We present a case of ULTepap-emergent CSA, confirmed by using a novel "clip-on" pressure transducer flow cannula (BRIGGS Medical, Avon, Ohio) for quantitative measurement of nasal airflow dynamics.
Report of case: A seventy-six-year-old male veteran with a history of heart failure with preserved ejection fraction, status post coronary artery bypass graft, mild chronic obstructive pulmonary disease, moderate obstructive sleep apnea presented for CPAP troubleshooting. Prior therapeutic interventions with CPAP and bilevel PAP were unsuccessful. A titration study demonstrated severe CSA with Cheyne-Stokes breathing with a therapeutic AHI of 4.1 on CPAP of 13 cmH2O. Despite therapeutic CPAP efficacy, the subject demonstrated poor CPAP adherence and failed to tolerate Bongo Rx devices across available sizes. Following a successful trial of ULTepap, a split night study with ULTepap was conducted using the novel ULTepap pressure transducer flow cannula. The diagnostic portion revealed obstructive hypopneas with flow limitation, while the therapeutic portion demonstrated paradoxical deterioration, with AHI increasing from 46 to 62 events/h, predominantly comprising CSA.
Conclusion: We present the first documented instance of ULTepap-emergent CSA, validated through measurements obtained with an innovative flow cannula specifically engineered for ULTepap application. The historically low detection rate of EPAP-emergent CSA may be attributed to technical limitations in measuring flow during EPAP. While treatment-emergent CSA typically resolves within a few months of therapy initiation, this newly developed cannula enables follow-up monitoring of CSA emergence and resolution after the ULTepap implementation. This case illustrates both a rather paradoxical therapeutic response and offers a methodological advancement to measuring flow during ULTepap therapy.
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1425
REFRACTORY HYPERSOMNIA IN IDIOPATHIC HYPERSOMNIA FOLLOWING COVID-19 - THERAPEUTIC INTERVENTION WITH SODIUM OXYBATE

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Introduction: This case highlights the link between viral infections, particularly COVID-19, and the development of neurological disorders like narcolepsy. Initially diagnosed with idiopathic hypersomnia, the patient's symptoms worsened after COVID-19, leading to narcolepsy type 1 with cataplexy. This progression shows how viral infections can trigger or worsen sleep disorders. Narcolepsy type 1 involves autoimmune mechanisms, where the immune system targets hypocretin-producing neurons essential for wakefulness. COVID-19 may trigger this response in genetically predisposed individuals. The patient's transition from idiopathic hypersomnia to narcolepsy shows how viral infections can exacerbate neurological conditions. This case also highlights challenges in distinguishing idiopathic hypersomnia from narcolepsy. Despite not meeting typical criteria for two sleep-onset REM periods (SOREM) on the Multiple Sleep Latency Test (MSLT), excessive daytime sleepiness and cataplexy supported the diagnosis.
Report of case: A 17 year old female with GAD and allergic rhinitis presented for severe daytime sleepiness. Patient was a Division 1 NCAA athlete. Initial PSG and MSLT PSG - AHI: 3 MSLT -SOL- 4 minutes SOREM- 0/5 (IHS) She was started on Modafinil 100 with improvement in sleepiness and quality of life. In February 2023, the patient had COVID-19 and developed her first cataplexy episode while at a cheer competition. Her cataplexy episode was described as her knees buckling as her excitement built up prior to her cheering competitions. Overall sleepiness was no longer controlled on Modafinil after COVID. Multiple cataplexy episodes were noted during Cheering competitions. Lexapro was initiated and Modafinil dosage was titrated with minimal benefit in sleepiness or cataplexy. PSG and MSLT (post COVID) PSG - AHI: 2.8; MSLT – SOL- 5 mins SOREM- 1/5 After testing she was transitioned to Xywav with reported improvement in daytime sleepiness with complete resolution of cataplexy symptoms.
Conclusion: In conclusion, this case study underscores the importance of considering viral infections as potential triggers for narcolepsy and other neurological disorders. Ongoing research into the mechanisms linking viral infections and neurological diseases is crucial for improving understanding and

developing targeted interventions. Understanding the interplay between genetic susceptibility, immune regulation, and environmental triggers is key to advancing diagnostic and therapeutic approaches for narcolepsy and other neuroimmune disorders.
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1426
AWAKE AGAINST THE ODDS: A NARCOLEPSY PATIENT'S JOURNEY TO BECOME A PHYSICIAN

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Introduction: Excessive sleepiness is widespread across the United States. Specifically, severe excessive daytime sleepiness is higher in women compared to men (13% vs 8.6%) in the general population. In the medical field, daytime sleepiness is often overlooked as a byproduct of our grueling schedules. However, in this case, our patient did not realize until her third year of fellowship that her overwhelming drowsiness and cataplexy were symptoms of narcolepsy.
Report of case: A 35-year-old female with a history of depression, currently in a highly demanding subspecialty fellowship, realized during her sleep medicine rotation that she needed to seek evaluation as a sleep medicine patient. She had experienced hypersomnia for 25 years, requiring at least 10 hours of sleep to function. She struggled with drowsiness throughout her fellowship, especially in the afternoons, after meals, and after 6 PM. She recalled childhood cataplexy (which resolved with escitalopram) and frequent sleep paralysis. Her Epworth Sleepiness Scale score was 18, and she relied on two to five caffeinated drinks daily. Polysomnography showed mild periodic leg movements and an MSLT revealed a mean sleep latency of 7.68 minutes and two sleep-onset REM periods, diagnosing her with narcolepsy type 1. She initially began treatment with modafinil 100 mg but continued to experience daytime sleepiness, likely exacerbated by her demanding schedule. The dosage was subsequently increased to 200 mg, which enabled her to function effectively and successfully complete her fellowship.
Conclusion: It's essential to recognize that, as medical professionals, we too can be diagnosed with the same conditions as our patients. While the demanding schedules of college, medical school, residency, and fellowship can cause daytime somnolence, it's crucial to identify when symptoms deviate from normal exhaustion. This patient's perseverance through years of hypersomnolence is truly remarkable, managing to overcome significant challenges while still becoming a successful physician. She developed coping mechanisms and maintained her resilience despite her symptoms. She initially chose to pursue a career in a demanding field because its active nature helped her remain alert throughout the day. We must remember to look after ourselves as patients too—narcolepsy is something that can affect us just as much.
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1427
SPONTANEOUS RESOLUTION OF CENTRAL SLEEP APNEA DUE TO CHIARI ONE MALFORMATION IN A CHILD

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Introduction: Chiari malformation (CM) type I can cause obstructive sleep apnea (OSA) and central sleep apnea (CSA) as a result of brainstem compression affecting control of breathing and airway muscle tone. Surgical decompression may improve both OSA and CSA. We report a child with CSA due to CM type I resolve without surgical decompression.
Report of case: A 5-year-old boy presented to sleep medicine clinic with known CM type 1 witnessed silent pauses in breathing, excessive daytime sleepiness and unusual movements during sleep. Polysomnography demonstrated severe CSA (central apnea hypopnea index [AHI] 29.7), and REM sleep without atonia. The patient was initiated on Bilevel Positive Airway Pressure therapy Spontaneous Timed mode (BPAP-ST) as well as a trial of acetazolamide 250 mg nightly which was subsequently discontinued as patient was adherent to BPAP-ST. He was compliant with BPAP-ST therapy nightly with residual AHI < 5 and greatly improved daytime sleepiness. Brain magnetic resonance imaging showed low lying and elongated cerebellar tonsils with adequate cerebral spinal fluid (CSF) flow. No surgical intervention beyond monitoring was performed due to adequate CSF flow. Five years later, repeat polysomnography after holding BPAP-ST showed complete resolution of CSA and no evidence of REM sleep without atonia. Based on study results, BPAP-ST was discontinued. Six months after discontinuation of BPAP-ST, patient reports doing well without excessive daytime sleepiness or other sleep-related symptoms.
Conclusion: CM is a known cause of both CSA and OSA (as well as REM sleep without atonia) in children and adults which can be effectively managed by positive airway pressure therapy or surgical decompression. In adults, resolution of CM type 1 is exceedingly rare. However, children have been reported to have spontaneous resolution of CM type 1. This is believed to occur due to increased posterior fossa volume with growth allowing for ascent of the cerebellar tonsils. Given this, use of positive airway pressure therapy for sleep apnea and watchful waiting rather than surgical decompression may be an appropriate treatment option in selected cases.
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1428
LESS IS MORE: REDUCING VOLTAGE TO MANAGE A CASE OF PERSISTENT TECSA IN INSPIRE

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Introduction: Treatment emergent central sleep apnea (TECSA) is a rare event when managing obstructive sleep apnea (OSA) with non-PAP therapies including hypoglossal nerve stimulation (HNS), occurring < 4% of cases. The proposed mechanism for TECSA in HNS therapy is thought to be due to increased airway patency which unmasks high chemosensitivity and leads to a "loop gain" phenomenon. While case reports of TECSA in HNS are reported, the optimal treatment strategy for this remains unknown. We present a case in which awake endoscopy was used to optimize voltage settings, leading to symptomatic improvement in a patient with persistent TECSA in HSN therapy.
Report of case: A 58 year-old female with severe OSA (REI 40/h on HST) and PAP intolerance presented to sleep clinic for

management of Inspire following implantation. Initial PSG titration showed a significant reduction in AHI to 3/h at 2.4V. After slow outpatient titration to 2.4V, the patient experienced mild improvement in daytime sleepiness but was found to have continued nocturnal desaturations on oximetry testing, spending 49 minutes < 88% SpO2. Repeat HST showed an REI of 35/h on therapy and a subsequent PSG titration demonstrated high baseline CAI of 60/h, with best results at 2.3V (AHI 13/h; 4 central apneas, 5 obstructive hypopneas) when titrated between 2.2-2.6V. Higher voltages had more events. TTE and MRI brain were unremarkable, and patient denied any opioid use. Due to continued sleep fragmentation, daytime sleepiness, and persistent nocturnal hypoxia, the patient was referred to ENT to evaluate device efficacy. ENT performed an awake endoscopy and found that 1.9V on +-+ configuration had good opening with less inspiratory effort compared to voltages of 2.1V and above. The patient has since experienced significant improvement in sleep quality and daytime sleepiness at 1.9V, currently pending a repeat PSG titration study to ensure efficacy.

Conclusion: While TECSA in HNS therapy has been described, its true prevalence and pathophysiology remains incompletely understood. Some proposed mechanisms include increased airway patency leading to loop gain phenomenon and overstimulation resulting in arousal-induced excessive ventilation. One hypothesized treatment strategy includes a reduction in stimulator voltage, which resulted in symptomatic improvement in this case.

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1429

ASSESSING THE NEURODEGENERATIVE PROGRESSION OF REM BEHAVIOR DISORDER AND TRAUMA ASSOCIATED SLEEP DISORDER WITH CUTANEOUS ALPHA-SYNUCLEIN TESTING

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Introduction: Isolated rapid-eye-movement sleep behavior disorder (iRBD) is one of the earliest and most specific prodromal signs of α-synuclein driven neurodegenerative disease including Parkinson's disease, dementia with Lewy bodies, and multiple system atrophy. Trauma Associated Sleep Disorder (TASD) overlaps significantly with iRBD, with features of both dream enactment and REM without atonia; however, it remains unclear if TASD also represents a prodromal neurodegenerative disease. Cutaneous phosphorylated alpha-synuclein (P-Syn) is a sensitive and specific biomarker of α-synuclein; however, rates of P-Syn positive in TSAD are unknown.

Report of case: A 35-year-old man with medical history of major depressive disorder and post-traumatic stress disorder was referred for the evaluation of sleep violence and dream enactment. He reported weekly nightmares with dream enactment that have been persistent for a few years. Most of these actions were typically in response to nightmares related to his time in Afghanistan. He denied other prodromal symptoms including hyposmia, cognitive impairment, or autonomic dysfunction. Video polysomnogram confirmed the presence of REM without atonia. Autonomic testing including measures of sudomotor, cardiovagal, and sympathetic adrenergic function was normal. Skin biopsy was performed at the C7 paraspinal area, proximal and distal leg and processed for immunohistochemical analysis of P-Syn. All sites were normal without denervation of P-syn deposition.

Conclusion: A diagnosis of RBD or TASD can be distressing for patients due to the risk of progression to a debilitating neurocognitive disorder. This case illustrates the utility of synuclein testing in further distinguishing RBD and TASD. Skin biopsies are usually well-tolerated by patients and can offer an objective approach to characterizing disease severity and progression. Further studies are needed in larger cohorts to confirm absence of P-Syn in TASD.

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1430

RECURRENT EARLY-MORNING SYNCOPE: A CASE OF VASOVAGAL SLEEP SYNCOPE WITH TEMPORAL SLEEP-WAKE DEPENDENCY

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Introduction: Vasovagal sleep syncope (VVSS) is a rare condition characterized by transient loss of consciousness (LOC) shortly after awakening, often while supine or during early morning hours. We present a case of a woman with recurrent early-morning syncopal episodes emerging during early-morning wake times in the setting of sleep restriction and forced awakening.

Report of case: A 22-year-old female presented with an 8-year history of recurrent LOC emerging exclusively during early-morning awakening in association with early AM awakenings for a new job. These paroxysmal episodes are consistently preceded by prodromal symptoms of dizziness, nausea, pallor, diaphoresis, and an impending sense of doom lasting up to 2 minutes. There was no history of convulsions, tongue biting, or incontinence. Coinciding with these spells, the patient reports sleep inertia and a "drunken-like" state without any residual neurologic sequelae. Previous electroencephalograms and neuroimaging were normal. Tilt table and orthostatic testing did not reveal orthostatic changes. Diagnostic polysomnography with forced awakening during early AM slow-wave sleep depicted tachycardia up to 110 beats per minute with mild bradycardia down to 50 beats per minute upon standing, indicative of vasovagal reflex cascade. Episodes discontinued upon resumption of normal sleep-wake patters.

Conclusion: This case illustrates the important inclusion of VVSS in the differential diagnosis of complex nocturnal behaviors emerging in the early AM during SWS. Early recognition and tailored interventions to avoid sleep restriction are essential to improving quality of life and functional outcomes.

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1431

ELEVATED CENTRAL VENOUS PRESSURES MAY INCREASE RISK FOR UPPER AIRWAY RESISTANCE SYNDROMES IN PATIENTS WITH CARDIAC SINGLE VENTRICLE PHYSIOLOGY

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Introduction: Patients with cardiac single ventricle physiology undergo multi-staged palliative surgeries culminating in

the Fontan procedure. These patients are at increased risk for obstructive sleep apnea, but the etiology of this is not well understood. Here, we highlight a case showing how increased central venous pressures may contribute to upper airway resistance, therefore increasing the risk for obstructive sleep-disordered breathing.
Report of case: The patient was a female child with cardiac single ventricle physiology consisting of a double outlet right ventricle with mitral valve atresia. She underwent initial palliative surgery within her first month of life followed by a bidirectional Glenn at nine months of age. Her oxygen saturations after this surgery were appropriately in the 80s-90s in room air. She was followed by the sleep medicine service and underwent two polysomnograms 19 months apart due to gasping at night and restlessness. Both showed average oxygen saturations in the 80s-90s. The obstructive apnea hypopnea indices (AHI) were 0.2-2.6/hour. Snore indices were 15.8-17.7/hour. Echocardiograms and cardiac catheterizations within six months of each study showed mildly depressed systemic ventricular function, no evidence of pulmonary hypertension (PH), and stable superior vena cava (SVC) pressures of 12 mmHg. The patient underwent Fontan completion at 5 years of age. A cardiac catheterization shortly after her procedure which showed an increase in SVC pressure to 18 mmHg. There was still no evidence of PH. Echocardiograms before and after her cardiac catheterization, as well as two months following surgical intervention showed mild-moderately depressed right ventricular function. A repeat polysomnography five months post-Fontan procedure showed a stable AHI (1.6/hour), but snoring index was increased to 51.0/hour suggesting increased upper airway resistance.
Conclusion: This is the first case report highlighting serial changes in central venous pressures evaluated by cardiac catheterization with associated changes in polysomnography findings. A mechanism of elevated central venous pressures leading to tonsillar and/or adenoid edema could increase the risk for upper airway resistance syndromes in this population.
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1432

A CASE OF BREAKTHROUGH SLEEPINESS ON SODIUM OXYBATE WITH EXCESSIVE SLOW WAVE SLEEP

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Introduction: Sodium oxybate is commonly used in disorders of hypersomnia to decrease excessive daytime sleepiness and decrease disrupted sleep. The medication acts by increasing slow wave sleep through agonizing GABA-B receptors. Dosage optimization is done incrementally and based on subjective improvement in excessive sleepiness.
Report of case: Here we present a 48 year old female with a history of obstructive sleep apnea on PAP therapy and Narcolepsy Type II-Idiopathic hypersomnia spectrum. She presents with breakthrough sleepiness with an ESS of 12 after initially improving with Sodium Oxybate. She was titrated to the maximal total dose of 9 mg without improvement. Repeat polysomnogram with the sodium oxybate showed adequate treatment with PAP therapy with a residual AHI of 2.8. Her study revealed appropriate sleep efficiency, however she had a significant increase of N3 sleep of 62% without REM sleep. She had 425 minutes of sleep time and sleep efficiency of 91%. MSLT demonstrated decreased MSL of 7.6 minutes with no SOREMs which was now most consistent with Idiopathic hypersomnia. For further evaluation a MWT was performed which showed MSL of 36 minutes without evidence of SOREMs. Her UDS was negative. Other medical causes for hypersomnia ruled out and no other medications suggest alternative reasons for breakthrough sleepiness. Patient is planned to be counseled on starting therapy with a wake promoting agent pitosant therapy during her follow up visit.
Conclusion: The optimal treatment of idiopathic hypersomnia is still unclear and current guidelines are based on studies for narcolepsy. While sodium oxybate can be used as a first line agent in narcolepsy, it only has a conditional recommendation for idiopathic hypersomnia and is usually used when there is treatment failure with wake promoting agents. Although there is known increased N3 with sodium oxybate, there is little evidence regarding the optimal amount of stage 3 sleep to improve excessive sleepiness. Additionally, could there be a threshold where an excessive amount of slow wave sleep contributes to worsening sleepiness, possibly by increasing sleep inertia. Titration guided by polysomnogram could give further insight to optimal doses of sodium oxybate and slow wave sleep.
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1433

PARADOXICAL INSOMNIA, VISUAL SNOW SYNDROME, AND OZONE TOXICITY: HOW ARE THEY CONNECTED?

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Introduction: Paradoxical insomnia is insomnia disproportional to the presence of objective sleep disturbance or daytime impairment. Hypervigilance occurs while patient is trying to sleep, suggesting paradoxical insomnia has a hyperarousal component, and there may be physiological or perceptual deficits that affect sleep/wake discrimination causing sleep time underestimation. Visual snow is a recently identified neurologic condition consisting of a constant visual disturbance described as multiple dots over the entire visual field. Visual snow syndrome occurs when, in addition to visual static, patients also report palinopsia, entoptic phenomena, photophobia, and nyctalopia. With pollutant ozone toxicity, well-established evidence has been produced for short-term effects, especially on respiratory and cardiovascular systems. Unfortunately, ozone therapy has mostly been studied in the setting of environmental exposures, less so in alternative medicine settings.
Report of case: 41 year old female with history of anxiety, depression, visual snow syndrome, and recent ozone toxicity presented to hospital for pain, vision changes, weakness, and insomnia. Two months before presentation, patient was receiving IV ozone therapy repeatedly that led to suspected ozone toxicity. Days later, patient was diagnosed with visual snow syndrome by neuro-optometrist. Lack of sleep for the following two months prompted hospital presentation. Patient described inability to sleep, but explained entering a "twilight state" where she dreamed, but could hear her surroundings. 24 hour EEG confirmed patient was sleeping and ruled out nocturnal seizures. Free radical damage from ozone toxicity could lead to thalamic injury, but none was seen on functional MRI. With normal testing/imaging and based on descriptions of this "twilight" state, her symptoms were consistent

with paradoxical insomnia, so she was discharged from hospital on Valium 5mg TID, Ambien 20mg nightly, and Lyrica 125mg nightly – despite these medications, she reported she was still unable to sleep. In outpatient follow up, she had a normal polysomnogram and actigraphy consistent with paradoxical insomnia. Over the next few months, medications were weaned, and patient was treated for paradoxical insomnia.
Conclusion: This case portrays multiple rare diagnoses in one patient with a relatively common sleep diagnosis. It also highlights the role polypharmacy plays in treatment for neurological and psychiatric complaints.
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1434

AVOIDING THE 2 FOR 1: CHALLENGES IN RISK-ASSESSMENT OF POST-PROCEDURE EXTUBATION FAILURE IN NEUROMUSCULAR DISORDERS

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Introduction: Patients with neuromuscular disorders who require mechanical ventilation support for elective procedures face numerous barriers to ventilator liberation, particularly for patients already on non-invasive ventilation (NiV). Preoperative risk stratification is additionally challenging for providers given the absence of perioperative guidelines, thus leading to wide variability in procedural approaches and outcomes.
Report of case: A 53-year-old man with amyotrophic lateral sclerosis (ALS) presented with worsened dysphagia and orthopnea. Due to discomfort, he had been inconsistently using his full-face mask NiV device. His significant secretion burden was managed with nebulizer treatments and a chest wall oscillation vest. His pulmonary function tests showed a FEV1 2.06L (60% predicted), FVC 2.54L (58% predicted), and total lung capacity 3.46L (53% predicted). Given his worsening dysphagia and following multidisciplinary discussions involving pulmonology, neurology, and gastroenterology, he elected for percutaneous endoscopic gastronomy (PEG) placement. There were no intraoperative complications. However, copious secretions and profound muscular weakness prevented ventilator liberation, leading to tracheostomy placement. He subsequently developed pneumonia which further limited ventilator weaning. Given his previously expressed wishes to avoid long-term ventilator dependence, he elected to transition to comfort-focused measures.
Conclusion: Although less than 10% of patients with ALS receive tracheostomies, PEG placement is more common. Preoperative assessment and optimization is therefore crucial, particularly in assessing the likelihood of post-procedural extubation when intubation and sedation is necessary. Current ALS guidelines recommend PEG placement when the FVC is greater than 50%. Despite this patient meeting this threshold, he was unsuccessfully weaned from mechanical ventilatory support. Additional patient characteristics such as secretion burden, nutritional status, and comorbid conditions are likely important considerations, but difficult to quantify. There is emerging evidence for PEG placement in ALS patients under moderate sedation while continuing NiV. However, given the lack of consensus guidelines for preoperative risk stratification for this patient cohort, it is unknown which patients would benefit from these advanced approaches. This is of particular relevance to our safety-net hospital system where such procedures are not widely available. Therefore, additional metrics are undoubtedly warranted to improve preoperative optimization such that patients can make well-informed decisions, since tracheostomies have significant impacts on quality of life and caregiver burden.
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1435

DEVICE MALFUNCTION IN HYPOGLOSSAL NERVE STIMULATION (HGNS) FOR SEVERE OBSTRUCTIVE SLEEP APNEA (OSA)

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Introduction: HGNS is a well-established treatment for OSA in patients intolerant to CPAP therapy. However, device-related technical issues can hinder therapy efficacy. This case highlights challenges in managing severe OSA with a malfunctioning HGNS device.
Report of case: A 65-year-old male with severe OSA (home sleep test, AHI 92.6/h, entirely supine, O_2 nadir 75%) underwent HGNS implantation due to CPAP intolerance. Programming during activation identified 1.3V as tolerable, but the patient could not advance beyond this due to discomfort, resulting in minimal improvement in his symptoms. Awake endoscopy showed the initial configuration A(+/-/+) achieved excellent airway opening at 1.7V. Adjustments to pulse width and rate improved tolerance, allowing him to increase the amplitude to 1.9V. Despite these adjustments, HGNS titration study failed to identify a therapeutic amplitude. The expected device artifact was intermittently absent on PSG, and the patient reported no sensation of therapy while supine. Subsequent interrogation revealed abnormal impedance with concerns about signal transmission from implantable pulse generator (IPG) to center electrode. This issue, termed "connection issue" by the manufacturer, likely originated at the IPG level and caused intermittent functionality of the center electrode at the cuff. To address this, the electrode configuration was adjusted to C(-/o/-), turning off the center electrode. A follow-up PSG demonstrated consistent device artifact and patient reported feeling the device at all times. The study also revealed a significant positional component to his OSA which was not previously known and HGNS was effective only in the non-supine position. The patient was advised to use combination therapy with positional therapy and gradual device up-titration. If this approach fails, IPG replacement may be required to enable alternative configurations.
Conclusion: This case demonstrates how HGNS device malfunction can hinder therapy optimization and highlights the importance of identifying absent device artifacts on PSG. Although rare, device malfunction can result in poor outcomes and reduced tolerance. Comprehensive evaluations including close follow-up, awake endoscopy, and engineering diagnostics enabled bypass of the device malfunction. In case of persistent positional sleep apnea, combination therapy may be necessary. These findings underscore the value of individualized and multidisciplinary care in overcoming technical challenges in HGNS therapy.
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1436

