Sleep for Science
RESEARCH LABORATORY
BROWN UNIVERSITY

PEDIATRIC SLEEP, RHYTHMS, AND MENTAL HEALTH

William C. Dement

Sleep and Chronobiology Behavioral science Research

Bradley Hospital COBRE Center For Sleep and Circadian Rhythms in Child and Adolescent Mental Health

Retreat Colloquium Poster Presentations

Brown University
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Race as a Risk Factor in Trauma Related Dreaming

Aysheh Abuarqub
1. Bradley Sleep Lab, Brown University

Introduction

- Race is a major risk factor in both sleep health and PTSD
- Black people are significantly more likely to develop PTSD than any other racial demographic
- Dreaming plays a key role in PTSD development, identification, and recovery
- Key Question: How do race, dreaming, and PTSD relate to each other?

Why I chose this topic

- Gain a better understanding of the role systemic racism plays in sleep and mental health
- Learn how trauma informs dreaming, I wanted to know how someone's race can affect the experience of their dreams

PTSD and Race

African Americans experience highest rates of PTSD– 8.7% (vs 7.4% in a White sample) (Robers et al., 2011)

Race is a significant risk factor in exposure to trauma

- 89% of a black urban sample had experienced at least one traumatic event in their lives (Brown & Mellman, 2014)

There is a significant positive predictive relationship between experiences with racial discrimination and PTSD development (Alegría et al., 2013)

Race and Dreaming

- There is evidence to suggest that race has an impact on the way dreams are experienced
- One study looked at the dream content of individuals in the aftermath of the murder of George Floyd (Bulkeley & Schredl, 2022)
- Black participants were most likely to support BLM
- BLM supporters reported dreams referencing protests and George Floyd
- Dreams often personalized political and racial themes and content

PTSD and Dreaming

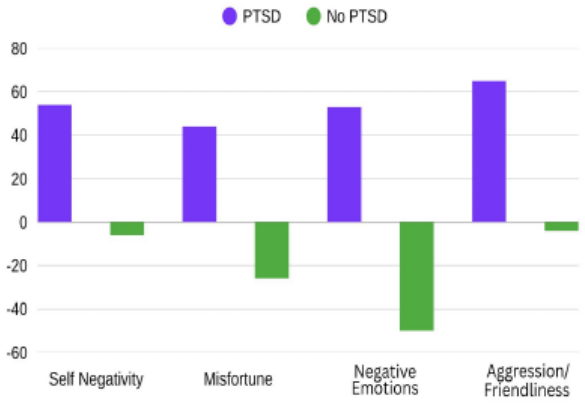
Dream Types:

- n = 60 admitted to trauma center after life threatening injury
- PPTs reported dreams, rated level of disturbingness, repetition, + replication (Mellman et al., 2001)
- trauma dreams strongly associated with the development of PTSD
- High similarity dreams are not adaptive: promote maladaptive thought
- Non-similar and non-distressing dreams promote adaptation

	High Distress	Low Distress
High Similarity	10	N/A
Low Similarity	7	4

Dream Content:

- n=47, recruited from hospitals within 2 months of trauma, 20 developed PTSD (Pidgeon et al., 2021)
- Dream were self reported, researchers conducted theme analysis
- PTSD dreams featured significantly higher self negativity, misfortune, negative emotions, and aggression/friendliness ratio



Conclusion

- Nightmares increase risk of developing PTSD.
- Race is shown to be a prevalent theme in the dreaming of BLM supporters, who are disproportionately Black
- Disturbing political and racial themes may manifest as personal in nightmares.
- There is evidence to suggest that race is a risk factor in experiencing nightmares, thus increasing risk PTSD development.

Next Steps:

- More research on how race manifests in dreams
- Understanding risk factors in dreaming could be used in a therapeutic setting once more research is done

About Me

- Rising sophomore at Loyola University Maryland Majoring in Psychology and Philosophy

Future Plans:

- Continue sleep research at Loyola; we plan on looking into sleep in juvenile detention centers this year
- I after graduation I plan on completing a PhD in Clinical Psychology with a concentration in philosophically informed psychology

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Non-pharmacological interventions for patients with cancer-related insomnia

Alex Callahan[1, 2]

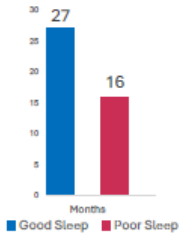
[1]Brown University Sleep and Chronobiology Research Lab, [2]Emory University

Introduction

- Sleep disturbances are a common and overlooked comorbidity of cancer[1]
- 86.4% of lung cancer patients surveyed had poor quality sleep[1]
- Poor sleep quality is associated with worse survival outcomes[2] and lower quality of life[1]
- Insomnia is present in 30-50% cancer patients[3] and can be treated using non-pharmacological interventions

Martin, et al. Sleep Quality in Lung Cancer Patients

Gottfried et al. Survival Post-Diagnosis in Cancer Patients



An App-Based Intervention HaruToday

Alternative Medicine

- Some data suggest that non-traditional medical interventions may improve insomnia symptoms[4, 5, 6, 7]
- Mindfulness[4], yoga-breathing[5], acupuncture[6], and auricular acupressure[7] (a type of pressure point treatment), are potentially promising, yet inferior to CBT-I
- All four treated ancillary conditions, like anxiety, rather than the sleep disturbances themselves
- More research is needed to determine the efficacy of these treatments

Auricular Acupressure Points Huang et al.

Cognitive Behavioral Therapy-Insomnia (CBT-I)

- The gold standard for insomnia treatment; recommended by the American College of Physicians[8]
- Berger, et al. showed improved PSQI scores in participants with breast cancer treated with CBT-I[9]
- Bean et al. compared patients treated with CBT-I and light therapy with patients who were given relaxing audiotapes[10]
  - The CBT-I group showed improvements in insomnia symptoms over the audiotape cohort (Insomnia Severity Index −5.27 [CBT-I] vs −4.45 [Audiotape])
- CBT-I is expensive which limits patients access to it, therefore more affordable treatments are required

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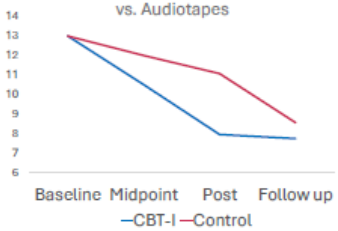
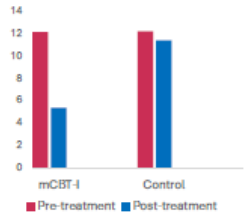
Bean, et al. CBT-I + Light therapy vs. Audiotapes



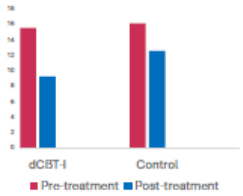
Digital CBT-I (dCBT-I) and Other Variations

- Research is being done on the efficacy of more affordable insomnia treatment options
- Minimal Cognitive Behavioral Therapy (mCBT-I) is a solution proposed by Casault, et al.
  - Participants read short booklets and receive up to three 30-minute phone calls with a psychologist over a six-week period[11]
  - Reductions in ISI scores (−6.84) were observed, however participants were a non-representative population with 65.8% having earned a college degree[11]
- Phone-application based interventions have been tested with promising results
- The CBT-I application NUKKUAA has been shown to reduce in ISI scores (-6.0) amongst participants with insomnia symptoms[12]
- Chung, et al. tested the effects the dCBT application HaruToday on sleep quality in cancer patients[13]
  - Reductions in PSQI were found (-9.53), although on average participants were still classified as having poor quality sleep[13]
- While more research is needed to implement dCBT-I into oncological treatment plans, it remains a highly promising avenue for future exploration

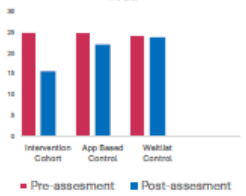
ISI Before and After mCBT vs Control. Casault, et al.



ISI Before and After NUKKUAA vs Control. Hinterberger, et al.



PSQI Before and After HaruToday vs Controls. Chung, et al.



