Title

0286 Cross-Sectional and Longitudinal Relationships between Rest-Activity Rhythms and Metabolic Biomarkers in Older Men: The Osteoporotic Fractures in Men Sleep Study

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Model 1 was adjusted for age, sex, race, and education, and Model 2 added depressive symptoms (Center for Epidemiologic Studies-Depression Scale) to Model 1 covariates.
Results: Higher scores on neuroticism were associated with more severe insomnia (Model 2: β = 0.05, 95% CI 0.02, 0.09) and greater sleepiness (Model 2: β = 0.11, 95% CI 0.07, 0.14), while Scoring higher on conscientiousness was associated with less severe insomnia (Model 2: β = -0.07, 95% CI -0.10, -0.04) and less sleepiness (Model 2: β = -0.08, CI: -0.11, -0.04). Higher scores on extraversion were associated with less severe insomnia (Model 2: β = -0.06, CI: -0.08, -0.03), but only with sleepiness in Model 1 (β = -0.04, 95% CI -0.07, -0.002). Higher scores on openness were associated with less sleepiness (Model 2: β = -0.04, 95% CI -0.07, -0.002, and scoring higher on agreeableness was only associated with less severe insomnia in Model 2 (β = -0.03, CI: -0.06, -0.001).
Conclusion: In well-functioning older adults, specific personality traits are associated with reports of insomnia and daytime sleepiness, mostly independent of depressive symptoms. Our results suggest that sleep disturbances may be one mechanism through which personality influences health. Studies with objective sleep measures are needed.
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0285

SEX AS A BIOLOGICAL VARIABLE ON THE INFLAMMATORY EFFECTS OF INTERMITTENT HYPOXIA

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Introduction: Intermittent hypoxia (IH) occurs in patients with obstructive sleep apnea (OSA), which, in turn, has been associated with cardiovascular mortality. However, in observational studies, the adverse events are more pronounced in men compared to women. The mechanisms underlying such sex differences are unknown, but inflammation has been posited as a mechanism by which OSA causes cardiac disease. We aimed to determine sex differences in pro-inflammatory cytokine production by peripheral blood mononuclear cells (PBMCs) in response to in-vitro IH. We hypothesized that PBMCs derived from men produce more interleukin-6 when stimulated in-vitro with IH than PBMCs derived from women.
Methods: After overnight sleep study, venipuncture was performed and PBMCs isolated and then resuspended into specialized cell culture cassettes that allowed for oxygen and nitrogen permeability. Cells were divided into two culture preparations - one subjected to normoxia (in the incubator) and the other to IH in a programmable hypoxia chamber (Oxycycler C-chambers; Biospherix, Inc.). The IH consisted of 5 cycles/ hour with a baseline of 20.9% and nadir of 5% FiO_2. After 18 hours of incubation, the supernatant was collected and Interleukin-6 was measured using ELISA techniques (R&D Systems).
Results: In 39 individuals (19 men) who had OSA (n=14), asthma (n=8), chronic obstructive pulmonary disease (n=3) or healthy (n=14) confounding factors that could influence production of IL-6 by PBMCs were obtained: age, body mass index, anti-inflammatory medications, smoking history, serum testosterone levels, and number of cells in culture. PBMCs from men produced greater levels of IL-6 following exposure to IH when compared to PBMCs in normoxic conditions. In contrast, PBMCs from women appeared to produce less IL-6 following exposure to IH than those cells exposed to normoxia. These differences were adjusted for confounders and there remained an interactive effect between IH and sex (F=4.68; P=0.038); anti-inflammatory medications (F=11.4; P=0.002) and a tendency for plasma testosterone levels (F=2.7; P=0.11).
Conclusion: Sex differences in cellular response to intermittent hypoxia may explain epidemiological observations of sex as a biological variable in studies involving OSA and cardiovascular mortality.
Support (If Any): Unfunded

0286

CROSS-SECTIONAL AND LONGITUDINAL RELATIONSHIPS BETWEEN REST-ACTIVITY RHYTHMS AND METABOLIC BIOMARKERS IN OLDER MEN: THE OSTEOPOROTIC FRACTURES IN MEN SLEEP STUDY

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Introduction: Growing evidence has linked disturbances of the sleep-wake cycle to cardiometabolic conditions. However, most previous studies focused on nighttime sleep and few have examined different aspects of the 24-hour rest-activity rhythms in relation to metabolic health. We examined both the cross-sectional and prospective associations between rest-activity rhythms and metabolic biomarkers in the Outcomes of Sleep Disorders in Older Men (MrOS Sleep) study.
Methods: We used wrist-worn actigraphy to measure rest-activity rhythms over ~5 days at baseline (2003-2005). We applied an extended cosine model to calculate amplitude (peak-to-nadir difference in activity), acrophase (time of peak activity), mesor (minimum+1/2 amplitude), and pseudo-F statistics of goodness-of-fit (a measure of the strength of rhythmicity). Leptin, adiponectin, glucose and insulin were measured from fasting blood at baseline and at a follow-up visit (2007-2009). We used multiple linear regression to examine the associations between baseline rest-activity rhythm parameters and metabolic markers at baseline (N=2,538), and changes in markers between baseline and follow up (N=985).
Results: Results from the cross-sectional analysis suggest that a lower amplitude, mesor and pseudo-F are associated with higher leptin and insulin ($\beta_{Q1\ vs\ q4}$ (95% CI): amplitude, 1.30 (0.52, 2.08) for leptin (ng/ml), 1.17 (0.19, 2.15) for insulin (uIU/ml); mesor, 1.02 (0.25, 1.78), 1.20 (0.23, 2.16); pseudo-F, 1.39 (0.62, 2.17), 1.21 (0.24, 2.18), all *p-for-trend* < 0.02). When compared to normal acrophase (12:30-16:30), an earlier acrophase is associated with higher levels of fasting glucose at baseline (4.66 (0.36, 8.97), mg/dL). In addition, early acrophase is associated with a significant decrease in fasting glucose between follow-up and baseline while late acrophase was associated with a significant increase (multivariable adjusted mean change, early: (-7.23 (-13.03, -1.43); normal, -0.40 (-1.33, 0.53), late, 6.02 (0.26, 11.78), *p-for-trend*=0.001).
Conclusion: Multiple parameters of the rest-activity rhythms exhibit cross-sectional relationships with metabolic markers. A later acrophase may be a risk factor for higher increase in fasting glucose