TRAUMATIC BRAIN INJURY-INDUCED TRANSIENT REM SLEEP BEHAVIOR DISORDER IN A VETERAN WITH OBSTRUCTIVE SLEEP APNEA AND POST-TRAUMATIC STRESS DISORDER

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Introduction: REM behavior disorder (RBD) is a condition in which affected individuals have dream enactment behaviors. These behaviors are often associated with nightmares and can result in injury to self or bed partner. RBD is known to have an intricate association with other sleep disorders, psychiatric conditions, and neurodegenerative diseases.
Report of case: We describe a case of transient RBD following a traumatic brain injury (TBI) in a 31-year-old male veteran with a history of post-traumatic stress disorder (PTSD) and obstructive sleep apnea (OSA). He was initially diagnosed with OSA in 2014 but was unable to tolerate positive airway pressure (PAP) therapy at the time. Shortly after the patient sustained a TBI in early 2015 he began experiencing episodes of sleep-walking and dream enactment behaviors, consistent with RBD. These symptoms persisted for several months but resolved spontaneously within one year with no recurrence of symptoms to date. The patient presented to our sleep center to establish care in 2024 with complaints of worsening snoring, excessive daytime hypersomnia, and occasional nightmares. The re-evaluation revealed progression of his OSA in the setting of an increase in body mass and age. However, the progression of his OSA was not associated with a reemergence of the parasomnia behaviors that initially followed his TBI.
Conclusion: This case highlights the complex relationship between TBI, RBD, PTSD, and OSA. Although RBD is typically associated with neurodegenerative diseases, its transient presentation following TBI suggests a distinct etiology separate from idiopathic or neurodegenerative RBD. A multidisciplinary approach and close follow-up is needed in such cases, especially in the veteran population that faces a complex interplay of mental health conditions and sleep disorders. Additional research is needed to clarify the mechanisms linking TBI to transient-RBD and its interactions with PTSD and OSA. This case adds to growing evidence connecting TBI with sleep disturbances and psychiatric comorbidities, further reinforcing the importance of early diagnosis and holistic management for affected patients.
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1437

A CASE OF MERCURY POISONING AND SLEEP DISTURBANCES

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Introduction: A 16-year-old male with no chronic health issues presented with snoring, witnessed apnea, excessive daytime sleepiness, and nighttime leg discomfort. For seven months, he frequently fell asleep during the day but he was able to maintain energy for daily activities. He also felt an urge to move his legs at night for relief. His sleep schedule was from 8:30 PM to 5:30 AM in his own dark, quiet room. His mother noted episodes of sleep talking, screaming, and unusual hand movements during sleep, but denied signs of sleep paralysis, cataplexy, or hallucinations. The patient has never had a prior sleep study. Polysomnography revealed mild obstructive sleep apnea without recorded parasomnias.
Report of case: Additional symptoms included muscle weakness, sweating, watery diarrhea, a 30-pound weight loss, and a rash on his arms and abdomen. Two months after his symptoms began, his brother developed similar symptoms. Subsequent testing showed elevated serum and urine mercury levels. Further investigation revealed that nine months prior, the patient had received a plastic vial containing an unidentified metallic liquid from a classmate, which could have led to exposure through direct contact with spillage and aerosolization from carpet vacuuming. Following chelation therapy, their mercury levels decreased with improvement of daytime sleepiness and other symptoms.
Conclusion: Mercury is a neurotoxin that can affect sleep. Autopsy findings from workers exposed to elemental mercury show its accumulation in the pineal gland (Parmalee, 2017). In Thailand, adults in E-waste facilities with an average urinary mercury level of 19.0 µg/g reported more insomnia symptoms compared to unexposed workers (Derachat, 2018). Reports of high mercury exposure in adults and children through accidental poisoning or gold mining documented sleep complaints including fatigue, excessive sleepiness, and sleep disturbances (Bose-O'Reilly, 2016; Do, 2017; Kasznia-Kocot 2010). Mercury exists in elemental, inorganic, and organic forms, all of which can be toxic to the nervous system. Diagnosis is confirmed by measuring mercury levels in blood or 24-hour urine, with urine testing preferred for suspected chronic exposure. Those affected by mercury toxicity should be immediately removed from exposure sources, and most neurotoxic effects resolve after chelation therapy and cessation of exposure.
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1438

PARADOXICAL EPIGLOTTIC MOTION IN THE EVALUATION FOR HYPOGLOSSAL NERVE STIMULATION

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Introduction: Hypoglossal nerve stimulation (HNS) has become an increasingly popular option for the treatment of select patients with obstructive sleep apnea (OSA) intolerant to positive airway pressure (PAP) therapy. Eligibility for HNS requires a thorough evaluation, including drug-induced sleep endoscopy (DISE), to determine the pattern of upper airway collapse. Epiglottic obstruction, especially paradoxical movement during tongue protrusion, poses a unique challenge when evaluating candidacy for HNS.
Report of case: A 69-year-old male with a history of hypertension, gastroesophageal reflux disease, interstitial lung disease, type 2 diabetes mellitus, and migraines presented with persistent OSA symptoms, including sleep fragmentation and morning headaches. Diagnosed with moderate OSA 9 years earlier, he was intolerant to PAP therapy and failed a mandibular advancement device (MAD) due to dentition issues. A repeat polysomnogram confirmed moderate OSA with an apnea-hypopnea index of 15 and oxygen saturation nadir of 78%. Considering alternatives to PAP, he underwent DISE to assess candidacy for HNS. DISE revealed no concentric velopharyngeal collapse but

demonstrated paradoxical epiglottic obstruction that worsened with tongue protrusion and partial jaw thrust. Improvement was noted only with maximal jaw thrust. Based on these findings, HNS was not recommended to the patient, who was advised to reattempt MAD therapy and consider hyoid suspension surgery.
Conclusion: This case highlights the importance of individualized assessment in OSA management. During DISE, attention should be paid to findings beyond pattern of velopharyngeal collapse. DISE findings of paradoxical epiglottic obstruction may reduce HNS efficacy, as suggested in prior literature.
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1439

OBSTRUCTIVE SLEEP APNEA AND ORTHOSTATIC HYPOTENSION: AN UNCONVENTIONAL ASSOCIATION

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Introduction: Although Obstructive Sleep Apnea (OSA) has a commonly recognized association with hypertension, it is not often thought of as causing or exacerbating hypotension, specifically orthostatic hypotension. Here we present the unusual case of a patient with a long history of OSA and good compliance with Auto-PAP therapy, whom after temporarily going without PAP therapy due to parts malfunction, developed progressively worsening orthostatic symptoms ultimately necessitating inpatient admission and remedied after restoration of PAP therapy.
Report of case: 61yo M with PMHx known OSA, mild traumatic brain injury, Pulmonary embolism, Paroxysmal Atrial Fibrillation s/p ablation and hypothyroidism who presented to the Emergency Department at his primary care physician's recommendation due to progressively worsening BP at home with systolic blood pressures as low as 80s as well as dizziness upon standing. The symptoms started 3 weeks after he reported difficulty using his Auto-PAP due to improper fit of a new mask. He was given IV fluids in the Emergency Department which did not alleviate his symptoms. Adrenal insufficiency workup was also negative. Interestingly, once he was loaned an Auto-PAP, his symptoms improved, and he was discharged shortly thereafter. The appropriate adjustments were made to his home device, and his symptoms have not recurred since.
Conclusion: In this unique case, the patient developed symptoms consistent with orthostatic hypotension after discontinuing PAP therapy, and his symptoms resolved after restoration of appropriate PAP therapy. This uncommon observation raises an intriguing thought regarding our current understanding of blood pressure control and its relationship with untreated OSA. Although the mechanisms between OSA and hypertension are well established, we propose that the orthostatic hypotension observed in this case is due to baroreceptor dysregulation as well as increased Atrial Natriuretic Peptide (ANP) release causing a relative hypovolemia.
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1440

FRACTURED SLEEP: SERIOUS INJURY UNCOVERS A CHALLENGING CASE OF ABNORMAL MOVEMENTS IN SLEEP

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Introduction: Disorders of arousal (DoA) and sleep-related hypermotor epilepsy (SHE) are difficult to distinguish. Both involve abnormal movements in sleep that may lead to serious harm to the patient or others. We present a case of abnormal movements in sleep leading to serious injury and discuss diagnostic features of SHE.
Report of case: The patient is a 48-year-old male with severe OSA on CPAP. He presented after multiple falls from bed. One fall resulted in a right tibial-fibular fracture requiring surgical fixation. He described five to ten episodes of nightly rhythmic limb movements leading to falls out of bed. The episodes occurred in the first half of the night. After an event, he would experience full awakening with preserved memory of rhythmic body movements leading to fall. Events were not dream related and devoid of sleepwalking, sex-related behavior, or sleep eating. Comprehensive physical and neurologic exam was only notable for ecchymoses on the right forearm. In-lab polysomnography on CPAP showed successful control of OSA and simultaneously captured eight episodes of abrupt onset stereotyped motor activity arising out of N3 sleep. These 30-90 second episodes included rhythmic arm flapping, head bobbing and synchronized leg movements. EEG during episodes was obscured by muscle artifact. EEG following episodes showed wake rhythm. There were no epileptiform discharges, hypersynchronous activity or build up to the episodes. The patient was treated with one milligram of oral clonazepam nightly and the episodes improved. He has had no falls out of bed or injuries since starting medication.
Conclusion: Distinguishing SHE from DoA is challenging. EEG abnormalities are not found in the majority of cases of SHE and more than half of patients are reported to have a normal scalp EEG. This patient had stereotyped movements captured on video with no epileptiform discharges on EEG. Unrecognized and untreated SHE may lead to serious injury. Diagnostic and confidence level criteria have been described by Tinipur et al. to support this important diagnosis in the absence of EEG-confirmed epileptiform activity. Video recording of episodes is a critical contributor to accurate diagnostic assessment of patients with abnormal movements in sleep.
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1441

SEVERE SLEEP ONSET CENTRAL APNEAS IN A YOUNG FEMALE WITH SEIZURE DISORDER AND ARNOLD CHIARI MALFORMATION POST-DECOMPRESSION

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Introduction: This case highlights the challenges towards treating a patient with isolated sleep-onset central apnea. I present a challenging case of a young female with a sleep-onset central sleep apnea treated with a conservative management approach leading to significant improvement.
Report of case: A 30-year-old female with a medical history of cognitive delay, Lennox-Gastaut with intractable seizures, and Arnold Chiari malformation status post-decompression (10 years prior) was referred for evaluation due to episodes of apnea observed by her mother. She notably had her clonazepam discontinued a few months prior to this presentation. During these events, she experienced oxygen desaturations to the 60s lasting up

to 2–3 minutes. Labs suggest a chronic hypocapnic state at baseline. Polysomnography revealed isolated severe sleep-onset central apneas without significant sleep-disordered breathing during the rest of the night. Total apnea-hypopnea index (AHI) was minimal, but the severity of apneic-episodes during sleep onset warranted immediate attention. Continuous EEG was unremarkable. BiPAP ST and ASV were considered but given her developmental delay and risk of worsening apneic episodes this was deferred. The patient was started on low-dose clonazepam and empiric oxygen therapy at 2 liters/min, resulting in significant improvement of central sleep apnea events. No further apneas have occurred.
Conclusion: The onset of sleep causes ventilatory instability with transition from alpha to theta activity. During this transitory state, wakeful CO2 eupnea converges with the emerging CO2 apnea threshold of sleep which predisposes to apneic episodes. Although normal in healthy individuals, various predisposing factors such as a low CO_2 reserve, heightened chemoreceptor sensitivity, or increased loop gain can significantly increase the risk and magnitude of these central apneic events. The challenge in this case was in limiting excessive ventilation with the use of potentially deleterious non-invasive ventilation while maintaining her drive to breath. Our intervention targeted normalizing her baseline hypocapnia with pharmacotherapy and supplemental oxygen which improved her symptoms thereafter on follow-up visits, avoiding the need for intermittent non-invasive ventilation.
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1442

THE VALUE OF SMART SECURITY CAMERAS IN DIAGNOSTIC EVALUATION OF COMPLEX NOCTURNAL BEHAVIORS

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Introduction: Sleep clinicians regularly encounter patients who present with complex nocturnal behaviors (CNB) where differentiating sleep-related epilepsy (SRE) from parasomnias is critical for management and prognosis. Sleep terrors (ST) arise from non-REM sleep and are generally self-limited, while SRE may require detailed neurologic workup and, in some cases, long-term antiepileptic treatment. We present a patient who presented with abnormal arousals at night, initially diagnosed as ST where video footage from a Smart Security Camera (SSC) prompted long-term video-electroencephalographic monitoring (LTVEM), which confirmed the presence of SRE.
Report of case: A 14-year-old male presented with abnormal nocturnal behaviors consisting of abrupt awakening in the first half of the night with screaming, agitated demeanor, followed by confusion and amnesia. Outpatient video electroencephalogram (EEG) during the day was normal. Nocturnal polysomnography utilizing expanded electromyographic montage did not support the presence of sleep apnea (AHI, RDI =0, SaO2 nadir =95%). Two nocturnal events were recorded, both emerging from NREM sleep with confusion, but the limited four-channel electroencephalogram (EEG) did not reveal any ictal activity. Sleep extension and scheduled awakening intervention were employed over the next month but did not resolve the episodes, which occurred nightly at a frequency of 3-4 episodes per night. The patient's parents resorted to placement of SSC over the child's bed. Video footage capturing five days of data revealed (1) abrupt awakenings with stereotyped agitation, screaming, and repetitive bicycling and (2) quiet confusion and searching behavior.. The unusual frequency and stereotyped semiology of the events raised suspicion for nocturnal seizures, and the patient was admitted for LTVEM. On the first day of admission, he presented with vigorous hyperkinetic spells, and the EEG captured interictal epileptiform discharge emerging from the mesial frontal lobe. Subsequent management with Levetiracetam resolved the episodes.
Conclusion: This case highlights the potential diagnostic value of SSC as the video footage was instrumental in corroborating the presence of frequent CMN with stereotypic semiology in a patient presumed to have ST, prompting LTVEM and confirming the SRE. Home SSC is a low-cost but high-value tool that may identify patients who may benefit from LTVE in the evaluation of CNB.
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1443

FROM PERITONEAL DIALYSIS TO TRANSPLANT: INSIGHTS INTO RESOLVING RESTLESS LEG SYNDROME IN END-STAGE RENAL DISEASE

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Introduction: In end-stage renal disease (ESRD), the sensory symptoms and motor signs of restless legs syndrome (RLS), including periodic limb movements of sleep (PLMs), are twice as common, severely disabling, and often resistant to standard treatments like dopaminergics and gabapentinoids. While renal transplantation can lead to remission, significant morbidity often occurs due to delays inherent in the matching versus queue system, and the recognition and treatment of RLS/PLMs in ESRD remains challenging. We report a case of RLS/PLMs where worsening symptoms in ESRD caused substantial morbidity. This highlights the clinical need for enhanced recognition and treatments in the form of a non-traditional opioid – namely, buprenorphine, which exhibited remarkable efficacy, safety, and absence of tolerance.
Report of case: A 33-year-old man with familial RLS since his early twenties, presented in 2020 with severe RLS (IRLSSG rating scale of severity of 33/40; insomnia severity index of 28/28; and Epworth Sleepiness Scale of 18)), months after starting PD for ESRD due to IgA nephropathy. Five nights of ambulatory, triaxial accelerometry (PAM-RL) showed a PLM index of 49.9 events per hour, 70.4 minutes of time "up" nightly, and an estimated total sleep time of 5 hours and 55 minutes. After initiating buprenorphine, the PAM-RL index rose to 59.52 events per hour; however, his time "up" decreased to 3.8 minutes, total sleep time increased to 7 hours and 50 minutes, and his IRLSSG score improved to 20/40. Following a kidney transplant in 2022, his symptoms showed further improvement, enabling a reduction in his buprenorphine dosage to 0.5 mg per day.
Conclusion: Opioids are utilized for refractory RLS, but are often approached with caution. Buprenorphine, a DEA Schedule III partial μ-opioid receptor agonist, should be considered for use as it offers several advantages over Schedule II opioids for the treatment of RLS. These include: (a) a longer half-life, (b) liver-based rather than renal elimination, (c) a lower risk of respiratory depression, (d) reduced abuse potential—particularly relevant as the patient had a history of opioid misuse following a rugby injury—and (e) a minimal risk of tolerance (based on personal observations).
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1444

HIGH-ALTITUDE PERIODIC BREATHING: DIAGNOSTIC AND MANAGEMENT CHALLENGES

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Introduction: High-altitude periodic breathing (HAPB) is characterized by alternating cycles of central apnea and hyperpnea driven by hypoxia and ventilatory instability at high altitudes. These fluctuations can fragment sleep, causing frequent nocturnal awakenings, excessive daytime fatigue, and impaired cognitive function. Moreover, hypoxia and oxygen desaturation associated with HAPB may exacerbate pre-existing medical conditions, such as cardiovascular or pulmonary diseases, posing further risks to a patient's health.

Report of case: A 55-year-old male with a history of interstitial lung disease, bilateral lung transplant, and obstructive sleep apnea (OSA) on continuous positive airway pressure (CPAP) therapy presented for follow-up evaluation of OSA. He reported location-dependent symptoms, including unrefreshing sleep and morning fatigue when visiting Pinetop, Arizona (7,000 ft elevation), compared to feeling well-rested in Tucson (2,400 ft elevation). A recent titration study conducted in Tucson in August 2023 demonstrated that CPAP therapy at a pressure of 15 cm H_2O effectively reduced his respiratory index to 3.4 events per hour. However, a review of his PAP data revealed residual apnea-hypopnea indices (AHIs) consistently exceeding 10 events per hour during stays in Pinetop, peaking at 42 events per hour, with most events classified as central apneas. By contrast, his AHI in Tucson consistently remained below 5 events per hour. The significant increase in AHI and symptoms at high altitude were attributed to HAPB. Without a detailed travel history, this diagnosis could have been overlooked since the overall AHI was 5. A titration polysomnography (PSG) at high altitude was recommended to reassess and tailor his management strategy.

Conclusion: This case underscores the need to recognize high-altitude periodic breathing (HAPB) as a potential cause of sleep-disordered breathing, particularly in patients with complex medical histories. The patient's dramatic differences in AHI and symptoms based on altitude highlight the importance of obtaining a thorough travel history to ensure accurate diagnosis and management. Treatment options for HAPB include descent to lower altitudes, supplemental oxygen, positive airway pressure therapy, and pharmacologic interventions such as acetazolamide. Among these, descent is the most effective, as it directly addresses the underlying hypoxia. Supplemental oxygen can also alleviate hypoxia and stabilize ventilatory patterns, improving sleep quality and reducing fatigue.

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1445

TREATMENT EMERGENT NIGHTMARES IN OBSTRUCTIVE SLEEP APNEA

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Introduction: Nightmares have been well documented in untreated obstructive sleep apnea (OSA) since the 19th century. Early researchers found that blocking the nose and mouth with a cloth induced nightmares and hypothesized that recurrent oxygen desaturation prompted nightmares. Previous studies have demonstrated a reduction in nightmares with positive airway pressure (PAP) therapy. We present a case in which PAP therapy worsens nightmares.

Report of case: A 70 year old male veteran with severe OSA presents to establish care with the Veteran's Administration sleep clinic. He was previously prescribed auto-adjusting continuous positive airway pressure (APAP), but despite several attempts at desensitization he stopped using it. The patient states the primary barrier has been new onset severe nightmares with APAP therapy. He did not have consistent dream content themes, but reports that when he awakens he feels like he is suffocating. The patient did not have issues with any nightmares prior to APAP initiation. He has no previous diagnosis of post-traumatic stress disorder nor other psychologic comorbidities. On review of his APAP compliance data, the patient attempted to use APAP for over two months. He had high leak and residual apnea hypopnea index 17.6/hr with central index 1.3/hr, obstructive index 4.5/hr, and unknown index 11.1/hr. He is pending a repeat split polysomnogram with PAP titration.

Conclusion: This patient demonstrates an unexpected response to PAP therapy—new onset severe and recurrent nightmares. Previous studies have demonstrated improvement in nightmares with treatment of OSA, so his response is uncommon. The mechanism of this is unclear. Patients with higher AHI typically have lower nightmare recall than more mild forms of OSA, likely due to decreased REM sleep. We suspect that the patient has an unfortunate combination of partially treated OSA, where he has both increased REM sleep and ongoing frequent arousals due to high leak and high residual AHI. We will determine whether this patient continues to have this side effect when his PAP is optimized.

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1446

"STIMULATION ARTIFACT" AS A CLINICAL SURROGATE FOR HYPOGLOSSAL NERVE STIMULATOR ACTIVATION: A CASE REPORT

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Introduction: Hypoglossal nerve stimulation (HGNS) is an effective second-line therapy for obstructive sleep apnea (OSA) in patients intolerant to continuous positive airway pressure (CPAP). Polysomnography (PSG) is a critical tool for titration and optimization of HGNS settings. However, there is limited understanding of the "stimulation artifact," visualized as a sinusoidal 33 Hz wave on the chin electromyography (EMG) lead, which is thought to correspond to electrical stimulation of the hypoglossal nerve. Our case outlines how this artifact can be used as a reliable surrogate for device activation and to guide clinical decision-making during titration.

Report of case: A 57-year-old male with a past medical history significant for anxiety, diabetes, and hypertension underwent HGNS implantation after intolerance to CPAP and mandibular

advancement therapy. Sleep history was notable for difficulties with sleep initiation and sleep maintenance, with low Epworth Sleepiness Scale scores. Despite consistent device usage, his follow-up revealed persistent insomnia and frequent nightly pauses on device downloads, however noted overall increased energy and reduction in snoring. He underwent an in-laboratory PSG for titration. PSG data demonstrated overall excellent apnea-hypopnea reduction barring a 30-minute window of supine N2 sleep, where frequent hypopnea and apnea episodes were noted. Hypnogram as reported demonstrated activation of HGNS for the entire sleep period. Review of polysomnography raw data identified the absence of stimulation artifact signals during this corresponding window, correlating with device deactivation, thought to be accidental, during this interval. The study was re-scored and evaluated based on the time of the sleep study spent with the HGNS device activated, as evidenced by the "stimulation artifact" signal, following which final treatment recommendations were provided and the patient was encouraged to use the device outpatient with close clinical follow-up.

Conclusion: This case highlights the clinical significance of the stimulation artifact as a real-time indicator of HGNS activation during PSG. Its visualization and reporting on the chin EMG lead not only verifies therapy delivery but also enables accurate titration of device settings. Long term implications include integration of this surrogate into reporting models for standard PSG interpretation and advancing awareness of this phenomenon amongst respiratory therapists and clinicians.

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1447

THE UNSEEN BURDEN OF UNTREATED OBSTRUCTIVE SLEEP APNEA (OSA): AORTIC COMPLICATIONS LEADING TO EMERGENCY SURGERY

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Introduction: OSA contributes to cardiovascular complications through intermittent hypoxia and intrathoracic pressure swings, leading to vascular wall stress. This case illustrates untreated severe OSA as a potential factor in acute aortic dissection requiring emergent intervention.

Report of case: A 69-year-old male with past medical history of hypertension, hyperlipidemia, and untreated severe OSA (AHI 58.5/h, O_2 nadir 70%, O_2 < 90% during 41.7% of total sleep time) initially presented to PCP's office for acute substernal chest pain. He was sent to an emergency room where they found rising troponin and elevated d-dimer. CT angiogram chest was ordered to evaluate for pulmonary embolism which showed mild ectasia of the ascending aorta measuring roughly 4 cm without dissection. He was then transferred to a tertiary hospital for ischemic evaluation. After the transfer, he subsequently described only pleuritic chest pain and fevers and was found to have new pericardial effusion, elevated CRP, and ST elevations consistent with pericarditis. Stress testing ruled out cardiac ischemia. He then developed a new atrial flutter and his repeat CT angiogram showed aortic intramural hematoma with pseudoaneurysm. The patient was evaluated by cardiothoracic surgery and was taken to the operating room for an emergent repair of aortic dissection with ascending aorta and hemiarch replacement.

Conclusion: Severe untreated OSA is increasingly recognized as a significant contributor to vascular complications, including aortic dissection and aneurysm progression. Friend et al. (2022) demonstrated that OSA might predispose individuals to larger aortic diameters at the time of acute dissection, suggesting a mechanistic link between repeated apnea-induced wall stress and vascular vulnerability. Similarly, Mason et al. (2012) identified OSA as a potential accelerant of aneurysm expansion due to episodic surges in intrathoracic pressure, oxidative stress, and vascular inflammation. In this patient with long-standing severe OSA, his aortic complication likely reflects chronic intermittent hypoxia and sympathetic overactivation inherent to his untreated OSA. These findings suggest the need for vigilant management of OSA in patients with vascular comorbidities, particularly those at risk of aortic pathologies. Further research is needed to assess whether treating OSA could mitigate the progression of aortic disease and improve patient outcomes.