Conclusions and Next Steps

- dCBT-I and app-based CBT-I Variations are the most promising low-cost interventions
- While alternative treatments may improve sleep quality in cancer patients, it is likely a secondary effect
- CBT-I remains the gold standard for insomnia treatment
- Future research should focus on the efficacy of dCBT-I and app-based interventions, as well as how to implement them in areas with limited access to sleep professionals and in treatment plans for patients unable to afford traditional CBT-I

Acknowledgements

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About Me

- Rising sophomore at Emory University majoring in Biology
- I chose this topic as my main research interests are in cancer biology
- After graduation I hope to pursue and MD/PhD following a gap year or two

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Advancing Sleep Technology for Menopausal Vasomotor Symptoms

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Introduction

- Up to 80% of menopausal women are affected by vasomotor symptoms (VMS)
- VMS are known to cause sleep disturbances associated with poor sleep quality and insomnia
- Research on menopausal sleep and gold-standard technologies show inconsistent results
- New technologies show great potential for menopause research

Physiology of Vasomotor Symptoms (VMS)

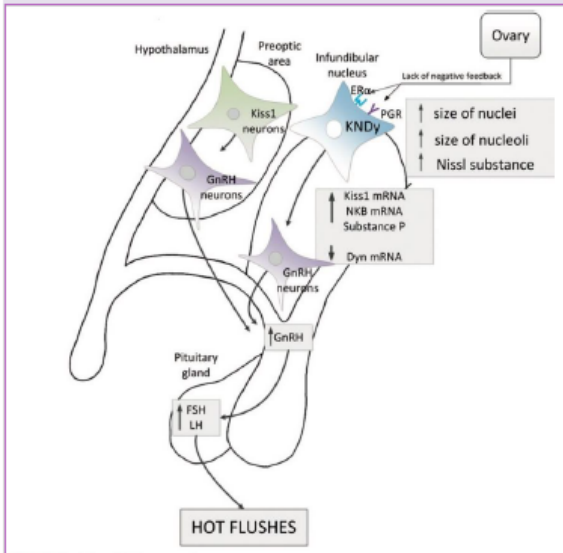
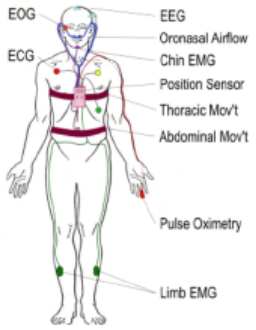


Figure 2. Regulation of KNDy neurons after menopause.

The Gold Standard: Polysomnography (PSG)

- PSG has been used to examine VMS physiology and cortical activity
  - Awakenings
  - Sweating
  - Heart rate (HR)
  - Respiration
- Lab studies relating objective measures of VMS to PSG show mixed results
- Subjective measures are currently more consistent with VMS
- PSG may not be the most effective way to study VMS physiology



Menstrual Health: Oura Ring

- Electronic sensors measure HR, distal skin temperature, and activity
  - Infrared polyplethysomnography (PPG)
  - Negative temperature coefficient (NTC)
  - 3D accelerometer

Alzueta et al. 2022:
- n=26 women aged 18-35 with regular menstrual cycles
- **Baseline (1 mo):** daily sleep diary
- **Experimental (1 cycle):** wore Oura Gen2 continuously + daily sleep diary

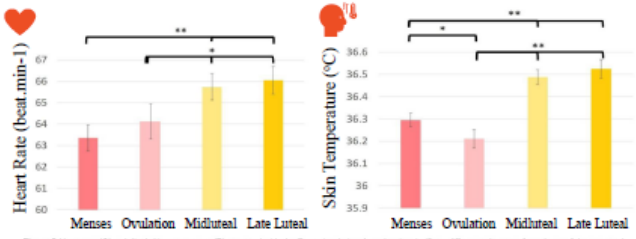


Figure 3 Heart rate (A) and distal skin temperature (B) measured with the Oura ring during sleep showing significant differences between four phases of the menstrual cycle (Menses, Ovulation, Midluteal, and Late luteal) in healthy, reproductive-aged women (n = 26).
Notes: *p = 0.05, **p < 0.01.

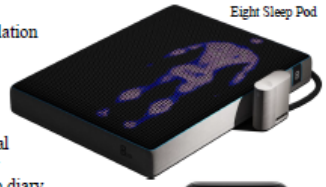
Findings:
- HR and distal skin temp were higher during luteal phase and lower during ovulation
- No significant variation in TST, SE, SOL, WASO, or SWS across menstrual cycle

Limitations:
- Sleep tracking
- Only tracked one cycle

Strengths:
- Women could use wearables for long-term tracking of HR, skin temp, and menstrual cycle patterns

Thermoregulation: Eight Sleep

- Sensors and AI detect changes in vital signs and circadian rhythms
  - Piezoelectric sensors
  - AI-powered temperature regulation
  - Adjustable cool pillow



Avis et al. 2022:
- n=15 perimenopausal and postmenopausal women aged 45-59 with 4+ VMS per day
- Baseline questionnaires and 2-week sleep diary
- 8 weeks using Pod 5 cooling mattress system & VMS diary

Findings:
- VMS frequency declined by 52% ($p<0.0001$)
- PSQI scores dropped from 11.14 to 7.87 ($p=0.011$)
- Hot Flash Related Daily Interference Scale scores dropped from 4.16 to 1.92 ($p=0.011$)

Limitations:
- Small sample size

Strengths:
- Made tangible improvements in lives of participants
- Significant results in pilot alone

Better Bedtime: Virtual Reality

- Hyperarousal interferes with ability to fall asleep
- Virtual reality (VR) is being explored for hyperarousal and insomnia

De Zambotti et al. 2022:
- n=52 high school students (32 female)
  - 34 with insomnia, 18 control without insomnia
- **Intervention:** 20 min of evening VR-guided meditation & paced breathing
- **Control:** 20 min of evening quiet activity
- Recorded EEG, ECG, HR, HRV, and self-reports

Findings:
- Lower cortisol and HR after VR
- Lower HRV among insomnia group
- No significant changes in EEG cortical activity or cognitive arousal

Limitations:
- Only two evenings, random
- Did not isolate VR from breathing

Strengths:
- VR and paced breathing may help menopausal women better respond to VMS & stress

Significance & Next Steps

- Advancements in consumer technology and at-home devices could enable high-yield continuous data collection from women in their daily lives
  - More accessible than in-lab studies
  - May reflect more natural physiological metrics than in-lab measures
  - Increase general knowledge about menopause and sleep
- More studies on menopausal women
- Long-term testing of these devices on menopausal women
- Hybrid devices combining consumer technology and research-grade technology

Autobiography – About Me

- Rising 3rd year student at the University of Massachusetts Amherst studying Biomedical Engineering and Neuroscience
- Derived interests in sleep science and women's health as a research assistant at the UMass Somneuro Lab
- Pursuing a career in neural engineering or medicine

Thank you to Dr. Fiona Baker of SRI International & Dr. Mary Carskadon, Dr. Jared Saletin, and my colleagues at the Brown University sleep lab for their guidance and support.

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Sensory Responsivity & Sleep Disruption in Autism Spectrum Disorder

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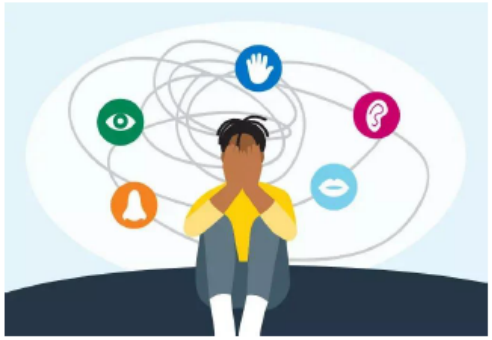
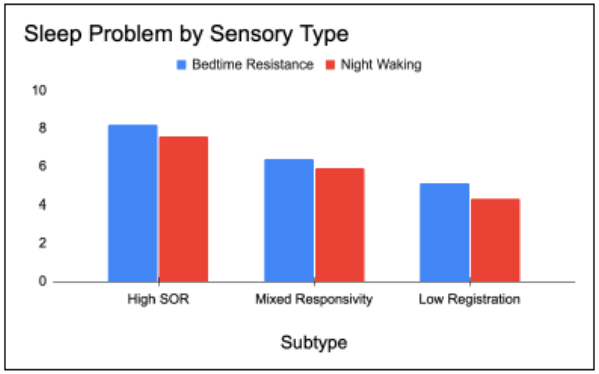
Introduction

- Up to **80% of individuals with ASD** experience chronic sleep difficulties
- Sensory responsivity differences may contribute to sleep disruption
- Past research focus heavily on behavioral or neurological explanation
- SOR and SUR have unique profiles and offer a new perspective



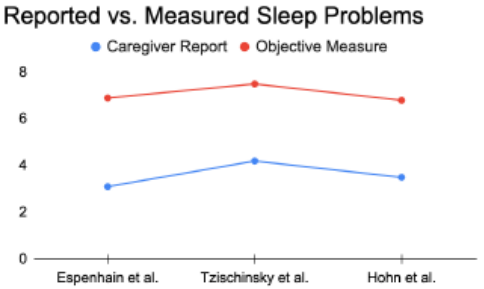
Sensory Subtypes Predict Sleep Outcomes

- Children with high SOR and mixed responsivity profiles had the **highest resistance** and **night waking**
- Those with low registration showed **delayed sleep onset**, but fewer night wakings
- Sensory cluster analysis explains more variance in sleep outcomes than autism severity or anxiety