over ~6 years of follow up while an early acrophase appears to be protective.
Support (If Any): National Institutes of Health.

0287

SCHEDULED AFTERNOON-EVENING SLEEP IMPROVES NIGHT SHIFT PERFORMANCE IN OLDER ADULTS.

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Introduction: We previously reported that a combined strategy of enhanced light during the latter part of the night and 8h afternoon-evening sleep significantly improved night shift performance and sleepiness in older adults. This follow-up study investigates the effect of time-in-bed alone on night shift performance and subjective sleepiness.
Methods: Eighteen healthy adults (6 females) aged 57.0±4.4y (mean±SD) participated in the study; 4 day shifts, 07:00-15:00, followed by 4 night shifts, 23:00-07:00. Dim light salivary melatonin onset (DLMO) was assessed before the first and final night shifts. Subjects slept at home. Day shifts: all groups were instructed to remain in bed attempting to sleep for 8h. Night shifts: control group (n=9) were not given any sleep instructions; sleep timing (ST) intervention group (n=9) were instructed to go to bed between 1-2 pm and remain, attempting to sleep, for 8h. On all shifts, subjects took an hourly PVT and rated their subjective sleepiness with a Karolinska Sleepiness Scale. Mixed model analysis was (SAS 9.4) to compare night shifts to day shifts and shifts between the groups.
Results: Sleep was not significantly different between the groups on the day shifts. The ST group slept a similar amount on night shifts as they had on day shifts, whereas the control group slept less on all the night shifts ($p<0.05$). The ST group performed significantly better on the night shifts than the control group ($p<0.0001$). There was no significant difference in subjective sleepiness between the groups. The DLMO of the ST group phase advanced by nearly an hour (54 ±25.9 min), significantly greater ($p=0.029$) than the control who phase delayed by ~10 min (9.7±9.9 min).
Conclusion: This study demonstrates that when older adults remain in bed attempting to sleep for 8 hours they get significantly more sleep than when sleeping ad lib. It highlights that a behavioral change solely under the control of the individual, i.e. remaining in bed trying to sleep, is enough to extend sleep, thereby improving performance and subjective sleepiness on the night shift.
Support (If Any): NIH grants UL1TR001102, R01AG044416, T32HL007901

0288

HIGHER STRESSOR REACTIVITY TO INSUFFICIENT SLEEP IS ASSOCIATED WITH HIGHER BODY MASS INDEX IN MIDDLE-AGED WORKERS

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Introduction: Previous research reports that shorter sleep duration than usual predicts perceiving more stressors the following day. This within-person effect indicates *stressor reactivity to insufficient sleep* (SRIS). Less is known about whether SRIS is associated with body weight, particularly in middle-aged workers who are prone to having a lack of time for sleep and self-care, and frequent daily stressors across work and non-work domains. We examined whether SRIS was associated with body mass index (BMI) in middle-aged workers.
Methods: We used a sample of 128 office workers (M_{age}=45.26) who participated in 8 consecutive days' diary study. We evaluated within-person slope of total stressor frequency regressed on sleep duration to predict BMI (measured height and weight, kg/m^2). Analyses adjusted for sociodemographics and mean stressor frequency.
Results: Workers reported more stressors than usual after nights with shorter sleep duration than usual (SRIS, negative slope means higher reactivity; $p<.001$). Compared to those whose SRIS was in the average range (within ±½SD; 35% of the sample; reference), workers with higher SRIS (≤-½SD; 28%) had higher BMI (B=3.29, $p<.05$). The mean BMI of these workers fell within the obese range. There were no differences in BMI between workers with lower SRIS (≥½SD; 37%) and the reference group. We further tested with reactivity to poor sleep quality; higher stressor reactivity to poorer-than-usual sleep quality was associated with higher BMI albeit at a trend-level ($p<.08$). Supplementary analyses showed that higher stressor reactivity to shorter or poorer sleep were correlated with more unhealthy behaviors (encompassing smoking, alcohol consumption, lack of exercise, fast-food consumption), which were also correlated with higher BMI.
Conclusion: Middle-aged workers who perceive more stressors following insufficient sleep may be at greater risk for obesity. Future research could target these workers to improve their sleep and modify negative feedback on stressor perception and health behaviors.
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0289

SLEEP AND MORTALITY IN OLDER ADULTS: A MACHINE-LEARNING-BASED COMPARISON WITH OTHER RISK FACTORS

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Introduction: Sleep characteristics related to duration, timing, continuity, and sleepiness are associated with mortality in older adults, but are rarely considered in health recommendations. Examining the predictive ability of sleep as a multidimensional construct - rather than a series of separate characteristics—may clarify its importance and influence recommendations for measuring public health. We applied machine learning to: (1) establish the predictive ability of multidimensional self-reported sleep for all-cause and