UNIVERSITY OF PITTSBURGH

SLEEP AND CIRCADIAN SCIENCE

RESEARCH DAY

THURSDAY

November 13, 2025

WILLIAM PITT UNION

The 10th Annual Sleep and Circadian Science Research Day

November 13, 2025

Program

8:15 am – 9:00 am — **Registration/Breakfast**

9:00 am – 9:10 am *WPU Assembly Room*

Program Chair: **Jonna Morris, PhD, RN**
Assistant Professor of Health and Community Systems
University of Pittsburgh
School of Nursing

Opening Remarks: **Daniel Buysse, MD**
Distinguished Professor of Psychiatry, Medicine, and Clinical and Translational Science
UPMC Endowed Chair in Sleep Medicine

9:10 am – 9:20 am *WPU Assembly Room*

SPONSOR SHOWCASE **Avadel– Mandy Wills**

9:20 am – 10:25 am *WPU Assembly Room*

Symposium: Collaborative **Pathways to Transform Sleep Research: Integrating Community and Researcher Perspectives**

Chairs:
Jessica Levenson, PhD
Assistant Professor of Psychiatry

Marquis Hawkins, PhD
Assistant Professor of Psychology

Panelists:

Marquis Hawkins, PhD
Assistant Professor of Psychology

Rachel Kolko Conlon, PhD
Assistant Professor of Psychiatry

Toni Watkins
Community Health Advocate, Healthy Start, Inc.

Overview of the formative development of a community health worker-led sleep intervention: history of the collaboration and ongoing efforts

Tamara Tyree, MSW
Perinatal Mental Health Clinician, Healthy Start, Inc.

Working with community partners to design grant applications related to sleep/circadian interventions

Jessica Levenson, PhD
Assistant Professor of Psychiatry

Lisa G. Zur, MPH
Health Innovations Program Manager, Kids Plus Pediatrics

Navigating challenges and strengths in a community-partnered randomized controlled trial

Amy Hartman, PhD
Assistant Professor of Occupational Therapy

Dana Mueller, PA-C, DPAS, MPAS, IBCLC
UPMC Children's Community Pediatrics

Emerging collaborations: The CSCS Community Partner Board

Moderators:
Alison Klevens
Graduate Student, Department of Psychology

Drew Carter
President, Community Wellness Initiative

10:25 am – 10:45 am — **Break**

10:45 am – 11:45 am
WPU Assembly Room

DAVID J. KUPFER KEYNOTE LECTURE

Keynote Lecturer: **Miranda M. Lim, MD, PhD**
Professor of Neurology
Co-Director, Oregon Alzheimer's Disease Research Center
Oregon Health & Science University
Director, Sleep & Health Applied Research Program (SHARP)
Discovering Sleep's Many Functions from Neurodevelopment to Neurodegeneration: From Bench to Bedside and Back Again

11:45 am – 12:45 pm
Kurtzman Room

Lunch Boxed lunches provided (if requested)

12:45 pm – 2:00 pm
WPU Assembly Room

Bits & Bytes: From Big Data to Best Practice

Chair: **Mark Thomas, PhD**

Panelists:

Nicole Chenet, DDS, D-ABDSM
Sleep Apnea Dental Center

Oral Appliances to Treat OSA

Tice Harkins, MD
Department of Otolaryngology – Head and Neck Surgery,

Exploring a novel AI-assisted method for quantifying retropalatal airway cross-sectional area in patients with obstructive sleep apnea

Avinash Aggarwal, MD
Clinical Associate Professor of Neurology

Sangeeta Chakravorty, MD
Director, Sleep Laboratory, VA Pittsburgh Healthcare System

Restless Legs Syndrome: Diagnostic Criteria and Current Treatment Guidelines

2:00 pm – 2:15 pm

Break

2:15 pm – 2:45 pm
WPU Assembly Room

TICA HALL DATA BLITZ

Chair: **Matthew Lehrer, PhD**
Assistant Professor of Psychiatry

2:45 pm – 3:10 pm

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Gregory Palmer
ResMed

Percival van Daam, MPAS, PA-C
Idorsia Pharmaceuticals

3:10 pm – 4:45 pm
WPU Ballroom

Poster Session/Networking

Co-Chairs: **Karen Jakubowski, PhD**
Assistant Professor of Psychiatry

Christopher Kline, PhD
Associate Professor of Health and Human Development

Brant Hasler, PhD
Associate Professor of Psychiatry, Psychology and Clinical and Translational Science

4:45 pm – 5:00 pm
WPU Ballroom

Awards & Closing Remarks

Jonna Morris, PhD, RN
Assistant Professor of Health and Community Systems

DATA BLITZ

BLITZ #	PRESENTER	TITLE
1	Taylor, Maddison L. mat401@pitt.edu	Pupil Sleepiness Test decreases across CBT-SAD and Light Therapy in Seasonal Affective Disorder
2	Stowe, Taylor A stowet@upmc.edu	Diurnal rhythms in neuronal activity in the nucleus accumbens: underlying mechanisms and impact of cocaine self-administration
3	Sharma, Samskrathi samskras@andrew.cmu.edu	Host metabolism is fine-tuned by gut microbiota-Rev-Erb interactions
4	Rennick-Zuefle, Karl H rennickzueflekh@upmc.edu	Shift Work History Moderates Relationships Between Measures of Sleep Health and Blood-Based Synuclein Biomarkers
5	Mazzotti, Diego R droblesmazzotti@kumc.edu	Night-to-night variability in surrogates of obstructive sleep apnea severity: main and sex-specific effects on next-day symptom presentation
6	Griffith, Rebecca L. griffithr3@upmc.edu	Sleep and Cognitive Control: Distinct Pathways to Anger and Impulsivity
7	Goldberg, Emily B ebg9@pitt.edu	Adherence Using Wrist-Worn Actigraphy to Measure Sleep in Individuals with Post-Stroke Aphasia
8	Bruno, Ekaterina kab723@pitt.edu	Anterior Cervical Discectomy and Fusion (ACDF) on Upper Aerodigestive Tract Functions: A Rapid Scoping Review

POSTER LIST

PRESENTER	TITLE	POSTER #
Acevedo-Fontanez, Adrianna I. aia35@pitt.edu	Disparities in the epidemiology of obstructive sleep apnea risk factors, diagnosis, and treatment among American Indian or Alaska Native US Adults	1 – A 3:15-3:45pm
Armstrong, Danielle P dpa18@pitt.edu	Diurnal Patterns in Reward Processing and Psychomotor Vigilance in Young People at Risk for Mania	2 – B 3:45-4:15 pm
Asadollah, Fatemeh Sha279@pitt.edu	Continuous Positive Airway Pressure (CPAP) Use in Women: Associations with pre-treatment stigma	3 – A 3:15-3:45pm
Bobrow, Annalise R bobrowar@upmc.edu	Comparing Agreement Between Sleep Diary and Actigraphy in Retired Night Shift Workers and Retired Day Shift Workers	4 – B 3:45-4:15 pm
Brovender, Isabel H isb29@pitt.edu	Powering down for better sleep for children with ADHD	5 -A 3:15-3:45pm
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Clay, Abby M clayam@upmc.edu	Fear of Sleep and Cardiovascular Reactivity	8 – B 3:45-4:15 pm
Costa, Amy N costaan3@upmc.edu	Daily Patterns of Sleep and Metacognition in Older Adults	9 – A 3:15-3:45pm
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Griffith, Rebecca L. griffithr3@upmc.edu	Sleep and Cognitive Control: Distinct Pathways to Anger and Impulsivity	12 – B 3:45-4:15 pm
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Keller, Lauren S kellerls@upmc.edu	Longitudinal Chronotype Instability in Young People at Risk for Mania	14 – B 3:45-4:15 pm
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POSTER LIST

PRESENTER	TITLE	POSTER #
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Petersen, Kaitlyn kap206@pitt.edu	Adolescent Circadian Rhythm Disruption Leads to Increased Risk-Taking and Transcriptional Changes in Adulthood	23 – A 3:15-3:45pm
Rennick-Zuefle, Karl H rennickzueflekh@upmc.edu	Shift Work History Moderates Relationships Between Measures of Sleep Health and Blood-Based Synuclein Biomarkers	24 – B 3:45-4:15 pm
BS, Aswathy asb399@pitt.edu	A Circadianâ€“Metabolic Link: Ketogenic Diet Alters Dopaminergic Activity in the Ventral Tegmental Area in a Mouse Model of Bipolar Disorder	25 – A 3:15-3:45pm
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Staab, Trevor D tds61@pitt.edu	Melanopsin-Driven Pupil Responsivity as a Driver of Circadian Dysregulation in Young People at Risk for Mania	31 – A 3:15-3:45pm
Stachula, Diana A diana.stachula@downstate.edu	Symptom-Based Identification of Low Arousal Threshold in Patients with Obstructive Sleep Apnea	32 – B 3:45-4:15 pm
Stowe, Taylor A stowet@upmc.edu	Diurnal rhythms in neuronal activity in the nucleus accumbens: underlying mechanisms and impact of cocaine self-administration	33 – A 3:15-3:45pm
Taylor, Maddison L. mat401@pitt.edu	Pupil Sleepiness Test decreases across CBT-SAD and Light Therapy in Seasonal Affective Disorder	34 – B 3:45-4:15 pm
Vaughan, Dylan T dtv5@pitt.edu	Melanin-concentrating hormone reduces learned helplessness in male mice and modulates layer 2/3 medial prefrontal cortex neuron properties	35 – A 3:15-3:45pm
Wescott, Delainey L wescottdl2@upmc.edu	Preference or behavior? Unique associations between circadian preference, sleep behaviors, and depression in youth	36 – B 3:45-4:15 pm
Zaheed, Afsara B zaheedab@upmc.edu	Next-year sleep and cognitive health associations differ by proximity to dementia diagnosis	37 – A 3:15-3:45pm

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Sleep and Circadian Science
Research Day 2025

ABSTRACTS

Presenter Name/Degree(s): Adrianna I. Acevedo-Fontanez, PhD

Current Position: Postdoctoral Scholar

Title: **Disparities in the epidemiology of obstructive sleep apnea risk factors, diagnosis, and treatment among American Indian or Alaska Native US Adults**

Author(s): Adrianna I. Acevedo-Fontanez[1,2], Vernon M. Grant[3], Darlynn M. Rojo-Wissar[4,5] & Sanjay R. Patel[2]

Affiliation(s): [1]Department of Psychiatry, University of Pittsburgh; [2]Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, University of Pittsburgh, Pittsburgh, PA, USA; [3]Center for American Indian and Rural Health, Montana State University, Bozeman, MT, USA; [4]Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University, Providence, RI, USA; [5]Bradley/Hasbro Children's Research Center, E.P. Bradley Hospital, East Providence, RI, USA;

Introduction: The American Indian and Alaska Native (AIAN) population in the United States (US) is known to experience a high prevalence of multiple risk factors for obstructive sleep apnea (OSA), including obesity (~43%) high blood pressure (~31-68%), and snoring. Data on OSA prevalence and treatment in AIANs remains sparse. Given the disproportionate burden of diabetes, heart disease, stroke, and premature mortality in AIANs, understanding the epidemiology of OSA in this population is a vital step in determining the need for resource allocation for OSA diagnosis and treatment.

Purpose: To estimate the prevalence of OSA risk factors, diagnosis, and treatment in AIANs.

Methods: Data were from the US National Longitudinal Study of Adolescent to Adult Health, Wave V, when participants were 33-43 years old. The proportion of AIAN participants was 0.4% (N=21 [weighted N=77,211]), with 56% being male. OSA risk factors were self-report of 1) the participant noticing or others telling them that they snore and/or 2) stop breathing during sleep, 3) objectively measured high blood pressure (HBP), and 4) BMI>35. Participants also reported whether they had ever been diagnosed with OSA and if they were being treated for it. Data are presented as a descriptive analysis of nationally representative survey-weighted prevalence estimates of OSA risk factors, diagnosis, and treatment in AIANs.

Results: In AIAN adults, 82% reported snoring, (non-AIAN: 72%, range across racial categories: 67-77%), 28% stopped breathing during sleep (non-AIAN: 16%, range: 10-32%), 55% had HBP (non-AIAN: 52%, range: 35-72%), and 29% were obese (BMI>35; non-AIAN: 23%, range: 6-55%). AIAN adults also had a higher prevalence of having multiple OSA risk factors, with 74% having ≥ 2, compared to non-AIAN adults with 53% having ≥ 2 (range across racial categories: 37-69%). Diagnoses and treatment for OSA were much lower for AIAN adults, with 1% reporting an OSA diagnosis (non-AIAN: 8%, range: 0-18%), and 0% reporting receiving treatment (non-AIAN: 13%, range: 0-76%).

Conclusions: These data demonstrate that AIANs carry a high burden of individual and cumulative OSA risk factors. Despite 74% of the AIAN participants experiencing two or more OSA risk factors, only 1% reported an OSA diagnosis and 0% report OSA treatment. These findings highlight a critical need for increased access to sleep diagnostic and therapeutic resources in tribal communities.

Funding Source: AAF is supported by NHLBI T32 Training Grant HL082610. VG is supported by NHLBI 5K01HL146993. DMR is supported by NHLBI 1K01HL169495 and NIGMS P20GM139767 (Stroud, Laura).

Presenter Name/Degree(s): Danielle Armstrong

Current Position: Undergraduate Research Assistant

Title: **Diurnal Patterns in Reward Processing and Psychomotor Vigilance in Young People at Risk for Mania**

Author(s): Danielle Armstrong[1]; Lauren Keller, BS[1]; Margaret Kuzemchak, MS[1]; Prachi Shah, BS[1]; Allison Caswell, BS[1]; Simey Chan, MS[1]; Adriane M. Soehner, PhD[1]

Affiliation(s): [1]University of Pittsburgh, Department of Psychiatry

Introduction: Mania is associated with elevated levels of reward sensitivity, psychomotor vigilance, and circadian disruption. Arousal, mood, and attentiveness exhibit daily rhythms in healthy individuals, thus individuals at-risk for mania-risk may experience disruptions to reward and vigilance rhythms across the day. Healthy individuals exhibit greater afternoon reward sensitivity and a dip in psychomotor vigilance; at-risk individuals may exhibit exaggerated afternoon peaks. Our focus is to preliminarily determine if reward sensitivity and psychomotor vigilance show diurnal patterns, and whether mania severity moderates these diurnal differences. We hypothesize that those at risk for mania will exhibit higher reward responses and psychomotor vigilance in the afternoon vs the morning testing session.

Methods: This preliminary analysis included 123 participants aged between 18 and 24 years old (*M*=21.6, *SD*=2.13) with no previous diagnosis of bipolar disorder recruited across a spectrum of mania vulnerability (MOODS-SR-Lifetime; MOODS). During a 24-hour lab visit, participants completed a reward motivation behavioral task (Effort Expenditure for Rewards Task; EEfRT), reward-based aggression paradigm (Point Subtraction Aggression Paradigm; PSAP), and a psychomotor vigilance task (Psychomotor Vigilance Test; PVT) in both the morning and afternoon. Linear mixed effects models assess the effect of mania risk group (MOODS-SR-L score), time of day (AM vs PM), and their interaction on reward (EEfRT, PSAP) and psychomotor vigilance (PVT) outcomes.

Results: There were no significant differences in outcomes between the morning and afternoon testing sessions found for reaction time on PVT, aggressive choices taken on the PSAP, or reward related behaviors on the EEfRT (all p-values >0.05). There were significant diurnal differences in PVT lapses (β= -1.02, p=0.019) and reaction time (β = -13.03, p = 0.0035) as a function of mania vulnerability. In participants with none/low mania vulnerability, PVT lapses decreased from morning to afternoon while lapses in the moderate/high mania group increased. All mania groups exhibit decreased PVT reaction time from morning to afternoon, but the none/low group experienced a significantly greater decrease compared to the high mania group.