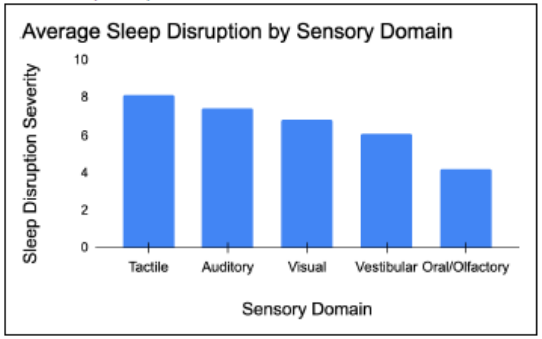
Underreported Under-Responsivity

- Caregivers of children with SUR often don't recognize sleep issues, even when actigraphy shows problems
- Average reported sleep problem score: 3.1/10, but actigraphy shows 6.9/10
- Suggests a need for objective screening tools in low-registration sensory profiles



Vestibular & Oral Modalities

- Vestibular sensitivity linked to **nighttime restlessness** and **frequent awakenings** (3.5/night vs. 1.2)
- Oral hypersensitivity associated with **prolonged sleep latency** and selective nighttime eating behavior
- These modalities are often excluded from mainstream sleep-sensory research despite reports



Significance

- Sensory subtypes offer a precise and individualized understanding of ASD-related sleep challenges
- Behavioral interventions may be more effective if tailored to a sensory profile
- Studies suggest SOR and SUR lead to distinct types of sleep problems that can't be addressed by one size fits all solutions

Next Steps

- More longitudinal research to track how sensory traits and sleep interact over time
- Increase attention to vestibular and oral domains in clinical sleep studies
- Combine objective tools with subjective parent-report to improve accuracy
- Develop screening tools and sensory based sleep interventions

Autobiography – About Me

- B.S. in Biological Sciences
- Minors in Cell and Molecular Biology & Leadership Studies
- Full-time Supertech at Brown Sleep Lab
- Research Assistant at URI investigating ADHD in children and young adults
- Background as a Medical Assistant in a Sleep Clinic

Why I Chose This Topic

- Interest in stimulation to the senses or lack thereof
- There is little research on the deaf/blind populations so I shifted my focus
- There are gaps in research regarding the ASD population

My Future

- Attend further education to get either a MSA or Medical Doctorate

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THE IMPACT OF BINGE EATING DISORDER ON SLEEP AND THE GUT MICROBIOME

FRANCES MORINIERE
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PEDIATRIC SLEEP, RHYTHMS, AND MENTAL HEALTH

Sleep for Science RESEARCH LABORATORY OF BROWN UNIVERSITY

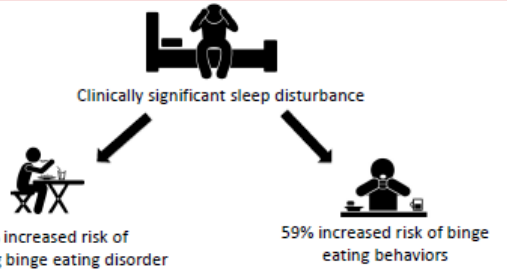
INTRODUCTION

What is Binge Eating Disorder (BED)?
- A disorder where a person consumes large amounts of food quickly, often without control, which affects emotional, physical, and mental health.

What is the gut microbiome?
- The community of tiny organisms, like bacteria, that live in your digestive system. They help with digestion, support your immune system, and can affect your mood and overall health.

Why focus on sleep and the gut?
- BED is linked to poor sleep and gut microbiome changes. These issues may not just be effects of BED, but drivers of it.

BINGE EATING DISORDER AND SLEEP DEFICIT

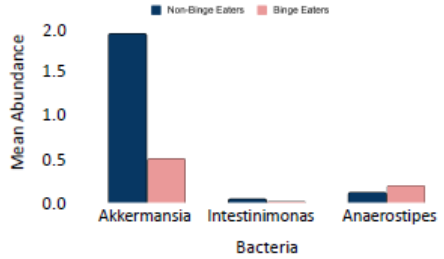


Sleep problems may predict, not just follow, disordered eating

Nagata et al., *Eating Weight Disorder.*, 2025

BINGE EATING DISORDER AND THE GUT MICROBIOME

Bacterial Abundance in Non-Binge Eaters vs. Binge Eaters



Binge Eating Disorder linked to:
- A lower abundance of bacteria (Akkermansia and Intestinimonas), important to overall gut health
- A higher abundance of bacteria (Anaerostipes) that impact appetite-regulating hormones and neurotransmitters

Suggests microbiome shifts may impair impulse control

Leyrolle et al., *Clinical Nutrition*, 2021

GUT MICROBIOME AND SLEEP QUALITY

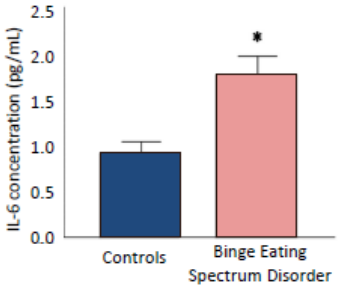
Good Sleepers	Poor Sleepers
Higher gut microbiome diversity	Lower gut microbiome diversity
Greater tryptophan metabolism leading to better serotonin/melatonin production	Reduced tryptophan pathways leading to worse mood and sleep quality
Lower inflammation and stress reactivity	Higher inflammation and stress reactivity

Poor sleep is linked to changes in the gut microbiome that disrupt mood and sleep-regulating pathways, creating a cycle that makes improving sleep quality challenging.

Seong et al., Frontiers Microbiology, 2024

INFLAMMATION AS THE BRIDGE

Elevated IL-6 Levels in Individuals with Binge-Eating Spectrum Disorders



- Higher IL-6 levels in binge eating disorder spectrum disorders vs. controls
- IL-6 correlates with binge severity and leptin
- IL-6 follows a circadian rhythm, peaking at night, and is linked to sleep quality and binge timing

Campanile et al., *International Journal of Eating Disorders*, 2024

SIGNIFICANCE

- Binge eating disorder is the most common phenotype of eating disorder
- Poor sleep, gut microbiome disruption, and inflammation interact in a self-reinforcing cycle
- Microbiome changes affect mood, sleep, and stress, factors that can trigger binge episodes
- Inflammation may be the biological link connecting poor sleep, gut changes, and binge eating; targeting it could help break the cycle

Binge eating disorder is shaped by interconnected biological, psychological, and social factors. Targeting sleep, gut health, or inflammation could help to reduce its severity.

NEXT STEPS

- Increase screening for binge eating disorder in primary care, where it is often overlooked
- Address sleep disruption and gut microbiome imbalance in treatment
- Advance research linking binge eating disorder, sleep, and the gut microbiome
- Explore biological interventions, such as probiotics, sleep therapy, and anti-inflammatory strategies, as potential tools to disrupt the binge eating disorder cycle

AUTOBIOGRAPHY – ABOUT ME

- Rising junior at Brown University studying Cognitive Neuroscience with a minor in Entrepreneurship
- Passionate about how the gut-brain axis influences sleep, mental health, and emotional regulation
- This project allowed me to explore how these systems interact, especially through the lens of binge eating disorder, and how they may reinforce one another
- Plan to continue studying how these factors can be used for prevention and intervention in mental health

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The Influence of Sleep on Depression and Anxiety During the Perinatal Period

Gretchen Morris

1. Bradley Sleep Lab, Brown University

Introduction

- Up to 13% of women experience symptoms of depression and anxiety during postpartum (PP) (Bauman, B. L., et al. 2018).
- Many pregnant women suffer from an inability to sleep through the night without waking up, referred to as "poor sleep continuity" (Okun, M. L., et al. 2018).
- While there are many reasons to establish a better maternity leave act in America, one of the driving factors for changing policy is rooted in the evidence that sleep is a significantly disrupted dimension of health among women during the perinatal period.