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1448

UNMASKING SLEEP-DISORDERED BREATHING CHALLENGES: CARDIAC ARREST IN A PRADER-WILLI PATIENT WITH UNTREATED OSA AND SLEEP RELATED HYPOVENTILATION

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AQ5

Introduction: Prader-Willi Syndrome (PWS) is a genetic syndrome (incidence 1 in 25,000) characterized by hypotonia, psychomotor retardation, developmental delay, hyperphagia, obesity, etc. Over 80% of individuals with PWS have sleep-disordered breathing (SDB).

Report of case: A 13-year-old male with PWS (BMI 78.4, >99%), obstructive sleep apnea (OSA) and sleep-related hypoventilation (SRH) presented to outpatient MRI (with anesthesia) to rule out lower extremity osteomyelitis. During intubation attempts, he became hypoxic, bradycardic, and subsequently underwent brief cardiac arrest. After receiving 1mg epinephrine, 1mg atropine, and 1 minute CPR, he regained cardiac activity and was hospitalized in the PICU with laryngeal mask airway and, later, high flow nasal cannula. Recent PSG had shown OAHI/total AHI 81.3/SpO2 nadir 76% associated with SRH (81% TST with CO > 50mmHg). He had a history of PAP intolerance and non-adherence to follow up visits. During admission, he continued to have SRH with hypoxemia and BiPAP intolerance. Developmental status and aggression made adherence challenging. Throughout his hospitalization, interventions by the sleep team aimed to develop a positive relationship with him and the BIPAP therapy (including mask fitting, changing PAP settings, medication use (hydroxyzine), behavioral interventions (e.g., play therapy, positive reward systems), etc. BiPAP compliance improved to 90% and more than 4 hours with normal AHI.

Conclusion: PWS is a genetic syndrome associated with SDB and an abnormal hypercapnic ventilatory response with higher arousal thresholds leading to SRH. Individuals with PWS are at risk for OSA, but those with obesity are at higher risk. Obesity contributes to changes in anatomy, metabolic demand, cardiopulmonary reserve, ventilation, circulation, and pharmacokinetics that require special consideration. It is important to

pursue treatment of SDB, to avoid serious/fatal consequences if left untreated. PAP intolerance and inadequate compliance in PWS are challenging; medications, behavioral interventions, and desensitization are viable options for improvement.
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1449
A LEAD IN THE CASE OF A PATIENT WITH A MALFUNCTIONED HYPOGLOSSAL NERVE STIMULATOR

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Introduction: Obstructive Sleep Apnea (OSA) is a disorder characterized by reduced airflow (hypopneas) or cessation of airflow (apneas) 10 seconds in duration or longer. Continuous Positive Airway Pressure (CPAP) is the mainstay of treatment for OSA, but its effectiveness is limited by patient adherence. Alternative treatments are limited by patient adherence, morbidity, and suboptimal efficacy. Hypoglossal Nerve Stimulator (HNS) is a surgically implanted device stimulating tongue protrusion and is an effective treatment for moderate to severe OSA in patients intolerant of CPAP. Complications are minimal with most being procedure and device-related discomfort as well as temporary tongue weakness.
Report of case: A 71 year male with history of obstructive sleep apnea (OSA) with apnea hypopnea index (AHI) of 26.9/hour with lowest oxygen saturation of 83% intolerant of CPAP underwent hypoglossal nerve stimulator implantation. He was lost to follow-up and returned to sleep clinic 28 months after initial presentation. At that visit, he reported a sensation of his tongue being pinched despite being set at the lowest level and was unable to use the device despite multiple attempts made at adjusting settings. The patient was later found to have a heterogenous thyroid mass ultimately requiring thyroidectomy following a nondiagnostic fine needle aspiration with pathology confirmed medullary thyroid carcinoma. Following surgery, he noted that the HNS remote control was unable to connect to his HNS device. The issue persisted despite resetting the HNS device using the programmer in the clinic. Chest radiography was obtained for further evaluation, which demonstrated a foreshortened stimulation lead terminating over the right hemithorax concerning for inadvertent device lead excision during the thyroidectomy. Histopathology confirmed presence of a wire device measuring 16 cm. The patient followed up with his ENT surgeon and requested HNS device explantation.
Conclusion: This case report illustrates a unique and potential complication that may be encountered in patients with HNS implantation undergoing head and neck surgical procedures. This case also highlights the need for special consideration to surgical approach and technique in patients with HNS implantation needing to undergo head and neck surgery.
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1450
TRAUMA-ASSOCIATED SLEEP DISORDER WITH DREAM ENACTMENT BEHAVIOR

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Introduction: Trauma-associated sleep disorder (TASD) is a proposed parasomnia that, while sharing criteria with REM-behavior disorder (RBD) remains under-recognized by clinicians. It is more common in the veteran population, and lacks clear guidelines on treatment, especially when accompanied by dream enactment behavior.
Report of case: A 67 year-old Gulf War veteran presented to sleep clinic with over 30 years of frequent dream enactment behavior (DEB). He has a concurrent history of insomnia, depression, and PTSD. Military service lasted 23 years, with active combat 1990-1991. DEB started then, as frequently as 5-7 times weekly. Behaviors include throwing nearby items, jumping out of bed, crawling on the floor, swinging, and yelling. The patient can only intermittently recall corresponding dreams. He has no tremor, shuffling gait, or change in handwriting. Neurological exam showed no cogwheel rigidity or resting tremor. He was diagnosed with trauma-associated sleep disorder and started on melatonin in 2017. Even with doses up to 15 mg there was no effect on parasomnia frequency or intensity, or any effect on sleep length or latency. He tried prazosin and doxazosin without improvement. These were stopped for side effects. Nighttime nausea and dizziness from other medication prevented starting clonazepam. He was later started on amitriptyline, which helped with sleep onset, but did not affect parasomnia. The patient is averse to group therapy because hearing others' trauma has previously made his nightmares worse. The planned treatment is 1-on-1 image rehearsal therapy.
Conclusion: TASD with DEB is a parasomnia not discussedin the ICSD-3-TR. Proposed mechanisms include hyperactivity in the locus coeruleus and peri-LC structures, as seen in PTSD, chronic stress, and psychiatric medications. TASD features nightmares that can occur in REM and NREM sleep and should be considered in any veteran with dream enactment. IRT is a non-pharmacologic treatment for PTSD-associated nightmares, but its effect on DEB is unclear, with only case reports. This patient has a decades-long history of DEB, but no signs of other neurological illnesses. The risk of evolution to true RBD and of developing alpha-synucleinopathies in these patients need to be clarified.
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1451
LONG-STANDING HALLUCINATIONS, A RARE PRESENTATION OF LEWY BODY DEMENTIA

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Introduction: Lewy Body Dementia (LBD) is a neurodegenerative disorder characterized by cognitive fluctuations, visual hallucinations, and parkinsonian features. While visual hallucinations are common in LBD, their early and prolonged presentation without significant cognitive decline is rare. This case report describes a patient with a 13-year history of visual hallucinations preceding the diagnosis of LBD, highlighting the importance of recognizing atypical presentations of this condition.
Report of case: A 79-year-old female presented with a 13-year history of complex, well-formed visual hallucinations with preserved insight. The hallucinations occurred during sleep transitions and when her eyes were closed, consisting of scary animals and recreated daily events. She experienced 4-5 episodes per week without auditory components or delusions. The patient's medical

history included autoimmune hemolytic anemia, giant cell arteritis, cardiovascular disease, sleep apnea, insomnia, and anxiety. Neurological examination revealed axial and upper limb rigidity, more pronounced on the right side, mild postural and action tremor in both upper extremities, and gait abnormalities. Cognitive assessment showed mild impairment (MoCA 23/30) with deficits in visuospatial/executive function, naming, attention, and delayed recall. Diagnostic workup included normal visual examination, polysomnography ruling out REM sleep behavior disorder, and normal EEG.Brain MRI showed mild chronic microvascular ischemic disease and a left sphenoid meningioma. FDG-PET revealed hypometabolism in bilateral temporal, lateral occipital, mesial frontal lobes, and cerebellar hemispheres, aligning with findings in DLB and supporting the diagnosis. DaT scan showed normal uptake. Autonomic testing demonstrated moderate abnormal sweating in hands and feet, decreased Valsalva ratio, and labile blood pressure. UPSIT score indicated moderate microsmia.
Conclusion: This case highlights the importance of considering LBD in patients with long-standing visual hallucinations, even in the absence of significant cognitive decline or typical parkinsonian features. The prolonged prodromal period with predominantly psychiatric symptoms underscores the need for comprehensive evaluation and long-term follow-up in elderly patients presenting with visual hallucinations. The combination of visual hallucinations, mild cognitive impairment, subtle parkinsonian signs, autonomic dysfunction, and specific FDG-PET findings supports the diagnosis of LBD. This case emphasizes the heterogeneity of LBD presentations and the potential for extended periods of isolated psychiatric symptoms before the emergence of more classical features.
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1452

RESOLUTION OF PULMONARY HYPERTENSION WITH PAP IN A PATIENT WITH ACHONDROPLASIA AND SEVERE OSA

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Introduction: Achondroplasia is an autosomal dominant skeletal dysplasia that results in short stature, midface hypoplasia, and craniocervical junction constriction, resulting in sleep disordered breathing. Cases of pulmonary hypertension (PH) in patients with achondroplasia have been attributed to chronic hypoxemia in the setting of obstructive sleep apnea (OSA), central apnea caused by cervicocranial compression, as well as congenital lung hypoplasia. OSA can cause or worsen PH, presumably related to increased pulmonary vascular resistance from alveolar hypoxia. Management of OSA can lead to improvements in, or resolution of, PH. We present a case of PH in the setting of severe OSA in which vasodilators could be discontinued after successful control of OSA with PAP.
Report of case: A now 3 year old male with achondroplasia, severe OSA, and PH was referred to sleep medicine at 4 months of age for snoring and respiratory distress. Polysomnogram revealed severe OSA with an oAHI of 25.1/hour, CAI of 0/hr, SpO2 nadir of 77%, and TcCO2 max of 67 mmHg, successfully treated with supplemental oxygen. He was subsequently admitted for acute hypoxemic respiratory failure with evidence of right heart failure, and discharged on continuous positive airway pressure (CPAP). One month later he was admitted for bronchiolitis and started on sildenafil, given elevated right ventricular pressures on transthoracic echocardiogram (TTE) despite CPAP. Brain MRI showed severe osseous stenosis of the foramen magnum and cervical spinal canal at the C1 level for which he underwent surgical decompression. He was discharged on CPAP, however he was not able to tolerate PAP at home, thus a repeat PSG was obtained and BPAP was recommended. Following this he was admitted for RSV, and was transitioned to Average Volume Assured Pressure Support (AVAPS) with increased compliance. Repeat TTE showed no evidence of PH, and he was weaned off sildenafil, with no change in TTE.
Conclusion: Individuals with achondroplasia have an increased risk of central and obstructive sleep apnea, both of which are associated with PH. This case demonstrates resolution of PH after treatment of OSA with PAP, allowing discontinuation of vasodilator therapy, highlighting the importance of OSA management in preventing and improving long term sequelae.
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1453

AN UNEXPECTED SEVERE SIDE EFFECT FOLLOWING MODAFINIL USE

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Introduction: Modafinil is a widely prescribed wakefulness-promoting agent used to treat narcolepsy and other sleep disorders. It is generally well-tolerated. Common side effects include headache, nausea, and back pain. Rare but serious adverse effects, including Stevens-Johnson syndrome and multi-organ hypersensitivity reactions, have been reported. However, to our knowledge, severe neuropathic pain has not been reported as an adverse reaction to modafinil.
Report of case: A 25-year-old female with a recent diagnosis of narcolepsy type II was started on modafinil. An initial dose of 100 mg caused mild headache and appetite suppression. Increasing the dose to 200 mg adequately improved her daytime sleepiness and was continued. Three weeks after initiation, she developed severe, diffuse muscle and joint pain accompanied by a fever of 101.4°F, facial and eye redness, and a severe headache. She sought care at an urgent care facility, where no rash was noted. Flu and COVID-19 tests were negative, and modafinil was temporarily discontinued. One week later, she resumed 200 mg modafinil and experienced a recurrence of headaches and appetite loss. The following day, she had five syncopal episodes. The next morning, after taking 100 mg modafinil with coffee, she developed pins-and-needles sensations in her hands and feet, which gradually progressed proximally. This worsened into severe, deep, burning neuropathic pain and cramping muscle pain involving her back, buttocks, and arms. She presented to the emergency department, where examination revealed no rash, swelling, or erythema but showed 4/5 muscle strength in the lower extremities and normal sensation. Initial labs showed elevated white blood cell count and mild elevations in CK, ESR, and CRP. Iron deficiency was noted. Additional testing, including autoimmune myopathy and myositis panels, TSH, vitamin levels, and MRI of the brain and spine, was unremarkable. Oxycodone, gabapentin, and compression wraps provided significant relief. She was discharged on day 3, and her symptoms and labs normalized within a few days. Follow-up labs a week later showed further improvement.

Conclusion: Though modafinil is generally well-tolerated, this case highlights a severe reaction of neuropathic pain closely linked to modafinil administration. This emphasizes the need for clinicians to remain vigilant for delayed adverse reactions when using modafinil.
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1454
COMBINATION THERAPY: HYPOGLOSSAL NERVE IMPLANT AND CUSTOM MANDIBULAR ADVANCEMENT DEVICE

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Introduction: Obstructive sleep apnea (OSA) is a sleep disorder characterized by recurrent episodes of airway obstruction during sleep. Hypoglossal nerve stimulation (HGNS) is an emerging treatment option for patients who are intolerant to continuous positive airway pressure (CPAP) therapy.
Report of case: A 62-year-old male with history of generalized anxiety disorder presented to the sleep clinic seeking alternative treatments for OSA. He reported daytime sleepiness, loud snoring, and bruxism. He had previously been intolerant to CPAP due to anxiety and discomfort. A drug-induced sleep endoscopy was performed, confirming the patient as a suitable candidate for HGNS. His initial polysomnography (PSG) revealed an AHI of 50 events per hour, indicating severe OSA. The patient underwent HGNS implantation. Following activation of the device, he reported a significant improvement in sleep quality and increased daytime alertness. A follow-up PSG indicated a reduction in AHI from 50/hr to 11/hr, demonstrating the substantial effectiveness of HGNS therapy. Despite the improvement in AHI, which was now in the mild range, the patient continued to experience persistent snoring and bruxism. An oral examination revealed considerable tooth attrition. The dental team was consulted, leading to the removal of all maxillary teeth. A plan was established to restore the edentulous maxilla with a complete denture. Given the anticipated delay in denture fabrication and persistent bruxism injuring the gums, a custom-fabricated mandibular advancement device (EVO) was created. This unusual approach involved anchoring the device to the maxillary arch, accommodating the patient's edentulous status. A home sleep apnea test was conducted with the hypoglossal nerve stimulator activated and the oral appliance in place. The result was a reduction in both AHI to 2/hr and bruxism therefore limiting the damage to the upper gums. The combination of HGNS therapy and the custom mandibular advancement device proved effective in managing the patient's OSA and bruxism.
Conclusion: HGNS was successfully used in this case to treat severe OSA in a patient who was intolerant to CPAP. The addition of a custom mandibular advancement device in an edentulous patient underscores the adaptability of treatment strategies. The combination therapy emphasizes the importance of personalized and multidisciplinary approaches to treating OSA.
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1455
INTERPRETING POLYSOMNOGRAM IN THE PRESENCE OF DEEP BRAIN STIMULATOR ARTIFACT

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Introduction: The application of polysomnography (PSG) for the evaluation of Obstructive Sleep Apnea (OSA) and REM sleep behavior disorder (RBD) presents a unique challenge in the setting of neurostimulation, such as Deep Brain Stimulation (DBS). DBS delivers high frequency pulse stimulation to the brain, which results in artifact that obscures sleep staging. We present a case that illustrates the presence of artifact in a patient with Parkinson's disease (PD) treated with DBS who presented for evaluation of OSA and dream enactment behavior (DEB).
Report of case: A 60-year-old male with PD status post bilateral subthalamic nucleus DBS presented for evaluation of OSA and DEB. The patient underwent PSG with extended EMG montage. He declined to turn off his DBS device. During the PSG, a 125 Hz artifact obscured the EEG, EOG, EKG, and chin EMG channels. The DBS artifact was characterized by a series of narrow-band components at the harmonic frequency of the DBS generator with a pulse width of 60 and 125 Hz. While the DBS artifact hindered our ability to stage sleep and evaluate the patient for REM sleep without atonia (RSWA) in the chin, it did not compromise our ability to score respiratory events and RSWA in the limbs. The PSG confirmed OSA with an AHI 8.7/hr and RBD based on an episode of shouting and abrupt movement during sleep as well as RSWA in the limb EMG.
Conclusion: This case demonstrates the unique challenges of PSG scoring and interpretation in the setting of DBS. When clinically indicated, PSG with expanded EMG montage provides a high diagnostic yield of OSA and RBD despite DBS artifact. Several interventions can be used to suppress DBS artifact on PSG, including using matched filtering and frequency-domain Hampel filtering to remove outliers. Turning off the DBS is an option as well, however this often results in the emergence of tremor artifact in patients with PD. With the increased use of neurostimulation among patients who are likely to be evaluated for sleep disorders, this case highlights the importance of recognizing DBS artifact on PSG.
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1456
IMPACT OF COMORBIDITIES ON PHRENIC NERVE STIMULATION THERAPY FOR CENTRAL SLEEP APNEA: TWO EXPLANTATION CASES

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Introduction: Central sleep apnea (CSA) and Cheyne-Stokes respiration (CSR) frequently occur in patients with congestive heart failure (CHF), particularly those with reduced ejection fraction

(EF). This report details two cases of CHF patients with CSA who failed BiPAP therapy and were treated with phrenic nerve stimulator (PNS; the Remedē® system) but required eventual explantation. Both cases demonstrate how comorbidities influenced outcomes.

Report of case: Patient 1: CHF with Insomnia and CSA A 65-year-old male with CHF (EF 20%), CSA, hypertension, and anxiety experienced persistent insomnia despite BiPAP S/T (spontaneous/timed) therapy. A phrenic nerve stimulator was implanted, resulting in improvements in CSA episodes and maintenance insomnia. However, initiation insomnia persisted, aggravated by the patient sensing device activity during sleep. Cognitive Behavioral Therapy for Insomnia (CBTi) was attempted but provided no significant relief. The patient ultimately requested device explantation due to ongoing sleep disturbances. Patient 2: CHF with Severe COPD and CSA A 72-year-old male with CHF (EF 30%), CSA, and severe COPD who also failed PAP therapy for the sleep apnea. Following PNS implantation, the patient initially reported improvements in CSA symptoms. However, a COPD exacerbation led to severe cough, which persisted despite treatment with antibiotics and steroids, and resulted in device lead displacement. Given the risk of recurrent lead displacement, the decision was made to explant the device. These cases highlight the challenges in treating CSA in CHF patients, particularly when comorbid conditions like insomnia and COPD are present. Patient 1: While PNS improved CSA symptoms and maintenance insomnia, unresolved initiation insomnia pointed to the need for tailored insomnia management in CSA cases. Patient 2: Illustrates the impact of respiratory comorbidities like COPD on CSA therapy with PNS, complicating device efficacy.

Conclusion: Phrenic nerve stimulation offers a promising alternative for managing CSA in CHF patients, but success depends heavily on the presence of comorbid conditions. Insomnia and respiratory disorders can significantly hinder treatment outcomes, as illustrated by our cases. Optimizing care requires personalized, integrative approaches, including consideration of all comorbidities, to improve therapeutic success.

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1457

THE DOUBLE-EDGED PILL: PEDIATRIC AUGMENTATION OF RLS WITH GABAPENTIN

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Introduction: The American Academy of Sleep Medicine (AASM) updated its guidelines on restless leg syndrome (RLS), advising reduced use of dopamine agonists due to side effects like augmentation. While gabapentin shows low augmentation rates (~0.9%) in adults, limited data exist for pediatric cases. This report highlights treatment-resistant RLS in a 10-year-old male, potentially involving gabapentin-related augmentation.

Report of case: A 10-year-old with mild obstructive sleep apnea (OSA) and significant atopy presented with chronic nocturnal leg tingling relieved by movement. Family history included RLS in his father and pregnancy-related symptoms in mother. Labs were unremarkable, including ferritin at 85 ng/mL. X-rays ruled out lower extremity malignancy. Neurology consultation yielded no additional guidance. Oral iron therapy failed to improve symptoms. Gabapentin was initiated and titrated with resolution of symptoms. After one year, symptoms worsened despite gabapentin. The mother explored alternative therapies including transcutaneous electrical nerve stimulation unit, compression, massage, and magnesium, with minimal relief. Ferritin dropped to 47 ng/mL; oral iron was resumed. Symptoms escalated and occurred earlier in the day, raising concerns of gabapentin-induced augmentation. Gabapentin was weaned, and pregabalin was considered but declined due to parental concerns of side effects. Benzodiazepines were also avoided due to a family history of substance misuse. CPAP therapy for mild OSA was poorly tolerated despite multiple adjustments. Eventually, the mother agreed to trial IV ferric carboxymaltose with pending improvement.

Conclusion: This adolescent initially responded to gabapentin, requiring high doses to control RLS. Occurrence of symptoms earlier in the day with increasing severity suggested augmentation. Co-morbid uncontrolled OSA may have contributed, though pediatric adherence to CPAP can be challenging. This case highlights a fairly underreported phenomenon of gabapentin-induced augmentation in pediatric RLS. This highlights the complexities of managing restless leg syndrome in children and emphasizes the need for more research and treatment strategies in the pediatric population.

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1458

NON-24-HOUR SLEEP-WAKE CIRCADIAN RHYTHM DISORDER IN A 44-YEAR-OLD SIGHTED WOMAN

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Introduction: Non-24-hour sleep-wake rhythm disorder has typically been a diagnosis associated with blindness, in which the retino-hypothalamic tract does not convey a diurnal light signal to the suprachiasmatic nucleus. In this situation, sleep onset is not entrained with environmental cues to maintain a 24-hour pattern, and it naturally drifts away from the earth's light-dark cycles due to the underlying biological clock in humans, which has a day-length of 24.2 hours. Sighted individuals with this circadian disorder are rare and likely have a different etiology for their symptoms.