Conclusion: Our interim analysis indicates that there are diurnal differences in psychomotor vigilance as a function of mania vulnerability, with poorer afternoon performance relative to the morning among individuals with high/moderate mania vulnerability. No diurnal differences in reward behavior were observed, which stands in contrast to data from healthy samples. These results suggest that daily rhythms in vigilance may differ as a function of mania vulnerability. Study recruitment is still ongoing, and analyses in the full cohort may allow us to draw more definitive conclusions on the relationship between mania risk and diurnal patterns in reward and psychomotor vigilance outcomes.

Funding Source: R01MH124828 (Soehner)

Presenter Name/Degree(s): Fatemeh Asadollah

Current Position: PhD Student in Nursing at University of Pittsburgh

Title: **Continuous Positive Airway Pressure (CPAP) Use in Women: Associations with pre-treatment stigma**

Author(s): Fatemeh Asadollah, MSN[1]; Paul W. Scott PhD[1]; Yue Dong RN, Sanjay R. Patel MD, MS[2]; Jonna L. Morris, PhD, RN[1]

Affiliation(s): [1]School of Nursing, University of Pittsburgh, [2]Division of Pulmonary Allergy Critical Care and Sleep Medicine, University of Pittsburgh

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.

Funding Source: Breathe PA

Presenter Name/Degree(s): BS Aswathy, PhD

Current Position: Post Doctoral Associate

Title: **A Circadian–Metabolic Link: Ketogenic Diet Alters Dopaminergic Activity in the Ventral Tegmental Area in a Mouse Model of Bipolar Disorder**

Author(s): Aswathy BS[1], Nelson L[1], Kaminsky M[1], Olmeda S[1], Fairbanks N[1], McClung C[1]

Affiliation(s): [1]Department of Psychiatry, University of Pittsburgh, School of Medicine

Introduction: Circadian clocks exert strong control over mesolimbic dopamine (DA) circuits that shape reward, mood, and arousal. Disruption of circadian timing is a hallmark of bipolar disorder (BD), and core clock gene variants are linked to altered reward processing. The ClockΔ19 mutant mouse bearing a dominant-negative mutation in a core circadian regulator displays manic-like behaviors and increased DA transmission from the ventral tegmental area (VTA), paralleling clinical observations of heightened reward network activation in BD. Given the bidirectional crosstalk between metabolism and the circadian clock, we tested whether a ketogenic diet (KD) modulates VTA DA function in this clock-mutant model.

Methods: Wild-type (WT) and ClockΔ19 mice were fed either a KD or standard chow for four weeks. Following the dietary intervention, brains were harvested. Whole-cell patch-clamp recordings were conducted in the DA neurons from the VTA to assess the electrophysiological properties of dopaminergic neurons, identified by spontaneous firing at zero current injection, a rebound spike after hyperpolarizing current, and a voltage sag during the hyperpolarizing step. The action potential (AP) firing properties were assessed in the current-clamp mode. Neurons were subjected to incremental current steps ranging from −80 to 200 pA, and the evoked action potential responses were recorded and analyzed.

Results: Preliminary results indicate altered dopaminergic transmission in ClockΔ19 mice on KD, including a higher rheobase and decreased excitability compared to ClockΔ19 mice on control chow, suggesting a genotype-specific response to the ketogenic diet.

Conclusion: These findings suggest that the ketogenic diet may modulate VTA dopaminergic neuron function in core clock–disrupted ClockΔ19 model, highlighting a circadian–metabolic interface in BD-relevant circuitry. Ongoing analyses aim to further characterize intrinsic membrane properties and synaptic inputs and to explore potential sex-specific effects. These early observations support the possibility that dietary interventions such as the ketogenic diet can influence dopaminergic signaling in BD, offering a novel avenue for future therapeutic exploration.

Funding Source: This study is supported by the Baszucki Foundation Grant.

Presenter Name/Degree(s): Annalise R. Bobrow, BS

Current Position: Research Project Assistant

Title: **Comparing Agreement Between Sleep Diary and Actigraphy in Retired Night Shift Workers and Retired Day Shift Workers**

Author(s): Annalise R. Bobrow, Ellie Rapp, Matthew H. Lehrer, Daniel J. Buysse

Affiliation(s): University of Pittsburgh

Introduction: Self-reported sleep diaries and wrist actigraphy are commonly used to assess sleep, yet they do not always work in tandem to create the perfect picture of sleep. A history of night shift work, which disrupts circadian rhythms and sleep regulation, may further influence how older adults experience their sleep. The purpose of this study was to compare diary-and actigraphy-measured sleep between retired day shift workers (RDSW) and retired night shift workers (RNSW), and to test whether prior shift work history moderated correspondence between the two measurement modalities. This agreement may be influenced by altered subjective-objective alignment due to the long-term effects from shift work. The sustained circadian instability along with altered expectations of sleep may make their subjective recall less stable.

Methods: Participants (N =139; mean age: 68.2; 54% females; 14% non-white) included RDSWs (n = 77) and RNSWs (n = 62). Indices of sleep (duration [total sleep time], efficiency, timing [sleep midpoint], wake after sleep onset [WASO]) were measured using two modalities: self-report diary (Pittsburgh Sleep Diary), and wrist actigraphy. Diary and actigraphy were completed concurrently over 7 consecutive days. Regression models examined associations among the same sleep indices measured by different modalities (e.g., diary-assessed sleep duration predicting actigraphy-assessed sleep duration), adjusting for age, sex, race, and education. Group status (RDSW vs. RNSW) was included as a predictor of interest and as an interaction term with diary-assessed sleep in each model. Bland–Altman analyses were conducted to evaluate agreement and to compare bias and limits of agreement (LOA) between groups.

Results: In the full sample, diary–actigraphy associations were strong for sleep duration ($\beta = 0.65$, $p < .001$) and timing ($\beta = 0.93$, $p < .001$), but weak for efficiency ($\beta = 0.03$, $p = .72$) and WASO ($\beta = 0.07$, $p = .37$). RNSWs did not differ significantly from RDSWs on mean diary or actigraphy sleep estimates ($p > .1$ for all). A trend-level diary by group interaction ($p = .08$) suggested that the association between diary-assessed WASO and actigraphy-assessed WASO was stronger in RNSWs compared to RDSWs. No other modality by group interactions were significant. Descriptive Bland–Altman analyses revealed systematically lower values of sleep duration by diaries compared to actigraphy, with greater bias and variability among RNSWs than RDSWs. Diary-estimated sleep efficiency was 2.7% lower when measured by diaries versus actigraphy), with a marginally greater bias in RNSWs (3.8% lower) versus RDSWs (1.9% lower). For WASO, diaries underestimated actigraphy by 58 minutes overall, and this difference was consistent across both groups. Mid-sleep timing showed minimal bias, with similar agreement in RNSWs and RDSWs.

Conclusion: Retired night shift workers showed largely comparable diary-actigraphy agreement in sleep compared to retired day workers, suggesting that the ability to estimate sleep is preserved in older adulthood despite a history of sleep and circadian rhythm disruption during prior night shift work. Bland-Altman analyses demonstrated that RNSWs showed greater misalignment for sleep duration than their RDSW counterpart. The data could reflect a learned bias toward viewing their sleep as insufficient or non-restorative.

Funding Source: R01AG047139 PI: Daniel Buysse, K01AG075171 PI: Matt Lehrer

Presenter Name/Degree(s): Isabel Brovender, OTS

Current Position: Research Assistant

Title: **Powering down for better sleep for children with ADHD**

Author(s): Isabel Brovender, OTS; Tracey Murray; Adriane M. Soehner, PhD; Heather Joesph, DO; Jessie Northrup, PhD; Victoria Wong, OTS; Dalia Toth, OTS; Amy G. Hartman, PhD, OTR/L

Affiliation(s): University of Pittsburgh, Department of Occupational Therapy

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 levels at bedtime to support sleep health. This pilot study examines the feasibility, acceptability, and preliminary efficacy of a novel sensory-based intervention.

Methods: Thirty children (6-13 yrs) with ADHD and their caregivers were recruited to participate in a 3-week pilot intervention trial. Active data collection included 1-week of baseline data, one lab visit to learn the intervention, followed by a 2-week intervention period. The intervention, called the Power Down Program, included education related to sleep and sensory processing, and a nightly caregiver-provided manualized gentle pressure massage and mindfulness protocol. Psychophysiological data were measured through the Empatica EmbracePlus watch (pulse rate, skin temperature, electrodermal activity, respiratory rate, and physical activity). Reports of sleep routines, sensory processing, and emotion dysregulation were collected through caregiver and child-reported questionnaires and daily sleep diaries. Intervention feasibility and acceptability are measured through qualitative interviews and questionnaires. Preliminary efficacy is measured through change in perception of sleep (caregiver-reported PROMIS measures, child-reported Children's Report of Sleep Patterns; CRSP) at the end of the intervention trial (2 weeks long) compared to a 1-week baseline. Hedge's g was used to determine effect sizes.

Results: Families reported high feasibility (M=18.55, SD=2.04) and acceptability (M=18.25, SD=2.61) of the Power Down Program using the Feasibility and Acceptability of Intervention measures respectively (a scale of 0-20 with higher scores indicating high feasibility/acceptability). Children reported less sleep disturbances overall with large effects in subsections of bedtime fears ($\Delta M = -0.71$; $g = 1.39$), restless legs ($\Delta M = -1.02$; $g = 1.53$), and insomnias ($\Delta M = -1.30$; $g = 1.32$). Caregivers reported large improvements in sleep disturbances (PROMIS $\Delta T = -5.37$; $g = 2.29$) and sleep-related impairments ($\Delta T = -7.98$; $g = 2.56$) following intervention.

Conclusion: This study examines the feasibility, acceptability, and preliminary efficacy of a novel sensory-based intervention called the "Power Down". The results indicated high feasibility and acceptability of the Power Down intervention from both caregivers and children. Following the 2-week trial, children reported a decrease in bedtime fears, restless legs, and insomnia, while caregivers reported improvements among sleep disturbances and sleep-related impairments. These findings provide evidence that the Power Down Program is an effective intervention in addressing bedtime behaviors, sleep problems, and sensory over-responsivity in children with ADHD.

Funding Source: The Klingenstein Third Generation Foundation Fellowship (PI Amy Hartman)

Presenter Name/Degree(s):	Ekaterina Bruno, MEd
Current Position:	Undergraduate or Graduate/Medical Student
Title:	**Anterior Cervical Discectomy and Fusion (ACDF) on Upper Aerodigestive Tract Functions: A Rapid Scoping Review**
Author(s):	Ekaterina Bruno[1], Alexander Rothstein[2], Thomas M. Kaffenberger[2,3], Sanjay Patel[4], Gail Kouame[5], Kendrea L. (Focht) Garand[1]
Affiliation(s):	[1]Department of Communication Science and Disorders, University of Pittsburgh, Pittsburgh, PA, USA; [2]Department of Otolaryngology-Head and Neck Surgery, University of Pittsburgh School of Medicine, Pittsburgh, PA, USA; [3]Veterans Affairs Pittsburgh Healthcare System, Pittsburgh, PA, USA; [4]Division of Pulmonary, Allergy and Critical Care Medicine, University of Pittsburgh School of Medicine, Pittsburgh, PA, USA; [5]University of South Alabama, Mobile, AL, USA

Introduction: Anterior cervical discectomy and fusion (ACDF) is commonly used to treat spinal conditions, such as cervical disc herniation, cord compression, and spinal stenosis. Post-operative complications can include dysphagia, pharyngeal edema, airway obstruction, muscle weakness, and hardware failure. Studies have investigated the interplay between ACDF and obstructive sleep apnea (OSA). This rapid scoping review aimed to: 1) explore whether ACDF increases the risk of new-onset or worsening OSA; 2) survey commonly reported outcomes in ACDF and OSA; and 3) identify key themes and gaps to guide future investigations and clinical practices.

Methods: Literature searches were performed across PubMed, MEDLINE via Ovid, CINAHL, Cochrane, Scopus, Web of Science, and Google Scholar. The review followed PRISMA-ScR guidelines. English-language studies were included if they involved adults with ACDF and a pre- or post-operative OSA. Two blinded reviewers assessed eligibility, with a third resolving discrepancies by consensus.

Results: Of 539 studies, 10 met inclusion criteria: eight case reports, one cohort study, and one large-scale database analysis. Findings suggest ACDF may increase OSA risk due to pharyngeal narrowing, pharyngeal plexus injury, edema, altered head positioning, and reduced cervical mobility. Preexisting OSA may be exacerbated post-operatively, contributing to respiratory complications, weakness, and delayed healing. The ACDF-OSA relationship appears bidirectional.

Conclusion: ACDF may contribute to structural, neurological, and functional changes that increase OSA risk or severity, which requires an interdisciplinary approach. Larger prospective studies using validated, standardized measures are needed to elucidate the impact of OSA on clinical outcomes in patients undergoing ACDF, as well as the the role of OSA as a potential therapeutic target, to improve patient outcomes.

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Presenter Name/Degree(s): Miranda G. Chappel-Farley, PhD

Current Position: Postdoctoral Scholar

Title: **Greater choroid plexus volume is linked to poor sleep, neurodegeneration, and cognition in older adults: Evidence from the IGNITE Study**

Author(s): Miranda G. Chappel-Farley[1], Kelsey R. Sewell[2], Audrey M. Collins[2], Cristina Molina Hidalgo[2], Shivangi Jain[2], Haiqing Huang[2], Patricio Solis-Urra[2], Lauren Oberlin[2], George Grove[4], Arthur F. Kramer,[5,6] Edward McAuley[6,7], Jeffery Burns[8], Charles Hillman,[5,9] Eric Vidoni[8], Bradley P. Sutton[6], Anna Marsland[4], M. Ilyas Kamboh[10], Chaeryon Kang[1], Lu Wan[2], Kirk I. Erickson[2], Kristine A. Wilckens[1]

Affiliation(s): [1]Department of Psychiatry, University of Pittsburgh School of Medicine[2]AdventHealth Research Institute, Neuroscience, Orlando, FL, 32804, USA; [4]Department of Psychology University of Pittsburgh, Pittsburgh, PA, 15213, USA;[5] Department of Psychology, Northeastern University, Boston, MA, 02115, USA;[6] Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana Champaign, IL, 61801, USA [7] Department of Health and Kinesiology, University of Illinois at Urbana Champaign, IL, 61801, USA; [8] Department of Neurology, University of Kansas Medical Center, Kansas City, KS, 66160, United States [9]Department of Physical Therapy, Movement, & Rehabilitation Sciences, Northeastern University, Boston, MA, 02115, USA; [10]Department of Human Genetics, University of Pittsburgh School of Public Health, Pittsburgh, PA, 15213, USA

Introduction: Impaired clearance of neurotoxic waste via cerebrospinal fluid (CSF) transport may contribute to neurodegeneration. Notably, this clearance process is principally active during sleep, suggesting poor sleep may drive neurodegenerative cascades. The choroid plexus (ChP) produces CSF and ChP enlargement is associated with impaired waste clearance and cognitive decline. Prior studies, however, have not directly linked sleep, ChP volume, neurodegeneration, and cognition within a single sample of older adults.