Prevalence of Sleep Disruption During Pregnancy

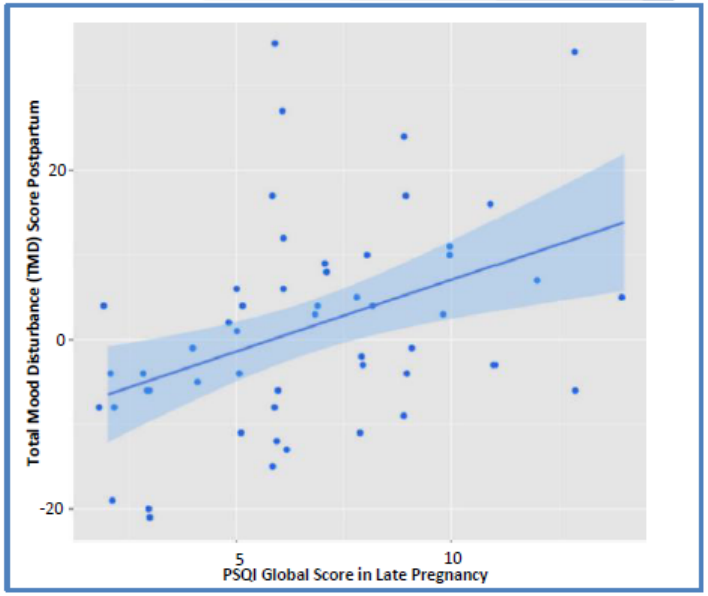
Common sleep troubles during perinatal period:

- Physical discomfort
- Increased pressure on the bladder
- Increased risk of sleep disorders
- Stress, rumination
- Adjusting to a new sleep schedule

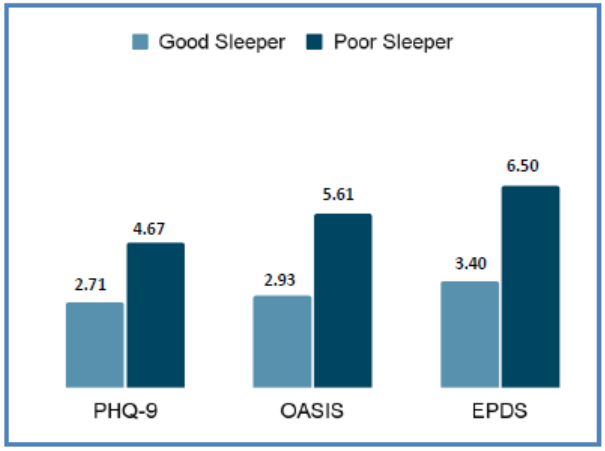
Reid, et al., 2018

- N= 782
- 29.7% got insufficient sleep
- 50% had a WASO of > 42 mins

Sleep Quality and Total Mood Disturbance in Late Pregnancy, Bangsgaard, R.B., et al. (2025)



Poor Sleep Quality → Depression, Anxiety Symptoms, (Okun, M. L., et al. 2018)

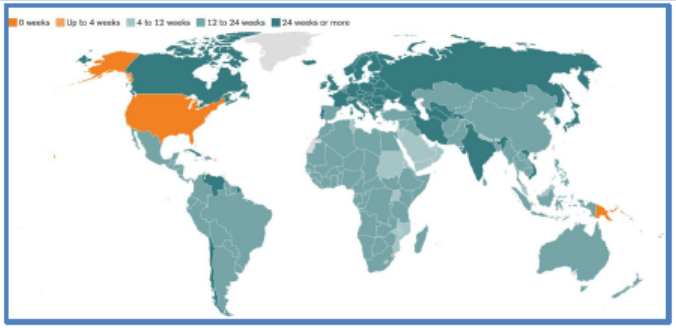


Significance

- Important for expectant parents to practice proper sleep hygiene prior to the perinatal period
- It is important that health care providers prepare new parents for the possible sleep troubles they might experience, while also underlining the risk of PPD symptoms.
- Possible behavioral/medical interventions can help mitigate sleep disruption and symptoms of anxiety and depression
- New parents are expected to go to work when they are adjusting to life with a newborn. Due to the high likelihood of sleep troubles during this time, it is possible for new parents to feel the effects of sleep deficiency such as daytime sleepiness, fatigue, irritability, difficulty concentrating, and changes in mood.

Future Directions

U.S is 1 of 7 countries without a Federal Paid Family Leave Act. While the United States only offers 12-weeks of job protected leave, many other countries offer much longer leaves, some nearly a year long. Bulgaria, for example, offers 58.4 weeks of fully paid maternity leave while the U.K. offers up to 52 weeks with partial payment (World Population Review)



Autobiography – Why I chose this topic

- Interested in how science can shape public policy
- The current FMLA is failing the children and families of our country
- Establishing a new family leave act could foster sufficient sleep among expectant and new mothers, a dimension of health very necessary for the overall well-being of both the infant and the mother.

Autobiography – About Me

- From Exeter, NH
- Recent graduate from Loyola University MD
  - Psychology
  - Club Lacrosse

Autobiography – Future

- Joining the Supertech Team!
- Hoping to pursue a Masters or Doctorate degree in Clinical Psychology
- Hoping to work with children and adolescents

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World Population Review. Maternity leave by country 2025.

Benefits of Circadian Synchronization To Improve Cellular and Physiological Function in Type II Diabetics

Lauren Rocheford[1,2]

[1]Bradley Sleep and Chronobiology Research Laboratory, Brown University, Providence, RI,
[2]Gustavus Adolphus College, Saint Peter, MN

Introduction

- Endogenous circadian rhythms are oscillations throughout a 24 hour day that create rhythms in physiological functions and biological processes. They are generated internally, and continue to persist while conditions are constant.
- The Suprachiasmatic Nucleus (SCN) within the Hypothalamus controls our endogenous circadian rhythms (Figure 1).

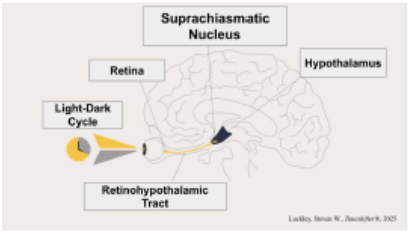

Figure 1: The Suprachiasmatic Nucleus and pathway that light travels through to entrain it.

- The SCN acts as our "master clock", relaying signals to peripheral clocks in organs and cells (Figure 2).
- Zeitgebers, which are environmental or behavioral cues, entrain the SCN and endogenous rhythms.
- Circadian misalignment occurs when there is misalignment between the central clock and environmental, behavioral, or both clocks.
- Circadian misalignment can lead to many health problems, including metabolic disease.

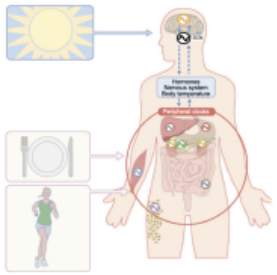

Figure 2: The SCN and peripheral clocks[1]

- Metabolic diseases are types of disorders that cause the body to abnormally process nutrients, affecting our metabolism. One of the most notable metabolic diseases is **Type II Diabetes.**

What I Found

In 2016, 8.6% American adults living with T2DM

- **20% involved in shift work**
- **69% experience social jetlag**
- **33% sleep no more than 6 hours per night**

Potential link between circadian disruption and T2DM?

Hogenboom et. al 2019: looked at neurons and glial cells from Hypothalamic tissues from donors with and without T2DM found that those with T2DM[2]:

Had two types of neurons and one type of astroglial cell that were found to be significantly decreased compared to the healthy donor tissues

The death of these cells has impact on the rhythmicity of the SCN clock communication.

This study suggests that lifestyle changes and/or medication to synchronize central biological function in Type II Diabetics could be helpful.

Intervention

Time Restricted Eating (TRE):

- Restricting eating window to a set amount of time during the day when all calories are consumed.
- Feeding time is a strong zeitgeber, promotes clock synchronization
- Shown to be an effective non pharmacological strategy that gives many cardiometabolic benefits.

Kramer et al. 2024: evaluated if TRE improves pancreatic beta cell function in overweight individuals with early stage T2DM[3]:

Group 1: Standard Lifestyle	Group 2: 20 hours fasting/4 hours eating

x 6 weeks

- Evaluated using the Insulin Secretion Sensitivity Index 2 (ISSI-2) from an oral glucose test done weekly

Findings:

- TRE showed a 14% increase in ISSI-2, as well as a 14% reduction of hepatic insulin resistance
- TRE improved beta cell function and insulin resistance in patients with early diabetes

Significance:

TRE is a lifestyle change that can be implemented in early stage diabetics to improve circadian clock rhythmicity which is suggested to in turn improve physiological and cellular function.

Acknowledgements

I would like to thank Dr. Karen Gamble, my mentor, for all of her guidance in navigating this topic. I would also like to think Dr. Carskadon, Dr. Saletin, and all of the members of the Brown Bradley Sleep Laboratory for making this summer an amazing experience and providing me with this invaluable learning opportunity.

