Support: This study was conducted using the University of Arkansas SONA system.

0221

LATE MEALS, SLEEP DURATION, AND SLEEP FRAGMENTATION: FINDINGS FROM THE AMERICAN TIME USE SURVEY

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Introduction: Sleep hygiene recommendations discourage eating close to bedtime, though published data on the impact are not consistent. Associations between eating or drinking, within 1-hour prior to bedtime, sleep duration and sleep fragmentation were examined in a nationally-representative sample.
Methods: Data from the American Time Use Survey (ATUS), administered to a nationally representative sample of n=201,151 US residents aged ≥15 years were utilized. In an annual phone interview, ATUS participants were asked to record their activities during a 24-hour period (04:00am to 04:00am on the interview day) and were randomly selected to report weekdays or weekend activities. The present analysis included data from 2003–2018 and restricted to weekday respondents (n=124,242). Reporting of eating/drinking activities within 1-hour prior to bedtime was considered as a dichotomous variable (yes/no). Sleep fragmentation was defined as any awakening during the primary sleep episode (yes/no). Linear and logistic regression models, adjusted for age, sex, cohabitation, education and employment, were used to examine associations between eating/drinking and sleep duration or sleep fragmentation.
Results: In this ATUS sample, 56% of respondents were female and the mean age was 45 years. Mean sleep duration was 8.02 (0.007) hours, and 6% of survey participants ate/drank within 1-hour prior to bedtime. Overall, eating/drinking within 1-hour prior to bedtime was associated with longer sleep duration ($p<0.01$). Women and men who ate/drank within 1-hour prior to bedtime, in comparison to those who did not, had 35 minutes and 26 minutes longer sleep duration (p- value<0.0001) Eating/drinking activities within 1-hour prior to bedtime were associated with 1.8 higher odds of fragmented sleep ($p<0.001$).
Conclusion: In this large population-based survey, weekday eating or drinking within 1-hour prior to bedtime was associated with sleep fragmentation and longer sleep duration. Causal pathways would be difficult to discern, though sleep fragmentation could lead to compensatory increases in sleep duration.
Support: None

0222

THE ASSOCIATION OF HABITUAL PHYSICAL ACTIVITY WITH 24-HOUR SLEEP OUTCOMES IN PRESCHOOLERS

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Introduction: Sedentary behavior, physical activity (PA), and sleep are health behaviors that contribute significantly to overall and early childhood health. Although interactive relationships of these behaviors have been reported in adults and school-aged children, there is limited evidence that PA is associated with sleep using objective measures in younger children and findings have been mixed. The purpose of this study was to determine if objectively measured PA and sleep behavior outcomes are associated in preschoolers.
Methods: Participants (n=77, age: 4.34±177;0.91 years; 55.8% female) were included in this cross-sectional study. Actiwatch Spectrum monitors (wrist-worn, triaxial accelerometers) were worn 24-hours for 16-days to measure PA (total PA counts, sedentary time [ST], light PA, and moderate-to-vigorous PA [MVPA]) and sleep (24-hour, nighttime, and nap sleep duration, bedtime, wake after sleep onset [WASO], and sleep efficiency).
Results: Multiple linear regression models adjusted for age and wear time during wake periods indicated that greater MVPA was associated with less nighttime sleep duration ($\beta=-3.48$, $p<0.001$), less total 24-hour sleep duration ($\beta=-3.38$, $p<0.001$), and a later bedtime ($\beta=0.07$, $p<0.001$). Total PA counts were associated with less nighttime sleep duration ($\beta=-0.0002$, $p=0.001$), less total 24-hour sleep duration ($\beta=-0.0002$, $p=0.001$), and a later bedtime ($\beta=4.83$, $p=0.001$). Greater ST was associated with greater total 24-hour sleep duration ($\beta=1.92$, $p=0.006$) and an earlier bedtime ($\beta=-0.36$, $p=0.02$). Percent time spent in light PA was not associated with any sleep outcomes and no PA variables were associated with nap sleep duration, WASO, or sleep efficiency.
Conclusion: As these findings are in contrast to previous studies reporting null or beneficial associations, further analyses are warranted to examine potential mediators/effect modifiers (e.g., sleep timing, gender, body mass index, and socioeconomic status) and temporal relationships between these movement behaviors in young children.
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0223