Methods: We tested whether greater ChP volume was associated with poor sleep, neurodegeneration, and cognition in a sample of 556 cognitively unimpaired older adults (u_{age}=69.7±3.7, 70% Female) enrolled in the IGNITE study (NCT0287530). Neurodegeneration was determined by examining hippocampal and gray matter volumes adjusting for estimated total intracranial volume. Sleep was assessed with the Pittsburgh Sleep Quality Index (PSQI) and actigraphy. Confirmatory factor analysis generated composite scores of subjective cognitive decline, episodic memory, working memory, processing speed, executive function(EF)/attentional control, and visuospatial function from a comprehensive neuropsychological battery. A multiple regression approach tested hypotheses adjusting for age, sex, study site, and *APOE4* carriage; education was included as another covariate for models with cognition. Mediation models tested for mediation by ChP volume in sleep-neurodegeneration relationships adjusting for the same covariates.

Results: Consistent with predictions, lower PSQI-assessed sleep quality (β=0.13, p=0.001), sleep duration (β=-0.10, p=0.009), and sleep efficiency (SE; β=-0.12, p=0.004) were associated with greater ChP volume. Actigraphy-derived sleep measures were not associated with ChP volume. Greater ChP volume was associated with smaller hippocampal (β=-0.38, p<0.001) and gray matter volumes (β=-0.09, p=0.02). ChP volume mediated the relationship between PSQI-assessed sleep quality (standardized indirect effect (SIE)=-0.05, 95% CI [-0.076, -0.020]) and SE (SIE=0.04, 95% CI [0.014,0.077]) with hippocampal volume, and sleep duration with gray matter volume (SIE=0.009, 95% CI [1.85, 475.48]. Finally, greater ChP volume was associated with poorer processing speed (β=-0.10, p=0.02) and EF/attentional control (β=-0.10, p=0.02), but not other cognitive domains.

Conclusion: Alterations to ChP morphology may underlie associations between poor sleep and neurodegeneration, contributing to downstream cognitive consequences in older adulthood. Disrupted sleep may contribute to cognitive decline by compromising brain regions critical for waste clearance.

Funding Source: These data were gathered as part of a study funded by National Institutes of Health (NIH) grant R01AG053952. MGC-F is supported by NIH grant T32HL082610. KAW is supported by R35AG072307, R01AG068001, PO1AG025204, R01AG080609, and R01DA059465.

Presenter Name/Degree(s): Abby Clay, B.S.

Current Position: Research Specialist at the Center for Women's Biobehavioral Health Research

Title: **Fear of Sleep and Cardiovascular Reactivity**

Author(s): Abby Clay, B.S.[1], Rachel Kolko Conlon, Ph.D.[1], Elizabeth Pantesco, Ph.D.[2], Rebecca Reed, Ph.D.[3], Karen Jakubowski, Ph.D.[1,3]

Affiliation(s): [1]Department of Psychiatry, University of Pittsburgh School of Medicine; [2]Department of Psychological and Brain Sciences, Villanova University; [3]Department of Psychology, University of Pittsburgh

Introduction: Fear of sleep (FS) refers to the fear of losing vigilance and being vulnerable to harm during sleep. Prior work in select samples (e.g., first responders, clinical samples) indicates that FS is associated with trauma exposure and increased symptoms of PTSD, depression, and insomnia. Limited prior work has also found that FS is related to risk factors for maladaptive cardiovascular (CV) reactivity, an index of cardiovascular disease risk. Using a sample of healthy young adults, we aimed to (1) examine FS total scores and subdomains across demographic and psychosocial characteristics and (2) examine the relationship between FS and CV reactivity.

Methods: Participants (n=114, ages 18-28) self-reported FS (Fear of Sleep Inventory-Short Form; FoSI-SF); yielding a total score and three subscale scores: 1) Vigilance [e.g., "I was fearful of letting my guard down while sleeping"], 2) Nightmares [e.g., "I woke up in the night, and I was terrified of returning to sleep"], and 3) Darkness [e.g., "I slept with a light on to feel safer"]. They also self-reported depressive symptoms (Center for Epidemiological Studies-Depression; CES-D), PTSD symptoms (PTSD Checklist-Civilian Version; PCL-C), adverse childhood experiences (Behavioral Risk Factor Surveillance System ACE module), intimate partner violence (psychological, physical, or sexual IPV), demographics, and substance use (smoking, cannabis use, and alcohol; each yes/no). Additionally, participants provided physical measures (body mass index; BMI) and completed standardized speech preparation and delivery tasks, which yielded indices of SBP and DBP reactivity (standardized residuals for average speech task SBP and DBP, respectively, regressed on average speech preparation levels; higher=more reactivity). Independent samples *t*-tests were used to examine differences in FS total score and subscale scores across demographic (sex, race), psychosocial (CES-D≥16; PCL-C≥14), and trauma (any ACE; any IPV) subgroups. Associations between FS total scores and subscales with CV reactivity were examined in separate linear regression models adjusted for age, sex, race/ethnicity, BMI, substance use, task stressfulness and demand, and depressive symptoms.

Results: Participants were, on average, 18 years old, and the sample was approximately 50% female and 70% white. Women, individuals with clinically elevated depressive and PTSD symptoms, and individuals with a history of ACEs or IPV reported significantly greater FS total scores (all *p*s <.001), as well as greater subscale scores for Vigilance (all *p*s <.001) and Nightmares (all *p*s ≤.01). Racial/ethnic minorities, individuals with clinically elevated depressive and PTSD symptoms, and individuals with a history of ACEs or IPV reported significantly greater Darkness scores (all *p*s ≤.03). Greater FS total score was not significantly related to SBP reactivity [B(SE) = -0.00(0.02), *p*=.99], or DBP reactivity [B(SE) = 0.01(0.03), *p*=.63] in models adjusted for demographics, mood, and behavioral risk factors. Considering FS subscales, greater Darkness scores were significantly related to greater DBP reactivity [B(SE) = 0.05(0.07), *p* <.001]. No associations emerged with Vigilance or Nightmares subscales.

Conclusion: These preliminary results suggest that women, those with PTSD or depressive symptoms, and trauma-exposed populations may be more likely to report greater FS. Additionally, the Darkness subscale was associated with maladaptive CV reactivity, a risk factor for CVD. The Darkness subscale may represent a specific kind of sleep-related vigilance related to CV reactivity. FS may reflect a novel and underexplored risk factor for CV risk. Future analyses will consider the relationship between FS and CV recovery, a related CVD risk factor.

Funding Source: University of Pittsburgh; NHLBI (T32 HL07560, PI: Matthews).

Presenter Name/Degree(s): Amy Costa, PhD

Current Position: Post-Doctoral Scholar

Title: **Daily Patterns of Sleep and Metacognition in Older Adults**

Author(s): Ashley Curtis, PhD[2]

Affiliation(s): [1]University of Pittsburgh, [2]University of South Florida

Introduction: While previous research has extensively investigated the relationship between sleep and cognition in older adults, most work utilizes aggregated patterns of average sleep rather than daily patterns of associations. Past work has highlighted the importance of examining daily patterns in sleep and cognition, seeing it has unique associations with health in aging populations. Metacognitive abilites are used daily across the lifespan, but may change day-to-day, making variability in metacognition and what may influence this variability critical to support daily functioning in older adulthood. Thus, this study explored daily-level associations between sleep (diary and actigraphic) and metacognition in older adults.

Methods: Cognitively healthy older adults (N=38, Mage=69.4±4.9 years, 35 women) with no major medical conditions completed AM and PM electronic sleep diaries in addition to wearing a GENEActiv actiwatch for 14 consecutive days. Both subjective and actigraphic sleep onset latency (SOL, in minutes), total sleep time (TST, in minutes), and sleep efficiency (TST/time in bed x 100) were collected every day. After reporting their prior night's sleep in the AM diary, participants provided ratings of their current metacognitive quality on a visual analog scale (0-very poor to 100-very good). Multilevel linear modeling analyses were conducted to explore intraindividual variability of prior night's sleep on next-morning metacognitive quality ratings. Analyses controlled for within-person sleep medication usage and anxiety (0-not anxious at all to 100-most anxious imaginable), and between-person sleep parameters, age, and sex. Within-person variables were person mean-centered to capture within-person variability, and between-person variables were grand-mean centered to capture between person variability. The model allowed for random slopes for each individual.

Results: Daily subjective TST was associated with deviation in next-morning metacognitive quality (γ =.02, p=0.04). Daily subjective sleep efficiency was associated with deviation in next-morning metacognitive quality (γ =.21, p=0.03). No significant associations between actigraphic sleep variability and metacognition were observed.

Conclusion: Variability in subjective sleep duration and efficiency impacted next-day metacognition ratings in cognitively healthy older adults. Worse subjective sleep than the individuals average was associated with lower next-day metacognitive ratings than their average. Better subjective sleep than the individuals average was associated with higher next-day metacognitive ratings than their average. Worse sleep than an individual's average could make an individual feel less cognitively effective the following day, regardless if they experience cognitive deficits. This may be described as "brain fog", leading to perceived daytime dysfunction. Interestingly, results were only significant at the intraindividual level, and not at the interindividual level, suggesting individual variation in sleep has specific impacts on metacogntive functioning, above and beyond their average sleep pattern. Additionally, there was an absence of a relationship between actigraphic sleep variability and metacognition in this study, which may reflect the idea that subjective sleep and actigraphic sleep measure different constructs of the sleep experience. The present study adds to the existing literature suggesting a unique impact of daily variability in sleep on daily functioning, and only utilizing the mean values may provide an incomplete picture.

Funding Source: Sleep Research Society Foundation

Presenter Name/Degree(s): Alyssa Dela Cruz

Current Position: Undergraduate Student in Psychology

Title: **Inattentive ADHD symptoms interact with sleep duration to predict melanopsin-driven light sensitivity.**

Author(s): [1]Dela Cruz, A., [1]Klevens, A.M., [1]Taylor, M.L., [2]Wescott, D.L., [2]Franzen, P.L. [1]Roecklein, K.A.

Affiliation(s): [1]University of Pittsburgh Department of Psychology, [2]University of Pittsburgh Department of Psychiatry

Introduction: Melanopsin containing retinal ganglion cells convey information about environmental light to the circadian clock to synchronize internal rhythms with the solar day. Individuals with attention deficit hyperactivity disorder (ADHD) exhibit greater delays in circadian rhythms and disrupted sleep patterns in comparison to the average population. In this study, we tested the hypothesis that individuals that exhibit greater symptoms of ADHD would have lower melanopsin driven responses to light. We analyzed the post illumination pupil response (PIPR), which is a measure of melanopic responsivity to light. The PIPR is associated with circadian rhythms and depression, among other transdiagnostic psychopathology, sleep, and circadian processes. In addition, because sleep duration has a significant impact on both symptoms of ADHD and depression, we hypothesized that the effects of ADHD symptoms on PIPR would be moderated by sleep duration.

Methods: Participants were recruited from two studies conducted at the University of Pittsburgh using different pupillometers. They had a range of depression symptoms from none to severe and either seasonal or non-seasonal patterns of recurrence. Participants were analyzed for the current study if they completed the adult ADHD self-report scale (ASRS) and Wender Utah rating scale (WURS) to assess current adult and retrospective childhood ADHD symptoms respectively as well as had all PIPR measures. The PIPR was measured for different durations post-stimulus: 6 seconds after stimulus (PIPR6), 20 seconds after stimulus (PIPR20), and 30 seconds after stimulus (PIPR30). Responses to red light, which are not specific to melanopsin were subtracted from responses to blue light, which is driven primarily by melanopsin to control for things like autonomic tone. Because sleep duration affects ADHD symptoms, we tested an interaction between self-reported sleep duration and ADHD hyperactive and inattentive subscales on each PIPR measure, controlling for time of day and individual differences in stimulus intensity.

Results: For Study 1 and Study 2, tests with PIPR6 and PIPR20 as well as the total ASRS and the hyperactivity subscale were not statistically significant. In Study 1, the interaction between the ASRS inattentive subscale and self-reported sleep duration significantly predicted PIPR30 ($b = 0.00124$, $p = 0.046$). This interaction was replicated in Study 2 ($b = 0.0015$, $p = 0.033$). None of the WURS scales were associated with the PIPR.

Conclusion: The ASRS inattentive subscale, when interacting with sleep duration, was associated with a positive correlation with PIPR 30 in both Study 1 and Study 2. This suggests that adult ADHD inattentive symptoms may be specifically predictive of light sensitivity, although this finding is seen only in those reporting shorter sleep duration. Follow up tests should investigate whether a curvilinear effect of sleep duration is a stronger predictor than this linear test, given prior findings that both short and long sleep duration are detrimental in multiple behavioral health processes. In addition, the effects of environmental and therapeutic light on ADHD symptoms could be evaluated in the context of light sensitivity to amplify treatment response and identify potential prevention targets.

Funding Source: NIH R01 MH103313 and R03 MH096119 (K.A.R.)

Presenter Name/Degree(s): Diego R. Mazzotti, Ph.D.

Current Position: Associate Professor

Title: **Night-to-night variability in surrogates of obstructive sleep apnea severity: main and sex-specific effects on next-day symptom presentation**

Author(s): Diego R. Mazzotti, PhD[1]; Paul W. Scott, PhD[2]; Faith S. Luyster PhD[2,3], Garret Funck[2]; Meghan Fissore[2]; Weiwen Wang DNP, PhD[2]; Sara Klein MSN[2]; Nick Pfeiff[1]; Whitney Theis[1]; Julia Walewicz[1]; Pinar T. Garbioglu[2]; Jonna L. Morris PhD, RN[1]

Affiliation(s): [1] University of Kansas Medical Center, Department of Internal Medicine.

[2]University of Pittsburgh, School of Nursing

[3] VA Pittsburgh Healthcare System

Introduction: Obstructive sleep apnea (OSA) is a heterogeneous disease with complex pathophysiology and varying symptom presentation. Yet, most of what we know about how the disease expresses is based on the results of a single sleep study and symptom questionnaires that summarize individuals' recent experience with OSA. Here, we leverage multi-night assessments of objective sleep parameters, including disease severity surrogates, and daytime symptom presentation in individuals with OSA. Our primary goal was to assess the association between prior night's sleep parameters on next morning symptom presentation. We also assess whether this relationship is moderated by sex.

Methods: Individuals with a pre-existing and untreated OSA (apnea hypopnea index [AHI]≥5 events/h) were recruited from the community. Participants were invited to wear the SleepImage ring, a device that estimates a series of objective sleep parameters based on cardiopulmonary coupling for 15 consecutive nights, along with responding to semi-structured ecological momentary assessments of daytime symptoms (sleepiness, fatigue, stress, mood and sleep quality), using a scale from 0 to 100. Associations between sleep parameters and next morning symptoms were assessed using linear mixed-effects models controlled for age, body mass index categories and baseline Epworth sleepiness scale score. Models incorporating an interaction term with sex were also evaluated.

Results: A total of 1,513 nights from 86 participants (52.3% women; mean [SD] age 54.5 [15.5] years; mean [SD] diagnostic AHI 19.0 [18.3] events/h) were included. We observed significant associations between increased prior night sleep efficiency and worse next day sleepiness, fatigue, mood and sleep quality; increased sleep duration and lower stress and improved sleep quality; increased wake after sleep onset (WASO) and worse fatigue and mood; and greater mean pulse rate and worse fatigue, mood, and sleep quality. Sex-specific effects on the association between sleep quality index (SQI) and fatigue and mood were also observed (interaction $p < 0.05$). No associations between OSA severity surrogates (AHI, time below 90% saturation, mean event duration, oxygen saturation index) and next day symptoms were observed.

Conclusion: Cardiopulmonary coupling estimated sleep parameters such as sleep efficiency, sleep duration (WASO) and mean pulse rate were associated with variations in next morning symptom presentations, with sex-specific effects observed on the SQI. The effect of other surrogates of OSA severity on symptoms remain unclear.

Research/Grant Support: NHLBI (1R01HL170675-01; MPI: Jonna L. Morris; Diego R. Mazzotti), University of Pittsburgh School of Nursing Research Catalyst Award; Sleep and Circadian Science & Aging Research Hubs; Sleep Image System & Sleep Research Society Foundation.