About Me

- I am a rising senior at Gustavus Adolphus College majoring in Exercise Physiology and minoring in Chemistry. My research interests include chrononutrition, behavioral sciences and how they affect health outcomes, and cardiometabolic disease risk factor mitigation.
- I chose this topic because I am passionate about how circadian science can be used to treat Type II Diabetes, it combines my interests in chrononutrition and behavioral sciences.
- After undergrad I aspire to attend medical school with the hopes of eventually working in a primary care specialty where I can work as a clinician and explore my various research interests.

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Sleep Health Risks in Transgender Individuals

Xia Tuttle[1,2]

[1] Brown University Sleep and Chronobiology Research Laboratory, [2] Hofstra University

Introduction

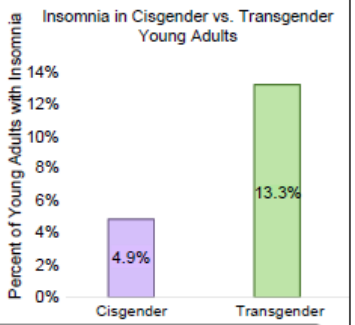
- The transgender community makes up a very small portion of the overall population, leading them to be majorly underrepresented
- Marginalization leads to worse mental health
  - Some studies have estimated them to be over 4x more at risk for anxiety, over 2x more likely to have depression, and 4x more likely to attempt suicide (Gavidia et al., *Journal of Clinical Sleep Medicine*, 2022; Hershner et al., *Nature and Science of Sleep*, 2021)
- There is a bidirectional relationship between sleep disorders and mental health
- We need to better understand the role of sex hormones in sleep disorders

Insomnia Risk Before and After Hormone Therapy

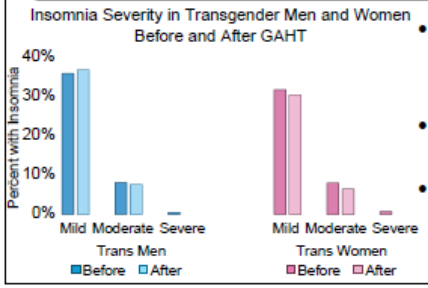
How do insomnia rates differ between cisgender and transgender people?

- A study of young adults in North America looked at insomnia risk between these two groups
- Transgender n=3471
- Self-report survey-based
- Transgender young adults are 2.7x more likely to experience insomnia than their cisgender counterparts

(Hershner et al., *Nature and Science of Sleep*, 2021)



How do insomnia rates differ between transgender men and women?

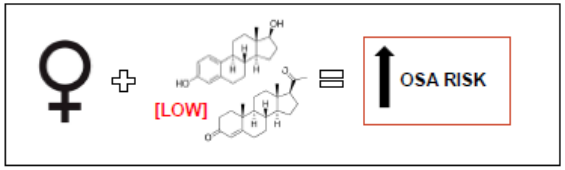


- A study of transgender men and women in the first year of hormone therapy
- n=445 (262 men, 183, women)
- Overall, only slight decreases in insomnia

(Morssinkhof et al., *Sleep Medicine*, 2023)

Obstructive Sleep Apnea Risk

What do we know from menopause studies?

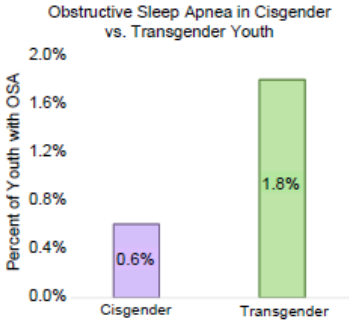


(Sigurðardóttir et al., *PloS one*, 2022)

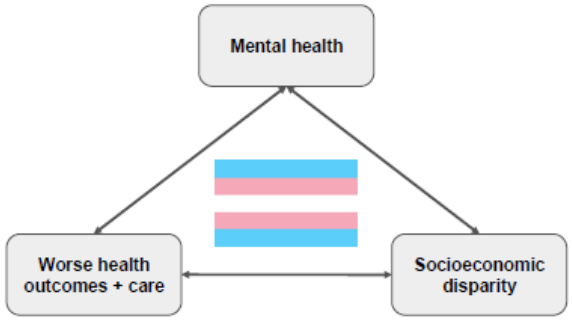
How do OSA rates differ between cisgender and transgender people?

- One study looked at the OSA risk for cisgender and transgender youth aged 12-25 for OSA
- Transgender n=2652
- Classified by prescribed hormones, other gender-affirming care codes, and ICD-10-CM diagnostic codes through a health claims database
- Transgender youth are 3x more likely to suffer from obstructive sleep apnea than cisgender youth

(Gavidia et al., *Journal of Clinical Sleep Medicine*, 2022)



Significance



Next Steps

- There is a clear need to look further into the role of these hormones with insomnia and OSA
  - OSA risk in transgender women before and after transitioning
  - Build more upon case studies, i.e., Robertson et al., *Journal of Clinical Sleep Medicine* 2019
  - How sleep health risks change by the amount of time on hormones, i.e., Šnobrová et al., *Frontiers in neurology*, 2023
  - How increased OSA risk in transgender men on testosterone can be mitigated

Autobiography

About Me

- I am a Junior at Hofstra University majoring in Biology, with a concentration in pre-medical studies

Why I Chose This Topic

- As a nonbinary person, I found it meaningful to explore a topic relevant to those around me and shine light on a less-spoken about topic

My Future

- I plan on doing an MD/PhD after I graduate and I see myself going into pediatric psychiatry

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Circadian timing and nighttime self-referential thoughts in youth

Anastacia Y. Kudinova [1,2,5], Jaqueline Nesi [1,3], Celia Roberto[1,2], Sarah Cunningham [1,2,5], and Mary A. Carskadon [1,2,4,5]

[1] Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University
[2] Emma Pendleton Bradley Hospital
[3] Rhode Island Hospital
[4] EP Bradley Hospital Sleep Research Laboratory
[5] COBRE Center for Sleep and Circadian Rhythms in Child and Adolescent Mental Health

Background

- Phase angle– a period between an individual's circadian clock timing (Dim Light Melatonin Onset) and bedtime – increases during adolescence
- Although disruptions in circadian patterns are linked to mental health problems in teens, the associations of phase angle and maladaptive cognitions remain understudied
- Self-criticism and self-reassurance are known cognitive risk and protective factors for youth mental health

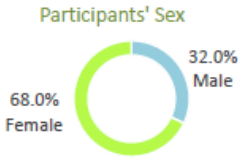
Main aims of the study

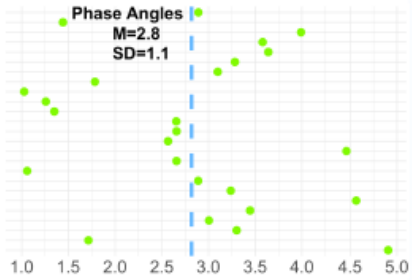
- Examine the associations of individual's phase angle and ecologically-derived self-criticism and self- reassurance in youth to inform future research aimed at decreasing maladaptive nighttime cognitions

Method

Participants

- N = 2 5 13-18-year-old youth recruited from partial hospitalization, inpatient, and outpatient programs and community
- Age M=15.6, SD=1.19





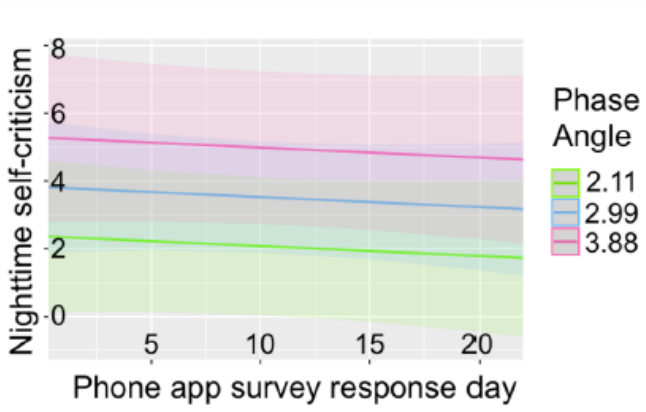
Measures

- Ecologically assessed (phone app surveys) self-criticism and self-reassurance across the 3-week assessment window (3x a day, 298 observations)
- Actigraphy (Motionlogger) and sleep diary to assess bedtimes
- DLMO test to to assess internal clock
- Phase Angle = Actigraphy-assessed bedtime –DLMO time

Analyses

- Linear mixed models using R-Studio (dplyr, lme4, lmerTest, ggplot)

Adolescents with a longer period between their circadian clock timing and bedtime were more self-critical at nighttime



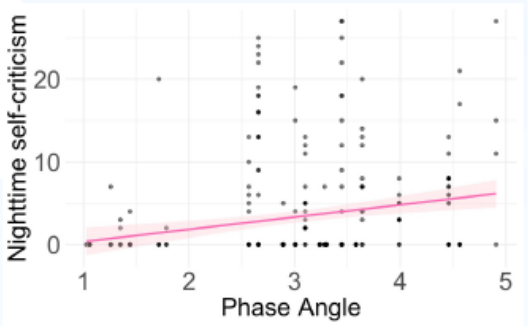


Figure 1 A and B: Linear mixed modeling showed a significant effect of an individual's phase angle on ecologically-assessed nighttime (after 6:00 PM) self-criticism (B=1.6, SE=0.8, p<0.05). Phase angle was not linked to self-reassurance.