INTERACTIONS BETWEEN HOME, WORK, AND SLEEP AMONG FULL-TIME FIREFIGHTERS

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Introduction: Firefighters endure large occupational burdens (e.g., heat, exposure to toxic fumes, witnessed trauma) and generally operate under conditions of chronic sleep deficiency due to long shifts plus disrupted sleep and circadian disruption due to emergency calls during the night. A typical shift for firefighters is 24-hours on/48-hours off, and firefighters are expected to use time-off to recover from any sleep debt. However, firefighters need to balance that recovery with social/family needs and home maintenance. We conducted focus groups and qualitative analysis of responses to understand how firefighters' sleep recoverability is affected by occupational burdens and home/family dynamics.
Methods: Focus groups were conducted via convenience sampling in Portland, Oregon, with full-time firefighters, battalion chiefs, and spouses of firefighters to assess current strategies and coping mechanisms used to manage occupational burdens, home/family obligations, and sleep loss based on their 24-hours on/48-hours off shift schedule. Grounded theory, using NVivo 12 plus, was used to code focus group transcripts to reveal reoccurring concepts that were further grouped into themes.
Results: Major themes that emerged among firefighters and spouses (n=48) centered on spousal resentment of firefighters, driven by understanding a firefighters' heroic occupation and need to recover from accumulated sleep loss and shift schedule, but also wanting a partner physically/emotionally present to share home/social responsibilities. While married firefighters discussed choosing family/home obligations over reducing sleep debt to maintain social/family relationships, single and divorced firefighters spoke of fewer conflicts impeding their ability to prioritize sleep at home.
Conclusion: This study improves our understanding of how work impacts home life in firefighters and can inform future strategies to address work-family conflict and sleep loss concerns, and highlights the importance of managing expectations of time-off to promote a healthier work-life balance.

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0224

OPTOGENETIC MANIPULATION OF BASAL FOREBRAIN PARVALBUMIN NEURONS MODULATES VIGILANT ATTENTION AND RESCUES SLEEP DEPRIVATION INDUCED IMPAIRMENTS

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Introduction: Sleep disruption leads to attention impairments, excessive daytime sleepiness, and is a major contributor to accident rates and decreased workplace productivity. The basal forebrain (BF) region has long been associated with promoting cortical arousal and wakefulness. Recently, selective excitation of BF parvalbumin (PV) GABAergic neurons has been shown to produce high frequency cortical activation and brief periods of wakefulness. Here we test the hypothesis that BF PV neurons are involved in vigilant attention using bidirectional optogenetic manipulations in a signaled reaction time task.
Methods: Brief optogenetic excitation (ChR2) and inhibition (ArchT) of BF PV neurons was applied during a lever release version of the rodent psychomotor vigilance task (rPVT). Mice were trained to hold a lever down to initiate a trial and after a random delay, a 200ms cue light signaled the mouse to quickly release the lever within 1s to receive a sucrose pellet reward. The reaction time between cue light onset and lever release was the primary measure of attentional performance. Sleep deprivation (8h) produced by gentle handling was also investigated. Laser parameters: brief (1s) of continuous (non-pulsatile) laser stimulation was delivered beginning 500ms prior to cue light onset (5mW 473nm blue light for ChR2-mediated excitation; 10mW 530nm green light for ArchT-mediated inhibition).
Results: BF PV excitation led to faster reactions times (N=6, 14% faster, p<.001), interpreted as an enhancement of attention. Sleep deprivation slowed reaction times (20% slower, p<.01) and BF PV excitation rescued the sleep deprivation induced impairments. BF PV inhibition significantly slowed reaction times (25% slower, p<.02), an effect that resembled the effects of sleep deprivation.
Conclusion: This is the first demonstration of a role for BF PV neurons in attention and in the attention deficits produced by sleep deprivation.
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0225