Presenter Name/Degree(s): Emily B. Goldberg, M.S. CCC-SLP

Current Position: PhD Candidate

Title: **Adherence Using Wrist-Worn Actigraphy to Measure Sleep in Individuals with Post-Stroke Aphasia**

Author(s): Emily B. Goldberg[1, 2,] Kristine Wilckens[2], Hannah Fleytekh[1], & Michael Walsh Dickey[1, 3]

Affiliation(s): [1]University of Pittsburgh, Dept. of Communication Science & Disorders; [2]Center for Sleep and Circadian Science; [3]VA Pittsburgh Healthcare System

Introduction: Between 20% to 50% of stroke survivors experience post-stroke sleep disturbance (Katzan et al., 2020; Khot & Morgenstern, 2019). High quality sleep is associated with optimal learning and memory functions, both of which are fundamental in supporting stroke recovery and rehabilitation (Dignam et al., 2017; French et al., 2021; Galski et al., 1993; Skidmore et al., 2010; Vallila-Rohter & Kiran, 2013). Accordingly, human and animal studies have found post-stroke sleep disturbance to be associated with worse stroke outcomes (Fulk et al., 2020; Siengsukon et al., 2015; Zunzunegui et al., 2011). However, these investigations have excluded patients with *aphasia* – an acquired language disorder that affects the ability to speak, understand, read, and write. Thus, the role of sleep function in post-stroke aphasia recovery is not well-characterized. Conventional sleep measures, such as self-reported sleep quality and sleep diary recordings, often depend heavily on intact language abilities. This study aimed to: (1) determine the adherence of individuals with aphasia in using actigraphy for measuring sleep function, and (2) investigate habitual sleep characteristics of individuals with post-stroke aphasia.

Methods: Individuals (n=27) with chronic (>6 months) post-stroke aphasia wore an ActiGraph GT9X Link device on their preferred wrist for 7 consecutive days. Individuals with aphasia (or their caregivers) were required to demonstrate the ability to don and doff the device. While wearing actigraphy, participants maintained a sleep diary. Study team members processed actigraphy data using ActiLife software using an existing data processing pipeline (Wilckens et al., 2024). This preprocessing pipeline yields wear time validation information (Aim 1) and mean habitual sleep parameters (e.g. total sleep time, wake after sleep onset, sleep efficiency [Aim 2]). We calculated descriptive-level statistics to estimate average wear time (Aim 1) and report on actigraphy-derived sleep parameters averaged across the 7-day wear period (Aim 2).

Results: Aim 1: Individuals with aphasia wore actigraphy devices for an average of 22.0 (SD: 2.7; range: 14.3-24.0) hours per day over the 7-day wear period. **Aim 2:** The average 7-day mean total sleep time of the study sample was 6.8 hours (SD: 2.0 hours; range: 2.9-10.3 hours). The average 7-day mean sleep efficiency of the study sample was 85.7% (SD: 9.3%; range: 56.6%-97.2%). The average 7-day mean WASO of the study sample was 65.1 minutes (SD: 45.7 minutes; range: 9.1-195.4 minutes).

Conclusion: Results support the feasibility of using actigraphy for assessing sleep in stroke survivors with aphasia. Participants adhered to wearing actigraphy devices on their wrists, on average, for 91.7% of each day across the 7 day wear period. This suggests strong compliance and acceptability for actigraphy usage in stroke survivors with language impairments (Aim 1). Of the sleep characteristics evaluated in the study, total sleep time and efficiency are comparable to those reported in other post-stroke populations without aphasia (Aim 2). For instance, the average of 7-day mean total sleep time across participants was 6.8 hours, which is consistent with findings reported by Bakken et al. (2014) in acute stroke survivors without aphasia, and findings reported by Cavalcanti et al. (2012) in chronic stroke survivors without aphasia. Average WASO is consistent with findings from Fleming et al. (2021) in chronic stroke survivors without aphasia. The SE findings are consistent with results from Smith et al. (2024) in acute stroke patients. Notably, there was a wide range of TST, sleep efficiency, and WASO values in the study sample, underscoring the heterogeneity of sleep disturbance in the chronic phase of stroke recovery. Findings from this study highlight the feasibility of obtaining valid actigraphy to assess sleep in individuals with post-stroke aphasia, and lay groundwork for future studies examining how individual differences in sleep may relate to recovery and outcomes.

Funding Source: Sleep Research Society Foundation Small Research Grant; Behavioral Brain Research Training Program (T32GM142630-04); Translational Research Training in Sleep and Circadian Science (T32HL082610-17); F31DC023142-01

Presenter Name/Degree(s): Rebecca L. Griffith, Ph.D.

Current Position: Postdoctoral Scholar

Title: **Sleep and Cognitive Control: Distinct Pathways to Anger and Impulsivity**

Author(s): Rebecca L. Griffith, PhD[1], Lauren Keller, BS[1], Simey Chan, MS[1], Prachi Shah, BA[1], & Adriane Soehner, PhD[1]

Affiliation(s): [1]University of Pittsburgh, Department of Psychiatry

Introduction: Cognitive control is a core regulatory process implicated in externalizing behaviors (e.g., aggression, rule breaking), but it is typically measured by average accuracy across trials. Less attention has been given to *variability* in performance, which may index instability in control processes not captured by mean accuracy. Sleep is another key regulator of affective and behavioral outcomes, yet its role in shaping how cognitive control relates to externalizing is not well understood. In this study, we examined whether cognitive control variability (CCV) and accuracy predicted two facets of externalizing—anger and impulsivity—and whether sleep duration and efficiency moderated these associations.

Methods: Participants (N = 120 at baseline, N = 89 at 6-month follow-up; ages 16–24, M = 21.7, SD = 2.13) were recruited across a spectrum of mania vulnerability using the Mood Spectrum Measure–Lifetime Version (MOODS) Mania Scale. They completed two weeks of sleep monitoring via daily diary and actigraphy. Cognitive control was with the multi-source interference task (MSIT), from which two indices were derived: trial-to-trial variability in reaction time (CCV) and mean accuracy. Anger was assessed using the PROMIS Anger Short Form, which asked about feelings of irritability/anger in the past 7 days, overlapping with the sleep diary window. Impulsivity was measured using the UPPS-P Negative Urgency subscale. Analyses tested whether sleep duration and efficiency moderated associations between cognitive control indices and anger/impulsivity, covarying age, sex, mania level (none/low, moderate, high), and mean reaction time (for CCV models).

Results: For anger, higher CCV predicted greater symptoms, particularly when diary-measured sleep duration was shorter (interaction $p < .05$). By 6 months, moderation effects faded, and CCV showed small but consistent direct associations with anger across sleep measures. For impulsivity, accuracy—not CCV—was the key predictor. At baseline, actigraphy-based sleep efficiency moderated the association, such that higher efficiency amplified the protective effect of accuracy. By 6 months, accuracy was a robust direct predictor of lower impulsivity across both sleep measures. Neither sleep duration nor efficiency showed independent main effects.

Conclusion: Findings indicate that different aspects of cognitive control map different facets of externalizing dimensions. Variability in cognitive control was a risk signal for anger, particularly under shorter sleep. This fits with anger as a *state-based, proximal measure*—capturing anger in the past week—that appears especially sensitive to short-term fluctuations in sleep and moment-to-moment instability in control. In contrast, accuracy was most relevant for impulsivity, with efficient sleep amplifying its protective effect. This pattern aligns with impulsivity as a more *trait-like disposition* to act rashly under distress: less tied to immediate sleep changes, but robustly predicted by accuracy over time. Across outcomes, sleep's role was proximal, shaping baseline associations, whereas cognitive control indices themselves carried the longer-term signal. Together, these results suggest that variability and accuracy capture different pathways to externalizing behaviors, with sleep conditionally shaping how those pathways are expressed.

Funding Source: National Institute of Mental Health Grant R01MH124828

Presenter Name/Degree(s): Mariya Kaminsky, PhD

Current Position: Postdoctoral Associate

Title: **Ketogenic Diet as a Potential Treatment for Bipolar Disorder**

Author(s): Mariya Kaminsky (1,2), Nicole Fairbanks (1,2), Joe Inzano (2) and Colleen A. McClung (1,2)

Affiliation(s): *1)* Department of Psychiatry, University of Pittsburgh School of Medicine, Pittsburgh, PA, USA. 2) Translational Neuroscience Program, University of Pittsburgh, Pittsburgh, PA, USA

Introduction: Bipolar disorder is a common and debilitating mood disorder. It is characterized by aberrant GABAergic and dopaminergic signaling, as well as mitochondrial dysfunction and oxidative stress. There is recent interest in the ketogenic diet as a treatment for bipolar disorder with small case study reports of efficacy. However, the neurobiological mechanisms by which ketone bodies might ameliorate symptoms of bipolar disorder are yet to be determined. Here we investigate whether ketogenic diet rescues manic-like behavior in ClockΔ19 mice, a mouse model for bipolar disorder and who exhibit disrupted circadian rhythms, and whether it leads to changes in gene expression in the nucleus accumbens and ventral tegmental area of the brain.

Methods: To investigate the effects of ketogenic diet on behavior, homozygous ClockΔ19 and wild type (WT) male and female mice (n = 8-10/treatment and genotype group) were treated with a control chow (Research Diets D19082304) or a ketogenic diet (Research Diets D10070801) for four weeks. Then mice went through behavioral tests in the following order: locomotor activity, open field, dark/light box, elevated plus maze and forced swim test. Following testing, blood ketone levels were measured using the ketone monitoring system (Abbott); mice were sacrificed, brains were rapidly extracted and flash frozen, punches from the NAc and VTA were taken and RNA isolated with RNeasy Plus Micro Kits (Qiagen) followed by CDNA synthesis (Invitrogen) for quantitative PCR analysis.

Results: Our results show that the ketogenic diet increased levels of β-hydroxybutyrate in the blood of both homozygous ClockΔ19 and WT mice. The ketogenic diet normalized the abnormally high novelty seeking behavior in female *Clock*Δ19 mice ($p<0.05$), with no effect in the males in the light dark box. In comparison, the diet produced an antidepressant-like response in both males ($p<0.05$) and females ($p<0.001$) in the forced swim test. Interestingly ketogenic diet decreased locomotor activity in female WT mice ($p<0.05$) only. No differences were observed in the time spent in the center in the open field test or in the time spent in the open arms in the elevated plus maze following the ketogenic diet. We have also found that keto diet led to a significant decrease in tyrosine hydroxylase (a rate-limiting enzyme in dopamine synthesis) in ClockΔ19 mice, suggesting that the diet reduces their aberrant hyper dopaminergic transmission**.**

Conclusion: Our findings suggest that the keto diet affects mouse behavior relevant to bipolar disorder and reduces hyper dopaminergic transmission in the VTA.

Funding Source: This work was supported by a grant awarded to Colleen A. McClung from NMIH (MH106460) and another grant awarded to Colleen A. McClung from Buszucki Foundation.

Presenter Name/Degree(s): Lauren Keller, BS

Current Position: Research Project Coordinator

Title: **Longitudinal Chronotype Instability in Young People at Risk for Mania**

Author(s): Lauren Keller, BS[1]; Margaret Kuzemchak, MS[1]; Prachi Shah, BS[1]; Allison Caswell, BS[1]; Simey Chan, MS[1]; Adriane M. Soehner, PhD[1]

Affiliation(s): [1]University of Pittsburgh, Department of Psychiatry

Introduction: Chronotype refers to an individual's preference for the morning or evening. Later chronotype has historically been associated with bipolar disorder, but recent data indicate that chronotype instability over time may be a unique characteristic of the condition. Our goal is to examine whether mania risk is associated with self-report and behavioral measures of chronotype instability over the course of two years. We hypothesize that higher mania risk will be associated with longitudinal fluctuations in chronotype stability characterized by changes in midsleep.

Methods: This analysis included 137 young adults between 16 and 24 years old (*M*=21.6*, SD= 2.17)* across a spectrum of mania vulnerability (Mood Spectrum Measure-Lifetime Version; MOODS) without bipolar disorder. Every 6 months for up to 3 years, participants completed two weeks of sleep tracking (Actigraphy), self-report chronotype (Munich chronotype questionnaire; MCTQ), and clinician ratings of past-week mania (Young Mania Rating Scale; YMRS) and depression (Hamilton Depression Rating Scale, HDRS). Linear mixed effects models evaluated relationships between mania vulnerability (MOODS) and instability in chronotype over time (MCTQ and actigraphy midsleep on free days). All models adjusted for age, sex, lifetime depression, past week mania and depression symptoms, mediation use, and the time between follow up visits.

Results: There were no significant associations between the level of mania vulnerability and chronotype instability (MCTQ and Actigraphy) over the follow up period (all p-values >0.05).

Conclusion: Our interim findings indicate that there was not a significant association between mania vulnerability and chronotype instability over time. Study recruitment is still ongoing, and analysis on a larger cohort may allow us to draw more definitive conclusions on the ties between chronotype changes and mania vulnerability.

Funding Source: R01MH124828 (Soehner)

Presenter Name/Degree(s): Emmet Klein, B.A. Psychological and Brain Sciences

Current Position: Clinical Research Coordinator, Center for Biobehavioral Health, Nationwide Children's Hospital, Columbus, OH

Title: **Processing speed relates to Objective and Self-Reported Wake After Sleep Onset, but not sleep duration, in Neurotypical Youth**

Author(s): Emmet Klein, B.A.[1], Chelsea Cadle, M.A.[1], Gabrielle Deutsch, B.S.[1], Ahna Pai, Ph.D.[1,3], Maninder S. Kalra, M.D., PhD.[2,3], Paola Malerba, Ph.D.[1,3]

Affiliation(s): [1] Center for Biobehavioral Health, Nationwide Children's Hospital, Columbus, OH
[2] Division of Pulmonary and Sleep Medicine, Nationwide Children's Hospital, Columbus, OH
[3] The Ohio State University College of Medicine, Columbus, OH

Introduction: Processing speed (the ability to automatically perform simple mental and motor tasks) is related to working memory and general/fluid intelligence. A range of mental health outcomes, neurodevelopmental disorders, and chronic illnesses can be associated with deficits in processing speed in youth, including major depressive disorder, acute lymphoblastic leukemia, and acute post-concussive symptoms. Additionally, previous studies have shown that youth who experience poor sleep may exhibit lower processing speed performance, which may negatively impact cognitive outcomes such as sustained attention and academic performance. However, not all literature supports the association between sleep and processing speed in youth. These mixed findings may be due to sleep measure selection, which can influence the quantification of a relationship between sleep properties and cognitive outcomes. Here, we investigate how objective and self-reported measures of sleep can differentially contribute to the relation between sleep and processing speed in typically developing youth. In an effort to consider multiple aspects of sleep, we study sleep acquired both at home and in laboratory, and explore metrics of sleep duration and disturbances (wake after sleep onset (WASO)).

Methods: Participants completed one overnight polysomnography (PSG), cognitive measures including the Wechsler Intelligence Scale for Children/Wechsler Adult Intelligence Scale (WISC-V/WAIS-IV), and a seven-day sleep diary. From WISC-V/WAIS-IV, we derive the Processing Speed Index (PSI). From sleep diaries, we quantify self-reported sleep duration (dDuration, minutes) and wake after sleep onset (dWASO, minutes). From PSG, we quantify objective sleep duration (psgDuration, minutes) and wake after sleep onset (psgWASO, minutes). We compare objective and subjective measures of sleep with PSI using linear Pearson's correlations. We examine the role of age as a covariate in these associations using partial correlations. We consider significance for all analyses at the $p<.05$ level. The institutional review board at Nationwide Children's Hospital approved all study procedures prior to enrollment. All participants gave consent/assent according to study procedures.