Report of case: Patient is a 40-year-old woman with past medical history of obesity and bipolar affective disorder seen at Dartmouth-Hitchcock Sleep Disorders Center due to long history of circadian disruption including daytime sleepiness and difficulty sleeping at night. She described a pattern of going to sleep approximately 1 hour later every night in a progressive fashion, leading to an inability to maintain a stable sleep schedule. She reported 2 prior sleep studies which were negative for sleep-disordered breathing. She stated that she was disabled and had no structured daytime activities, spending most of the day on the same couch where she slept at night. She also reported dozing briefly after eating on a regular basis. Regarding possible parasomnia symptoms, she had experienced sleep paralysis on venlafaxine but had no cataplexy symptoms. She had also experienced hallucinations while awake, but not while falling asleep or waking up. During most recent visit, HST and Actigraphy were ordered to further assess reported symptoms. Results of the HST showed an REI 4% of 3/hour, with a minimum SpO2 of 86% and a mean SpO2 of 94%. Results of the 4-week actigraphy

showed a progressive shift in bedtime over the 4-week period, associated with a progressively later wake time.
Conclusion: Although very rare, sighted individuals could present with a non-24-hour sleep-wake rhythm disorder and is likely to have a different etiology for their symptoms. This is an interesting case report about a sighted 40-year-old woman presenting with an actigraphy showing a pattern of sleep approximately 1 hour later every night in a progressive fashion.
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1459

THE GROWTH HORMONE DILEMMA IN PRADER-WILLI SYNDROME: BALANCING OBSTRUCTIVE SLEEP APNEA RISK WITH THE BENEFITS OF GROWTH HORMONE THERAPY

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Introduction: Recombinant growth hormone therapy (rGHT) should be considered for patients with Prader-Willi syndrome (PWS). However, rGHT increases the risk of lymphoid hyperplasia (LH), potentially worsening obstructive sleep apnea (OSA). Case reports have linked rGHT and LH to sudden death during the initial treatment phase. Current guidelines recommend sleep oximetry, preferably completed by polysomnography (PSG), before starting rGHT in all patients, and repeating it and obtaining ENT assessment 3–6 months after initiation. We present a child with PWS who developed LH after starting rGHT, leading to rGHT discontinuation due to safety concerns, despite sleep apnea resolution. This case raises questions about whether rGHT should be withheld in patients with LH without significant sleep apnea, considering its long-term benefits.
Report of case: The patient was seen at age 7 weeks for hypotonia. Genetic testing confirmed PWS. Before starting rGHT, PSG revealed severe sleep apnea, primarily central. ENT evaluation showed no LH, and rGHT was initiated. Following therapy, tonsillar hypertrophy was identified, leading to discontinuation of rGHT. Repeat PSG was normal, but due to reports of sudden death in patients with LH, rGHT was withheld for over a year. Patient's BMI rapidly increased, muscle tone decreased, and subsequent sleep study revealed mild OSA.
Conclusion: Patients with PWS have high annual mortality (~3%), but there is no evidence to suggest rGHT increases this risk. Multiple studies found no increase in OSA-related mortality while receiving rGHT in PWS. More evidence-based guidelines are needed to clarify whether rGHT should be withheld in cases of LH without clear worsening of OSA. Withholding rGHT should carefully be considered on a case-by-case basis, as this can deprive patients from the benefits of rGHT.
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1460

PERSISTENT NOCTURNAL TACHYPNEA IN CENTRAL SLEEP APNEA: UNMASKING THE ROLE OF CARDIOGENIC OSCILLATIONS

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Introduction: Nocturnal tachypnea is commonly linked to central sleep apnea (CSA) with Cheyne-Stokes breathing (CSB), a pattern of nocturnal tachypnea alternating with apneas. Persistent nocturnal tachypnea in the setting of CSA, however, is unusual and can result from cardiogenic oscillations (COs)—cyclic intrathoracic pressure changes during the cardiac cycle—which mimic inspiratory efforts and trigger bilevel positive airway pressure (PAP) devices, leading to inappropriate initiation of tachypnea.
Report of case: An 83-year-old man with a history of moderate obstructive sleep apnea (OSA), central sleep apnea, and heart failure with reduced ejection fraction (HFrEF), presented with complaints of nocturnal tachypnea observed by his wife. The patient had a 20-year history of OSA, initially managed with continuous positive airway pressure (CPAP). However, as his heart failure progressed, he developed CSA. He transitioned to adaptive servo-ventilation (ASV), which provided better control of his central apneic events. Following a myocardial infarction, his ejection fraction declined to 25%, prompting a switch from ASV to bilevel PAP with a backup rate, given the increased risk of cardiovascular mortality associated with ASV therapy in patients with reduced EF. While on bilevel PAP, the patient's wife noted persistent episodes of tachypnea during the night. A Nox T3 portable home sleep study demonstrated central apneas with fluctuating respiratory rates (14–56 breaths/min), resembling CSB. However, bilevel PAP compliance reports revealed persistently elevated tachypnea (95th percentile respiratory rate: 33 bpm). Given the discrepancy, inappropriate triggering by COs was suspected. The trigger sensitivity on the bilevel PAP device was reduced to a lower setting. Follow-up compliance data revealed significant improvement: the 95th percentile respiratory rate decreased to 22 bpm, and the triggered percentage for detected spontaneous breaths dropped from 93% to 42%. By lowering the sensitivity, the device became less prone to triggering from minor, non-respiratory airflow generated by cardiogenic oscillations. Two years of follow-up observations reveal continued resolution of nocturnal tachypnea.
Conclusion: Persistent nocturnal tachypnea in CSA patients with heart failure may result from an interplay between CSB and COs triggering bilevel PAP devices. Adjusting trigger sensitivity effectively reduced CO-induced over-triggering, allowing for an accurate assessment of the patient's respiratory pattern.
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1461

SLEEPING WITH THE ENEMY: CPAP THERAPY PARADOXICALLY WORSENS SLEEP APNEA

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Introduction: Obstructive sleep apnea (OSA) is often treated with continuous positive airway pressure (CPAP) therapy. We present a case wherein CPAP therapy paradoxically worsened OSA.
Report of case: A 35-year-old man presented to Johns Hopkins Sleep Medicine Clinic endorsing excessive daytime sleepiness, with an Epworth Sleepiness Scale rating of 11. Several years prior, he had a home sleep apnea test that reportedly demonstrated severe OSA. He was treated briefly with CPAP but was unable to continue CPAP therapy after an insurance change. He also gained significant weight in the interim. We recommended a repeat sleep study, with findings of severe OSA as indicated by an apnea-hypopnea index (AHI) of 89.9 events per hour and an

oxygen nadir of 79%. Due to OSA severity, the patient's study was split to include CPAP titration. Surprisingly, CPAP induced even worse OSA, with pressures from 6 to 12 cm H2O demonstrating persistent inspiratory flow limitation. There was some improvement noted at a pressure of 14 cm H2O before the study ended. The patient preferred an oronasal mask interface during the study due to impaired nasal breathing. Ultimately, the patient was advised to wear CPAP at a pressure of 16 cm H2O with the oronasal mask interface tested. Thirty-day adherence data for CPAP use demonstrated appropriate adherence with a residual AHI of 2.1 events per hour. He reported an improvement in daytime sleepiness and expressed satisfaction with his treatment.
Conclusion: Our case demonstrates that CPAP therapy paradoxically worsened OSA during a titration study. We speculate that this phenomenon was caused by using an oronasal mask interface, which can cause posterior displacement of the tongue when air enters the mouth. We will continue to encourage the patient to switch to a nasal mask when he feels it tolerable, as we know several studies demonstrate that oronasal mask interfaces are often associated with lower CPAP tolerability, higher CPAP pressure requirements, and higher residual AHI scores.
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1462
WHAT A PICKLE. A CASE OF HYPOGLOSSAL NERVE STIMULATOR DISPLACEMENT

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Introduction: Hypoglossal nerve stimulators (HNS) provide an alternative treatment for obstructive sleep apnea (OSA) in patients intolerant to CPAP machines. These devices are surgically placed, typically with the generator anchored above the pectoralis major muscle and under the fat pad on the right side of the chest. While complications are rare, displacement is the most common reason for revision surgery. We present a case of HNS generator dislodgment following exertion during a pickleball game.
Report of case: A 66-year-old female with severe OSA and CPAP intolerance had an HNS implanted in June 2022. In May 2023, she experienced neck pain and noticed a lump on her right chest while playing pickleball. She pressed the lump and continued playing. Over the next few days, her sleep quality declined, and her OSA symptoms reappeared. Suspecting device dislodgment, she visited her otolaryngologist, who confirmed the device had been dislodged and was mobile in the chest wall. She underwent successful revision surgery in June 2023, followed by significant improvement in her sleep apnea symptoms.
Conclusion: This case highlights the overlooked risks associated with implantable surgical devices. While detailed data on HNS complications are limited, the risks tied to implantable cardiac devices are well documented. Among the most common reasons for cardiac device dislodgment include intense physical exertions or trauma. Although pickleball is not the most intensive physical activity, the repetitive motion needed in the sport can potentially increase the risk of device dislodgment. The MAUDE database does not list device migration among the most common complications, but reported migrations have risen as more data has been collected. A literature review does not reveal any reported cases of HNS dislodgment following physical exertion in activities requiring arm swinging. Case reports on HNS device dislodgment suggest that obesity and abundant breast tissue are risk factors for device migration, with no mention of physical activity being a risk factor. This case identifies upper arm exertion as a potential risk factor for HNS device migration. Further research and incident reporting are necessary.
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1463
NARCOLEPSY TYPE 2 FOLLOWING MYCOPLASMA PNEUMONIA INFECTION

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Introduction: Narcolepsy is an uncommon sleep disorder characterized by excessive daytime sleepiness, cataplexy, hypnagogic hallucinations, sleep paralysis, low levels of hypocretin-1 in the CSF, and a strong association with the HLA DQB1*0602 allele. Secondary narcolepsy has been associated with infections including Streptococcus Pyogenes, COVID-19, influenza H1N1 and the H1N1 vaccination. To date, there is one reported case of narcolepsy type 1 (NT1) associated with M. Pneumonia infection in a pediatric patient. We report a case of narcolepsy type 2 (NT2) following M. pneumonia infection in an adult.
Report of case: A 33-year-old female with a history of severe persistent asthma, obesity, depression and PTSD who presented to sleep clinic with excessive daytime sleepiness for the past 8 months. She was initially hospitalized for an asthma exacerbation and found to have positive mycoplasma pneumonia IgM antibodies. Two weeks after discharge, she reports increased sleep requirements of 20 hours per day, auditory hypnogogic hallucinations, and infrequent episodes of sleep paralysis. Two months before her clinic visit, she fell asleep while driving, causing a motor vehicle accident. She denied symptoms of cataplexy. Her ESS was 19. Given an unremarkable physical exam, cranial imaging was deferred. Overnight polysomnogram showed positional sleep apnea with an overall AHI of 7. The five naps MSLT showed mean sleep latency of 4.4 minutes, 2 SOREMs, and negative urine drug screen. HLA DQB1*0602 was positive but she declined CSF analysis for hypocretin levels. She was treated with Modafinil 200 mg twice daily. However, due to persistent sleepiness she is awaiting approval to start Pitolisant.
Conclusion: NT1 is believed to be autoimmune mediated given the strong genetic association with HLA DQB1*0602 which regulates T-cell immunity. Several articles have reported the development of NT1 following infections, especially streptococcal infections, influenza, and most recently, COVID-19. This case highlights the development of NT2 following mycoplasma pneumonia infection and suggests a similar pathophysiology mechanism resulting in a partial loss of hypocretin producing cells. The hypothesized mechanisms include cytokine storm, hyper-activation of the immune system and molecular mimicry.
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1464
KLEINE-LEVIN SYNDROME AND EMERGENT MANIC SYMPTOMS IN A YOUNG PATIENT AFTER RAMELTEON INITIATION: A CASE REPORT

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Introduction: Kleine-Levin Syndrome (KLS) is a rare central disorder of hypersomnolence characterized by episodes of excessive sleep, altered behavior (e.g., hyperphagia, hypersexuality), and cognitive dysfunction. This case describes a young patient with KLS who developed emergent manic symptoms following the initiation of ramelteon, a melatonin receptor agonist.
Report of case: A 15-year-old male presented with recurrent KLS episodes, marked by hypersomnolence exceeding 18 hours per day, confusion, irritability, hypersexuality, and disorganized behavior, with full recovery between episodes. Ramelteon 8 mg was initiated to prevent recurrent KLS episodes. 36 days later, the patient developed manic symptoms, including decreased need for sleep, grandiosity, paranoia towards his parents, and disorganized behavior. Ramelteon was discontinued, and psychiatric consultation was obtained. Lithium was initiated and titrated to 300 mg twice daily to address the emergent manic symptoms and potentially reduce future KLS episodes. An atypical antipsychotic was prescribed for acute mania management. The patient demonstrated significant initial improvement and received further psychiatric involvement in his care for optimization.
Conclusion: This case highlights the complexity of managing KLS when emergent psychiatric symptoms occur. The temporal relationship between ramelteon initiation and the onset of mania raises the possibility of a paradoxical circadian reaction, potentially linked to shared vulnerabilities between KLS and bipolar disorder. The TRANK1 gene, associated with both conditions, may contribute to this connection. This underscores the importance of individualized treatment planning, considering potential genetic predispositions when prescribing circadian-targeted therapies. Multidisciplinary collaboration among sleep medicine, neurology, and psychiatry is essential for monitoring treatment responses and ensuring comprehensive care. Further research is needed to explore the nature of circadian dysfunction in KLS and its psychiatric comorbidities.
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1465

REFRACTORY OBSTRUCTIVE SLEEP APNEA IN CHILDREN WITH RUBINSTEIN-TAYBI SYNDROME

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Introduction: Rubinstein-Taybi Syndrome (RTS) is a rare genetic condition characterized by distinctive broad and/or angled fingers and toes, craniofacial dysmorphism, short stature, and global developmental delay. The studies in adults with RTS report higher prevalence of obstructive sleep apnea (OSA) but the data in children is limited.
Report of case: We follow five children with RTS at our pediatric sleep center, all with moderate to severe OSA (ages: 3-18 years, Apnea Hypopnea index (AHI): 7.5-90 events/hour). Two of them continued to have severe OSA following adenotonsillectomy (AT). Case A was diagnosed with severe OSA (AHI 12.2 events/hour, SpO2 nadir 70%) at 11 months of age and underwent AT. After AT, this patient's OSA symptoms improved but his AHI remained elevated at 8.5 events/hour with SpO2 nadir 76% and he needed oxygen therapy. A repeat sleep study at age three showed severe OSA (AHI 20.7 events/hour, SpO2 nadir 87%); hence, he underwent drug-induced sleep endoscopy, revision adenoidectomy, epiglottopexy and inferior turbinate reduction. A follow-up sleep study showed AHI of 9 events/hour with SpO2 nadir 78%. This patient is currently undergoing desensitization for high flow nasal cannula therapy. Case B was diagnosed with OSA at 2 years of age following an episode of bradycardic arrest during anesthesia for a urologic procedure. During that same hospital stay, he underwent AT with improvement of symptoms but was lost to follow-up. At 17 years old, he was diagnosed with very severe OSA (AHI 90 events/hour, SpO2 nadir 75%) and treated with non-invasive ventilatory (NIV) support. Later, he underwent revision adenoidectomy, lingual tonsillectomy and epiglottopexy. However, he continued to have symptoms that necessitated NIV support. For cases A and B, OSA recurrence coincided with an increase in body mass index.
Conclusion: The experience at our center shows moderate to severe OSA in children with RTS and OSA persistence despite airway revision surgeries in two children. Craniofacial anomalies, hypotonia, and obesity likely contribute to residual OSA. NIV treatment is often challenging given their cognitive impairment. This highlights the need for further studies to understand the natural history of OSA, evaluate causative factors, and analyze the effects of various treatment options in RTS.
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1466

SUSPECTED FRONTOTEMPORAL DEMENTIA-PSP VARIANT VS. ANTI-IGLON5 ENCEPHALITIS: CASE REPORT WITH SLEEP ALTERATIONS

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Introduction: Sleep-wake disturbances are common in neurodegenerative diseases, especially in movement disorders, affecting quality of life. Progressive supranuclear palsy (PSP) is a tauopathy characterized by tau hyperphosphorylation, leading to degeneration of cortical and subcortical brain structures, particularly the midbrain. Sleep abnormalities in PSP include REM sleep behavior disorder (RBD), restless leg syndrome (RLS), periodic leg movement in sleep (PLMS), obstructive sleep apnea (OSA)/central sleep apnea (CSA), insomnia, and excessive daytime sleepiness (EDS). Anti-IgLON5 disease, first described in 2014, is a recently recognized neurological condition. Unlike other tauopathies like PSP and corticobasal syndrome (CBS), anti-IgLON5 features distinct tau deposition patterns. Polysomnography with synchronized audiovisual recording is crucial for diagnosis, showing characteristic sleep patterns like "undifferentiated-NREM (UN-NREM)" and "poorly-structured N2 (P-SN2)".
Report of case: We present a 62-year-old patient with symptoms starting in 2021, including hyperexplexia to sounds, rapid movements of the right upper limb, and delayed speech latency. In 2022, anxiety, restlessness, weight loss, and thoughts of doom emerged, along with a festinating gait and axial flexion posture. By 2023, the patient developed perseverative thoughts, compulsive guttural sounds, bilateral tremors, and sleep disturbances, including long daytime naps. Behavioral disinhibition,

topographic disorientation, and emotional lability were also noted. In mid-2024, the patient exhibited nighttime leg movements, gait instability, progressive dysphagia, increased irritability, and a suicide attempt, leading to admission in the psychiatric unit. Due to dysautonomia, the patient was transferred to neurology, where polysomnography was conducted. Polysomnography findings revealed severely disrupted sleep architecture: prolonged wakefulness (327.5 minutes), predominance of light sleep (Stage N1, 85.1%), and a significant reduction in Stage N2 (10.0%) and REM sleep (4.9%). These findings indicate profound sleep fragmentation and loss of restorative sleep stages.
Conclusion: Due to the lack of financial resources from both the patient and the hospital, as well as the absence of necessary supplies for cerebrospinal fluid measurements to detect anti-IgLON5 autoantibodies, a definitive diagnosis could not be established. The treatment was symptom-directed.
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1467
IDIOPATHIC HYPERSOMNIA DURING PREGNANCY
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Introduction: Idiopathic hypersomnia (IH) is a central hypersomnia disorder that results in severe sleepiness, often accompanied by long sleep, pronounced sleep inertia, and cognitive symptoms. Because IH is often diagnosed in adolescence or early adulthood, women may already be diagnosed with and treated for IH when they enter their childbearing years. In healthy people, pregnancy commonly results in daytime sleepiness, particularly in the first trimester. In contrast, rare cases of resolution or temporary improvement of IH during pregnancy have been reported.
Report of case: A 39-year-old, G1P0 woman was diagnosed with IH >10 years prior to her pregnancy, with multiple sleep latency test showing mean sleep latency of 5.5 minutes and no sleep onset REM periods. Prior to pregnancy, her IH was treated with Solriamfetol 150 mg and flumazenil 12mg in the morning, 18mg at bedtime. Because of limited pregnancy safety data for Solriamfetol and flumazenil, she changed to methylphenidate for pregnancy. During pregnancy, she reported a dramatic benefit on her IH symptoms, despite taking very low doses of methylphenidate. Specifically, she noted "I'm feeling less sleepy than expected", staying awake during the day with less effort, and a reduction in her IH cognitive symptoms ("It's just easier to think"). Prior treatment with traditional stimulants pre-pregnancy had not resulted in similar improvements. Her on-treatment, pre-pregnancy Epworth was 19. In pregnancy weeks 12, 22, and 31, her Epworth scores were 16, 17, and 18, on methylphenidate daily doses (divided) of 7.5mg/day, 12.5mg/day, and 17.5mg/day, respectively. Despite this gradual increase in Epworth scores and methylphenidate dosing, at week 31 she reported her IH symptoms all remained noticeably less severe than pre-pregnancy, reporting "I wish I could just keep this [state of pregnancy]". She is considering whether to breastfeed while taking methylphenidate.
Conclusion: This case illuminates several considerations regarding medication decisions between patients and their healthcare providers in the pre-pregnancy, pregnancy, and post-partum periods. It also adds to rare cases in the literature describing improvement in IH symptoms during pregnancy. Further research is required to understand the typical course of IH symptoms during pregnancy and identify mechanisms underlying these changes.
Support (if any):

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1468
A CASE OF RESTLESS LEGS SYNDROME AND HEREDITARY HEMOCHROMATOSIS
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Introduction: Hereditary hemochromatosis (HH) is a genetic disorder characterized by iron overload due to increased GI tract iron absorption. Treatment often involves therapeutic phlebotomy with target ferritin of 50-150ng/mL. Restless legs syndrome (RLS) can be seen in HH, possibly due to low regional iron stores in the brain despite systemic iron overload. We present a rare case of RLS in a patient with HH whose clinical course was complicated by augmentation due to over-correction of serum ferritin and use of dopaminergic agents.
Report of case: A 46-year-old male with no medical history presented to primary care with bilateral leg discomfort and difficulty falling asleep. RLS diagnosis was made based on meeting all 2014 IRLSSG consensus criteria. Blood testing showed: elevated ferritin of 932.4ng/mL, elevated TSAT 67%, iron 182mcg/dL, TIBC 272. Genetic testing for HFE showed a homozygous C282Y mutation, confirming HH. Phlebotomy and nightly ropinirole 0.25mg was initiated. Ferritin levels stabilized between 100-200ng/mL for 3 years, though subsequently fell and remained below 75ng/mL. This coincided with onset of RLS symptoms earlier in the day as well as spreading to involve more proximal legs and hands. Ropinirole dose was gradually increased to 1.5mg/day for symptom management. He was subsequently referred to Sleep Clinic for frequent nighttime awakenings, daytime sleepiness, and snoring. Ferritin level was 35.8ng/mL and diagnostic polysomnogram showed an AHI 5.2/hr, PLMI 20/hr, PLMAI 3.2/hr. In collaboration with Hematology, target ferritin was increased to 200-300ng/mL. Augmentation was further managed with initiation of nightly gabapentin while beginning a slow taper off ropinirole.
Conclusion: This case highlights a rare combination of RLS symptoms and concomitant HH, which suggests localized CNS iron deficiency despite markedly elevated serum ferritin. Abnormalities in the iron transport system across the blood-brain barrier could explain this discrepancy. However, our patient's RLS symptoms did worsen with serum ferritin levels falling below 50-75ng/mL. Therefore, a multi-disciplinary approach with Hematology is needed in managing these patients to avoid exacerbation of RLS symptoms due to overcorrection of serum ferritin levels.
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1469
RARE GENES, RESTLESS NIGHTS: A CASE OF OBSTRUCTIVE SLEEP APNEA IN A PATIENT WITH CORNELIA DE LANGE
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Introduction: Cornelia de Lange syndrome (CdLS) is a rare genetic disorder affecting 1 in 10,000 newborns. It is characterized by growth restriction, developmental delays, and high rates of comorbid respiratory, cardiac, gastrointestinal, and neurologic conditions. Approximately 25% of individuals with CdLS experience epilepsy, for which vagal nerve stimulators (VNS) can be used as a treatment. However, VNS has been associated with obstructive sleep apnea (OSA) through various mechanisms including decreased airflow and change in respiratory effort. This report highlights a CdLS patient with OSA initially attributed to VNS implantation.
Report of case: A 13-year-old male with a history of CdLS, chronic epilepsy managed with VNS, and ahistory of adenotonsillectomy at a young age presented to the pediatric sleep clinic for OSA management. Two years post-VNS implantation, his epilepsy remained poorly controlled on EEG. Pediatrician noted hypersomnia and snoring, and a sleep study was ordered which revealed severe OSA (apnea-hypopnea index (AHI) of 14.8/h, central apnea index (CAI) of 0.4/h, and oxygen nadir of 81%). Initially, VNS-induced worsening of OSA was suspected, and nighttime VNS settings were adjusted. His mother reported continued restlessness during sleep, but no witnessed apnea. Patient underwent repeat adenoidectomy with ENT. Post-operative sleep study confirmed persistent severe OSA (AHI 18.1, RDI 46, oxygen nadir 74%). The patient began therapy with APAP 5–15 cm H_2O and excellent adherence. On APAP, his residual AHI improved to 1.3, indicating effective treatment of sleep disordered breathing.
Conclusion: This case underscores the complexity of managing OSA in patients with rare syndromes and various comorbidities. While VNS was initially suspected to exacerbate OSA, settings adjustment proved ineffective, highlighting the need for comprehensive evaluation. Despite repeat surgical interventions, PAP therapy ultimately proved to be the most efficacious treatment, demonstrating that even patients with syndromic conditions and complex medical histories can achieve effective treatment & adherence with appropriate interventions. Providers must remain informed about the unique needs of the complex pediatric population to deliver optimal care, including those with vagal nerve stimulators.
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1470

SLEEP-RELATED HYPOVENTILATION IN CYSTIC FIBROSIS: THE SILENT DANGER

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Introduction: Cystic fibrosis is a genetic disorder that affects multiple organs, particularly the lungs and pancreas. This progressive condition can compromise lung function through recurrent respiratory infections, bronchiectasis, and chronic inflammation with hypoxia. One area that warrants further research is the effect of cystic fibrosis on sleep. Individuals with cystic fibrosis can face challenges with sleep-related breathing disorders which can exacerbate fatigue and impair one's quality of life.
Report of case: A 39-year-old male with history of cystic fibrosis, diabetes mellitus, depression, chronic sinusitis, and pancreatic insufficiency presented for evaluation of daytime fatigue and excessive daytime sleepiness. Patient reported fatigue, snoring and unrefreshed sleep for several years. He had reports of sleepwalking as a child which resolved in adulthood, otherwise no other specific sleep complaints were reported. His vital signs were within normal limits and no desaturation on room air was noted during the clinic visit. Body mass index was 26.04 kg/m2. Upon reviewing his previous laboratory results, HCO3 levels were noted to be 29 mmol/L. Patient underwent an in-lab polysomnography with CO2 monitoring. The study revealed sleep-related hypoventilation with baseline TcCO2 at 39 Torr, increasing to a maximum of 73 Torr in the study and baseline oxygen level of 92% with a nadir of 84%. However, the AHI, according to AASM criteria overall was 2.7. The REM supine AHI was higher at 13.8. Desaturation was also noted to be in the low 90s and high 80s during wakefulness and during sleep, independent from respiratory events. Patient is to initiate Bilevel S/T for significant hypoventilation and to follow up in the clinic to assess response regarding symptoms of excessive daytime sleepiness and fatigue.
Conclusion: This case aims to emphasize the critical role of recognizing sleep-related hypoventilation as a significant contributor to daytime fatigue in patients with cystic fibrosis and to advocate for the use of non-invasive ventilation strategies, such as Bilevel S/T, to enhance respiratory function and improve quality of life. Moreover, it highlights the necessity of CO2 monitoring during polysomnography, challenging the traditional focus on obstructive sleep apnea alone as the sole explanation for excessive daytime somnolence in this patient population.
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1471