Limitations and Future Directions

- Replication in a larger sample is needed
- The potential intersection with other sleep variables and nighttime behaviors (e.g., social media use) needs to be examined

Preliminary Conclusions

- The findings suggest that the more time passes between the internal clock and when the teens go to bed, the more likely they are to engage in self-criticism at nighttime
- The findings highlight the potential of assessing and targeting circadian timing misalignments to decrease maladaptive self-referential cognitions in adolescents

The project was supported by the NIH (K23MH122587) and Bradley Hospital Sleep and Circadian Rhythms and Child and Adolescent Mental Health (NIGMS, P20GM139743). Please address correspondence to anastacia_kudinova@brown.edu

Board #: 138 Abstract ID: 380
Presentation Session: P-26

PEDIATRIC SLEEP, RHYTHMS, AND MENTAL HEALTH

Associations of Sleep and Oral Microbiome among Adolescents and Young Adults in the United States

Marie-Rachelle Narcisse, PhD,
David Barker, PhD, Tsute Chen, PhD, Evangelia Morou, DDS, PhD, Kiara Medeiros, Mary Carskadon, PhD

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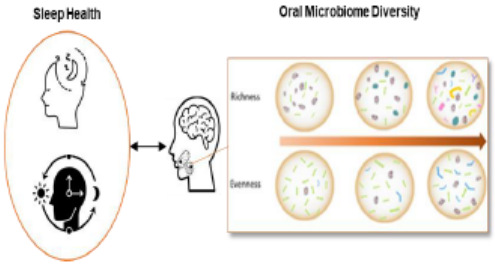
ORAL MICROBIOME

"The ecological community of commensal, symbiotic, and pathogenic microorganisms that share our body space and have been all but ignored as determinants of health and disease." — Nobel Prize-winning Professor Joshua Lederberg



KEY HIGHLIGHTS

- **The oral microbiome diversity is positively associated with longer sleep duration among teenagers and young adults**
- **Further research needs to determine the potential mechanisms behind the associations observed in this study**

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Support: E.P. Bradley Hospital COBRE Center for Sleep and Circadian Rhythms in Child and Adolescent Mental Health (P20GM139743)

BACKGROUND

- The human mouth is densely colonized by microbial species
- Microbial diversity is associated with chronic physical and mental health conditions
- There is a link between sleep disturbances and microbial community dysbiosis

OBJECTIVES

- To examine associations of oral microbiome diversity with self-reported sleep duration among a representative sample of adolescents and young adults ages 16-26 in the United States

METHODS

- **Data**: National Health and Nutrition Examination Survey (NHANES, 2011-2012)
- **Sample**: 1,322 participants from 50 US States and DC: 463 ages 16-18, and 869 ages 19-26
- **Outcomes**: Oral microbiome alpha (α) diversity measures of richness and evenness: (1) Observed operational taxonomic units (OTU), (2) Faith's phylogenetic diversity (FPD), (3) Shannon-Weiner index (SWI), and (4) Inverse Simpson index (ISI)
- **Predictors**: Self-reported sleep hours on weekdays or school/workdays were categorized as very short, short, healthy, and long sleep according to AASM recommendations
- **Covariates**: Age, biological sex, race/ethnicity, marital status, place of birth, education level, federal poverty level
- **Statistical Analysis**: Four Generalized Linear Models (GLM) were fitted to the sample to investigate associations between each α diversity measure and sleep duration, controlling for covariates. All descriptive and regression analyses were adjusted for NHANES complex survey design

RESULTS

- The mean age was 20.9 years, and 50.4% were females
- Five in ten teenagers (50.6%) reported the recommended hours of sleep (8-10)
- Six in ten young adults (61.2%) had the recommended hours of sleep (7-9)
- OTU mean was 128.01 [95% CI: 122.35–133.64]; FPD mean was 14.24 [13.87–14.62] ; SWI mean was 4.61 [4.54–4.67]; ISI mean was 0.90 [0.89–0.90
- No significant association was found between ISI and self-reported sleep duration
- **Compared to those with healthy sleep duration, teenagers and young adults with long sleep duration (3% of participants) had significantly higher oral microbiome diversity, according to OTU, FPD, and SWI indicators: 43.02 [22.31–63.72]; 2.96 [1.16–4.76]; and 0.64 [0.07–1.21], respectively**

Board #: 133 Abstract ID: 366
Presentation Session: P-28

Weapon-carrying in US High Schools is Associated with Insufficient Sleep: 2009-2023

Marie-Rachelle Narcisse, PhD,
David Barker, PhD, Kiara Medeiros, Mary Carskadon, PhD

PEDIATRIC SLEEP, RHYTHMS, AND MENTAL HEALTH

THE WARREN ALPERT Medical School
BROWN UNIVERSITY

KEY HIGHLIGHTS

- **Findings underscore the potential risks associated with having sleep-deprived students on school property**
- **Policies that promote sufficient sleep during school days (e.g., later school start time) could help mitigate some of the risks of carrying weapons to schools**

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Support: E.P. Bradley Hospital COBRE Center for Sleep and Circadian Rhythms in Child and Adolescent Mental Health (P20GM139743)

BACKGROUND

- Most US high schools prohibit possession of weapons on school property
- Insufficient sleep is associated with impulsivity, lack of self-control, and other adverse emotional and mental health outcomes, which may contribute to risk-taking behaviors
- The role of sleep in influencing adolescents to carry weapons at school has been underexplored

OBJECTIVES

- To examine whether insufficient sleep on school days was associated with the risk of teenagers carrying weapons at school
- To explore whether race/ethnicity would modify this association

METHODS

- **Data**: Youth Risk Behavior Surveillance System Survey (YRBSS, 2009-2023)
- **Sample**: 88,044 high school students ages 16-18 years from 50 US States and DC
- **Outcomes**: Weapon carrying: "*During the past 30 days, how many days did you carry a weapon such as a gun, knife, or club on school property*?" 0 and 1, 2 or 3, 4 or 5, ≥ 6 days (recoded as 1)
- **Predictors**: self-reported insufficient sleep (< 8 hours/night on school days)
- **Covariates**: Age, biological sex, race/ethnicity
- **Statistical Analysis**: 1. Weighted multivariable logistic regression
  2.Effect modification: Race/ethnicity and adjusted Wald test
- All descriptive and regression analyses were adjusted for the YRBS complex survey design

RESULTS

- Five percent of high school students reported carrying weapons on school property
- Seven in ten teenagers (70%) reported sleeping less than eight hours
- Insufficient sleep (< 8 hours) was associated with greater odds of carrying weapons on school property (AOR: 1.14; 95% [CI: 1.02; 1.27])
- Reported sleep for 4 hours/night (8.40% of participants) tripled the odds of weapons-carrying (AOR: 3.14; 95% [CI: 2.67; 3.70])
- Although the odds of weapon-carrying were greater among American-Indian/Alaska Native and Native Hawaiian/other Pacific Islander adolescents (AOR: 1.76; 95% [CI: 1.07; 2.91] and AOR: 2.04; 95% [CI: 1.19; 3.48]) than among their White peers, the association between insufficient sleep (< 8 hours) and weapon-carrying was not modified by race/ethnicity ($F_{(6,536)} = 0.57$; p=0.76)

Relationship Between Subjective Sleep Quality and Objective Sleep Parameters from Wearable EEG in Youth with Significant Anxiety and Related Disorders

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INTRODUCTION

- Anxiety and obsessive-compulsive disorder (OCD) are prevalent in youth and cause significant impairment and distress[1-2]
- Youth with anxiety and OCD report high rates of sleep problems[3-4]
- Evidence suggests that self-reported sleep problems predict slower improvement and poorer clinical outcomes in exposure-based CBT[5]
- However, subjective sleep reports often demonstrate poor agreement with objective sleep measures[6-7]
- The aim of this poster is to examine the relationship between subjective and objective metrics of sleep quality in youth with moderate-to-severe anxiety and related disorders.