Results: 61 participants completed all study measures (mean age=13 ± 3.2 years, 36 females). PSI scores were positively correlated with both dWASO ($R=.29$, $p<.05$, small effect) and psgWASO ($R=.31$, $p<.05$, small effect), but were not correlated with psgDuration ($p=.21$) or with dDuration ($p=.64$). When accounting for age, PSI still significantly correlated with psgWASO ($R=.28$, $p<.05$, small effect), but the correlation with dWASO did not remain significant ($p=.08$).

Conclusion: While objective and subjective WASO significantly correlated with processing speed in neurotypical youth, sleep duration did not. This suggests that specific measures of sleep can be selectively revealing of the quantifiable effect of sleep on cognition. Our findings highlight that careful consideration is needed in deploying sleep and cognition measures that can best quantify the sleep-cognition relation. Specifically, our results suggest that WASO is best poised to elucidate the role of sleep in processing speed in youth.

Funding Source: This research was supported in part by The Worthington Companies Pediatric Research Fund 2025 to PM.

Presenter Name/Degree(s): Maggie Kuzemchak, MS

Current Position: Statistician

Title: **Investigating the correspondence between self-reported and smart-bed sleep health: with novel four-dimensional modeling techniques**

Author(s): Maggie Kuzemchak [1], Meredith L. Wallace [2], Daniel J. Buysse [2], Lan Yu [3], Rachel P. Kolko Conlon [2]

Affiliation(s): [1]University of Pittsburgh Medical Center
[2]University of Pittsburgh, Department of Psychiatry
[3]University of Pittsburgh, Department of Medicine

Introduction: Ru-SATED 4.0 is a psychometrically valid questionnaire that measures self-reported subjective sleep. The relationship between Ru-SATED and objective sleep was unknown. Comparing single dimensions of objective and subjective sleep are often disparate. This analysis examines the relationship between subjective sleep health (Ru-SATED) and modifiable dimensions of objective sleep: amount, regularity, and timing (ART). We use novel methods that allow for non-linear and multidimensional relationships to relate objective and subjective sleep.

Methods: Our analytical sample included N = 2,625 Sleep Number Bed Users who completed the Ru-SATED 4.0 scale, measuring multidimensional sleep health over 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 used 4-dimensional modelling to explore complex relationships allowing for interactions between each objective measure, a three-way interaction term, and quadratic relationships. Additionally, we used novel graphical techniques to visualize our results.

Results: Best predicted sleep health is associated with regular (< 1 hour SD) sleep between 6 and 9 hours per night with a midpoint between 1:00-5:00 AM. Regular sleep (< 1 hour SD) allows for the largest range of timing and duration that predicts a high sleep health score. Worst predicted sleep health is associated with high irregularity and either long/late (>8 hours, midpoint > 5:00 AM) or short/early sleep (< 12:00 AM). Lower sleep health scores are associated with extremes of sleep duration and timing.

Conclusion: Our analysis further validates Ru-SATED 4.0 and sleep health as a multidimensional construct by comparing self-report and objective data. We found that the best subjective sleep health was associated with high levels of objective sleep regularity and ranges of sleep duration and timing that reflect consensus recommendations. Our modelling and graphical techniques can help to understand complex associations between multiple sleep health dimensions and measurement modalities.

Funding Source: RF1AG056331 (PI: Wallace), PI-Initiated grant from Sleep Number Corporation (Conlon)

Presenter Name/Degree(s): Lara Labardini

Current Position: Undergraduate student

Title: **Slow-Wave Sleep is Linked to White Matter Maturation in Adolescence and Early Adulthood**

Author(s): Lara Labardini[1], João Paulo Lima Santos[1], Lauren Keller[1], Adriane Soehner[1]

Affiliation(s): [1]University of Pittsburgh School of Medicine, Pittsburgh, PA, USA

Introduction: Sleep is crucial for adolescent brain development, with longer sleep duration linked to better white matter integrity. However, the relationship between specific sleep stages and white matter microstructure is poorly understood. Identifying how the different sleep stages support healthy white matter development can help guide targeted sleep interventions to reduce psychopathology risk. The uncinate fasciculus, a frontal-limbic pathway crucial for integrating emotional and cognitive processes, may be particularly sensitive to sleep-related influences.

Methods: A total of 30 participants recruited across a spectrum of subthreshold mania symptoms (50% Female; Age range= 16.5-24.7 years; Mean age [SD]=21.7 [2.14] years) were included in the analyses. Diffusion Magnetic Resonance Imaging (MRI) was used to derive Neurite Orientation Dispersion and Density Imaging (NODDI) metrics, with a primary focus on the Neurite Density Index (NDI), a marker of white matter maturation that increases with brain development. We extracted both the average NDI across the entire uncinate fasciculus and nodal NDI, which provides values at multiple points along the tract, allowing us to examine whether associations varied between the central portion and the tract terminations connecting temporal and prefrontal regions. Sleep architecture was assessed using the Dreem3 sleep EEG headband over two nights. From these recordings, the average total sleep time and the average percentage of time spent in N2, N3, and REM stages were calculated using both nights. Linear regression models tested associations between sleep stage percentage and uncinate fasciculus NDI, controlling for age, sex, pubertal status, history of psychiatric disorders, and total sleep time. False Discovery Rate (FDR) was used for multiple comparison correction. Q-values represent FDR-corrected P-values.

Results: Higher percentage of sleep spent in N3 (slow-wave sleep) was associated with greater NDI in the uncinate fasciculus (β=0.62, P=0.015, Q=0.045). There was no association involving N2 (β=-0.26, P=0.229, Q=0.283) and REM (β=-0.23, P=0.283, Q=0.283). Follow-up analyses indicated that the association between slow-wave sleep and uncinate fasciculus NDI was strongest at the connection points with the temporal and prefrontal regions, rather than in the central portion of the tract.

Conclusion: Our findings identify slow-wave sleep as a key contributor to uncinate fasciculus maturation during adolescence and early adulthood, supporting white matter development in a pathway vital for cognitive and emotional integration. The association between slow-wave sleep and uncinate fasciculus microstructure was strongest at the tract terminations connecting temporal and prefrontal cortices, suggesting that sleep may preferentially influence the cortical integration points critical for emotion regulation and cognitive function. This highlights the potential for preventative medicine to focus on strategies directed at enhancing slow-wave sleep, thereby supporting the neural mechanisms underlying emotional and cognitive functioning to reduce vulnerability to psychopathology.

Funding Source: National Institute of Mental Health (R01MH124828, PI: Soehner)

Presenter Name/Degree(s): Katherine Lyman, MD

Current Position: Postdoctoral Associate / Clinical Assistant Professor

Title: **Circannual Patterns of Gene Expression in Psychiatric Disease**

Author(s): Katherine Lyman[1], MD, Madeline R. Scott[1], PhD, Kyle D. Ketchesin[1], PhD, Kaitlyn Petersen[1], RuoFei Yin[2], Jaehyoung Choi[3], Xiangning Xue[2], PhD, Jill Glausier[1], PhD, David Lewis[1], MD, Marianne L. Seney[1], PhD, George Tseng[2], PhD, Colleen A. McClung[1], PhD

Affiliation(s): [1]Department of Psychiatry, University of Pittsburgh School of Medicine, [2]Department of Bioinformatics, University of Pittsburgh School of Medicine, [3]Department of Pharmacology and Toxicology, University of Toronto

Introduction: Human circannual rhythm, i.e. seasonal rhythm, represents an extended human rhythmic mechanism which has much in common with circadian rhythm, including its shared relationship to the suprachiasmatic nucleus (Swaab et al)[1] and the common centrality of melatonin to both processes[2]. Psychiatric disorders are known to exhibit seasonal patterns according to large-scale hospitalization data[3]. Given this pattern, as well as the well-known relationship between circadian dysfunction and psychiatric illness, we decided to study seasonal transcriptional rhythms in individuals with psychiatric disease using postmortem brain tissue samples.

Methods: Postmortem brain tissue samples were taken from the dorsolateral prefrontal cortex (DLPFC) and anterior cingulate cortex (ACC) of 33 bipolar disorder (BD) subjects, 50 schizophrenia (SCZ) subjects, 83 major depressive disorder (MDD) subjects, and 83 non-psychiatric comparison (NPC) subjects. RNA sequencing was performed and RNA-seq data processed via a pseudo-time-series analysis fitting the expression data for each gene to a sinusoidal curve, with a period length of 365 days; these curves were assessed for goodness of fit in order to determine the rhythmicity of each gene.

Results: In the DLPFC, individuals with bipolar disorder displayed 6229 genes with a seasonal pattern, SCZ subjects displayed 360, and MDD subjects displayed 433, while NPC subjects displayed only 70 genes with a seasonal rhythm. In the ACC, by contrast individuals with MDD showed more seasonality, with 2335 genes showing a seasonal pattern, while SCZ subjects showed 399 genes, BD subjects showed 132, and NPC subjects showed 380 genes with a seasonal pattern.

Conclusion: Circannual patterns of gene expression were found to be increased in individuals with psychiatric disorders, particularly mood disorders. This suggests altered processes of rhythmic regulation, with a possible shared pathology between seasonal rhythm dysregulation and the circadian rhythm dysregulation often seen in psychiatric illness.

Funding Source: National Institutes of Health; Physician-Scientist Institutional Award from the Burroughs Wellcome Fund (KL)

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Presenter Name/Degree(s): Hannah Martin

Current Position: Graduate Student

Title: **Nucleus Accumbens Interneuron Dynamics in Food Reward Seeking following Normal Sleep**

Author(s): Martin H1, Cai L1, and Huang YH1

Affiliation(s): 1Department of Psychiatry, University of Pittsburgh School of Medicine

Introduction: The nucleus accumbens (NAc) is an important part of both reward and arousal circuitry and plays an essential role in sleep-mediated regulation of reward processing. Although principal neurons in the NAc have been extensively studied in the context of reward seeking, sleep/wake transitions, and sleep-regulation of reward, little is known about the NAc interneuron dynamics in these processes. In vitro studies on NAc interneurons suggest that they powerfully impact NAc principal neurons through extensive feed-forward inhibition, further highlighting the importance of understanding their dynamics in vivo. This has been difficult, in part due to the low %population of NAc interneurons and a lack of robust and specific interneuron promoters. Here we used the S5E2 promoter to specifically target NAc interneurons to study their activity in vivo during reward-seeking behavior.

Methods: Adult C57B6 female mice were injected with AAV-S5E2-GCaMP6F into the NAc and implanted with 400 µm-core optic fiber ~100 µm above the injection site. After recovery, the mice were trained on FR1 schedule sucrose self-administration with simultaneous fiber photometry recording in vivo. Electrophysiological properties of NAc S5E2+ neurons were measured in acute brain slices in separate cohort of mice under whole-cell patch clamp and analyzed using principal component analysis.

Results: Electrophysiological data show that these interneurons were likely low-threshold spiking neurons (LTS) that were distinct from the principal medium spiny neurons or cholinergic interneurons. Fiber photometry recordings showed that S5E2 neuron calcium activity was increased surrounding lever press for sucrose reward. This pattern of activity evolved as the mouse continued training and resulted in a decrease in neuronal activity surrounding lever press when the mouse was well-trained. Reversing the active and inactive levers reinstated the increase in activity during lever press. Behavioral footage is currently being analyzed with Deeplabcut.

Conclusion: In female mice, nucleus accumbens S5E2+ interneurons are dynamically engaged during sucrose reward seeking following normal sleep. Future studies will focus on molecular and electrophysiological characterization of subpopulations of S5E2 interneurons and on elucidating their contributions to sleep/wake transitions and sleep-mediated regulation of reward in male and female mice**.**

Funding Source:

Presenter Name/Degree(s): Riya Mirchandaney, BA

Current Position: Graduate Student in Clinical-Health Psychology

Title: **The Rhythms in the Blues: Modeling and Modulating Diurnal Positive Affect Rhythms**

Author(s): Riya Mirchandaney[1], Meredith L. Wallace[2], Kathryn A. Roecklein[1], Allysa D. Quick[2], Margaret C. Kuzemchak[2], Duncan B. Clark[2], Daniel J. Buysse[2], Greg J. Siegle[2], Brant P. Hasler[2]

Affiliation(s): [1]University of Pittsburgh, Department of Psychology [2]University of Pittsburgh School of Medicine, Department of Psychiatry

Introduction: Our circadian clocks conduct roughly 24-hour rhythms in nearly all human processes including emotion. Controlled laboratory protocols and naturalistic studies reveal a 24-hour rhythm in positive affect (PA), which reaches its lowest point in the middle of the circadian night and its peak in the circadian afternoon. "Evening-types", who experience higher rates of depression, report PA rhythms that are delayed, blunted, and decreased, compared to "morning-types". Chronotherapeutic interventions to advance and/or realign circadian phase can improve mood, but the mechanisms behind this are unclear. In a sample of adolescents with later sleep timing, we examined whether a 2-week chronotherapeutic manipulation was associated with changes in PA rhythms (i.e., shifting the phase earlier, and increasing both the amplitude and the rhythm-adjusted mean).

Methods: We recruited 79 high school juniors and seniors (60% female, mean age = 17.5 years) who reported a weekend bedtime of 1 AM or later. Participants underwent a one-week baseline period followed by a two-week experimental period (i.e., random assignment to manipulation or control). All participants were asked to complete the Positive and Negative Affect Schedule – Short Form (PANAS-SF) 5-6 times a day (once upon waking, once before bed, and the rest semi-randomly in between) across the three weeks. Participants came into the laboratory for an assessment of DLMO twice – once at the end of the first week (prior to randomization) and once at the end of the protocol. Participants in the manipulation condition were asked to maintain a consistent rise time, advance their bedtime, reduce evening light exposure (via blue light blocking glasses), and administer morning bright light (via ReTimer glasses) every day for two weeks. Participants in the control condition were asked to continue to monitor their sleep. We used a cosinor variant of multilevel modeling with three-way interactions between cosine/sine terms, study condition (manipulation vs. control), and study week (Baseline, Experimental 1, or Experimental 2), while controlling for age and sex.

Results: Model estimates indicated the overall presence of rhythmicity in PA (p<.001), significant differences in PA rhythms during both experimental weeks compared to baseline (p=.02, p<.01), and significant differences in the weekly changes of PA rhythms depending on study condition (ps<.01). Specifically, bootstrapped pairwise contrasts revealed that PA phase advanced in the manipulation but this difference was not significant (4:29 pm to 3:23 pm, p=.096), while PA phase delayed significantly in the control (4:02 pm to 4:52 pm, β=.28, p=.002); PA amplitude significantly decreased during the manipulation (1.88 to 1.65, β=-.34, p=.03) but not the control (1.54 to 1.17, β=-.23, p=.174); and PA mean decreased over time in both the manipulation (10.25 to 9.78, β=-.52, p<.001) and the control (10.47 to 9.95, β=-.23, p<.001). Bootstrapped contrasts revealed that the change in acrophase from Week 1 to Week 3 was significantly different between the manipulation and control (β=0.469 or 1.79 hours, p<.001). No other contrasts of change were significant.

Conclusion: By the final week of the manipulation, participants' PA rhythms were significantly advanced relative to the control. While PA amplitude and mean significantly decreased in the manipulation, these changes were not significantly different from changes in the control group. Important next steps include examining how changes in PA rhythms associate with changes in sleep and circadian metrics (e.g., DLMO) and assessing whether changes in PA rhythms predict meaningful clinical outcomes (e.g., depression).

Funding Source: NIDA R01DA044143

Presenter Name/Degree(s): Megan Perez, B.S.