WHEN MACROGLOSSIA IS NOT BECKWITH-WIEDEMANN: A CASE OF AN INFANT WITH CONGENITAL CENTRAL HYPOVENTILATION SYNDROME

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Introduction: Congenital central hypoventilation syndrome (CCHS) is a rare genetic disorder caused by the mutation of the paired-like homeobox 2B (PHOX2B) gene that leads to alveolar hypoventilation during sleep and at times while awake. The majority of patients with CCHS have polyalanine repeat mutations (PARM) whereas 10% have non-PARM (NPARM). Of those with NPARM, less than 1% are caused by whole gene deletion. NPARM is associated with more severe phenotypes; however, some may have variable penetrance causing variable presentation within families.
Report of case: Our patient is a 4-month-old infant born at 32 weeks in an outside hospital and transferred to our tertiary NICU at 10 weeks of age due to feeding difficulties, respiratory distress, hypoxemia, macroglossia and concern for Beckwith-Wiedemann syndrome. Upon transfer, she was on 2L of oxygen (FiO2: 0.3) via high flow nasal cannula. During her stay, she was noted to have hypoventilation which was thought to be secondary to upper airway obstruction. Upper airway evaluation by ENT revealed mild laryngomalacia for which supraglottoplasty was performed. Drug induced sleep endoscopy (DISE) revealed macroglossia with posterior displacement of the epiglottis causing obstruction. Due to concerns for obstruction and persistent hypoxemia, she was referred for a polysomnogram (PSG). The study was started on room air, but 1/4L of oxygen via low flow nasal cannula (LFNC) was initiated after 6 minutes due to persistent hypoxemia and hypoventilation. PSG showed an apnea hypopnea index (AHI)

of 18/hour, central apnea index (CAI) of 11/hour with persistent nocturnal hypoventilation based on ETCO2, transcutaneous CO2 monitor (TCM) and blood gas (ETCO2 > 50mmHg for 85% of total sleep time (TST), max ETCO2: 62mmHg, TCM>50mmHg for 96% TST, peak TCM: 70mmHg). Given these findings, recommendations were made to obtain PHOX2B gene testing and obtain neurologic workup. Exome sequencing showed deletion of the PHOX2B gene consistent with CCHS.
Conclusion: A high suspicion for CCHS should be present in patients with central apnea and hypoventilation. Many children with CCHS may be missed due to complex genetic testing and variation in clinical presentation.
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1472
A CASE OF PULSE RATE ARTIFACT DUE TO DEVICE AVERAGING TIME DURING ATRIAL FIBRILLATION ON HOME PORTABLE SLEEP STUDY

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Introduction: Obstructive sleep apnea (OSA) is an established risk factor of atrial fibrillation (Afib). Home portable sleep studies composed of a nasal cannula, finger pulse oximeter and measures of ventilatory effort are being increasingly utilized to diagnose OSA due to convenience and decreased costs. The NOX system is, and device recorder secured around the chest using a belt. We report that the portable monitoring systems using 4 beat averaging time create a pulse artifact on recording that is consistent with atrial fibrillation.
Report of case: A 69-year-old male with history of atrial fibrillation with prior successful cardioversion underwent a two-night diagnostic home portable NOX sleep study. The first night of the study demonstrated a pulse rate artifact beginning abruptly around 0150. Prior to artifact, the average pulse rate was 45 beats per min with a very narrow range. In contrast the artifact demonstrated an increase of the average pulse rate 80 beats min and a wide pulse rate range (> +/- 20 beats/min). Subsequent smartwatch warning about an abnormal and irregular heart rhythm prompted the patient to visit the ED visit where EKG confirmed Afib followed by successful cardioversion. Subsequently, the second night of his study demonstrated no pulse rate artifact. Afib did not resolve despite appropriate OSA treatment and has been recommended ablation by Cardiologist.
Conclusion: Our case highlights the pulse rate variation produced by the averaging time during Afib on home portable sleep study. While not diagnostic, it is important to recognize this pattern and understand the role that sampling rate and averaging time play in generating the pattern seen.
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1473
PRECISION THERAPY IN TREATING SEVERE OSA

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Introduction: Continuous positive airway pressure (CPAP) is widely considered the gold standard treatment for severe obstructive sleep apnea (OSA). Adherence remains a significant barrier to therapy, with studies reporting non-adherence rates ranging from 28% to 83%. Oral appliance therapy (OAT) is considered effective when reducing the apnea-hypopnea index (AHI) by approximately 50% and is primarily recognized for the treatment of mild to moderate OSA. Its use in severe OSA remains less understood. This case highlights the role of combination therapy in select patients with severe OSA.
Report of case: An 81-year-old male with a history of heart failure with preserved ejection fraction presented with fragmented sleep and excessive daytime sleepiness. He underwent a home sleep apnea test (HSAT) which revealed severe OSA with a component of Cheyne-Stokes respiration (CSR) and significant central apnea events, showing a baseline AHI4% of 52.6 events per hour (62.6 supine, 9.8 non-supine), a central apnea/hypopnea index of 13.4, a CSR of 17%, with a nadir oxygen saturation (SpO2) of 59% and a cumulative time below 89% of 87 minutes. Given his aversion to CPAP, a repeat HSAT with the use of an OAT demonstrated an improvement in AHI4% to 26 events per hour, with persistent severe OSA supine (77.4 versus 11.7 events per hour), but no further evidence of CSR or central apnea events. Nocturnal hypoxemia persisted with a nadir SpO2 of 56% and a cumulative time below 89% of 52 minutes. With the addition of combination positional therapy and OAT, the AHI4% improved to 3.6 events per hour with no further hypoxemia.
Conclusion: Adherence to positive airway pressure (PAP) therapy represents an ongoing challenge, with mask discomfort and pressure intolerance frequently reported as the most common reasons for non-adherence. There continues to be a need for alternative treatment options, particularly in patients with severe OSA and high hypoxic burden, such as our patient. This case highlights the efficacy of OAT, particularly when combined with other treatment modalities, as a viable first-line therapeutic approach in select patients. Tailoring treatment to individual endotypes and phenotype can enhance outcomes and expand therapeutic possibilities beyond PAP, further emphasizing the importance of individualized care.
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1474
USING HIGH FLOW NASAL CANNULA FOR SEVERE OBSTRUCTIVE SLEEP APNEA IN AN 8-MONTH-OLD WITH COFFIN-SIRIS SYNDROME: A CASE REPORT

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Introduction: Obstructive sleep apnea (OSA) prevalence rises from 1-5% in the general pediatric population to as high as 80% in children with complex comorbidities, as reported in published studies. Adenotonsillectomy (AT) is the primary treatment modality but has limited success in children with obesity or underlying medical conditions. Continuous positive airway pressure (CPAP) is the main treatment post-AT but suffers from low adherence. High flow nasal cannula (HFNC) is emerging as a more tolerable alternative, with evidence suggesting it achieves similar reductions in obstructive apnea-hypopnea index (oAHI) and other polysomnographic metrics as CPAP.
Report of case: An 8-month-old female with Coffin-Siris syndrome presented with severe OSA. Her medical history included

2q13 chromosomal deletion, congenital hypotonia, agenesis of the corpus callosum, gastroesophageal reflux requiring G-tube and Nissen fundoplication, optic nerve hypoplasia, and mild micrognathia. At birth, she experienced respiratory distress requiring CPAP, subsequently weaned to room air. However, she was later noted to have persistent stridor and oxygen desaturation episodes. A polysomnogram (PSG) showed an overall AHI of 42.2 without significant hypoxemia or hypercarbia. Initial management included supplemental oxygen. The patient was subsequently hospitalized for bronchiolitis, and started on scopolamine for excessive secretions, in addition to bronchodilators. At 8 months, she exhibited restless sleep with snoring, choking, mouth breathing, and apneas associated with bradycardia of < 60 beats per minute (BPM). Repeat PSG, revealed an oAHI of 20.2/hr with a nadir oxygen saturation of 79% and hypercapnia (ETCO2 >50 mmHg for 79% of sleep time). Per otolaryngology she was not a surgical candidate and nocturnal home HFNC oxygen at 8 L/min at 22% FiO2 was started. This resulted in improvement of her symptoms, oxygen saturation (96-100%) and resolution of heart rate variability. Follow-up at 24 months showed persistent symptom improvement with HFNC. Mother reported more restful sleep, improvement in oxygenation, airway clearance with reduced sessions of chest physiotherapy, and no hospitalizations.

Conclusion: HFNC is a viable alternative home therapy for pediatric OSA patients with complex medical comorbidities who are not surgical candidates. This case demonstrates sustained symptom improvement and better adherence with HFNC compared to traditional CPAP therapy.

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1475

BILEVEL PAP DATA IN THE SLEEP APNEA PATIENT WITH CO-MORBID INTERSTITIAL LUNG DISEASE

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Introduction: Obstructive sleep apnea (OSA) is a common co-morbidity in patients with interstitial lung disease (ILD). Studies estimate that OSA prevalence among ILD patients ranges from 17-88%, compared with 2–4% in healthy adults, underscoring a strong association. ILD, characterized by progressive fibrosis and impaired gas exchange, can exacerbate hypoxemia during sleep, while OSA, marked by recurrent airway collapse, may worsen nocturnal oxygen desaturation and increase respiratory effort. Breathing pattern changes, such as altered respiratory rates, tidal volumes, minute ventilation and/or inspiratory to expiratory ratio (I:E Ratio) are frequently observed in ILD patients. These respiratory indices can be identified via bilevel positive airway pressure (BiPAP) therapy reports, providing valuable insights into patient's respiratory status. This case report highlights the utility of readily accessible data to gain deeper understanding of patient's clinical status.

Report of case: A patient with a 5-year history of OSA and CPAP (continuous positive airway pressure) intolerance established care for OSA on 01/2021. Following a PAP titration study, he restarted CPAP but struggled with therapy and was lost to follow-up. In June 2023, he was reevaluated while undergoing ILD workup. By 7/2023, he was diagnosed with fibrotic ILD (hypersensitivity pneumonitis vs. nonspecific interstitial pneumonitis) and underwent wedge lung resection. In August 2023, BiPAP was started, showing initial improvement with mild mask fit issues. In 2024, his condition deteriorated. More acutely in May 2024 developed bilateral pulmonary embolism and progressive respiratory failure. Ultimately, on 9/2024, he underwent bilateral lung transplantation. The data obtained from patients' bilevel PAP therapy report during this time offers a unique opportunity to review his pulmonary physiology as his clinical course deteriorated and after subsequent lung transplantation. Marked increases in respiratory rate, drops in tidal volume, increase in minute ventilation and increasing I:E ratio was seen. In stark comparison, with lung transplantation, all these values normalized.

Conclusion: Home BiPAP devices may provide easily accessible data on pulmonary physiologic parameters which can be followed longitudinally. Understanding normal parameters, recognizing abnormal patterns in pulmonary and other diseases, and monitoring this data over time may offer additional insights to enhance patient care.

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1476

CHALLENGES IN MANAGING SEVERE OBSTRUCTIVE SLEEP APNEA WITH HYPOGLOSSAL NERVE STIMULATION: A CASE REPORT

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Introduction: Hypoglossal nerve stimulation (HGNS) is a second-line treatment for obstructive sleep apnea (OSA) in patients who cannot tolerate positive airway pressure (PAP) therapy. However, its efficacy as a standalone treatment in severe cases is limited. This case highlights the challenges of HGNS and supports a multimodal treatment strategy enhanced by drug-induced sleep endoscopy (DISE).

Report of case: We present a 57-year-old female with BMI 32 and severe OSA with an apnea-hypopnea index (AHI) of 92. She was intolerant to PAP due to mask discomfort, dry mouth, and claustrophobia. Following HGNS implantation, she experienced complications with device up-titration including persistent dry mouth and tongue discomfort. Her follow-up sleep study with an HGNS amplitude of 2.1 revealed an elevated AHI of 65, indicating persistent airway obstruction. Repeat DISE showed ongoing soft palate collapse with various HGNS electrode configurations, while moderately improving the base of tongue collapse. Additionally, a deviated nasal septum and collapsed lateral wall of the hypopharynx were noted. During DISE, a hyoid-suspension maneuver was manually performed by the physician, revealing improved patency, suggesting that a hyoid-suspension surgery would be beneficial. The patient was subsequently referred back to ENT and underwent hyoid suspension surgery and septoplasty, which improved the soft palate and hypopharyngeal opening. Six weeks later, repeat DISE and sleep studies with HGNS set at 2.1 amps demonstrated an open soft palate and base of tongue, with a significantly reduced AHI of 12 events per hour.

Conclusion: This case illustrates the limitations of HGNS as a monotherapy for severe OSA. Despite initial HGNS implantation, the patient's symptoms persisted, necessitating additional investigation and surgical interventions. By combining HGNS with hyoid suspension surgery and septoplasty, the patient faced significant improvements in airway patency with a notable

reduction in AHI. This illustrates the importance of a multimodal treatment approach and the benefits of repeat DISE in optimizing therapy for severe OSA.
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1477
OTALGIA POST-HNS ACTIVATION

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Introduction: Hypoglossal nerve stimulation (HNS) is a surgical treatment for obstructive sleep apnea (OSA) for patients intolerant of positive airway pressure (PAP) therapy. This implanted medical device is used to stimulate the hypoglossal nerve leading to tongue protrusion and airway opening. The procedure and treatment are generally well tolerated. Common complications include post-op pain, infections, neuropraxia, and hematoma. We present a case of a patient developing otalgia post-HNS activation.
Report of case: A 54-year-old male with a history of severe OSA (respiratory event index 44.7/hour) with PAP intolerance underwent HNS implantation. He returned one month later to undergo HNS activation. During attempted activation, he reported right ear pain at 0.8 volt (V) stimulation, described as a "shock" sensation to the right eardrum that persisted only with stimulation. He denied associated hearing changes, dizziness, and pain elsewhere. He denied any other trigger for pain. HNS activation was deferred this visit to allow time for recovery. He returned two months later to re-trial activation. He did not experience recurrent right ear pain at 0.8 V or higher voltage up to 1.0 V. His HNS was set at an amplitude of 1.0 V. During subsequent visits, the voltage was gradually increased with improvement of OSA symptoms. He did not report recurrent ear pain.
Conclusion: Given the sensation of shock occurred only with stimulation of the nerve, the pain was attributed to nerve injury. Given the resolution of the pain after several months, the pain was suspected to be secondary to post-surgical inflammation leading to activation of nerves, and less likely to be from dissection of the nerves. Otalgia can result from impingement of several nerves and their branches including the trigeminal, facial, glossopharyngeal, and vagus nerves. Upon review of literature, we noted one case of exacerbated atypical trigeminal neuralgia that was suspected to be secondary to activation of muscles including genioglossus, geniohyoid, and potentially the palatoglossus during HNS stimulation, with symptoms only resolving after HNS explantation and medical treatment. While otalgia is not a common complication following HNS implantation, it is important to counsel patients on these risks.
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1478
A CASE OF UNEXPLAINED NOCTURNAL HYPOXIA

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Introduction: We present a patient with unexplained nocturnal hypoxia out of proportion to his severe obstructive sleep apnea (OSA) and detail the workup done to assess for causes of hypoxia.
Report of case: A 75 year-old male with a BMI of 30 kg/m2 and past medical history of cirrhosis and non-oxygen dependent chronic obstructive lung disease presented with snoring, nocturnal awakenings and excessive daytime sleepiness. A home sleep apnea test showed moderate OSA and prolonged desaturations without preceding apneas or hypopneas. Thereafter, a split-night polysomnogram with bilevel positive airway pressure (BPAP) titration showed severe OSA with a baseline AHI of 64/hr. The patient was titrated to BPAP pressures of 17/12 cm H2O with resolution of obstructive events but continued hypoxia requiring 3LPM oxygen supplementation. An awake arterial blood gas (ABG) did not show evidence of hypercapnia. There was mild hypoxemia with an A-a gradient of 37.5 mmHg. An ABG shunt study to determine responsiveness to supplemental oxygen is pending. Pulmonary function testing showed a mixed obstructive and restrictive pattern by GOLD criteria with hyperinflation and normal diffusing capacity. Computed tomography of the chest demonstrated right diaphragmatic elevation without parenchymal lung disease. Echocardiogram with bubble study was negative for shunting and did not reveal pulmonary hypertension. After a limited daytime positive airway pressure (PAP) nap study, auto-titrating continuous positive airway pressure (APAP) set at 10-16 cmh20 with 3LPM oxygen bleed in was recommended. On this, a 3-night oximetry test showed ongoing significant oxygen desaturations despite adequate treatment of OSA. Oxygen bleed-in was increased to 5LPM. A repeat 3-night oximetry is pending.
Conclusion: The nocturnal hypoxia is likely multifactorial secondary to obstructive and restrictive lung disease along with a possible shunt. Right diaphragmatic elevation seems unlikely to cause severe hypoxia. A phrenic nerve study and transcranial doppler are pending. Platypnea-orthodeoxia was absent and hypoxia did not resolve with oxygen therapy. It is possible that PAP, known to cause an increase in RV afterload due to elevated intrathoracic pressure, could potentially cause an unidentified shunt to become a right to left shunt thereby causing hypoxia.
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1479
DEVELOPMENT OF RESTLESS ARMS SYNDROME AFTER INITIATION OF DULOXETINE

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Introduction: Restless arms syndrome (RAS) is a disorder in which affected individuals experience the urge to move their arms. These symptoms are particularly worse in the evening and improve with movement. RAS is rare, with very few cases being described. The etiology is suspected to be related to iron deficiency or dysfunction of iron utilization within the central nervous system.
Report of case: A 68-year-old woman with a medical history including anxiety, a mood disorder, and insomnia presented to the sleep clinic after developing an uncomfortable urge to move her arms around bedtime after increasing duloxetine. The patient was initially started on duloxetine 20 mg four months prior to her

visit. Her dose was then increased two months later to 60 mg. Her RAS symptoms started shortly after this increase. An iron panel and ferritin level were ordered to evaluate for additional contributors of RAS, which yielded values of 74 and 54.9, respectively. She was subsequently started on ferrous sulfate with repeat levels pending. The patient was counseled that antidepressants, with the exception of bupropion, can cause restless leg syndrome (RLS), and thus, were likely to be the cause of her RAS. Additionally, she was advised to refrain from alcohol, tobacco, and caffeine as these can be triggers of RAS. Relaxation techniques and the application of hot or cold packs were recommended as well.
Conclusion: The International RLS Study Group has established criteria used to diagnose RAS. Thus far, very few cases of RAS have been diagnosed using these criteria and RAS is likely underdiagnosed. While 22–50% of patients with RLS experience similar symptoms in the arms, restlessness rarely starts in the arms. This case supports evidence that reuptake inhibition of serotonin and norepinephrine may be implicated in the etiology behind RAS in addition to underlying iron deficiency.
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1480
RESTLESS SLEEP DISORDER IN A CHILD WITH AUTISM SPECTRUM DISORDER: RESPONSE TO INTRAVENOUS IRON THERAPY

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Introduction: Restless Sleep disorder (RSD) is a relatively new diagnosis with etiology similar to other sleep-related movement disorders. Polysomnography typically shows at least five or more large muscle movements per hour/sleep, positional changes, and normal sleep architecture. Lab workup includes low ferritin levels. Autism spectrum disorder (ASD) comorbidity in a younger pediatric patient with RSD presents a clinical challenge due to difficulty cooperating with diagnostic procedures and therapy. To date, RSD treatment recommendations have been based on studies with typically developing children ages 6-18 years.
Report of case: A 3-year-old male with a history of non-verbal ASD, lead exposure, and iron deficiency anemia (iron saturation of 14%, ferritin 8, TIBC 436, iron 84 ug/dL) was referred to Sleep Medicine for sleep onset and maintenance insomnia, insufficient sleep, and significant daytime behavior problems. Polysomnography was deferred due to erratic sleep patterns and sensory challenges. Oral iron supplementation failed due to restricted dietary preferences. Medication trials (melatonin, clonidine, hydroxyzine) were unsuccessful. Therapy for insomnia by a psychologist with expertise in behavioral sleep medicine yielded a modest response. Patient was referred to hematology and received three intravenous infusions of iron sucrose spaced two weeks apart. Parents and specialists in sleep psychology, occupational therapy, speech, and advanced behavioral analysis endorsed dramatic improvement in sleep duration (from 7 to 11 hours). Gains in the PROMIS sleep disturbance scales followed by cognition, social functioning, and developmental milestones occurred within a few months of iron level normalization (iron saturation of 37%, ferritin 124, TIBC 386, iron 141 ug/dL).
Conclusion: This case illustrates sleep improvement for a young child with severe ASD and RSD with intravenous iron treatment. Identifying and treating RSD in patients with ASD is challenging in the context of other co-occurring medical and psychological symptoms/disorders. The intravenous route may be an option in children with developmental/sensory differences who cannot tolerate oral iron therapy. The role of behavioral therapy in conjunction with intravenous iron treatment is an area for future clinical and research examination.
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1481
EVOLUTION OF OSA IN CROUZON'S SYNDROME

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Introduction: Crouzon's syndrome is caused by fibroblast growth factor receptor 2 (FGFR2) gene mutation and is seen in 16 out of 1 million live births. It is characterized by the premature closing of calvarial and cranial base sutures as well as the orbit and maxillary complex resulting in exophthalmos, flattened forehead, midface hypoplasia, and hypoplastic maxilla. This deformity, this leads to a high prevalence of obstructive sleep apnea. Here we present a case of the progression of OSA in a patient with Crouzon's with subsequent medical and surgical interventions.
Report of case: At age 15 months, patient was evaluated by Pediatrician for loud snoring and witnessed apneas. Her I'M SLEEPY questionnaire was positive with score of 4 and physical exam was pertinent for +3 tonsillar hypertrophy. She was evaluated by ENT where evaluation of pathognomonic facies was initiated and found positive for Crouzon's due to FGFR2 gene variant - c.1018T>C, p.Tyr340His. At 2 years old, initial PSG showed AHI: 24.3, RDI: 24.3, Oxygen Nadir 93%. Underwent T&A with ENT and established care with Sleep Medicine for management. Found to have continued symptoms of loud snoring, apneas, unrefreshing sleep. Second PSG at 4 years old, showed AHI 8.8, RDI: 9.7, Oxygen Nadir 93%. Attempted usage of AutoPAP, unable to tolerate due mask intolerance and chronic rhinitis. Underwent anterior cranial vault reconstruction with midface advancement with OMFS and Neurosurgery. Third PSG at 6 years old, AHI 3.6. Compliance was difficult to implement due to mask intolerance. At 8 years old, underwent LeFort III surgery and corrective orbital surgery. Fourth PSG at 9 years old, AHI 4.1, RDI 16.5, Oxygen Nadir 97%. Recommendations to attempt AutoBiPAP and continued follow up with OMFS for surgical versus orthodontic interventions.
Conclusion: Crouzon's syndrome is characterized with anatomical deformities which leads to high prevalence of OSA of 68% but data is limited given the overall epidemiology of this syndrome. The predominant contributing factor for OSA is midface hypoplasia. Treatment options include T&A followed by PAP using nasal interface and definitive treatment is surgical midface advance like Le Fort III with distraction osteogenesis, monobloc advancement and facial bipartition.
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1482
NON-POLYALANINE REPEAT PHOX2B MUTATION PRESENTING AS SEVERE CENTRAL SLEEP APNEA AFTER DINUTUXIMAB