DO ASSOCIATIONS BETWEEN DAILY STRESS AND SLEEP VARY BY WORK SHIFT? A WITHIN-PERSON ANALYSIS IN NURSES

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Introduction: Longitudinal studies have shown daily stress and sleep are bidirectionally associated. Nurses are particularly likely to experience sleep disturbances and high stress due to demanding work environments. Night shift work may be a unique stressor for nurses that exacerbates associations between stress and sleep. Using a within-person design, we examined the daily bidirectional associations between stress and sleep and moderation by nightly work shift (day/off shift vs. night shift) in a large sample of nurses.
Methods: Participants were 393 nurses (91% female; 77% white, mean age = 38.4 years) recruited from two hospitals. Participants completed 14 days of sleep diaries and actigraphy to assess total sleep time (TST) and sleep efficiency (SE). They simultaneously completed assessments of stress on the previous day (0 = "not at all" to 4 = "extremely") and daily work schedule (day/off shift vs. night shift [work between 9pm-6am]).
Results: Results indicated greater daily stress was associated with shorter diary TST (b = -9.49, p<.0001) and actigraphy TST (b = -4.48, p<.01), as well as lower diary SE (b = -0.56, p<.001). When examining reverse pathways of sleep predicting next day stress, both diary TST (b = -0.0004, p<.0001) and actigraphy TST (b = -0.0002, p = .03) predicted higher next-day stress. Lower diary SE predicted higher next-day stress (b = -0.005, p<.001). Only the association between daily stress and nightly diary SE was moderated by daily work shift: only when nurses worked a day or off shift did they have a negative association between daily stress and diary SE (b = -0.68, p<.0001).
Conclusion: Daily stress and sleep disturbances occurred in a bidirectional fashion for night- and day-shift working nurses. Most associations were similar regardless of daily type of work shift. Objective and subjective short TST and low subjective SE may contribute to a cycle of increased stress and are prime targets for a tailored sleep intervention in nurses. More research is needed to develop interventions to address the unique sleep health challenges faced by nurses.
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0226

SLEEP DURATION AND SYMPTOMS ASSOCIATED WITH RACE/ETHNICITY IN ELITE COLLEGIATE ATHLETES

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Introduction: Previous studies have documented sleep disparities in the general population. Given the increased interest in sleep among athletes, and the degree to which demographics and schedules among athletes differ from the general population, this analysis aims to examine the relationship between race/ethnicity and sleep duration and symptoms among elite college athletes.
Methods: Data were obtained from N=189 Division-1 collegiate athletes across a wide range of sports played. Race/ethnicity was self-reported and categorized as Non-Hispanic White, Black/African-American, Hispanic/Latino, Asian, and American Indian/Alaskan Native. Outcomes of interest included self-reported typical sleep duration (in hours), CESD depression score, and frequency of sleep symptoms, assessed using items from the Sleep Disorders Symptom Check List (difficulty falling asleep, difficulty staying asleep, early morning awakenings, tiredness, sleepiness, loud snoring, choking/gasping, fragmentation, hypnogogic/pompic hallucinations, sleep paralysis, and nightmares). Sleep duration and depression were evaluated with linear regression, and symptoms were evaluated as ordinal. Covariates included age and sex.
Results: Compared to Non-Hispanic Whites, Blacks/African-Americans reported less sleep (B=-0.80, p<0.0005), more depression (B=2.85, p=0.046), more difficulty maintaining sleep (oOR=2.12, p=0.034), early morning awakenings (oOR=3.15, p=0.001), and sleepiness (oOR=2.11, p=0.048); Hispanic/Latinos reported more hypnogogic/pompic hallucinations (oOR=2.90, p=0.007), sleep paralysis (oOR=2.72, p=0.026), and nightmares (oOR=2.22, p=0.035);