Current Position: Graduate Research Assistant (PhD Student)

Title: **Patterns of Differential Splicing and Associated Putative Effects on Protein-Protein Interactions in the Striatum in Psychosis**

Author(s): M. S. Perez[1,2], R. Yin[3], K. F. Dowling[1], W. Zong[3], M. R. Scott[1], M. L. Seney[1], M. A. Hildebrand[1], V. G. Shankar[1], J. R. Glausier[1], D. A. Lewis[1], G. C. Tseng[3], K. D. Ketchesin[1], C. A. McClung[1]

Affiliation(s): [1]Translational Neuroscience Program, Dept. of Psychiatry, Univ. of Pittsburgh, Pittsburgh, PA; [2]Dept. of Human Genetics, School of Public Health, Univ. of Pittsburgh, Pittsburgh, PA; [3]Dept. of Biostatistics, Univ. of Pittsburgh, Pittsburgh, PA

Introduction: Psychosis is a highly disruptive and often debilitating symptom found in disorders such as schizophrenia and bipolar disorder. Prior studies have heavily implicated the striatum in psychosis. Furthermore, previous studies have reported a dysregulation of alternative gene splicing in psychosis. Alternative splicing is a major factor in transcriptional diversity and little research has been done regarding the intersection of psychosis and splicing in the striatum. Here, we begin to elucidate differential splicing (DS) in the striatum.

Methods: RNA-seq was performed on nucleus accumbens (NAc), caudate, and putamen samples from subjects with psychosis (n=36) or matched unaffected subjects (n=36). For identification and visualization of local splice variation we used LeafCutter and LeafViz, respectively. DIGGER was used to analyze how domain-domain interactions impact protein-protein interactions and Metascape was used for pathway enrichment.

Results: Across the three regions, we identified 705 named, unique genes that were DS. In the NAc, these genes were related to cellular organization and transport. In the caudate, there was enrichment in immune and cellular organization pathways. In the putamen, cilia-, mitochondria-, and cellular organization-related pathways were DS. Furthermore, there were many genes implicated in psychosis that featured cases of differential splicing such as *NRXN1*, *NRXN2*, and *CACNA1C*.

Conclusion: In these genes and pathways, the corresponding exons involved in the DS events encoded protein domains that participate in protein-protein interactions, potentially leading to alterations in the viability of these interactions. This may cause downstream effects in vital processes, such as bridging the synaptic cleft and the regulation of calcium ion channel activity. Future studies regarding differential transcript usage, splice factors, day/night differences, and sex differences will help us better understand striatal DS and its potential functional consequences in psychosis.

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Presenter Name/Degree(s): Kaitlyn Petersen, PhD

Current Position: Postdoctoral Scholar

Title: **Adolescent Circadian Rhythm Disruption Leads to Increased Risk-Taking and Transcriptional Changes in Adulthood**

Author(s): Petersen, KA[1], Depoy, LM[2], Vadnie, CA[3], Scott, MR[1], Zong, W[4], Yin, R[4], Matthaei, RC[1], Jaurez Anaya, F[1], Kampe, CI[1], Tseng GC[4], McClung, CA[1]

Affiliation(s): [1]Department of Psychiatry, University of Pittsburgh, [2]Department of Neuroscience, University of Toledo, [3]Department of Psychology, Ohio Wesleyan University, [4]Department of Biostatistics, University of Pittsburgh

Introduction: Circadian rhythm disturbances have long been associated with the development of psychiatric disorders, including mood and substance use disorders. Adolescence is a particularly vulnerable time for the onset of psychiatric disorders and for circadian rhythm and sleep disruptions. Preclinical studies have found that circadian rhythm disruption (CRD) impacts the brain and behavior, but this research is largely focused on disruptions that occur during adulthood. The goal of this study was to determine the long-term effects of adolescent CRD.

Methods: We exposed mice to four 12 h shifts in the light/dark cycle over the course of adolescence (P28-P37). Mice were sacrificed across 4 times of day in adulthood, approximately 4 weeks following the last shift (Figure 1). Behavioral testing was then performed to assess reward and risk-taking. To identify possible mechanisms by which CRD during adolescence affects behavior later in life, we also measured gene expression in brain regions relevant to circadian rhythms, mood and reward, the SCN, PFC and NAc, respectively.

Results: We first identified that adolescent CRD alters behavior later in life, namely increasing reward and risk-taking. We measured differential expression (DE) between control and adolescent CRD mice across time of day in male and female mice and found that the transcripts affected by CRD were largely distinct across time, sex, and brain region. The SCN was particularly affected, with the most DE transcripts identified at $q<0.05$. These transcripts were largely involved in circadian rhythms, adipogenesis, and intracellular signaling. Downstream of the SCN we also observed significant changes in the PFC of males at ZT0. Transcripts with altered gene expression were associated with neuronal activity, translation, and the extracellular matrix.

Conclusion: Overall, these studies suggested that adolescent CRD in mice is sufficient to persistently increase risk-taking behavior and alter gene expression long-term.

Funding Source: NIDA R01DA039865 (McClung), Wood Next Foundation

Presenter Name/Degree(s): Karl Rennick-Zuefle

Current Position: Undergraduate Researcher

Title: **Shift Work History Moderates Relationships Between Measures of Sleep Health and Blood-Based Synuclein Biomarkers**

Author(s): Karl Rennick-Zuefle,[1] Xuemei Zeng,[2] Helmet T. Karim,[2] Thomas K. Karikari,[2] Daniel J. Buysse,[2] H. Matthew Lehrer[2]

Affiliation(s): [1]Department of Biological Sciences, University of Pittsburgh ,[2]Department of Psychiatry, University of Pittsburgh

Introduction: Night shift work is associated with poor sleep both during work exposure and in retirement. Both poor sleep and night shift work itself are also associated with dementia. Characterizing the health risks of shift work is key to forming health recommendations surrounding this growing line of employment. Much of the prior research surrounding sleep, shift work, and dementia draws from self-reported descriptions of sleep, laboratory-based sleep studies (e.g., polysomnography), and clinical diagnoses of both sleep disorders and dementia. However, few studies examine habitual sleep patterns from a multidimensional perspective in individuals previously exposed to shift work. In addition, newly identified biomarkers of neurodegeneration offer the opportunity to potentially identify disease processes before they manifest clinically. This study examined relationships between sleep health and neurodegenerative biomarkers in retired day workers (RDW) and retired night shift workers (RNSW).

Methods: Participants (N=57, mean age=67.7 +/- 5.4 years, 49.1% females, 12.3% non-White) were 33 RDW and 25 RNSW. Participants provided an average of 6.98 days of sleep diary and actigraphy data, which was collected in participants' home environments. Multidimensional sleep health (MDSH) was quantified using wrist actigraphy measures of sleep efficiency, timing, duration, and regularity, a diary measure of sleep satisfaction, and an Epworth Sleepiness Scale (ESS) score to measure daytime alertness. Each component was dichotomized and summed to create a composite score (0-6); higher values indicated better sleep health. A panel of neurodegenerative biomarkers were quantified by Nucleic Acid Linked Immuno-Sandwich Assay. Biomarker values were used to derive latent variables associated with amyloid and tau pathologies, synuclein and synaptic disorders, neurodegeneration, inflammation, and vascular health, respectively. Interaction models tested associations of multidimensional sleep health and its individual components with these biomarker groups in RDW and RNSW. Models were adjusted for age, sex, race, education, physical health (RAND-12), and depressive symptoms.

Results: Shift work history moderated the relationship between sleep timing and protective synuclein biomarkers (e.g., VGF, PARK7, SOD1, SNCA), with later-sleeping shift workers exhibiting higher protective synuclein biomarker levels, and earlier-sleeping day workers exhibiting higher protective synuclein biomarker levels (interaction coefficient=0.037, FDR-corrected p=0.028). Shift work history also moderated a quadratic relationship between sleep duration and biomarkers of synuclein-related degeneration, with retired shift workers exhibiting lower degenerative synuclein biomarker levels at short and long sleep durations and day workers exhibiting higher degenerative synuclein biomarkers levels at short and long sleep durations (interaction coefficient=-0.00041, FDR-corrected p=0.049). The MDSH composite score's relationship with degenerative synuclein biomarkers were also moderated by shift work history, as were midpoint and biomarkers of neurodegeneration and vascular health, but these significant relationships did not withstand FDR correction. No other relationships were significant.

Conclusion: RNSW exhibit a different synuclein/sleep phenotype compared to RDW. These results suggest that at extreme values of sleep duration and late sleep timing, shift workers are better protected against synucleinopathies than day workers. Future research may establish the physiological processes that result in synuclein changes and examine how sleep and neurodegenerative biomarkers change longitudinally in retired night and day workers.

Funding Source: R01AG047139, K01AG075171

Presenter Name/Degree(s): Rachel M. Sanders, MA

Current Position: PhD Candidate/ Graduate Student

Title: **Prevalence and Correlates of Adherence to 24-Hour Movement Guidelines in a Diverse Sample of Postmenopausal Women**

Author(s): Rachel M. Sanders[1], Kelliann K. Davis[1], Sharon E. Taverno Ross[1], Sanjay R. Patel[2], Kara M. Whitaker[3], Christopher E. Kline[1]

Affiliation(s): [1]Department of Health and Human Development, University of Pittsburgh, Pittsburgh, Pennsylvania
[2]Department of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania
[3]Department of Health and Human Physiology, University of Iowa, Iowa City, Iowa

Introduction: Adherence to 24-hour movement guidelines is related to health benefits in postmenopausal women, yet little research has examined correlates of adherence in this group. Therefore, this study examined sociodemographic and health factors associated with guideline adherence in a diverse sample of postmenopausal women.

Methods: These analyses included 1,160 postmenopausal women in the Study of Women's Health Across the Nation with valid accelerometry-based sleep and activity data. Adherence to the Canadian 24-hour movement guidelines was defined as: (1) 7–9 hours of sleep per night (7–8 hours for adults ≥65 y), (2) ≤8 h/day sedentary behavior (SB), (3) ≥5 h/day light-intensity physical activity (LPA), and (4) ≥150 min/week moderate-to-vigorous physical activity (MVPA). Logistic regression models, adjusted for site, examined sociodemographic and health-related correlates of adherence to all four guidelines and each individual guideline; variables associated with adherence at $p < .10$ in initial models were included in multivariable models.

Results: Only 17.5% of the participants met all four 24-hour movement guidelines, with adherence highest for LPA (88.0%) and lowest for sleep (26.6%). Older age (per year; OR=0.93, 95% CI: 0.86-1.00), financial strain (yes vs no; OR= 0.49, 95% CI: 0.25-0.93, p= .031), unsafe neighborhoods (yes vs no; OR= 0.37, 95% CI: 0.15-0.92, p=.031), and obesity (vs. healthy weight; OR=0.51, 95% CI: 0.30-0.87, p=.013) were associated with lower odds of overall adherence, while sleep efficiency (per 1% increase; OR=1.07, 95% CI: 1.03-1.11, p <.001) was associated with higher odds of overall adherence. Factors associated with adherence to individual guidelines varied, with race/ethnicity, employment status, education, health risks (e.g., sleep apnea, obesity, anxiety), sleep health dimensions (e.g., timing, efficiency), and health behaviors (e.g., smoking, alcohol consumption) associated with guideline adherence for at least one behavior.

Conclusion: Adherence to all four movement behavior guidelines was low, with sleep being the least commonly achieved. Sociodemographic and health-related characteristics may help identify postmenopausal women at greater risk of non-adherence to these guidelines.

Funding Source: N/A

Presenter Name/Degree(s): Prachi Shah, BA

Current Position: Research Specialist

Title: **The Human Behavioral Pattern Monitor in Individuals At-Risk for Mania**

Author(s): Prachi Shah, BA[1]; Lauren Keller, BS[1]; Simey Chan, MS[1]; Margaret Kuzemchak, MS[1], Holden Rosberg, BS[2]; William Perry, PhD[2]; Arpi Minassian, PhD[2]; Dr. Adriane Soehner, PhD[1]

Affiliation(s): [1]University of Pittsburgh, Department of Psychiatry, [2]University of California, San Diego, Department of Psychiatry

Introduction: Bipolar disorder (BD) is a severe and costly psychiatric condition characterized by periods of mania and hypomania. Mania is characterized by increased motor activity and goal-directed behavior, which can be evaluated objectively in the context of the human Behavioral Pattern Monitor (hBPM), a human version of the open-field paradigm. While the hBPM has been used to distinguish acute mania and bipolar disorder from other psychiatric conditions, it is not yet clear whether hBPM outcomes may capture mania vulnerability in unaffected young people. In an ongoing protocol, we examined the extent to which hBPM-derived measures of motor activity were associated with past-week mood symptoms and mania vulnerability. We hypothesized that mania vulnerability and/or subthreshold symptoms would be associated with increased locomotor disorganization and higher motor activity levels.

Methods: Seventy-eight participants aged 16-24yr (M = 21.5, SD = 2.27), recruited from a spectrum of mania risk (MOODS-SR-Lifetime; MOODS) unaffected by BD completed a 24-hour lab visit. Testing included the hBPM and assessments of past week mania (Young mania Rating Scale; YMRS) and depression (Hamilton Depression Rating Scale, HDRS). The hBPM is a reverse-translational paradigm in which patterns of activity and exploratory behavior are monitored via an overhead camera while human participants wait unattended for 15 minutes in a standardized room; motor activity outcomes are derived from visuospatial analysis of video recordings. Linear regression models examined the associations between hBPM-assessed locomotor disorganization (spatial-d) and activity level (activity count) with mood outcomes (past week depression [HDRS] and mania symptoms [YMRS]; mania and depression vulnerability [MOODS]) Models adjusted for age, gender identity, use of psychiatric medications, and the time between wake up and the beginning of the hBPM.

Results: Our preliminary results revealed no significant associations between motor activity measures (spatial-d and counts) and past-week symptoms or lifetime vulnerability or mania and depression (all p-values >0.05).

Conclusion: Interim analyses indicate that individuals at-risk for mania do not exhibit similar psychomotor activity abnormalities as individuals with established BD. As a next step, we will consider how individual differences in sleep, circadian function, age, and sex may influence associations between motor activity outcomes and mood.

Funding Source: National Institute of Mental Health Grant R01MH124828

Presenter Name/Degree(s): Samskrathi Sharma / B.Sc., M.Sc.

Current Position: Graduate student

Title: **Host metabolism is fine-tuned by gut microbiota-Rev-Erb interactions**

Author(s): Samskrathi Sharma, Junjie Ma, Zheng Kuang

Affiliation(s): Biological Sciences, Carnegie Mellon University, Pittsburgh, PA, USA 15213

Introduction: The circadian clock is key to normal host metabolism. Among a variety of intrinsic and environmental factors, the gut microbiota is known to modulate host circadian rhythms and affect host metabolism. The circadian clock paralogs *Nr1d1* and *Nr1d2* (*Nr1d1/2)* have known lipid metabolic functions in the liver and adipose tissues, however their roles in the intestine, where nutrient absorption occurs, is largely unknown. Intestinal epithelial cells (IECs) are the interface of host-microbiota interactions, which are crucial for metabolism. Thus, we tested the hypothesis that the gut microbiota regulates the circadian clock in the IECs and ultimately alters outcomes of lipid metabolism.

Methods: We generated mice that were an IEC-specific knockout of *Nr1d1* and *Nr1d2* (*Nr1d1/2*$^{\Delta IEC}$) to investigate their role in circadian rhythmic and lipid metabolic functions of the intestine. We performed a diurnal sampling and studying transcriptome rhythmicity. We then employed chronic Western diet feeding to study the roles of IEC *Nr1d1/2* in diurnal lipid metabolism and assessed several metrics to confirm obesity. Finally, we used transgenic and gnotobiotic mice to identify the mechanism by which microbiota regulates *Nr1d1/2* in IECs.