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Introduction: Congenital central hypoventilation syndrome(CCHS) is a rare disorder of autonomic nervous system dysregulation affecting control of breathing. Ten percent of cases result from non-polyalanine repeat expansion mutations(NPARM) of the paired-like homeobox 2B(PHOX2B) gene. NPARM are often associated with severe phenotypes, such as the need for invasive mechanical ventilation in the neonatal period, malignant neuroblastoma, and severe Hirschsprung's disease. Children with NPARM with mild ventilatory abnormalities are rare. We present a case of a 4-year-old child with metastatic neuroblastoma, later diagnosed with CCHS, following acute respiratory failure after dinutuximab.
Report of case: A four-year-old full-term male with past history of congenital bilateral ptosis and metastatic neuroblastoma status post surgical resection was admitted for dinutuximab immunotherapy. During pathologic analysis of neuroblastoma, it was found to have NPARM of PHOX2B (c.691_698dup). Following dinutuximab infusion, he developed fever, pain requiring opioid medications, acute hypercarbic respiratory failure, and mental status change, initially concerning for iatrogenic oversedation related to opioids or infusion side effects. Laboratory results showed mild hyponatremia(135 mmol/L), hypokalemia(3.6 mmol/L), elevated bicarbonate(28 mmol/L). Venous blood gas showed acute respiratory acidosis with severe hypercarbia(pH 7.2, pCO2 113 mmHg). He required intubation and mechanical ventilation. Brain imaging revealed microhemorrhages in dorsal pons and thalamocapsular regions, but clinical significance was unclear. Electroencephalogram was normal. Infectious work up was negative. After extubation, diagnostic polysomnography was performed to evaluate control of breathing and revealed severe central sleep apnea(CAHI=100.2 events/hour), obstructive sleep apnea (OAHI=5.2 events/hour), and non-apneic hypoxemia(SpO2< 90% for 107 minutes) with no significant hypoventilation (TCO2>50 mmHg for 13% total sleep time). After starting 0.25L/min supplemental oxygen, CAHI improved to 31.2 events/hour, OAHI to 0.4 events/hour. Unfortunately, hypoventilation was induced with application of supplemental oxygen(TCO2>50 mmHg for 48% total sleep time), limiting further titration. He was discharged on supplemental oxygen pending further evaluation.
Conclusion: NPARM in PHOX2B are rare and typically result in severe hypoventilation during the neonatal period. This unique presentation of an older child with NPARM in PHOX2B, severe central sleep apnea but without hypoventilation, discovered subsequent to neuroblastoma evaluation. This case highlights there may be a broader spectrum of late-onset presentations of CCHS in children with NPARM in PHOX2b.
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1483
BIOT'S BREATHING
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Introduction: In 1875, Camille Biot oberserved an irregular breathing pattern—now called Biot's breathing—in a patient with tuberculous meningitis. This pattern is characterized by rapid, shallow breaths followed by periods of apnea or gasping. Unlike Cheyne-Stokes respiration, which involves crescendo-decrescendo pattern of breathing influenced by vasomotor changes (increased heart rate and decreased blood pressure during the apneic phase), Biot's breathing lacks such rhythmic fluctuations. Biot's breathing is typically associated with damage to the brainstem, particularly the medulla oblongata or pons, from conditions such as trauma, stroke, infection, opioid abuse, or tentorial herniation. Disruption of the pneumotaxic center and respiratory control mechanisms in the brainstem may lead to intermittent hypoventilation and cyclic hypoxemia. This pattern is seen in critically ill patients who require intubation or are on mechanical ventilation.
Report of case: A 76-year-old female was evaluated in the sleep clinic for snoring, witnessed apneas, gasping arousals, insomnia, and daytime fatigue. A home sleep apnea test diagnosed severe obstructive sleep apnea(OSA) with a Respiratory Event Index(REI) of 68.5. She was initially treated with autoCPAP(-continuous positive airway pressure) which showed elevated Apnea-hypopnea Index(AHI) prompting a need for a bilevel positive airway pressure(BiPAP) titration study. During the study, she was noted to have Biot's breathing pattern. Titration was started at 8/4cmH2O to final pressure of 25/20cmH2O. Significant findings of this study were as follows: reduced sleep efficiency of 67.13%, fragmented sleep and an elevated AHI despite titration. Further investigation revealed that two months prior, patient had a fall and likely traumatic brain injury. CT scan of the brain showed minimal periventricular hypoattenuation but no acute trauma. Patient also had hydrocodone on her medication list. She was eventually titrated to ASV which showed some improvement in her sleep apnea management.
Conclusion: Biot's breathing is a rare and underreported phenomenon with limited representation in literature. Although it is typically associated with conditions like meningitis, this case may represent a transient condition caused by inadequate ventilation during titration. While the patient had a recent fall and was using opioids, no traumatic injury or opioid overuse was confirmed. Further research is indicated to explore the relationship between Biot's breathing and complex sleep-disordered breathing.
Support (if any):

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1484
A CASE OF MEDICATION-RELATED CENTRAL APNEA DURING WAKEFULNESS
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Introduction: Tizanidine is an alpha-2 receptor adrenergic agonist employed for treatment of musculoskeletal pain and muscle spasticity. Drowsiness, xerostomia, and, less frequently, sleep disturbance are notable side effects. Central sleep apnea (CSA) occurs in patients taking other alpha-2 receptor agonists such as clonidine but the frequency of CSA among users of tizanidine is less well-known. Rarer still is the presence of central apneic episodes during wakefulness in patients without heart failure who have an intact brainstem and are not taking opioids or benzodiazepines. We report a case of a patient with central apneic episodes during wakefulness in the setting of tizanidine use.
Report of case: A 60-year-old white male was referred to our sleep center for sleep apnea. He was previously diagnosed with severe obstructive sleep apnea (apnea-hypopnea index of 104 events per hour) but was not adherent to continuous positive airway pressure (CPAP) due to a previous head injury which made use of CPAP straps intolerably painful. Thus, he had undergone

a modified uvulopalatopharyngoplasty 3 months prior to evaluation. Despite UPPP he continued to have excessive daytime sleepiness. A repeat polysomnogram revealed frequent central apneic episodes during periods of wakefulness that did not persist after sleep onset. The patient had taken his nightly tizanidine 8 mg prior to testing. Echocardiogram prior to testing showed mild diastolic dysfunction and brain magnetic resonance imaging was unremarkable. A polysomnogram was repeated 1 month later, this time with tizanidine held for 1 week prior to testing. Wake-onset central apneic episodes had resolved without any other changes in medication or health status.

Conclusion: Certain medications such as opioids, benzodiazepines, and baclofen are known to induce CSA. However, to the best of our knowledge this is the first case of a commonly prescribed alpha-2 agonist implicated in the development of wake-onset central apneic episodes. More study is needed to elucidate the impact of tizanidine on ventilatory function in the wake and sleep states and whether similar effects may occur among other centrally acting medications.

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1485

REVIVING THE SLEEP-WAKE CYCLE: INTEGRATED APPROACHES TO CIRCADIAN RHYTHM AND RLS MANAGEMENT IN A COMPLEX CASE

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Introduction: Circadian rhythm disorders, often misdiagnosed as primary insomnia, can be challenging to treat with medications alone. Effective management requires an integrated approach that combines behavioral therapy, circadian rhythm interventions, and lifestyle modifications[1,2]. This case details the treatment of a 59-year-old male with an irregular sleep-wake pattern, severe social anxiety, and restless legs syndrome (RLS). His treatment involved behavioral strategies and circadian rhythm interventions, resulting in significant improvements in his sleep and overall well-being.

Report of case: The patient presented with severe sleep disturbances, including spending up to 20 hours in bed per day, with a highly fragmented sleep schedule. His typical sleep pattern involved sleeping at 11:00 PM and waking at 3:15 AM, averaging 6–7 hours of broken sleep nightly, compounded by excessive daytime naps. Initial home sleep apnea testing revealed a total sleep time (TST) of 4 hours and 26 minutes, an apnea-hypopnea index (AHI) of 0.7/hr, and a minimum oxygen saturation of 91%. Follow up polysomnography showed a TST of 175.5 minutes, with a sleep efficiency of 56%, an AHI of 1.0/hr, and a periodic limb movement index of 83.4/hour. An integrated treatment plan was initiated, combining cognitive behavioral therapy for insomnia (CBT-i), sleep environment modifications, and lifestyle changes. The patient was encouraged to adhere to a consistent sleep-wake schedule and reduce time spent in bed during the day. Additionally, he started an exercise program to help manage his RLS symptoms and joined a senior center for increased social engagement. Several sedative medications, including melatonin, hydroxyzine, and trazodone were gradually discontinued. The patient now uses doxepin for insomnia and gabapentin a few times per week for RLS symptoms. Following these interventions, he was able to maintain consolidated nighttime sleep. His RLS symptoms also improved with regular physical activity.

Conclusion: This case illustrates the effectiveness of an integrated treatment approach combining behavioral therapy, circadian rhythm interventions, and lifestyle changes in managing complex sleep disorders like circadian rhythm dysfunction and RLS. The patient's use of CBT-i, exercise, and improved sleep hygiene led to a significant reduction in sleep fragmentation and a more regular sleep-wake cycle, as reflected in the improvement in patient's symptoms.

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1486

HYPOGLOSSAL NEUROPRAXIA FOLLOWING ELECTRICAL CARDIOVERSION FOR ATRIAL FIBRILLATION

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Introduction: Hypoglossal nerve stimulation (HNS) is an alternative therapy for moderate-to-severe obstructive sleep apnea (OSA). Atrial fibrillation (AF) frequently co-occurs with OSA due to their interrelationship.

Report of case: A 71-year-old male with AF and moderate OSA (AHI 26.9) intolerant to positive airway pressure (PAP) therapy underwent HNS implantation in 2021. He was admitted for dofetilide loading and electrical cardioversion (CV). CV was performed using a single 360 J shock with anterior-posterior pad placement. Following CV, the patient activated his HNS and immediately experienced a "shock-like" sensation on the right side of his tongue and buccal mucosa with concomitant worsening of right tongue deviation. Reducing HNS voltage did not did not alleviate symptoms; however, turning off the device resolved them. The voltage was well tolerated prior to admission. Chest and soft tissue neck x-rays demonstrated stable device and electrode positions. He was advised to defer HNS use for two weeks and re-attempt activation at the lowest voltage. At four-week follow up, he reported resuming HNS therapy without recurrence of symptoms, and tongue deviation had resolved. Device interrogation confirmed normal function.

Conclusion: Patients with OSA and HNS may require CV for AF. Newer generation HNS have less risk of device malfunction following CV. If neuropraxia occurs, it is typically self-limited and no treatment is required. Those managing care for AF and OSA patients should be cognizant of potential post CV issues with HNS and counsel patients accordingly. Current generation HNS may need additional design updates in the future to help prevent neuropraxia following CV.

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1487

COMPLEX CASE OF HYPOGLOSSAL NERVE STIMULATION (HGNS) IN OBSTRUCTIVE SLEEP APNEA (OSA) WITH CARDIAC COMORBIDITIES

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Introduction: HGNS is an effective treatment for OSA in patients who are intolerant to CPAP therapy. However, achieving optimal therapeutic settings can be particularly challenging in patients with significant comorbidities. This case highlights the complexities of managing severe OSA with HGNS in a patient with cardiovascular disease, emphasizing the need for repeated evaluations and interdisciplinary collaboration.
Report of case: A 73-year-old male with severe OSA (AHI 58.8/h, O_2 nadir 74%) and history of aortic valve replacement initially underwent HGNS implantation followed by uneventful activation. However, his post-implantation course was notable for HGNS titration study which failed to identify a therapeutic amplitude. During the study, the patient reported shortness of breath and chest discomfort along with audible wheezing. He also had hypoxia when awake and desaturations without clear flow limitations when asleep on night of the titration. His study revealed periodic breathing throughout the night which prompted an evaluation by his cardiologist. The patient was found to have critical bioprosthetic aortic stenosis, moderate aortic insufficiency, and mild to moderate mitral regurgitation on his transthoracic echocardiogram. The patient subsequently received transcatheter aortic valve replacement (TAVR) and following the surgery, he reported significantly improved sleep quality. Despite his subjective improvement, the home sleep test revealed a persistently elevated AHI of 46.1/h. Further adjustments of device settings following findings from awake endoscopy still failed to significantly reduce obstructive events. Advanced titration was then conducted to find the ideal electrode configuration and exhalation sensitivity, which finally led to reduction in his AHI to 1.1/h as well as improvement in his periodic breathing.
Conclusion: This case underscores the challenges of optimizing HGNS therapy in patients with severe OSA and complex comorbidities. Device titration was complicated by coexisting cardiac dysfunction, which initially masked the effectiveness of HGNS therapy. The identification and treatment of critical aortic stenosis through TAVR led to subjective improvement in sleep quality, underscoring the need to evaluate other potential contributors to persistent symptoms beyond sleep apnea and HGNS-related factors. Achieving optimal HGNS efficacy also required advanced titration and individualized adjustments, demonstrating the importance of comprehensive evaluations and multidisciplinary approach.
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1488

A SEVERE CASE OF PROPRIOSPINAL MYOCLONUS

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Introduction: Propriospinal myoclonus (PSM) is a rare disorder characterized by axial muscle jerks originating in the thoracoabdominal region and spreading outward. These are often exacerbated in recumbent positions and preceded by an internal sensation. Spinal cord pathology is reported in 7–20% of cases, with greater prevalence in daytime symptoms. Cough has not been reported in association with PSM. This case describes a 51-year-old female with refractory chronic cough and myoclonic jerks, ultimately diagnosed with PSM requiring multiple medications for symptom control.
Report of case: A 51-year-old female presented with a persistent cough following refractory treatments for gastroesophageal reflux disease (GERD) and asthma. Gastroenterology evaluation revealed grade A esophagitis, but GERD therapy yielded minimal improvement. Pulmonary function testing was normal, and treatments with steroids, montelukast, and inhaled therapies had little effect. ENT evaluation ruled out vocal cord dysfunction. Speech therapy also failed to improve symptoms. One year after symptom onset, the patient developed myoclonic jerks predominantly in the lower extremities, worsening in the evenings, particularly when reclining. Neurology consultation revealed jerks preceded by an internal sensation originating in the thoracic spine and radiating outward along with unremarkable exam findings. Episodes occurred up to 30 times per hour. Gabapentin provided minimal relief for both cough and spasms. Clonazepam reduced jerking frequency by 70% when taken daily, though escalation was limited by sedation. Levetiracetam was trialed after a previous case reported success with dual therapy, but was discontinued due to fatigue. Lacosamide 100 mg twice daily reduced spasm frequency to 10–30 daily, primarily in the evenings. Interestingly, reductions in spasms correlated with improvements in cough. MRI of the brain revealed scattered subcortical T2 FLAIR hyperintensities without significant findings. Spine imaging is pending. Based on clinical presentation and treatment response, the patient was diagnosed with PSM, also suspected to be the underlying cause of her chronic cough.
Conclusion: There has not been a reported case requiring clonazepam and lacosamide for symptom control.The correlation between reduced spasms and improved chronic cough highlights the potential for PSM to manifest with atypical symptoms.
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1489

A DAYTIME SOLUTION TO A NIGHTTIME DILEMMA - PAP-NAP TO GUIDE THERAPY OF SLEEP-DISORDERED BREATHING

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Introduction: The PAP-NAP, a daytime abbreviated sleep study, is a tool designed to improve positive airway pressure (PAP) therapy use in patients with sleep-disordered breathing. We present a case where a PAP-NAP study was utilized to determine appropriate therapy in a complex sleep patient with persistent high residual apnea hypopnea index (AHI).
Report of case: A 54-year-old obese male with history of chronic pain and depression was diagnosed with severe obstructive sleep apnea (OSA) (AHI 90/h) in 2010 via a polysomnogram and titrated to CPAP 9 cm H2O with improvement in symptoms. He became noncompliant in 2014 and reinitiated therapy in 2018 with persistent snoring and fatigue. Repeat sleep study resulted in a CPAP prescription of 18 cm H2O with excellent compliance, minimal leak and residual AHI of 9/hr. The patient was diagnosed with tonsillar cancer in March 2024 requiring opioids for pain. Despite significant weight loss (BMI fell from baseline of

40 to 28), he required 11+ hours of sleep with high residual AHI of 17.2/hr and HCO3 of 31.5 (previously normal). CPAP was transitioned to APAP 16-20 cm H2O with 90th centile pressure of 19 cm H20 and high AHI. The patient underwent a bilevel titration study notable for minimal sleep and severe central and mixed sleep apnea. Given need for continued opioids, and patient resistance to repeat sleep study, decision was made to conduct a PAP-NAP in conjunction with arterial blood gas (ABG) to determine ideal therapy for patient - adaptive servo-ventilation (ASV) versus bilevel. ABG showed a metabolic alkalosis with normal paCO2. PAP-NAP showed excellent response to ASV-Auto with resolution of obstructive and central sleep apnea. At one month the patient demonstrated excellent compliance, with a residual AHI of 8/hr and improvement in daytime sleepiness.
Conclusion: Our patient was complex due to a history of severe OSA with emergence of severe central sleep apnea after weight loss and opioid use in the setting of new malignancy. He underwent several PSG titration studies, and declined an additional overnight study. PAP-NAP was the key to optimizing PAP therapy and improving his daytime symptoms.
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1490
COMPARISON OF A TWO DIFFERENT HOME SLEEP APNEA TESTS ON A SINGLE NIGHT

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Introduction: The diagnosis of obstructive sleep apnea (OSA) has increasingly relied on home sleep apnea tests (HSATs) for their convenience and cost-effectiveness, making the comparative analysis of such devices critical. Flow-based and peripheral arterial tone (PAT) HSAT devices are available. This case study compared these two different HSAT devices used simultaneously on a single night. The WatchPAT HSAT (Zoll Itamar, Atlanta, GA) is a wrist-worn device with a chest sensor that uses PAT technology to detect respiratory events and reports sleep stages. The Alice NightOne HSAT (Philips Respironics, Murrysville, PA) measures nasal airflow and uses a single respiratory effort belt.
Report of case: A 31-year-old man with no significant medical history wore both a WatchPAT and Alice NightOne HSAT simultaneously on a single night. The PAT HSAT showed an overall the American Academy of Sleep Medicine (AASM) apnea-hypopnea index (AHI) (hypopneas defined as associated with a ≥3% oxygen desaturation or arousal) of 14.1/hr, Centers for Medicare & Medicaid Services (CMS) AHI (hypopneas defined as associated with ≥4% oxygen desaturation) 5.9/hr, and an AASM rapid eye movement sleep AHI of 47.1/hr. The flow-based HSAT showed a total AASM AHI of 7.4/hr, CMS 3.0/hr. Total recording time was 212 minutes for the PAT device and for the flow-based device. The PAT device reported a total sleep time of 349 minutes with a sleep latency of 56.5 minutes. Sleep parameters were not reported with the flow-based device. No cardiac findings were seen in either study. The patient preferred the PAT device due to comfortability and overall ease of the process.
Conclusion: Studies demonstrate that PAT HSATs may overestimate the AHI, while flow-based HSATs tend to underestimate the AHI. These differences may be attributed to differences in scoring algorithms and physiological metrics analyzed. A lack of a sleep time measure with most flow-based HSATs leads the AHI being reported over the total recording time, not sleep time, often leading to a lower AHI. These findings underscore the importance of selecting an HSAT based on the clinical context and diagnostic needs, highlighting the complementary strengths of both devices in managing OSA.
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1491
BENEFIT OF HYPNOSIS IN NREM AROUSAL PARASOMNIAS

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Introduction: Non-rapid eye movement (NREM) parasomnias include complex behaviors such as sleepwalking, sleep-related eating disorder and confusional arousals that emerge mainly during deep sleep. Adult lifetime prevalence varies widely (4–67%). Management typically focuses on education, safety measures, and addressing underlying triggers. When standard therapies prove insufficient, adjunctive techniques like hypnosis may offer additional benefit.
Report of case: A 59-year-old female with a long-standing history of intermittent sleepwalking and sleep-related eating sought care following a near-fatal sleep-driving incident. Her background included generalized anxiety, depression, PTSD, anorexia, and restless legs syndrome. Comprehensive evaluation ruled out nocturnal epileptiform activity, periodic limb movements, and obstructive sleep apnea. Polysomnography demonstrated confusional arousals from N2 sleep and increased phasic muscle tone in REM, without witnessed abnormal movements. Reduced arousals in the first half of the night suggested sedation from multiple psychotropic medications concerning for polypharmacy. Initial management involved psychiatry consultation to streamline her psychotropic regimen, alongside behavioral and environmental interventions to ensure safety. After excluding active organic or psychological factors perpetuating the episodes, one session of clinical hypnosis was performed and recorded. The patient listened to the recording daily, gradually reducing its use as episodes improved. Clonazepam was introduced and up titrated when potentially harmful episodes persisted. At follow-up, both the patient and her bed partner reported a notable reduction in frequency and severity of the episodes, with no further injurious events.
Conclusion: In a case of refractory NREM parasomnia, hypnosis—implemented after careful evaluation, medication adjustment, and safety measures—resulted in meaningful clinical improvement. This brief, time-efficient intervention may serve as a valuable adjunct to established therapies when conventional measures alone do not achieve adequate control.
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1492
RAPID RESOLUTION OF CPAP-INDUCED EAR DISCOMFORT IN OBSTRUCTIVE SLEEP APNEA: A CASE OF PRESSURE TITRATION

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Introduction: Continuous Positive Airway Pressure (CPAP) therapy is the cornerstone of treatment for obstructive sleep apnea (OSA). However, higher pressure settings can occasionally lead to unexpected complications. This case highlights the importance of careful pressure titration while treating OSA, particularly in patients experiencing ear-related symptoms.
Report of case: A 74-year-old male with a history of coronary artery disease and moderate OSA (REI 22.9/hour) presented with left ear discomfort exacerbated by CPAP use. Auto PAP was decreased from 4 to 20 cmH2O to 4 to 8 cmH2O to improve PAP tolerance, but due to persistent hypersomnia, he underwent PAP titration where the optimal therapeutic pressure was BPAP at 17/12 cmH2O. However, due to poor tolerance and left ear pressure sensation, the device was placed in automatic mode with a maximum IPAP of 10 cmH2O and pressure support (PS) of 4 cmH2O. Despite some initial improvement, the patient continued to experience left ear pressure sensation. A CT scan of the brain revealed fluid in the left ear. Neuroimaging with MRI of the internal auditory canal and temporal bone CT were normal. BPAP was set at 6/4 cmH2O with significant relief of the ear discomfort and subsequent improvement in PAP adherence.
Conclusion: This case highlights the potential for pressure-related complications during treatment with PAP, potentially linked to conditions such as temporal bone dehiscence or barotrauma. It emphasizes the importance of individualized pressure adjustment to reduce side effects related to PAP therapy so its utilization can be optimized in the treatment of OSA. Sleep specialists should be vigilant for unusual pressure-related symptoms and be prepared to adjust therapy as required, even if it means deviating from standard titration protocols.
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1493

SLEEP DISORDERS IN SPINOCEREBELLAR ATAXIA TYPE 2

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Introduction: The most common sleep disorders associated with spinocerebellar ataxia type 2 (SCA2) are restless leg syndrome (RLS) (18%), periodic limb movements of sleep (PLMs) (38%), and obstructive sleep apnea (OSA) (50-70%). In rare cases, SCA2 can be associated with REM-sleep behavior disorder (RBD) (6.2%). Here, we present a rare spinocerebellar ataxia type 2 case, in which the patient demonstrates RBD, RLS, PLM, and OSA on their polysomnogram.
Report of case: A 33-year-old right-handed man with a history of RLS and SCA2 (diagnosed 10 years ago by genetic testing with 43 CAG repeats) presented for evaluation of sleep disturbance. He reported episodic catathrenia, intermittent apneas, nocturnal limb movements, and nightmares. Family history was significant for a grandfather with OSA. A baseline polysomnogram demonstrated frequent limb movements during non-REM sleep, and increased EMG tone during REM sleep, during which the patient had at least 4 episodes of semi-purposeful movements, which included hand movements and brief kicks and jerks of the lower extremities. A subsequent titration reproduced frequent semi-purposeful limb movements during REM sleep including leg jerks, arm flailing, head turning, and picking at his sheets. The PLM index ranged from 70-110 events/hour. RBD was not associated with untreated OSA. On follow-up, the patient recalled his ex-wife complaining about him hitting her during sleep.
Conclusion: SCA2 is characterized by the olivopontocerebellar atrophy accompanied by degeneration of the thalamus and substantia nigra. Increased CAG repeats are hypothesized to lead to loss of REM-sleep atonia and, subsequently, RBD2. Recognition of RBD in CAG repeat pathologies, such as spinal and bulbar muscular atrophy, Huntington's disease, dentatorubral pallidoluysian atrophy, and spinocerebellar ataxias types 1,2,3,6,7, and 17 can lead to early screening and treatment. PLMs may be caused by dysfunction of the dopaminergic system in the hypothalamus with descending pathways to the spinal cord and dysfunction in D2 receptor binding in the striatum. In contrast to RBD, there is no correlation between CAG repeats and PLMs. The development and subsequent severity of PLMs are closely associated with disease duration and ataxia. PLMs and RBD are underrecognized sleep disorders in SCA patients.
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1494

SENSOR LEAD BREACH IN HYPOGLOSSAL NERVE STIMULATION THERAPY

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Introduction: Targeted hypoglossal nerve stimulation (HNS) offers an alternative treatment approach by activating lingual muscles for patients with moderate to severe OSA who are intolerant of CPAP therapy.
Report of case: We present a case of a 71-year-old Male with severe obstructive sleep apnea, diagnosed in 2017. He developed CPAP intolerance after a short trial and subsequently underwent a Uvulopalatopharyngoplasty (UPPP) with re-emergence of OSA symptoms following the procedure. After the failure of another CPAP trial, the patient was implanted with HNS on 12/27/19. His device was activated; however, he was unable to complete his titration study due to the pandemic. He returned to clinic on 10/19/22 with the complaint of HNS intolerance. He reported the stimulation as uncomfortable, often turning on before he fell asleep. In-clinic interrogation showed no downward waveform deflections, good tongue movement and appropriate ratios on impedance check. His amplitude and start delay settings were adjusted. A follow up titration study at 3 months showed an ideal amplitude of 1.9V with well controlled apnea. At his follow-up visit on 3/15/23, the patient reported improved tolerance with usage averaging 45 hours per week. Interval HSAT showed respiratory event index of 14.2. At his 1-year follow-up, device interrogation revealed downward deflections and high frequency noise on sensor waveform. Findings were discussed with the device manufacturer and recommendation issued to stop treatment. Advanced testing showed persistent shark-fin waveform and high frequency noise indicative of respiratory sense lead breach. Patient was referred to ENT for revision of HNS. The surgeon noted a section of the respiratory lead that was discolored and fractured revealing the location of the sheath breach. He also noted a cracked sheath around the stimulation lead necessitating replacement of the entire HNS unit. Post surgery, the patient returned to clinic for successful activation and showed resolved abnormal waveform and no high frequency noise. Follow up sleep studies are pending.