CONTACT US

REFERENCES

METHODS

The full study involves clinical interviews, self-report measures of psychological functioning, sleep quality questionnaires, wearable actigraphy, at-home overnight EEG and 3 days of laboratory-based tasks

Participants

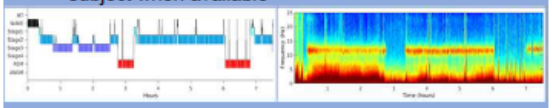
- Youth (*N* = 54), ages 11-18 (*M*= 14.63, *SD* = 1.85) (57.4% female, 88.7% white)
- Recruited from a CBT-based partial hospital program (PHP) for youth with anxiety and OCD
- Youth attend the PHP for up to 6 hours daily Monday-Friday and return home at the end of each day
- Average OCD severity (CYBOCS): *M* = 22.5, *SD* = 6.7
- Average anxiety severity (PARS): *M* = 16.48, *SD* = 11.7
- Average CGI: *M* = 5.4, *SD* = 0.7

Diagnoses	OCD	Anxiety	ADHD	MDD	Other	>1
N	25	45	20	11	11	72.2%

Medication Type	SSRI	SNRI	Stimulants	Atypical Antipsychotic	Benzo-diazepine	>1
N	41	1	10	5	2	66.5%

Measures

- Patient-Reported Outcomes Measurement Information System (PROMIS) Sleep Disturbance and Sleep-Related Impairment questionnaires
- Up to 4 nights of at-home Zmax EEG (Hypnodyne, LLC)
  - L & R Frontal (F7/F8) EEG at 256 Hz
  - Dreamento produced all-night hypnograms
    - Excluded records without all-night signal fidelity
  - Sleep stages were then quantified in Hume
  - Data was averaged across multiple nights within subject when available



- 52 participants have completed the PROMIS measures
- 33 participants have completed all 4 nights of the ZMax, with an additional 14 completing at least 50% of the recordings

RESULTS

Subjective Sleep Measures

PROMIS Sleep Disturbance (*N* endorsed within the past 7 days)	Never	Almost never	Sometimes	Almost always	Always
I had difficulty falling asleep	7	**14**	**14**	10	7
I slept through the night	2	8	**17**	13	12
I had trouble sleeping	7	11	**17**	8	8
I tossed and turned at night	6	13	**14**	7	12

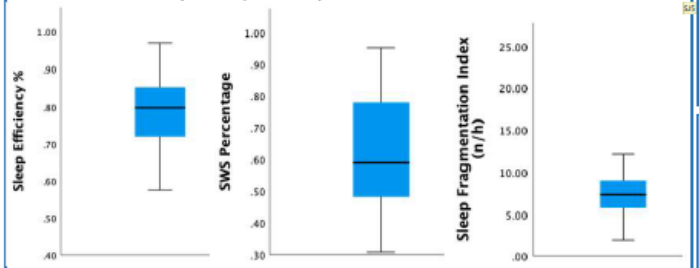
PROMIS Sleep Disturbance T Score = 60.8, SD = 8.3

PROMIS Sleep Impairment (*N* endorsed within the past 7 days)	Never	Almost never	Sometimes	Almost always	Always
I was sleepy during the daytime	0	4	**21**	16	11
I had a hard time getting things done because I was sleepy	6	11	**16**	**16**	3
I had trouble staying awake during the day	6	**19**	**19**	5	3
I was in a bad mood because I was sleepy	11	6	**25**	7	3

PROMIS Sleep-Related Impairment T Score = 62.8, SD = 9.6

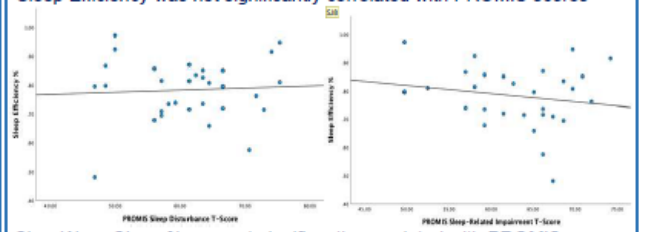
Objective Sleep Measures (chosen as indices of sleep quality and depth of sleep)

- Sleep Efficiency = percentage of total sleep time over sleep period time
- Slow Wave Sleep percentage = minutes of SWS over total sleep time
- Sleep Fragmentation Index = the number of awakenings or shifts to stage 1 over total sleep time (in hours)

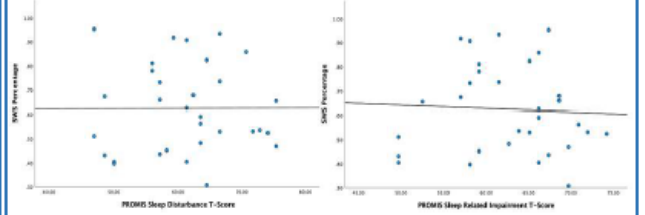


- Average Sleep Efficiency (*N*=33) = 78%, *SD* = 10%
- Average Slow Wave Percentage (*N*=33) = 63%, *SD* = 18%
- Average Sleep Fragmentation Index (*N*=33) = 7.9/h, *SD* = 3.8

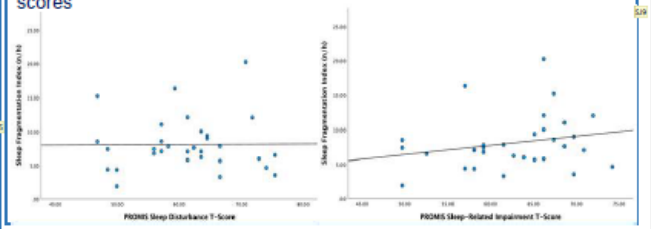
Sleep Efficiency was not significantly correlated with PROMIS scores



Slow Wave Sleep % was not significantly correlated with PROMIS scores



Sleep Fragmentation Index was not significantly correlated with PROMIS scores



DISCUSSION

- Participants reported higher-than-average subjective sleep problems
- Sleep efficiency is lower than non-clinical adolescent samples[8] possibly indicating lower quality of sleep
- Percentage of Slow Wave Sleep was unexpectedly high, possibly due to device or algorithmic errors
- No significant relationship was uncovered between subjective and objective sleep indexes
- Future directions include examinations of sleep microarchitecture and the relationship between sleep and exposure therapy outcomes

Using Fitbit devices to understand sleep processes in the context of adolescent cannabis use

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Introduction

- **Impaired youth sleep processes** (Meltzer, Williamson, and Mindell 2021) may **precede and follow** cannabis use (CU).
- **Acute** CU may **initially improve** sleep indices like decreased time to fall asleep.
- **Chronic** CU **increases sleep onset latency** along with **decreasing REM** and **slow-wave sleep**.
- Sleep disruptions may perpetuate a **cycle of increasing CU**, further disrupting sleep.
- **Passive** assessment can reduce burden on participants in **hard-to-reach** populations.
- **Fitbit devices** represent a promising device to enable researchers to gather information about participants' **daily** lives without reduced burden.

Objectives

To evaluate the utility of **passive data collection** via Fitbit Charge HR2 in determining if adolescents with **CU**differ from **cannabis-naïve youth** on sleep indices.

Hypothesis

We predict Fitbit sleep-related indices will **significantly differ** between adolescents who use cannabis and controls.

Methods

We used data from the **Adolescent Brain Cognitive Development** Study (release 5.01) (Garavan et al. 2018).

Participants were youth with **Year 4** Fitbit sleep data and **complete demographic** data.
* We selected adolescents with **CU** (**≥ 2 days/year**, n=48), and then created a matched-group of cannabis **naïve** youth (n=48 method described below).
* Ages at Year 4 ranged from **12-17** (x = 13.96; SD = 0.78), with **50% biologically female**.
* The sample **race/ethnicity** was 64% White, 23% Hispanic, 5.2% Black, and 8.3% Other.

Sleep Measures included **Fitbit** (pretabulated sleep duration, wake after sleep, sleep onset latency, and sleep stages); **Sleep Disturbances Scale for Children** (Bruni et al. 1996) (parent-reported sleep duration of youth); **Munich ChronoType Questionnaire** (Zavada et al. 2005) (youth-reported sleep duration). * In Year 4, some youth wore Fitbit devices for three weeks from which aforementioned sleep indices could be derived.
* Due to **intermittent device use**, we derived **daily output** (Mean, Standard Deviation [SD]) divided by **# of Fitbit days**.