Results: We found that the expression of *Nr1d1* and *Nr1d2 (Nr1d1/2)* was upregulated in the intestinal epithelial cells (IECs) of germ-free mice indicating microbiota regulation of diurnal rhythms in IECs. The *Nr1d1/2*$^{\Delta IEC}$ mice showed no difference in body weights and glucose tolerance but exhibited disrupted transcriptome rhythmicity. Several genes related to lipid metabolism were indeed altered. To further study the role of *Nr1d1* and *Nr1d2* in lipid metabolism, mice were challenged with a Western diet that is high in lipids. *Nr1d1/2*$^{\Delta IEC}$ mice gained more weight on this diet and exhibited several markers of obesity including heavier adipose tissues, higher triglycerides levels, and impaired glucose tolerance. Since we found that *Nr1d1/2* was repressed by the gut microbiota and played a role in lipid metabolism, the role of microbiota in the previously observed obesity phenotype was tested by depleting the microbiota during provision of a Western diet challenge. This obliterated the previously seen differences between *Nr1d1/2*$^{\Delta IEC}$ and *Nr1d1/2*$^{fl/fl}$ mice observed upon Western diet feeding. Finally, to study the mechanism of gut microbiota-mediated repression of *Nr1d1/2* themselves, germ-free mice were treated with two predominant components of bacterial cells- flagellin and lipopolysaccharides. This treatment phenocopied the repression of *Nr1d1* and *Nr1d2* in IECs as was observed in conventional mice where the microbiota is intact. We then found that the gut microbiota utilizes a dendritic cell-mediated immune circuit to relay signals of repression to *Nr1d1/2* in IECs.

Conclusion: Our work reveals an interplay between the gut microbiota and host diurnal rhythms in fine-tuning host lipid metabolism. We identified a microbiota-regulated circadian clock circuit that alters intestinal nutrient uptake and the outcomes of diet-induced obesity.

Funding Source: American Heart Association Predoctoral Fellowship (to S.S.), Institute of International Education (IIE) Quad Fellowship (to S.S.), National Institute of Health (NIH) grants R00 (DK120897) and (DP2DK136278) (to Z.K.)

Presenter Name/Degree(s): Karoline Shellhause, B.S.

Current Position: Research Project Assistant

Title: **Neuromodulatory effects of bright light on threat and reward network metabolism in depressed adults**

Author(s): Karoline Shellhause[1], B.S., Henry Chase[1], Ph.D., Melanie Wang[1], B.S., Lauren Keller[1], B.S., Cal Sollie[1], B.S., Kathryn Rocklein[2], Ph.D., Adriane Soehner[1], Ph.D.

Affiliation(s): [1]Department of Psychiatry, University of Pittsburgh School of Medicine, Pittsburgh, PA, [2]Department of Psychology, University of Pittsburgh, Pittsburgh, PA

Introduction: Light Therapy (LT) is a promising non-pharmacological treatment for depression, however, the mechanisms supporting its therapeutic benefits remain unclear. Preclinical models indicate that light modulates mood through melanopsin-containing of retinal ganglion cells (mRGCs). mRGCs are maximally sensitive to blue light and minimally sensitive to red light and directly convey light signals from the retina to brain structures involved in threat and reward processing. Using within-scanner light exposures, we examined the degree to which melanopsin-engaging blue (vs. red light and darkness) light modulated regional metabolism within brain regions supporting threat and reward processing in adults with depressive symptoms.

Methods: A total of 33 young adults ages 18 to 30yr (24.94 ± 3.17 yr; 20 Female) with elevated depressive symptoms (Patient Health Questionnaire-9 > 5) completed 1 week of a stable sleep schedule followed by an MRI assessment. During the MRI protocol, participants underwent pseudo-continuous arterial spin labeling to assess cerebral blood flow (CBF) during dark, blue, and red light exposures lasting approx. 5 minutes; the order of red and blue light was counterbalanced. A mixed effects model evaluated CBF differences in threat (amygdala, insula, ventromedial prefrontal cortex [vmPFC]) and reward (ventral striatum[VS], medial prefrontal cortex[mPFC]) network regions of interest, adjusting for age, sex, and depression severity.

Results: Light condition impacted the VS ($F=5.32$, $p=0.008$), mPFC ($F=4.41$, $p=0.017$), vmPFC ($F=4.63$, $p=0.014$), and insula ($F=6.02$, $p=0.004$). Activation was greater in red light versus dark in the VS ($p=0.014$), mPFC ($p=0.020$), vmPFC ($p=0.017$), and insula ($p=0.004$). There were no significant differences between dark and blue light, or red and blue light, contrary to our predictions.

Conclusion: There may be differences in brain activation of threat and reward areas based on light condition exposure. Activation of threat and reward circuits may be significantly impacted by red light when compared to dark conditions.

Funding Source: R21MH127294

Presenter Name/Degree(s): Carly Sokolowski, B.S. in progress

Current Position: Undergraduate Research Assistant

Title: **Obstructive sleep apnea among patients diagnosed with childhood scoliosis**

Author(s): Carly A. Sokolowski, Maddison L. Taylor, Alison M. Klevens, & Kathryn A. Roecklein

Affiliation(s): University of Pittsburgh, Department of Psychology

Introduction: The potential of scoliosis and Obstructive Sleep Apnea (OSA) to cause reduced quality of life and cardiopulmonary diseases makes identifying OSA in childhood scoliosis a public health goal. If they are comorbid, they serve as treatment targets for improving long-term health outcomes. Scoliosis is a musculoskeletal disorder of the spine produced from left or right curvature greater than 10 degrees that is typically identified in childhood (ages 0-17). OSA is a sleep-related breathing disorder characterized by cessation in breathing (apnea) or partial reduction in breathing effort and airflow (hypopnea). While both conditions have been well-studied independently, limited research has examined their comorbidity in children/adolescence. Ugur et al. (2023) showed that out of 299 adolescents in Turkey diagnosed with adolescent idiopathic scoliosis who were administered the pediatric sleep questionnaire (PSQ), 32.9% had PSQ scores indicative of OSA. Li et al. (2018) showed that 10.5% of adolescents in China with scoliosis (N = 57) had an apnea and hypopnea index (pAHI) greater than 5 compared to none of the 25 controls. However, these findings have yet to be replicated in U.S. samples. Theoretically, scoliosis can contribute to OSA through chest cavity deformity and decreased lung compliance. We investigated the number of individuals in a Pitt research participant registry with either OSA, childhood scoliosis, or both in order to determine if sufficient numbers of participants may be represented and potentially recruited. This is a first step to generate recruitment feasibility data prior to study recruitment to justify funding applications.

Methods: Counts of individuals who were identified as having either disorder were gathered from Pitt+Me. Pitt+Me is the research study recruitment registry of the University of Pittsburgh, located in Pittsburgh, Pennsylvania. Individuals and their parents have the option to report diagnoses and health conditions when joining Pitt+Me. We gathered participant numbers using ICD codes for each condition of interest. Data from the Pitt+Me research database was used to provide the number of children with infantile (0-3 years), juvenile (4-10 years), or adolescent (11-17 years) diagnosis of either condition. A chi-square test was used to determine if the frequency of reported OSA differed across those who did and did not report childhood scoliosis.

Results: A chi-square test indicated that individuals reporting scoliosis are more likely to also report OSA when compared to those reporting no scoliosis, $X^2(1, N = 78676) = 5.7, p < .05$. The rate of OSA reported in those identified as having childhood scoliosis (1.4%) was over twice that of those without scoliosis (0.6%). Most importantly, the Pitt+Me registry includes at least 565 individuals with childhood scoliosis, and at least 8 of those have OSA.

Conclusion: The results showed that the rate of OSA reported in Pitt+Me is higher among individuals with childhood scoliosis than those without childhood scoliosis**,** and that the sufficient number of children in Pitt+Me suggests that this recruitment tool would be effective. The next step in this line of research would be to recruit participants and use standardized scoliosis and OSA assessments.

Funding Source: NIH R01MH13305

Presenter Name/Degree(s): Trevor Staab

Current Position: Undergraduate Research Assistant

Title: **Melanopsin-Driven Pupil Responsivity as a Driver of Circadian Dysregulation in Young People at Risk for Mania**

Author(s): Trevor Staab; Lauren Keller, BS[1]; Margaret Kuzemchak, MS[1]; Prachi Shah, BS[1]; Allison Caswell, BS[1]; Simey Chan, MS[1]; Brant P. Hasler, PhD[1]; Kathryn A. Roecklein, PhD[2]; Adriane M. Soehner, PhD[1]

Affiliation(s): [1]University of Pittsburgh, Department of Psychiatry. [2]University of Pittsburgh, Department of Psychology

Introduction: Mania is associated with circadian rhythm dysfunction. Identifying the biobehavioral risk-markers that may drive circadian dysfunction may, in turn, help better detect and prevent mania. In humans, light conveyed through melanopsin-containing intrinsically photosensitive retinal ganglion cells (ipRGCs) is one of the strongest influences on circadian rhythms. Furthermore, recent evidence suggests that those with and at risk for mania are more sensitive to light. In an ongoing protocol, we examined the extent to which melanopsin-driven pupil responsivity is related to biobehavioral markers of circadian rhythm timing and robustness. We hypothesize that higher melanopsin-driven pupil sensitivity will be associated with biobehavioral indicators of later circadian timing and lower circadian rhythm robustness.

Methods: One hundred twenty-two participants aged 16–24yr (*M*= 21.7, *SD*= 2.11) across three levels of sub-threshold mania symptoms (MOODS-SR-Lifetime; MOODS) completed 2 overnight laboratory visits accompanied by a day of testing protocols. Data collection included melanopsin-driven pupil responsivity (post-illumination pupil response; PIPR), indices of circadian timing (dim light melatonin onset [DLMO], actigraphy midsleep, Munich Chronotype Questionnaire midsleep) and rhythm robustness (overnight urinary melatonin sulfate, actigraphy circadian function index, daily social rhythm metric [SRM] score]. PIPR was estimated at 3 post-stimulus intervals, 6sec (PIPR6), 10-30sec (PIPR20), and 10-40sec (PIPR30) after the light stimulus and calculated using the net PIPR (blue-red) as a percent of baseline and averaged across morning and afternoon testing sessions. Multivariate linear regression models were used to assess the effect of melanopsin-driven pupil responsivity on sleep timing and rhythm robustness measures. All models covaried for age, sex at birth, past-week depression and mania symptoms, psychotropic medication use, and MOODS mania score.

Results: Higher melanopsin-driven pupil responsivity (PIPR) was associated with lower circadian function index scores for PIPR20 (β_{PIPR20}=-0.28, p=0.020) and PIPR30 (β_{PIPR30}= -0.33, p=0.010) but not PIPR6 (p > 0.05). Additionally, higher PIPR6 was associated to later midsleep on sleep diaries (β_{PIPR20}=3.43, p = 0.022) but not PIPR20 or PIPR30 (p > 0.05). No significant results were found for the association between melanopsin-driven pupil responsivity and DLMO, actigraphy midsleep, SRM score, and urinary melatonin sulfate (all p-values >0.05).

Conclusion: Our interim findings indicate that higher melanopsin-driven pupil responsivity was associated with lower activity rhythm robustness and later self-reported sleep timing. These findings align with our hypothesis and indicate that melanopsin sensitivity may be a promising biological marker of rhythm dysfunction that is a characteristic of mania vulnerability.

Funding Source: R01MH124828 (Soehner)

Presenter Name/Degree(s): Diana Stachula, BA

Current Position: Medical Student, SUNY Downstate Health Sciences University

Title: **Symptom-Based Identification of Low Arousal Threshold in Patients with Obstructive Sleep Apnea**

Author(s): Diana A. Stachula, BA[1]; Katie Carlson, MPH[2]; Ryan J. Soose[2], Thomas M. Kaffenberger, MD[2,3]

Affiliation(s): SUNY Downstate Health Sciences University[1]; The University of Pittsburgh, Department of Otolaryngology and Head & Neck Surgery[2]; Veterans Affairs Pittsburgh Healthcare System[3]

Introduction: Obstructive sleep apnea (OSA) is a prevalent disorder characterized by recurrent upper airway collapse and sleep fragmentation. A low respiratory arousal threshold (low AT), defined as awakening easily to minor respiratory events, contributes to poor sleep quality and reduced adherence to therapies such as CPAP. Although AT can be estimated from sleep studies, how low AT patients manifest symptoms remains unexplored. We evaluated whether self-reported symptoms and questionnaires can identify patients with OSA who have a low AT.

Methods: From consecutive new patients presenting to an otolaryngology sleep medicine clinic, we collected demographics, sleep history items, standardized questionnaire responses (Epworth Sleepiness Scale [ESS], Insomnia Severity Index [ISI], Nasal Obstruction Symptom Evaluation [NOSE]), and sleep study variables. Our inclusion criteria were adult patients with a confirmed diagnosis of OSA who had completed our Intake Questionnaire at their initial visit and had a home sleep study ordered between December 1, 2024, and March 31, 2025. Patients who did not complete the Intake Questionnaire, did not have an OSA diagnosis, or had an apnea–hypopnea index (AHI) <5 events/hour were excluded. Patients were categorized as low AT vs not low AT using a validated clinical screening tool that assigns one point each for AHI <30, nadir oxygen saturation >82.5%, and hypopneas comprising >58.3% of respiratory events. A total score of 2 or higher indicates low AT. Group differences in questionnaire scores and symptom frequencies were evaluated using Wilcoxon rank sum and chi square tests. Logistic regression models were constructed to identify independent predictors of low AT.

Results: A total of 129 patients with OSA were included. In univariate analyses, low AT was significantly associated with longer subjective sleep latency (median 20.0 min [IQR 10.0–45.0] vs 13.8 min [IQR 5.0–30.0], p=0.041), higher ISI scores reflecting worry or distress about sleep difficulties (Question #6; median 2.5 [IQR 2.0–3.0] vs 2.0 [IQR 1.0–3.0], p=0.044), higher NOSE scores for nasal congestion (Question #1; median 10.0 [IQR 5.0–15.0] vs 5.0 [IQR 4.3–10.0], p=0.043), and lower ESS scores for sitting inactive in a public place (Question #3; 0.0 [IQR 0.0–1.0] vs median 1.0 [IQR 0.0–2.0], p=0.029). Subjectively reporting frequently falling asleep during the day was more common among patients without low AT (49% vs 28%, p=0.041). In multivariable regression adjusting for AHI, ESS sitting inactive in a public place (Question #3; OR 0.51, 95% CI 0.27–0.95, p=0.034) remained a significant predictor of low AT.

Conclusion: Within an OSA cohort from an otolaryngology sleep clinic, low AT patients were more likely to have longer subjective sleep latency, more worry about sleep difficulties, lower sleepiness scores for sitting inactive in a public place, and greater nasal congestion. Subjective frequent daytime sleepiness was more often reported among patients without low AT. After adjustment for AHI, reporting higher levels of sleepiness while sitting inactive in a public place was associated with significantly lower odds of low AT. These findings suggest that symptom-based screening may help identify patients with OSA who have a low AT, independent of OSA severity.