Conclusion: This case illustrates an approach to trouble shooting sensor lead hardware compromise and demonstrates the importance of monitoring for abnormal waveforms.
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1495
CSA INDUCED BY EXCESS PRESSURE SUPPORT: A CASE REPORT

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Introduction: Studies and cases have reported an association between the pathogenesis of OSA and CSA. There is also some increased propensity for CSA in OSA patients. A specific form of CSA, treatment emergent central sleep apnea (TECSA), mostly occurs with CPAP titrations. Additional risk factors for TECSA include bilevel PAP or high pressure support levels.
Report of case: Mr. C is a 37 year old male who originally was referred to the University of Kentucky sleep medicine clinic to establish care. He had already been diagnosed with OSA at an outside facility. His Epworth Sleepiness Scale score was 7. He was on BiPAP 18/10 cm H2O, with a pressure support of 8. His BiPAP download showed CSA, with a central index of 21 and AHI of 23 overall. He was not on any centrally acting medications, had no history of CVA, and his echocardiogram showed a normal LVEF. His therapy was changed to CPAP 10cm H2O. Within 14 days, his central index decreased to 8.6 and AHI was 10.8; most recently his AHI is now < 5. Clinically, he states he finally was able to obtain uninterrupted, deep sleep that was restorative in the mornings.
Conclusion: TECSA is an acknowledged complication of PAP therapy for OSA. However, this case demonstrates an event where high-pressure support via BiPAP induced CSA. 20-30% of patients with OSA are prescribed BiPAP for a variety of reasons. It is imperative to link the pathophysiology of CSA and OSA in patients with otherwise no clear etiology of CSA and acknowledge how elevated pressure support induced hypocapnia may correlate with the development of TECSA.
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1496
RESTLESS LEGS SYNDROME IN A PEDIATRIC PATIENT: A RARE COMPLICATION FOLLOWING GLOMERULONEPHRITIS

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Introduction: Restless Legs Syndrome (RLS) is a neurological disorder characterized by an irresistible urge to move the legs, often accompanied by uncomfortable sensations. In pediatric populations, RLS is less common, with studies suggesting a prevalence of 2-4%[1,2]. Although 12-35% of pediatric chronic kidney disease patients experience RLS symptoms, the incidence of RLS with glomerulonephritis is much lower, with only a few documented cases in the literature[3,4]. Therefore, the association of RLS in a child with glomerulonephritis is an unusual presentation, making this case particularly noteworthy.
Report of case: A 9-year-old male presented with difficulty falling asleep, maintaining sleep, and feeling fatigued despite adequate sleep hours since a year. These symptoms coincided with his recent diagnosis of glomerulonephritis following recurrent streptococcal infections. Despite undergoing tonsillectomy and adenoidectomy to treat these recurrent infections, the patient continued to experience significant daytime sleepiness, often falling asleep at school or in the car. The parents also reported frequent leg twitches, jerks, sleepwalking, and nocturnal eating episodes which cycled into restless and non-refreshing sleep. The patient's sleep study revealed no signs of sleep apnea, however showed reduced REM sleep (9.1%), low sleep efficiency (54%), increased sleep onset latency (190 minutes), and an arousal index of 7.5. These findings suggested significant sleep disruption, due to the patient's leg movements. Given the timing of his symptoms following the diagnosis of glomerulonephritis, RLS was suspected. Subsequent testing for ferritin level was found to be 56 ng/mL, which was slightly below optimal levels for his age. Treatment with a multivitamin containing iron and gabapentin led to significant improvements in his sleep quality and daytime symptoms. Parasomnias and leg twitches improved, and restorative sleep resulted.
Conclusion: This case highlights the rare occurrence of RLS following glomerulonephritis in a pediatric patient, underscoring the importance of considering neurological symptoms in children with kidney disease. Further research is needed to explore the potential link between renal conditions and RLS in pediatric populations.
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1497
NONCODING RNAS AND NEUROLOGICAL DISEASES: A NOVEL POLR3B MUTATION EXPANDING THE PHENOTYPIC SPECTRUM

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Introduction: Charcot-Marie-Tooth disease (CMT) is a heterogeneous group of monogenetic peripheral neuropathies with a prevalence of 1:2,500. Patients with CMT significantly lower sleep quality and excessive daytime sleepiness. Recent studies have shown that missense variants in POLR3B are part of the genotyping spectrum of mutational mechanisms associated with CMT. A total of 10 patients with neurological conditions, including CMT, and POLR3B missense heterozygous de novo mutations have been previously reported; however, sleep disturbances in individuals with these mutations are uncharacterized.
Report of case: The 35-year-old female patient with Charcot-Marie-Tooth syndrome and a missense mutation in the POLR3B gene (c.1424A>G/p.Gln475Arg) had a normal term delivery without complications. She had a history of chronic obstructive pulmonary disease, systemic lupus erythematosus, arthralgia, and progressive bilateral hearing and vision loss, skin lesions, and mouth ulcers. At age 27 years, she developed abdominal spasms and cognitive impairment, which progressed to dysautonomia, requiring her to stop working as a psychologist. Magnetic resonance imaging findings at the age of 31 years include right paramedian disc protrusion with spinal cord compression and left temporal extra-axial expanding

lesion. Polysomnography type I carried out at the age of 35 years showed normal sleep architecture, apnea/hypopnea index (AHI=0.9) and oxygen saturation. In Pittsburg Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS), she achieved 5 and 9 scores, respectively. She scored 2 in each of the PSQI subdomains referring to "sleep disturbances" and "sleep medications". Her autoperception of sleep quality and sleepiness (PSQI and ESS scores) contrasted with the report of her main caregiver, which described major problems in initiating and maintaining sleep.
Conclusion: The description of this case highlights the need of clinically evaluation sleep disturbances in CMT cases. When clinical data from the 10 previous reported patients are contrasted with this current narrative, this specific case is the only to have a late on-set disease, expanding the putative prognosis of this clinical spectrum. Sleep disorders were not mentioned in other case reports. To expand the genotype-phenotype correlation and indicate therapeutical interventions, future studies with larger cohorts and objective sleep assessments are warranted.
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1498
DOWN SYNDROME REGRESSION DISORDER: COMPLICATIONS AFTER HYPOGLOSSAL NERVE STIMULATOR IMPLANTATION

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Introduction: Hypoglossal nerve stimulation (HNS) therapy is indicated in patients with Down syndrome (DS) with severe obstructive sleep apnea (OSA). HNS is well-tolerated with significant reduction in apnea-hypopnea index (AHI). This is a case of a patient with DS whose recovery after HNS implantation was complicated by Down syndrome regression disorder (DSRD).
Report of case: An 18-year-old female with DS, repaired complete atrioventricular septal defect and mitral valve cleft, asthma, polycystic ovarian syndrome, OSA, and obesity (BMI 44) was diagnosed with severe OSA as a 7-year-old with elevated obstructive AHI (oAHI of 20.11). After surgical interventions, including tonsillectomy, adenoidectomy, and turbinate reduction, her sleep apnea remained severe (oAHI 12.8). She did not tolerate continuous positive airway pressure (7 cm H2O). At 16 years of age, a repeat PSG showed persistent severe OSA (oAHI 14.82) and endoscopy demonstrated partial collapse of the lateral pharyngeal wall and tongue base. Three months before HNS implantation, she developed auditory hallucinations and nystagmus. An extensive evaluation was negative for infection, encephalopathy, autoimmune disorders, and drug intoxication. Without a formal diagnosis for her symptoms, she underwent HNS implantation. Post-implantation, further evaluation of her symptoms with magnetic resonance imaging (MRI) of the brain was delayed until the HNS could be activated. She was ultimately diagnosed with DSRD, a rare regression of functional skills with potential neurological deficits, hallucinations, and poor sleep in patients with DS. She was treated with intravenous steroid and immunoglobulin infusions, lorazepam, and aripiprazole and clinically improved. HNS was activated two months post-implantation. Initiation PSG with HNS showed optimal control with an amplitude of 0.6 voltage, electrode configuration A, pulse width 90 microseconds, rate of 33 hertz with residual AHI 0. Despite adherence with HNS, she continues to experience mild snoring, fatigue, and restless sleep.
Conclusion: This patient's DSRD symptoms complicated the understanding of clinical improvement post HNS implantation. Inability to obtain an MRI prior to activation of the HNS device may have delayed the diagnosis of her DSRD. This population of patients with DS treated with HNS warrants further screening for potential co-morbidities prior to surgical implantation and further understanding of complications post-implantation.
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1499
FALSE VOCAL CORD ENLARGEMENT IN TRANSGENDER PATIENT ON TESTOSTERONE THERAPY CONTRIBUTING TO OBSTRUCTIVE SLEEP APNEA

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Introduction: Hormones have been shown to play an important part in obstructive sleep apnea (OSA). Female hormones are thought to be protective of obstructive sleep apnea with an increased prevalence of OSA in postmenopausal females. In transgender medicine, exogenous testosterone is the cornerstone of treatment with the goal of virilization to achieve physical attributes that match gender identity. Androgen excess in females leads to thickening of the vocal cords with hypertrophy and hyperplasia of the thyroarytenoid muscle, hyperplasia of the laryngeal mucosa epithelium, and edema of the connective tissue stroma and enlargement of the laryngeal cartilage.2 While these mechanisms can achieve the desired voice deepening, there is also concern that it may contribute to the development of OSA.
Report of case: Here we present the case of a 34 yo transgender female to male patient on testosterone therapy for the past 7 years who presents with CPAP intolerance. After struggling with CPAP for over a year, he was referred for PAP alternatives for his OSA and underwent drug induced sleep endoscopy (DISE) for evaluation for hypoglossal nerve stimulator. During the endoscopy he was found to have significant thickening of the false vocal cords (FVC) causing near complete obstruction of the airway, with improvement noted with jaw thrust. It was suspected that the patient's findings were related to testosterone therapy. The patient ultimately decided to continue the current dose of testosterone and opted for an oral appliance (OA) for management of his OSA.
Conclusion: Transgender medicine is an emerging field with an increased prevalence of gender affirming hormonal therapy and gender confirmation surgeries over the past decade. The findings of FVC thickening, likely related to testosterone use, has yet to be described in the literature and can give insight into the pathophysiology of OSA in patients on hormonal therapy. Special attention should be given to patients treated with testosterone who fail to improve with or report intolerance to PAP therapy as this may be linked to airway abnormalities such as FVC thickening reported here. DISE may help guide treatment decisions in these cases and patients may improve with alternative therapies such as OAs.
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1500

KLEINE-LEVIN SYNDROME: A TALE OF TWO SLEEP-WAKE STATES

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Introduction: Kleine-Levin Syndrome (KLS) is a rare disease characterized by relapsing-remitting episodes of severe hypersomnolence in association with cognitive, psychiatric, and behavioral disturbances. Described below is a case of KLS associated with viral infection, menstrual cycles, and vaccination.
Report of case: A 17-year-old female presented to the pediatric sleep clinic for evaluation of recurrent episodic behavioral changes associated with prolonged sleep time. An initial episode of manipulative behavior associated with family stressors was concerning for underlying depression and she was prescribed escitalopram but continued to report 'dissociative' episodes. Approximately six months later, the patient developed a fever associated with acute changes in mentation and increased sleep duration of 18 hours per 24-hour period. The patient underwent evaluation in a pediatric ICU. Workup included MRI brain (negative), respiratory viral panel (positive for human metapneumovirus), urine drug screen (positive for cannabis), and a lumbar puncture with viral testing (normal protein, cell count, and microbiologic testing [note that CSF human metapneumovirus testing was not performed]). She was diagnosed with encephalopathy due to human metapneumovirus and was discharged home with persistent prolongation of sleep duration for the subsequent 8 days. Over the next 7 months, the patient experienced 3 more episodes of hyperphagia, hypersomnolence, and changes in behavior including self-gratifying behavior lasting for 7-12 days. Two of these episodes were associated with the onset of menstruation. The third episode occurred after influenza vaccination. Note that between episodes, the patient was noted by her mother to return to baseline mentation and a have a normalization of sleep duration within a given 24 hour period. Upon evaluation in the pediatric sleep clinic, the patient underwent polysomnography with mean sleep latency testing demonstrating absence of sleep disordered breathing and a mean sleep latency of 8 minutes 24 seconds with no observed sleep onset REM periods. Therapy with modafinil was trialed but she had recurrent episodes. The patient is currently on carbamazepine with an overall reduction in the frequency and duration of episodes.
Conclusion: Presented above is a rare case of KLS associated with various triggers including viral infection, menstrual cycle, and vaccination.
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1501

SLEEPY TEENS: A CASE SERIES OF DIAGNOSTIC DILEMMAS IN PATHOLOGICAL EXCESSIVE DAYTIME SLEEPINESS (EDS)

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Introduction: Central disorders for hypersomnolence (CDH) consist of idiopathic hypersomnia (IH), narcolepsy type 1 and type 2. These are difficult to differentiate due to confounding social issues and mood disorders commonly encountered in pediatric clinical settings, which may contribute to the delay in diagnosis. These diagnostic dilemmas arise in patients who have significant sleepiness, but do not meet diagnostic criteria. Here, a case series of five patients with EDS, and their confounders will be presented.
Report of case: An eleven-year-old early teen with an Epworth Sleepiness Scale (ESS) of 17, who has undergone polysomnograms (PSG) and multiple sleep latency tests (MSLT) demonstrating 1-2 sleep onset rapid eye movement periods (SOREMP), and mean sleep-onset latency (MSL) of 8.7 minutes and 9 minutes. Genetic testing and cerebrospinal fluid orexin levels were normal. A twenty-year-old (ESS 13) with unrefreshing naps without cataplexy, underwent a PSG/MSLT demonstrating 3 SOREMPs and MSL of 3.3 minutes while on sertraline and trazodone, but 6.3 hours of sleep and AHI of 3.0/hr with normal genetic testing and orexin levels. An eighteen-year-old with hypersomnia (ESS 16) and snoring had no SOREMPs, but an MSL of 7.5 minutes and normal orexin levels with an AHI of 3.9/hr, while an eighteen-year-old with ESS of 20, cataplexy and hypnogogic hallucinations had no SOREMPs and an MSL of 14.3 minutes. Lastly, a 21-year-old with sleep paralysis had no SOREMPs and an MSL of 9.5 minutes on fluoxetine, with 1% REM sleep and 83.5% N3 sleep on the prior PSG. Sleep diaries had no significant findings. Each of these patients had confounding variables (Table 1). These patients all received trials of wake-promoting agents or stimulants with varying degrees of success.
Conclusion: These cases represent the challenges encountered in the children due to numerous confounders in EDS, and not meeting criteria for CDH. This is frustrating for both families and providers as they may or may not progress to narcolepsy or IH with time, hence, contributing to the problem of delays in diagnosis of CDH and treatment. Further studies and guidelines specific to children are needed to re-define CDH accounting for the variability in the presentation.
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1502

SEVERE UPPER AIRWAY OBSTRUCTION IN A PEDIATRIC PATIENT WITH PIERRE ROBIN SYNDROME: INCOMPLETE RESOLUTION AFTER SURGICAL MANAGEMENT

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Introduction: Pierre Robin syndrome (PRS) is characterized by micrognathia or retrognathia, glossoptosis, and cleft palate. Over 85% of patients have significant upper airway obstruction (UAO) with sleep-disordered breathing. Management of UAO in patients with PRS involves a multidisciplinary approach and often requires surgical management. The authors present a case of persistent obstructive sleep apnea (OSA) in a pediatric patient with PRS.
Report of case: Patient is a 7-year-old female with PRS with micrognathia, glossoptosis, and cleft palate, DiGeorge syndrome, and history of biliary embryonal rhabdomyosarcoma with complete resolution after chemotherapy. She was first diagnosed with severe OSA at one month of age with respiratory disturbance index of 176/hour. She underwent bilateral mandibular distraction at two months old. Repeat polysomnogram

(PSG) showed persistent severe OSA, although reduced in severity with obstructive apnea-hypopnea index (oAHI) of 54.7/hour. Titration PSG was completed with optimal control on bilevel positive airway pressure (BPAP) at 13/9 cm H2O. Repeat laryngoscopies showed improvement in glossoptosis and normal subglottis and trachea. However, given her persistent severe OSA and BPAP pressure intolerance, she underwent a second bilateral mandibular distraction at 3 years old. Repeat PSG showed persistent severe OSA with further reduction in oAHI to 13.41/hour. After multidisciplinary discussion, additional airway augmentation procedures were determined to not provide further benefit. Decision was made to proceed with cleft palate repair to facilitate improved speech and quality of life. She underwent palatoplasty at 4 years old and her initial post-operative PSG showed mild worsening of OSA with oAHI 21.12/hour. However, with continued healing and growth, repeat PSG at 6 years old shows improvement of OSA with oAHI 13/hour. Her OSA now remains well-controlled with optimal BPAP adherence. She continues to follow closely with speech therapy to improve articulation.

Conclusion: Mandibular distraction has become the mainstay of treatment for patients with PRS and severe UAO refractory to non-invasive treatment. Incomplete resolution of UAO after mandibular distraction is typically associated with infection, device failure, preoperative intubation, or laryngotracheomalacia, which this patient did not have. This case offers further understanding of the complexities of long-term management of patients with PRS and incomplete resolution of UAO after multiple surgical treatments.

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1503

FLOPPY EYELID SYNDROME: AN OVERLOOKED INDICATOR FOR DIAGNOSING OBSTRUCTIVE SLEEP APNEA

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Introduction: Obstructive sleep apnea (OSA) is characterized by recurrent episodes of disrupted breathing during sleep, caused by upper airway obstruction. It affects a substantial portion of the U.S. adult population, with millions estimated to have the condition, though most cases remain undiagnosed. Left untreated, OSA is associated with significant health risks, including obesity, hypertension, type 2 diabetes, cardiovascular disease, and stroke. While typical symptoms such as snoring, gasping, and witnessed apneic events occur during sleep, a less common but notable association exists with floppy eyelid syndrome (FES). FES, resulting from low-grade inflammation and elastin degradation in the eyelids, can serve as a visible indicator of OSA during wakefulness, especially for individuals without a bed partner to observe sleep-related symptoms.

Report of case: A 33-year-old male with morbid obesity and hypertension was referred to sleep medicine after his ophthalmologist observed floppy eyelids during an evaluation for a conjunctival growth. The patient reported mild excessive daytime sleepiness, as indicated by his Epworth Sleepiness Scale score, but did not recall symptoms like choking or gasping during sleep. However, his family reported snoring, gasping, and episodes of apnea. An overnight titration polysomnogram confirmed severe obstructive sleep apnea with an exceptionally high apnea-hypopnea index (AHI) and a significant obstructive component. Continuous positive airway pressure (CPAP) therapy at 13 cm H2O effectively reduced the respiratory disturbance index to 2.9 events per hour.

Conclusion: This case highlights the importance of floppy eyelids as a potential diagnostic clue for OSA, particularly in individuals who may not recognize or report common sleep-related symptoms. In this instance, the incidental finding of FES led to an OSA evaluation, resulting in diagnosis and treatment. Floppy eyelids provide a unique, observable indicator for clinicians and patients alike, serving as an accessible tool to aid in identifying OSA in the absence of self-reported or witnessed sleep symptoms.

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1504

COMPLEX IDIOPATHIC HYPERSOMNIA AND SEVERE OBSTRUCTIVE SLEEP APNEA CONTROLLED WITH HYPOGLOSSAL NERVE STIMULATOR

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Introduction: Idiopathic hypersomnia requires an extensive work-up, only to be a diagnosis of exclusion. The clinical presentation can overlap with other pathologies, often requiring multiple diagnostic and laboratory investigations. This can result in a complex care plan.

Report of case: We present the case of a 43 year old male with severe obstructive sleep apnea with an apnea-hypopnea index (AHI) of 56.7 events per hour. Despite nasal turbinate reduction and septoplasty for deviated septum, he was intolerant to both CPAP and BPAP therapy. He underwent hypoglossal nerve stimulator insertion with a final AHI of 3.5 events per hour during his fine-tune polysomnography. Despite adequate therapy, Patient continued to have excessive daytime sleepiness. He was trialed on modafinil with no improvement despite increased doses. There was no significant symptomatic improvement on armodafinil with increased doses. A home sleep test was conducted with a resulting Respiratory Event Index (REI) of 7.7 events/hour. The patient underwent diagnostic polysomnography followed by multiple sleep latency test (MSLT) after holding armodafinil for 3 days. During the preceding night polysomnography, the patient had difficulty maintaining sleep due to the voltage of the hypoglossal nerve stimulator. This improved after a decrease in the voltage by two levels. MSLT resulted in mean sleep latency of 4.1 minutes and 0 SOREM periods, thereby ruling out narcolepsy without cataplexy. Patient was started on calcium, magnesium, potassium, and sodium oxybate with improved quality of life and decrease daytime sleepiness.

Conclusion: This case illustrates many complexities of sleep medicine and diagnosing multiple sleep problems with overlapping symptomatology. This can sometimes involve extensive diagnostic testing and trial medications, only to result in a diagnosis of exclusion. This case reveals the added complexity of conducting an MSLT on a patient with a hypoglossal nerve stimulator. While the goal of PAP therapy is an AHI of less than or equal to 5 events per hour, successful therapy with a hypoglossal nerve stimulator is an AHI < 15 events per hour or a 50% reduction in the diagnostic AHI. This can create a discordance

of what defines a negative or normal preceding night polysomnography when conducting an MSLT.
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1505
THE DIAGNOSTIC VALUE OF SLEEP ABNORMALITIES IN ANTI-IGLON5 ENCEPHALITIS: CLINICAL AND POLYSOMNOGRAPHIC INSIGHTS

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Introduction: Autoimmune encephalitis (AE) is an underrecognized cause of sleep disturbances, presenting with motor and cognitive features that may raise suspicion. Identifying specific sleep-related abnormalities can provide critical insights for diagnosing AE.
Report of case: Patient 1: A 52-year-old women presented bilateral and symmetrical bradykinesia, rigidity and postural instability, and frequent falls. Her family reported frequent nightmares, dream-acting, yelling and hyper motor behavior during sleep. She was hospitalized for rapidly progressive dementia characterized by amnestic deficits, apraxia, impaired attention, and acalculia. Examination revealed a limitation in downward gaze. Brain MRI revealed diffuse cortical atrophy and CSF study showed albumin-cytological dissociation. Extensive evaluation ruled out nutritional deficits, neoplasms, infections and prions. Serum testing detected anti-IgLON5 antibodies via indirect immunofluorescence. She was treated with corticoids, intravenous immunoglobulin (IVIG) and cyclophosphamide, achieving clinical improvement. Follow-up polysomnography confirmed REM sleep behavior disorder with a non-atonic REM phase. Patient 2: A 52-year-old men with a history of snoring, diurnal somnolence and suspected obstructive sleep apnea syndrome underwent polysomnography study. His medical history included cervical dystonia, treated with botulinum toxin for a year. However, his symptoms were worsening with dysarthria and dysphagia. Moreover, the neurological assessment revealed bilateral bradykinesia and rigidity. The polysomnogram revealed stridor, OSA and a poorly integrated N2 phase. CSF showed isolated hyperproteinorrachia while MRI was unremarkable. Secondary causes of parkinsonism were excluded. A CSF autoimmune encephalitis panel had positive anti-IgLON5. The patient did not responded to high-dose corticosteroids and cyclophosphamide and it is currently waiting for monoclonal antibodies therapy insurance approval.
Conclusion: Anti-IgLON5 encephalitis is a rare autoimmune disorder with a subacute course, typically affecting individuals aged 40-60 years. Sleep disturbances including aberrant sleep architecture, parasomnia and insomnia are common. Bulbar symptoms such as dysphagia, dysarthria, stridor, and acute respiratory failure are frequent. The syndrome can mimic progressive supranuclear palsy due to vertical gaze limitations and atypical parkinsonian symptoms. Rapidly progressive dementia could precipitate hospital admission and complicate further the diagnosis. A suggestive clinical course among key findings in polysomnography could support diagnosis and proper early immunomodulating treatment.
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1506
CORRECTING SMILES AND AIRWAYS: ORTHODONTIC TREATMENT FOR PEDIATRIC OSA