Analysis Propensity score matching (1:1 nearest neighbor without replacement) (Ho et al. 2018) and **regression** evaluated the effect of **CU** on **sleep indices**, while matching on age, race/ethnicity, parental education, sex at birth. * **Matching variables** were included in regressions as **covariates** + household income (not matched due to missing values [n=6]). * To evaluate the association between informant-reported sleep duration and that of Fitbit, we correlated **Fitbit sleep duration** with **youth-** and **parent-reported** sleep duration.

Results

Sleep Variables	N	Control, N = 48[1]	CU, N = 48[1]
Mean Sleep Duration (min)	96	416.25 (49.63)	410.88 (69.15)
Standard Deviation of Sleep Duration (min)	90	73.90 (43.77)	99.91 (41.75)
Mean Light Sleep Duration (min)	96	247.50 (39.33)	246.17 (44.77)
Standard Deviation of Light Sleep Duration (min)	90	52.25 (26.94)	63.74 (27.74)
Mean Deep Sleep Duration (min)	96	83.21 (17.27)	77.51 (16.43)
Standard Deviation of Deep Sleep Duration (min)	90	23.44 (8.24)	25.57 (7.65)
Mean REM Sleep Duration (min)	96	85.54 (17.99)	87.20 (26.12)
Standard Deviation of REM Sleep Duration (min)	90	26.57 (8.60)	33.30 (10.79)
Mean Time to Fall Asleep (min)	96	6.61 (4.60)	9.28 (9.18)
Standard Deviation of Time to Fall Asleep (min)	90	7.96 (8.79)	11.78 (12.04)

[1]Mean (SD)

The estimated effect of CU on sleep indices indicated that relative to controls, CU teens had:

↑ Mean **sleep onset latency** (3.02, p = .038; Fig.1).

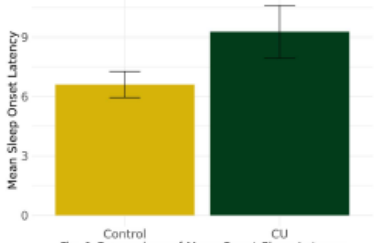

Fig. 1 Comparison of Mean Onset Sleep Latency

↑ SD of **wake after sleep** (3.91, p = .023).
↑ SD of **sleep duration** (28.3, p = .009).
↑ SD of **light sleep** (12.8, p = .049).
↑ SD of **REM sleep** (7.04, p = .001).

↑ SD of **sleep onset latency** (4.49, p = .035; Fig.2).

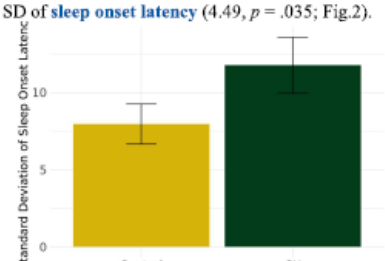

Fig.2 Comparison of SD of Sleep Onset Latency

Average **Fitbit daily sleep duration** was significantly associated with **youth-reported** school-day sleep duration (r = .28, p = .005), but not **parent-report** (r = -.17, p = .11).

Conclusions and Future Directions

Consistent with prior research, **CU** was associated with greater average and variability of **sleep onset latency**, and greater **variability** in other Fitbit-derived sleep indices. **Fitbit-derived sleep duration** was significantly associated with **youth-report** of sleep duration, but not parent's. Fitbit appears to be a promising, **low-burden** method to investigate **sleep** among **adolescents with CU**.

⭐ Fitbit devices distinguish CU youth from control youth.
⭐ For this age group, youth-reported sleep duration better was more strongly associated with an objective indicator of sleep duration than parent-report.
⭐ Limitations include data loss from Fitbit devices not being worn consistently, and Year 4 data only including half of all enrolled adolescents' data.
⭐ Future directions: Re-analyze data when ABCD includes Fitbit data in the next release (it was excluded in release 6.0). A next important step is evaluating objectively-derived sleep health measurements from actigraphy in the context of well-characterized adolescent cannabis use.

Acknowledgements

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Psychosis, sleep, and stress in adolescents: An actigraphy and daily diary study

PI: Elizabeth Thompson, PhD; RA: Emily Olenik, BS; Mentor: Jared Saletin, PhD

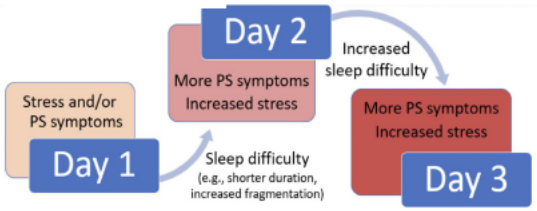
This project is funded by the E.P. Bradley Hospital COBRE Center for Sleep and Circadian Rhythms in Child and Adolescent Mental Health (P20GM139743)

Background

- Sleep problems and perceived stress are known correlates of early psychosis-spectrum (PS) conditions.
  - Clinical high risk (CHR)
  - First-episode psychosis (FEP)
- Sleep difficulties co-occur with PS symptoms.
  - Fragmented sleep, insomnia, nightmares
- Sleep pattern disruption and day/night reversal have been linked to positive symptoms in CHR youth.
- Sleep health may be an important factor linked to vulnerability for symptoms and ongoing illness.
- There is limited research demonstrating time-linked associations between daily sleep characteristics, stress, and PS symptoms. No such study exists focused on teens at CHR or with FEP.

Current Study

This study aims to examine daily interrelations between psychosis-spectrum symptoms (i.e. hallucinations and paranoia), sleep characteristics (measured via actigraphy and self-report), and stress (measured via self-report and IL-1β levels from saliva samples), in teens with early phase psychosis conditions.



Method

PARTICIPANTS: Teens aged 13-19 who have an IQ ≥ 75, currently meet criteria for CHR or FEP, are not currently undergoing medication changes, and speak/read English fluently.

16 participants have completed the protocol.

PROCEDURE: eligibility screening, baseline visit (psychosis assessment and self-reports), 2-week sampling period (actigraphy, daily diaries, daily [evening] saliva samples), and an exit session (self-reports, timeline follow-back, feedback).

Variables for these findings include the following actigraphy-derived sleep parameters: sleep duration, sleep efficiency, and time awake after sleep onset. Sleep quality, stress, and PS symptoms were measured via daily self-report.

ACTIGRAPHY: The Actigpatch is adhered to the tricep for 2 weeks. Actigraphy data is used with daily diaries and exit interviews to determine sleep intervals.

Sleep intervals were scored using the 15 minute rule (i.e. sleep onset and offset are scored based on the first and last 15 consecutive min. of sleep).

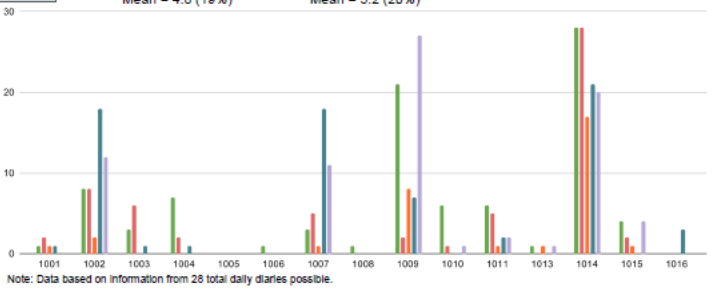
ANALYSES: Cross-sectional associations were derived from daily scores/ratings collapsed across the 2-week sampling period (e.g., mean values). Only significant bivariate correlations between primary variables of interest are presented here. Future analyses will explore daily, time-linked associations between variables of interest.

Preliminary data

Completion statistics (mean rates of completion):

- Actigpatch duration (14 days): 99.6%
- Scorable actigraphy data (14 days): 91.5%
- Saliva samples (14 total): 91.6%
- Morning diaries (14 total): 94.3%
- Nighttime diaries (14 total): 90.2%

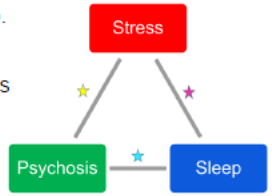
Diaries reporting PS symptoms



Note: Data based on information from 28 total daily diaries possible.

15 of 16 teens endorsed at least one symptom during the study period; 13 (81%) endorsed AH; 10 (63%) endorsed VH; 8 (50%) endorsed somatic experiences; 9 (56%) endorsed paranoia; 8 (50%) endorsed feeling watched.

Cross-sectional associations



Psychosis and sleep

- Hallucinations and sleep duration: $r = -.60$, $p = .03$
- Hallucinations and sleep efficiency: $r = -.55$, $p = .05$
- Paranoia and sleep parameters: *non-significant*

Psychosis and stress

- Hallucinations and daily stress: $r = .68$, $p = .01$
- Paranoia and daily stress: $r = .87$, $p < .001$

Sleep and stress

- Daily stress and sleep quality: $r = -.57$, $p = .04$