Funding Source: University of Pittsburgh T32 Training Grant in Sleep and Circadian Science

Presenter Name/Degree(s): Taylor Ashley Stowe, PhD

Current Position: Postdoctoral fellow

Title: ***Diurnal rhythms in neuronal activity in the nucleus accumbens: underlying mechanisms and impact of cocaine self-administration***

Author(s): TA Stowe*, Y Huang*, CA McClung*

Affiliation(s): *Psychiatry

Introduction: Biological rhythms, including diurnal (light/dark) rhythms, have been found in psychiatric disorders, such as substance use disorders (SUDs). Notably, drug-taking patterns can vary throughout the day, indicating that individuals may be more susceptible to drug use at certain times of day. Overall, it is crucial to determine the mechanisms that mediate rhythms in reward-related behaviors, like drug-taking, to better understand vulnerability to developing SUDs. The nucleus accumbens (NAc) plays a key role in reward-related behaviors and is primarily made up of GABAergic medium spiny neurons (MSNs) but also contains cholinergic interneurons (CINs). Our lab has previously shown diurnal rhythms in NAc MSN activity with higher activity during the dark cycle; however, MSNs are not all the same with some expressing dopamine D1 or D2 receptors with stimulation differentially impacting reward-related behavior. Additionally, we do not know if the CINs have diurnal rhythms in activity. CINs are the primary source of acetylcholine (ACh) in the NAc, which modulates dopamine (DA) release. Rhythms exist in the ACh modulation of DA, but it remained unknown if there were rhythms in CIN activity. Thus, we wanted to determine if rhythms in neuronal activity in the NAc were cell-type specific.

Methods: Here we expanded on our previous data by measuring activity via *ex vivo* electrophysiology in the NAc over the 24 hr cycle in specific types of MSNs and CINs. Using pharmacological methods, we also aimed to determine the potential mechanisms driving rhythms in these mechanisms. From our previous RNA sequencing data, we found that HCN channels may mediate diurnal differences in D1 and D2 MSNs. Thus, we applied an HCN channel antagonist and measure excitability in the light and dark cycle. In the NAc, CIN activity is mediated via D2 receptors and nAChRs. We utilized drugs targeting D2 receptors or nAChRs to determine if these potentially play a role in the diurnal rhythms and sex differences in CIN activity. After determining baseline variations and potential mechanisms, we also utilized cocaine IV self-administration to determine how chronic cocaine exposure affects rhythms in MSNs and CINs. Mice were implanted with a jugular catheter and went through 7 days of cocaine (0.5 mg/kg) self-administration on a fixed-ratio (FR) 1 schedule. After acquisition, mice were euthanized the following day for electrophysiology.

Results: Our data show that D1 and D2 containing MSNs may have opposing diurnal variations in excitability. We found that D1 MSNs were more excitable in the beginning of the light cycle while D2 MSNs were more excitable in the beginning of dark cycle. These rhythms may be driven by HCN channels. Additionally, our data suggest that tonic CIN activity is higher during the dark cycle, specifically in male mice. We found that D2 receptors may mediate rhythms in tonic CIN activity. Lastly, we found that chronic cocaine exposure changed rhythms in both D1/D2 MSNs and CINs. D1/D2 MSNs have an overall decrease in excitability in the beginning of the light cycle while there is an increase in CIN activity in both males and females in the beginning of the light cycle.

Conclusion: Given the essential roles of MSNs and CINs in motivated behaviors and local NAc dynamics, rhythmic activity in these cells may influence drug-taking behaviors and contribute to vulnerability to SUDs. These rhythms may also regulate local dynamics, such as DA release. In addition to baseline rhythms in these cell types, we also found that chronic cocaine exposure may change the neural activity based on cell type and time-of-day. These data further support the potential bidirectional rhythms between rhythms and SUDs. Collectively, these novel findings will advance our understanding of how rhythms contribute to the neural mechanisms driving reward-related behaviors associated with SUDs.

Funding Source: NIDA R01DA039865 (McClung), NIDA F32DA060613 (Stowe)

Presenter Name/Degree(s): Maddison L. Taylor, MS

Current Position: Graduate Student

Title: **Pupil Sleepiness Test decreases across CBT-SAD and Light Therapy in Seasonal Affective Disorder**

Author(s): Maddison L. Taylor, MS[1]; Alison M. Klevens, BS[1]; Kelly L. Rohan, PhD[3]; Greg J. Siegle, PhD[2]; Peter L. Franzen, PhD[2]; Kathryn A. Roecklein, PhD[1]

Affiliation(s): [1]Department of Psychology, University of Pittsburgh, Pittsburgh, PA; [2]Department of Psychiatry, University of Pittsburgh, Pittsburgh, PA; [3]Department of Psychological Science, University of Vermont, Burlington, VT

Introduction: Daytime sleepiness is a highly prevalent and debilitating symptom in seasonal affective disorder (SAD), a recurrent subtype of winter depression. SAD can be treated with Cognitive Behavioral Therapy for SAD (CBT-SAD) or light therapy (LT). Broadly, these treatments are theorized to reduce daytime sleepiness by improving sleep. While LT decreases self-reported sleepiness, less is known about how CBT influences sleepiness. Further, no study has examined changes in objective sleepiness following either treatment for depression. Objective measures are critical because self-report sleepiness is often confounded with fatigue, and residual sleep problems frequently persist after both pharmacotherapy and CBT, contributing to relapse. Notably, it remains unknown whether objective sleepiness changes across CBT-SAD or LT, which could indicate which treatment more effectively targets objective sleepiness. This study tested three hypotheses: (1) that objective sleepiness measured by the Pupil Sleepiness Test (PST) decreases over treatment; (2) that depression severity decreases over treatment; and (3) that PST and depression severity change scores are positively associated. As an exploratory aim, we tested whether pre- to post-treatment changes in PST differ between CBT-SAD and LT groups.

Methods: Participants included 47 (*M* age = 43.2, *SD* = 14.5) individuals diagnosed with seasonal depression randomized to CBT-SAD or LT, resulting in 141 observations (pre-, mid-, post-treatment). Depression severity was measured using the Structured Interview Guide for the Hamilton Rating Scale for Depression–Seasonal Affective Disorder. The PST was administered in a dark room for 11 minutes, while the EYE-TRAC (R) 6000 tracked pupil diameter at 60 Hz. The average PST across the full 11-minute protocol was calculated. For hypotheses 1 and 2, multilevel models with covariates (testing time, age, gender) accounted for repeated measures. A Type III ANOVA tested overall timepoint effects, with follow-up pairwise comparisons via estimated marginal means when significant. For hypothesis 3, bivariate regression models examined change scores with covariates (baseline PST and depression, age, gender, testing time). For the exploratory aim, treatment groups were analyzed separately.

Results: A significant main effect of timepoint was observed for both depression ($F(2, 91.73) = 4.30$, $p = .01$) and PST ($F(2, 92) = 42.19$, $p < .001$). Depression symptom severity significantly decreased from pre- to mid-treatment ($b = 6.51$, $p < .0001$) and from mid- to post-treatment ($b = 2.62$, $p = .03$). In contrast, PST showed a significant reduction only between mid- and post-treatment ($b = 0.23$, $p = .01$). Change in PST was not significantly associated with change in depression symptom severity. When treatment groups were analyzed separately, only the CBT-SAD group exhibited a significant reduction in PST from pre- to post-treatment ($b = –0.29$, $p = .03$).

Conclusion: This is the first study to show that depression treatment reduces PST scores. The lack of PST and depression change score association suggests distinct underlying mechanisms. Our exploratory analyses revealed CBT may more effectively target objective sleepiness than LT, which may warrant further mechanistic tests. For example, LT therapy primarily advances circadian timing. While CBT-SAD uses behavioral activation and cognitive restructuring to help manage inactivity and negative automatic thoughts. Future research should identify therapy-specific mechanisms that reduce sleepiness in depression.

Funding Source: This research was supported by NIH grant [5R01MH112819-05].

Presenter Name/Degree(s): Dylan Vaughan B.S.

Current Position: Pre-Doctoral Student

Title: **Melanin-concentrating hormone reduces learned helplessness in male mice and modulates the layer 2/3 medial prefrontal cortex microcircuit**

Author(s): Vaughan D[1,2,3] and Huang YH[1]

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Introduction: Posttraumatic stress disorder (PTSD) induces sleep changes that positively correlate with symptom severity. Rapid eye movement sleep (REMS) can improve PTSD symptoms and promote resilience, though the mechanisms are unclear. The medial prefrontal cortex (mPFC) is commonly dysregulated in PTSD, with certain features recapitulated in a mouse model of learned helplessness. Here, we focused on melanin-concentrating hormone (MCH), a neuropeptide predominantly released during REMS and implicated in cellular plasticity, and tested whether MCH acts on the mPFC microcircuit and reduces learned helplessness.

Methods: Exp 1: Male mice (n = 33) were run through a learned helplessness paradigm, including the conditioning and testing phases, to be characterized as helpless or resilient via k-means clustering (k=2). Following the first testing session, mice were given intranasal (IN) MCH, IN saline, i.p. TC-MCH-7c (MCHR1 antagonist) or i.p. saline. Mice were retested the following day to determine changes in helplessness. Exp 2. Acute brain slices were taken from male and female mice. Slices were incubated in ACSF, MCH, or TC-MCH-7c for 30 minutes. Electrophysiological recordings were done in layer 2/3 mPFC pyramidal neurons, parvalbumin (PV) interneurons, vasoactive peptide (VIP) interneurons, and somatostatin (SST) interneurons to assess changes in membrane and synaptic properties.

Results: Exp 1: IN MCH reduced helplessness (n=8, $p<0.01$, paired t-test) in male mice. Exp 2: MCH incubation increased the excitability of pyramidal neurons ($p<0.01$), VIP interneurons ($p<0.0001$), and PV interneurons($p<0.001$), but not SST interneurons ($p=0.6197$; One-way ANOVAs, n=10–12 cells per group, 2 – 4 cells per animal). Furthermore, MCH increased the frequency ($p < 0.0001$) and amplitude ($p = 0.0001$, one-way ANOVA, 8–12 cells per group, 2–4 cells per animal) of spontaneous inhibitory currents onto pyramidal neurons.

Conclusion: IN MCH reduces PTSD-like phenotypes in male mice and alters the electrophysiological properties of the mPFC microcircuit.

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Presenter Name/Degree(s): Delainey Wescott, PhD

Current Position: Postdoctoral scholar

Title: **Preference or behavior? Unique associations between circadian preference, sleep behaviors, and depression in youth**

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Introduction: Evening types ("night owls") are vulnerable to depression, which may be driven by late sleep timing and maintained by worsened morning mood and alertness upon waking. Factor analytic findings suggest eveningness comprises both a preference for later timed activities and negative morning affectivity. Targeted interventions shifting eveningness earlier can improve depression, although these shifts may reflect changes in morning affectivity and not sleep behaviors. The present study examined circadian preference, sleep behaviors, and depression in an intensive longitudinal sample of adolescents and young adults receiving treatment for depression and suicidal thoughts and behaviors. We examined changes throughout treatment and tested whether eveningness was uniquely associated with depression, morning mood, and alertness above and beyond sleep behaviors.

Methods: Participants (N=181, ages 13-22, 79% White, 75% female sex at birth) were enrolled in an intensive outpatient treatment program for depressed and suicidal youth and young adults and wore an actigraph to measure sleep onset timing and total sleep time for 1–18 weeks (M=4.7, SD=3.0). Clinicians rated weekly depression severity using the A-LIFE Psychiatric Severity Rating scales. Participants completed monthly circadian preference measures assessed with the Composite Scale of Morningness and daily sleep diaries reporting morning mood upon waking and morning alertness using visual analogue scales (1-100). We examined associations between circadian preference, sleep, and depression across time in treatment using multilevel models with a random intercept (participant) and a random slope (time). Exploratory analyses separated circadian preference into morning affective and timing preference subscales. Covariates included age, sex at birth, time in study, and weekday/weekend.

Results: Evening types had later (b=-0.03; p=0.005) and shorter sleep (b=-0.02; p=0.018) throughout treatment accounting for depression. Evening types reported worse morning mood upon waking (b=0.23, p=0.23) and reduced morning alertness (b=0.65; p<0.001) accounting for depression. Overall eveningness was not significantly associated with depression (b=-0.01; p=0.06); however, worse morning affectivity (b=-0.05; p=0.013) but not timing preference (b=-.01; p=0.260) was associated with depression. Sleep onset timing from actigraphy was not associated with morning mood (b=0.11, p>0.05), alertness (b=0.09; p=0.410), or depression (b=0.01; p=0.870).

Depression (b=-0.10; p<0.001) and morning mood upon waking (b=0.09; p=0.006) improved throughout treatment; morning alertness did not change (b=0.01; p=0.927). Improved morning mood was moderated by circadian preference; evening types, but not morning types, showed increased morning mood over time in treatment (b=-0.01; p=0.029). Circadian preference shifted towards morningness throughout treatment (b=0.57; p=0.029), driven by improvements in morning affectivity (b=0.34; p<0.001); timing preferences did not change (b=0.24; p=0.337). Sleep onset timing (b=0.01; p=0.930) and total sleep time (b=0.01; p=0.876) did not change throughout treatment.

Conclusion: Eveningness may comprise other factors beyond sleep timing behaviors that are linked with depression including negative morning affectivity. This morning misery could reflect sleep inertia, difficulty transitioning between sleep and wake, which may suggest waking at a time misaligned with preferred timing. Yet, sleep did not change throughout treatment. Sleep focused interventions may be necessary to improve sleep health during psychiatric treatment. Interventions shifting timing preferences and sleep timing earlier, including timed light and behavioral sleep interventions, may be clinically indicated in higher levels of care.

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Presenter Name/Degree(s): Afsara Zaheed, PhD

Current Position: Postdoctoral Scholar

Title: **Next-year sleep and cognitive health associations differ by proximity to dementia diagnosis**

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Introduction: Differentiating aspects of sleep health that are modifiable risk factors from those that are prodromal symptoms or consequences of dementia can inform dementia prevention and/or clinical screening efforts, and temporal mapping of sleep-cognition associations can further inform mechanistic hypotheses regarding the role of sleep leading up to dementia diagnosis. Our objectives were to: 1) characterize bidirectional associations between cognition and three modifiable aspects of sleep health, and 2) determine whether these associations differ based on years-to-dementia diagnosis. We hypothesized that: 1) short and long sleep, early timing, and low regularity would each be associated with lower next-year global cognition and vice-versa, and 2) that the strength of observed sleep-to-cognition and/or cognition-to-sleep associations would increase more proximally to dementia diagnosis.

Methods: Participants included 326 community-dwelling older adults from the Rush Memory and Aging Project (M age= 82.8 years; 93% non-Hispanic White, 7% other; 78% female) with up to 11 years of longitudinal sleep and cognitive health data prior to a diagnosis of dementia. Sleep health was assessed using wrist actigraphy-derived indices of amount (sleep interval length, alpha), regularity (inter-daily stability, intra-daily variability, midpoint SD), and timing (midpoint, acrophase). Global cognition (primary exposure/outcome) and 5 cognitive domains (secondary exposures/outcomes) were characterized via comprehensive neuropsychological assessment. Years-to-dementia diagnosis was included as a separate exposure and as an interaction term with either sleep or cognitive health exposures in each model. We applied linear mixed-effects models to investigate longitudinal sleep-cognition associations, bidirectionally, and to determine whether these associations were modified by years-to-dementia diagnosis. All models were adjusted for relevant demographic and health covariates.

Results: Sleep amount and regularity, but not timing, were associated with next-year global cognition. These associations were modified by years-to-dementia. Greater sleep amount was associated with better next-year global cognition a decade prior to dementia diagnosis, but worse next-year global cognition in the year preceding dementia diagnosis. Greater sleep irregularity was associated with better next-year global cognition a decade prior to dementia diagnosis, but worse next-year global cognition in the year preceding dementia diagnosis. We did not find robust evidence for cognitive health as a predictor of next-year sleep amount, regularity, or timing.

Conclusion: Our findings may reflect differences in the mechanisms underlying sleep-cognition associations at different time points along the path to dementia diagnosis and suggest that changes in sleep amount and regularity precede cognitive decline rather than the inverse. Additional mechanistic research and clinical trials are needed to determine whether optimizing sleep amount and regularity can slow cognitive decline and delay dementia onset.

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