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Introduction: Pediatric OSA has been linked with cognitive impairments, behavioral effects leading to academic underperformance and significant cardiovascular and metabolic consequences. Craniofacial abnormalities are one of the contributing factors for an increased risk of OSA and a cause of relapse or incomplete resolution of OSA. Orthodontic treatments have emerged as one of the treatment options for patients with craniofacial abnormalities.
Report of case: A 17-year-old patient with a history of mild obstructive sleep apnea (OSA) diagnosed at age 10 presented with persistent sleep-disordered breathing (SDB). Symptoms began at age 8, including snoring and loud breathing. The patient underwent adenoidectomy at 6 years of age and tonsillectomy at 10 years of age, with persistent symptoms leading to referral to Sleep Medicine and ENT. Physical examination findings included Class II malocclusion, left posterior crossbite, high-arched palate, macroglossia, maxillary and mandibular hypoplasia with lip pursing, a right-sided deviated nasal septum with internal nasal valve collapse, and bilateral inferior turbinate hypertrophy. A CT sinus study revealed bilateral concha and a septal spur on the right. Despite offering surgical intervention with septorhinoplasty and turbinate reduction, the patient and mother opted against proceeding with surgery. A repeat split-night polysomnography study demonstrated progression to severe OSA, with an apnea-hypopnea index (AHI) of 10.7 and an oxygen nadir of 82%. CPAP titration identified an optimal pressure of 7 cm H2O, resulting in a residual AHI of 0. To address structural issues, the patient established care with an orthodontist and an oral maxillofacial surgeon. Orthodontic treatment with braces and RME was initiated, with an expected duration of approximately two years to optimize the craniofacial structure and improve airway patency. Meanwhile, the patient was bridged with auto CPAP (settings: 5-15 cm H2O), which was well-tolerated and demonstrated adequate compliance. Follow-up visits noted significant improvement in residual symptoms of SDB.
Conclusion: Rapid Maxillary Expansion (RME) can lead to optimal outcomes with early detection and timely intervention. RME increases maxillary width, influences the dimensions of nasal vault, and increases upper airway space, with improvements in PSG parameters observed after one year of treatment.
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1507
EFFICACY AND TOLERABILITY OF ULTRA-LOW DOSE MIRTAZAPINE IN ADULT CHRONIC INSOMNIA

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Introduction: Mirtazapine is a commonly prescribed psychotropic for major depressive disorder, and can be used for its soporific as well as alerting properties. Mirtazapine's pharmacology is such that sedation is inversely related to dosage and may be clinically excessive in adults on 7.5mg and 15mg daily dose. Mirtazapine at low plasma concentrations (7.5mg and 15mg) predominately has antihistaminergic properties subsequently causing both an increased duration of sleep and increased sedation. At higher antidepressant doses (30mg and 45mg), the antihistamine activity is offset by increased noradrenergic and serotonergic transmission. Usage of mirtazapine even at 7.5mg and 15mg for insomnia may result in troublesome daytime drowsiness in 54% of patients; patients report feeling similar to being hungover. We speculated that an ultra-low dose (3.75mg) might improve insomnia without next day effects.
Report of case: In a retrospective review, 30 veterans were prescribed an ultra-low dose of mirtazapine due to lack of efficacy by traditional sleep aids (trazodone, doxepin). The Insomnia Severity Index (ISI) score was collected before and 1 to 3 months after initiating therapy. It is important to note that 7 patients did not complete the treatment. Two patients did not start the treatment, three stopped due to side effects, one stopped due to lack of efficacy, and one stopped for reasons unlisted. Of those who completed treatment, two subjects reported residual sedation.
Conclusion: Considering all patients, 50% of veterans showed a decrease in a meaningful ISI value (greater than 7 points). Ultra-low dose mirtazapine may produce an improvement in symptoms and ISI values for chronic insomnia with less possibility of residual sedation.
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1508

THIRD TIME'S THE CHARM: MANAGEMENT CHALLENGES IN STATUS CATAPLECTICUS IN A NARCOLEPTIC PATIENT FOLLOWING STROKE

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Introduction: Cataplexy is a hallmark symptom of narcolepsy, occurring in 60-70% of patients with narcolepsy type 1 (NT1). In contrast, status cataplecticus is a rare manifestation of NT1 in which patients have extended or frequent episodes of cataplexy lasting longer than one hour. The literature on status cataplecticus is limited and true incidence are unknown. Triggers of status cataplecticus include strong emotions, sleep deprivation, situational stress, fatigue, and abrupt withdrawal of cataplexy-suppressing medications.
Report of case: The patient is a 52-year-old male with a long-standing diagnosis of NT1 who presented to the sleep clinic requesting medication refills. His narcolepsy symptoms were previously well-controlled on modafinil and venlafaxine. However, 2 months prior to this visit he suffered a pontine stroke causing residual left arm weakness. While in the clinic waiting room, he became unresponsive to questions, prompting activation of the rapid response team and a stroke alert. His vital signs were notably stable during this episode. He awoke spontaneously but became agitated with further stimulation and then had 2 successive episodes of cataplexy associated with sleep attacks. It was discovered that he was taking half of his prescribed doses of venlafaxine and modafinil due to low supply, and the correct diagnosis of status cataplecticus was recognized. Evaluation for other etiologies including brain imaging was unrevealing, and patient's mental status and exam returned to baseline without intervention. His previous doses of modafinil and venlafaxine were resumed with a tentative plan of adding sodium oxybate after the next follow-up visit (which could treat both his excessive daytime sleepiness and cataplexy but require additional caregiver supervision).
Conclusion: This case illustrates the importance of recognizing status cataplecticus, a rare manifestation of NT1 which presents as prolonged or repeated episodes of cataplexy and sleep attacks and can easily be mistaken for stroke or other more common etiologies of an acute change in level of responsiveness. Such misdiagnosis could lead to potentially inappropriate interventions. Our case highlights the importance of medication adherence in NT1, which can become more challenging due to comorbid conditions such as our patient's recent stroke requiring additional caregiver support to ensure proper medication management.
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1509

SLEEP AND EXERCISE AS EXACERBATORS OF HYPOXEMIA AND THEIR RESPONSES TO SUPPLEMENTAL OXYGEN AT HIGH ALTITUDE

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Introduction: Acute mountain sickness, a potentially life-threatening condition consisting of sleep disturbances, headache, cerebral edema and pulmonary edema, is a complication of travel to high altitude. These complications stem from hypobaric hypoxia. Sleep can further exacerbate hypoxemia, resulting in periodic breathing and nocturnal arousals. Exercise reduces pulmonary transit time, potentially worsening hypoxemia. In this report, we characterize the acute effects sleep and physical activity on oxygenation and their responses to low intensity pulse-dose supplemental oxygen in a traveler during the first night at high altitude.
Report of case: A healthy 44-year-old male ascended to Puno, Peru (3825 m. above sea-level). Prior to ascent, he received prophylaxis with acetazolamide 250 mg every 12 hours for 2 days. On the first night at high altitude, we conducted nocturnal polygraphy on ambient air for 2 hours, followed by pulse-dose supplemental oxygen at 420cc/breath and then ambient air again and found that oxyhemoglobin saturation (SPO2) decreased from approximately 89% at baseline to a mean of 82.8%. Apneas and hypopneas occurred at a rate of 14.9 per hour of recording. Pulse dose supplemental oxygen markedly improved SPO2 (mean 95%). On the second day, polygraphy was performed during moderately intense physical activity (5 minutes intervals of lunges, METs equivalent of 3.8) on room air and with 1260 cc/breath supplemental oxygen. Exercise resulted in reductions in SPO2 from a baseline of mean of 91% to a nadir of 81%. During latter stages of exercise, periodic breathing was observed. Supplemental oxygen reduced respiratory flow and eliminated periodic breathing but did not change oxygenation.
Conclusion: Sleep and exercise aggravate hypoxemia at high altitude. Low dose pulse dose of supplemental oxygen reversed nocturnal but not exercised induced hypoxemia. The findings suggest that conditions that elevate cardiac output worsen hypoxemia at altitude.
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1510

UNUSUAL PRESENTATION OF KLEINE-LEVIN SYNDROME

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Introduction: Kleine-Levin Syndrome (KLS) is a rare neurological disorder characterized by recurrent episodes of hypersomnolence associated with cognitive dysfunction, altered perception, hyperphagia, hypersexuality and disinhibited behaviors. Between episodes there is typically a return to normal alertness and cognitive function. Patients with chronic hypersomnia presentations in KLS are less common.
Report of case: We describe a 23 year old male with Attention Deficit Hyperactivity Disorder (ADHD) and early-onset bipolar disorder (age 4). At age 16, he sought care after missing five months of school due to periods of severe somnolence sleeping 12-13 hours daily. He presented to the hospital on three occasions with episodes of hypersomnia, lethargy, bradycardia, and hypotension. Brain MRI, toxicology, a 24-hour Holter monitor, and an echocardiogram were unremarkable. Polysomnography (PSG) revealed mild obstructive sleep apnea (AHI: 8 events/hr), and the Multiple Sleep Latency Test (MSLT) showed a mean sleep latency of 5.8 min and 3 SOREMPs. He was unable to tolerate modafinil due to tremors, mood disturbance and, aggression. Eventually, he was diagnosed with KLS following a 3-day episode of hypersomnolence during which he was unarousable. Partial symptomatic improvement was achieved with clarithromycin and minocycline but residual hypersomnia was still debilitating. Due to inability to stay awake at school, he was enrolled in virtual high school. Despite this, he was unable to complete high school. He has become socially withdrawn and lost many of his friends. A year later, following the initiation of clarithromycin treatment, his wakefulness increased to 8 hours per day. However, symptoms worsened during the COVID-19 pandemic leading to an increased dosing with minimal effect. Despite treatment, he continued to experience episodes of hypersomnia lasting months at a time where he sleeps up to 18 hours daily. Severe weight loss (BMI: 17.0) has occurred due to limited wakeful hours and loss of appetite.
Conclusion: While still within the expected decade of symptom resolution in chronic KLS, he shows atypical features: persistence hypersomnolence in between episodes, significant weight loss causing failure to thrive, and social withdrawal leading to depression. Multidisciplinary management is crucial to address his complex clinical presentation of KLS and enhance his quality of life.
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1511

MANAGING MODERATE OBSTRUCTIVE SLEEP APNEA FOLLOWING EXPLANT OF HYPOGLOSSAL NERVE STIMULATOR DUE TO TRAUMA

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Introduction: Hypoglossal nerve stimulator implant remains an alternative therapy to patients who are intolerant to PAP therapy for obstructive sleep apnea. Complications can arise requiring removal of hypoglossal nerve stimulator implants. This can lead to difficulties treating PAP-intolerant patients with uncontrolled obstructive sleep apnea.
Report of case: We present a case of a 71 year old male with moderate to severe obstructive sleep apnea (apnea-hypopnea index (AHI) = 29.55 events/hour on diagnostic polysomnography) who was intolerant to PAP therapy. The patient successfully underwent hypoglossal nerve stimulator implantation with a residual AHI=2.5 events/hour. Twenty-two months following implantation, Patient was kicked in the chest by his 3 year old grandchild. He developed an erythematous violaceous nodule over the site of his implanted generator. The patient was evaluated by Wound Care and there was concern for underlying malignancy due to the patient having a prior history of skin cancer. A biopsy was recommended, but due to his thin body habitus (BMI=25.97 kg/m2) and lack of subcutaneous fat, the implant would be considered contaminated and therefore require removal. The patient underwent successful explant of hypoglossal nerve stimulator and biopsy of skin lesion. The final pathology was negative for malignancy with dense acute and chronic fibroinflammatory reaction and foreign body giant cell reaction with abscess formation. Given the patient's thin body habitus, there was concern re-implantation on the opposite side would be difficult due to thin body habitus and minimal subcutaneous fat. The patient was agreeable to dental consultation for oral appliance.
Conclusion: This case represents a unique situation of successful treatment of moderate to severe obstructive sleep apnea with hypoglossal nerve stimulator requiring explanation due to trauma. Given the patient's intolerance to PAP therapy, there is additional difficulty in treating his sleep apnea. Cases such as these create a unique treatment plan that is not often encountered. While an oral appliance may improve any residual respiratory events, it is unknown if this will result in successful treatment of moderate to severe obstructive sleep apnea.
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1512

SUPINE OR NOT? – HIDDEN SEVERITY OF OBSTRUCTIVE SLEEP APNEA DEPENDING ON POSITION DURING HOME SLEEP APNEA TEST

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Introduction: Severity of obstructive sleep apnea (OSA) varies significantly in some patients based on position. Here we present a case of positional OSA (POSA) which was masked in a home sleep apnea test (HSAT) due to lack of considerable time in supine position. This led to multiple tests along with second opinion with us prior to the correct diagnosis and management.
Report of case: A 74-year-old female presented to our sleep clinic for a second opinion on her OSA management. Initially, she was referred to outside sleep clinic by her cardiologist for suspected OSA, given snoring and new-onset Atrial Fibrillation. She underwent flow-based HSAT which revealed mild OSA with apnea hypopnea index (AHI) of 7.6/hour. She was given oral appliance with plan to repeat HSAT to determine efficacy. 6 months later, another flow-based HSAT with oral appliance revealed AHI of 17.8/hour. Given unexpected increase in AHI with oral appliance, outside sleep clinic performed another HSAT without oral appliance to confirm severity of OSA. Testing showed 90.5% supine sleep and AHI of 28/hour. After that test, patient sought second opinion with us. We reviewed

earlier studies thoroughly and explained that she has POSA. She had a delay of proper care as supine AHI was not reviewed in HSAT interpretation. Patient wanted to avoid using continuous positive airway pressure (CPAP) device, so we recommended a repeat HSAT with oral appliance and positional therapy (PT). Flow-based HSAT with combined oral appliance and positional therapy showed AHI of 1.6/hour. Recently, a classification system called Amsterdam positional OSA classification (APOC) is proposed for POSA. According to that, polysomnograms must have minimum 10% of total sleep time in their best and worst sleeping position. Our patient met criteria for APOC II which requires that AHI in their best sleeping position to be in a lower severity category compared to worst sleeping position.
Conclusion: Our case demonstrates the importance of reviewing sleeping position during sleep study interpretation as POSA may be masked by low supine sleep time. PT can be an effective first-line treatment in selective patients with POSA and supplemental treatment with oral appliance or CPAP in remaining patients with POSA.
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1513
REVISITING HYPOPNEA SCORING: THE SIGNIFICANCE OF RESPIRATORY AROUSALS

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Introduction: The debate surrounding the criteria for hypopnea scoring—3% versus 4% oxygen desaturation—remains unresolved. In 2012, the AASM Scoring Manual recommended defining hypopnea based on a ≥3% oxygen desaturation and/or arousal, while also recognizing ≥4% desaturation as an acceptable alternative, subsequently adopted by CMS (Centers for Medicare & Medicaid Services). However, the 4% AHI (Apnea-Hypopnea Index) criterion excludes arousals, which are indicative of fragmented sleep and sympathetic activation. Respiratory events that trigger arousals are associated with severe sleep symptoms, including poor sleep quality, excessive daytime sleepiness, and increased risk for adverse health outcomes, such as hypertension, amyloidogenesis, and other conditions. Treatment with positive airway pressure (PAP) therapy has shown significant symptom improvement in such patients.
Report of case: Case 1: A 59-year-old female presented with snoring, daytime fatigue, insomnia, irritability, and mood disorder. Polysomnography (PSG) revealed a 3% AHI of 14.7, REM AHI of 41.2, and a 4% AHI of 1.3, with a respiratory arousal index (RAI) of 13.9. Case 2: A 53-year-old male with a recent stroke, loud snoring, witnessed apnea and unrefreshed sleep underwent PSG, which showed a 3% AHI of 21, REM AHI of 32.4, and a 4% AHI of 2.6, with an RAI of 14.8. Case 3: A 75-year-old female with snoring, chronic obstructive pulmonary disease, and pulmonary hypertension had a PSG revealing a 3% AHI of 21.4, 4% AHI of 1, and an RAI of 18.8. Case 4: A 48-year-old female with known obstructive sleep apnea (OSA) and end-stage renal disease on hemodialysis presented with morning headaches after discontinuing PAP therapy. PSG showed a 3% AHI of 12.6, REM AHI of 31.1, and a 4% AHI of 2.22, with an RAI of 11.7.
Conclusion: These cases highlight the significant disparity between the 3% and 4% AHI criteria, emphasizing the need to incorporate respiratory arousals into the 4% scoring metrics. The exclusive reliance of CMS on the 4% criterion results in inappropriate management, persistent symptoms, and a poor quality of life for patients. Adopting a standardized scoring system that captures the full spectrum of sleep-disordered breathing is crucial for ensuring optimal care and improved patient outcomes.
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1514
MANAGEMENT OF SLEEP DISORDERED BREATHING IN PRADER-WILLI SYNDROME

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Introduction: Prader-Willi syndrome (PWS) is the most common syndromic form of obesity, and the majority of the cases arise sporadically. Patients with PWS are at a high risk of sleep-related disorders, such as obstructive sleep apnea (OSA), central sleep apnea (CSA), and nocturnal hypoventilation. Management of untreated sleep apnea is essential before starting growth hormone (GH) therapy for the treatment of PWS. We present a patient with PWS who was noted to have complicated sleep apnea during the preemptive workup, prompting the initiation of positive airway pressure (PAP) therapy.
Report of case: An 11-year-old male with PWS presented to the sleep medicine clinic for screening of sleep apnea before starting GH therapy. His past sleep medicine workup included a polysomnogram (PSG) at the age of 4 years, showing an apnea-hypopnea index (AHI) of 14.1/hour. He underwent tonsillectomy and adenoidectomy (T&A) after that study at the age of 4 and 7 years, and the repeat PSG showed residual OSA with AHI of 2.5/hour. The patient was not able to tolerate PAP therapy and was managed conservatively. On present evaluation, significant findings were excessive daytime sleepiness (EDS) with pediatric Epworth Sleepiness Score of 14/24, weight/age percentile of 62, and grade 2 facial malocclusion. Overnight PSG was performed, which showed an AHI of 8.0/hour (obstructive AHI 3.8/hour and central AHI of 4.2/hour, suggesting CSA), minimum oxygen saturation of 84%, average end-tidal carbon dioxide of 45.1 mm Hg, and time above 50 mm Hg of 40.2% of the total sleep time (suggesting nocturnal hypoventilation). A PAP titration study was done, which achieved adequate control with bilevel positive airway pressure (BPAP) of 12/8 cm H2O with a backup respiratory rate of 8 breaths per minute. The patient tolerated this therapy well during the titration study, and BPAP with the above settings was prescribed.
Conclusion: The management of sleep apnea in individuals with PWS remains challenging. Unlike in non-syndromic cases of pediatric sleep apnea, T&A is not as effective in these patients, who eventually require treatment with PAP therapy. Narcolepsy and cataplexy-like phenotypes are also common in this population, which also need to be adequately screened and treated.
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1515
A COMPLEX CASE OF OBESITY HYPOVENTILATION SYNDROME AND OBSTRUCTIVE SLEEP APNEA

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Introduction: Partial or complete airway obstruction during sleep occurs with obstructive sleep apnea (OSA), while daytime underventilation related to obesity occurs in Obesity hypoventilation

Syndrome (OHS). CPAP therapy is recommended for OSA, while noninvasive ventilation is usually indicated for OHS. If either is left untreated, patients can develop hypertension, heart failure, pulmonary hypertension, respiratory failure, and poor sleep quality. We present a complex patient case with both entities.
Report of case: The patient is a 33-year-old male with class 3 obesity (BMI 75) and hypertension who initially presented to his cardiologist's office with dyspnea on exertion, orthopnea, and leg swelling. Transthoracic echocardiogram revealed right ventricular systolic function moderately to severely reduced, elevated right ventricular systolic pressure (40-50 mmHg), and preserved left ventricular ejection fraction (50-55%). He was diagnosed with decompensated diastolic heart failure and referred to sleep medicine. Further evaluation revealed excessive daytime sleepiness (Epworth Sleepiness Scale 15) and chronic hypoxemic, hypercapnic respiratory failure based on ABGs obtained during previous hospitalization for decompensated heart failure (7.35/57.5/74/32). Our patient underwent a split night polysomnogram. The diagnostic segment revealed severe OSA with an AHI of 86.8 events/hour with an oxygen nadir of 72% and 69 minutes spent < 85%.
Conclusion: During the therapeutic segment, optimal settings could not be identified. Our patient was titrated from CPAP 5 to 15 cm H20, then switched to bilevel PAP due to CPAP insufficiency. Bilevel PAP was titrated to 23/15 cm H20 with 2L of oxygen, but oxygen saturation remained below 88%. Due to persistent sleep-related hypoventilation, he was ultimately placed on a noninvasive home ventilator. CPAP and noninvasive ventilation have been shown to be an effective treatment for OHS with concomitant OSA. In refractory cases, noninvasive ventilation via a home ventilator should be considered until appropriate weight loss can be achieved.
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1516

DIAGNOSTIC AND THERAPEUTIC CHALLENGES IN OBSTRUCTIVE SLEEP APNEA WITH PROMINENT CENTRAL EVENTS: REVISITING THE 50% CRITERION

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Introduction: Obstructive sleep apnea (OSA) is a prevalent sleep-related breathing disorder characterized by repeated upper airway collapse during sleep, leading to fragmented sleep, daytime fatigue, and increased cardiovascular risks. OSA is diagnosed with a respiratory disturbance index (RDI) ≥ 5/hour with symptoms or RDI ≥ 15/hour. Positive airway pressure (PAP) therapy is the primary treatment but can induce treatment-emergent central sleep apnea (TECSA), defined as central apneas accounting for >50% of respiratory events during PAP therapy. Primary central sleep apnea (CSA), distinct from TECSA, is diagnosed when central events comprise >50% of total apneas and hypopneas during diagnostic polysomnography. This case explores the diagnostic and therapeutic challenges when both obstructive and central events coexist.
Report of case: A 53-year-old male with prediabetes, obesity, atrial fibrillation, and a history of tobacco use presented with symptoms of loud snoring, gasping, witnessed apneas, and hypersomnolence. Home sleep apnea testing revealed severe OSA with an apnea-hypopnea index (AHI) of 70.2 events/hour, including 28.9 central apneas/hour. Despite the significant presence of central events, they accounted for < 50% of total events, leading to a diagnosis of severe OSA. During in-lab PAP titration, central events predominated with CPAP and bilevel PAP spontaneous (BPAP-S) therapy. Transitioning to bilevel PAP spontaneous/timed (BPAP-ST) therapy resolved both obstructive and central events. Final therapy was BPAP-ST 16/8 cmH2O with a backup rate of 10.
Conclusion: This case underscores the challenges in differentiating primary CSA from TECSA, particularly when central events are prominent but fall short of the 50% threshold. It raises questions about the applicability of current diagnostic criteria and whether a dual diagnosis of OSA and primary CSA might have been more appropriate. Nevertheless, following existing guidelines, the patient was diagnosed with OSA and TECSA. BPAP-ST therapy effectively addressed both obstructive and central components, highlighting its adaptability in managing complex sleep-disordered breathing cases. This case emphasizes the need for precise diagnostic criteria and individualized treatment to optimize patient outcomes.
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1517

SEVERE REM BEHAVIOR DISORDER IN A TRUCK DRIVER RESOLVED WITH OSA TREATMENT

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Introduction: REM sleep behavior disorder (RBD) is characterized by dream enactment behaviors, which can be dangerous in occupational settings. Obstructive sleep apnea (OSA) has been associated with parasomnia presentations and can exacerbate sleep fragmentation and REM dysregulation. This case explores the interplay of RBD and OSA in a 50-year-old truck driver, emphasizing the life-altering outcomes of OSA treatment.
Report of case: A 54-year-old obese male (BMI: 39 kg/m²) with restless leg syndrome and OSA with a career as a long-distance truck driver presented with frequent episodes of acting out his dreams during sleep. His typical sleep routine involved bunking in the back of his truck at highway rest stops. Twice he woke up in his truck disoriented. He also found himself waking up eating, but he had no recollection of how he got the food. Polysomnography confirmed severe OSA with an apnea hypopnea index (AHI) of 84.9 events/hour. Symptoms met diagnostic criteria for RBD based on clinical history and PSG findings. Despite reluctance to start positive airway pressure (PAP) therapy, counseling directed towards the possibility of improving RBD-like behavior helped him gain the commitment for treatment. He was initiated on Auto-Bilevel PAP therapy at Max IPAP 20 Min EPAP 4 pressure settings resolved the patient's apneas. At a 3-month follow-up, the patient reported complete resolution of dream enactment behaviors with excellent BiPAP compliance.
Conclusion: REM Sleep Behavior Disorder (RBD) involves the loss of normal muscle atonia during REM sleep, resulting in behaviors ranging from yelling and kicking to highly complex actions. While some cases are idiopathic, various conditions can disrupt REM sleep regulation and contribute to its development. This case highlights the need for comprehensive sleep evaluations in parasomnia presentations, especially in high-risk occupations, to identify and address underlying conditions like OSA and potentially reduce the need for adjunctive pharmacologic therapies. Despite his severity of RBD, addressing underlying OSA as a primary therapy is a worthwhile approach. In this case, PAP therapy alone led to complete resolution of the patient's symptoms, highlighting its significance as a first-line treatment in certain clinical scenarios.
Support (if any):