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CHANGES IN ALERTNESS OVER CONSECUTIVE WORKDAYS FOR INTERNAL MEDICINE INTERNS: A SECONDARY ANALYSIS OF THE ICOMPARE TRIAL

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Introduction: Little is known about the impact of cumulative workdays on medical residents' alertness. The purpose of this study was to examine changes in alertness over consecutive workdays following a day off for internal medicine interns.
Methods: This is a secondary report of a randomized non-inferiority trial of 12 internal-medicine residency programs assigned to either standard duty-hour (80h workweek/16h shifts) or flexible (80h workweek/no shift-length limit) policies. Interns were followed for 2 weeks during inpatient rotations. Each morning, alertness (number of Brief Psychomotor Vigilance Test [PVT-B] lapses) was assessed, and interns selected the type of shift worked (day-off, days, nights, beginning/ending extended overnights, or other). Sleep duration (actigraphy) was averaged each 24h day. For this analysis, interns were included if they had ≥1 day-off followed by at least 3 workdays, and had no flagged PVT-B results for non-adherence. To examine the longitudinal effect of consecutive workdays on alertness, a generalized linear mixed model with random intercept and slope, and Poisson distribution was used to determine the rate of PVT-B lapses for up to 4 work days following a day off, controlling work shift type, sleep duration, and policy, with sleep and shift type interaction, and linear spline to account for the change in slope after the 2nd workday.
Results: N=328 interns were included (mean age 27.8±2.2y, 49% males). Mean±SD number of PVT-B lapses were 3.4±4.5, 4.2±5.6, 5.3±6.6, 4.8±5.8, and 4.7±6.0, and mean±SD sleep duration was 9.0±1.9, 6.9±1.3, 6.5±2.1, 6.6±1.8, and 6.9±1.7 hours for a day off and workdays 1-4 respectively. Rate of lapses increased by 1.1 lapse/day from a day off to the 2nd workday ($p=0.004$; 95%CI: 1.03-1.18), and then significantly decreased from days 2-4 at a rate of 0.89 lapses/day ($p<0.0001$; 95%CI: 0.85-0.92). Patterns of change in the rate of lapses were similar to changes in sleep duration, where, from baseline, every 1h longer sleep duration was associated with 0.91 fewer PVT-B lapses ($p<0.0001$; 95%CI: 0.93-0.97).
Conclusion: Both sleep and subsequent alertness were negatively impacted when returning to work following a day off for interns in this study. After two workdays, sleep duration appeared to increase again, with observed improvements in alertness.
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MURDER ON THE MIDNIGHT EXPRESS: NOCTURNAL WAKEFULNESS AND HOMICIDE RISK

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Introduction: There is a nocturnal peak in incident suicide risk after adjusting for population wakefulness (Perlis et al., 2016; Tubbs et al., 2020). This peak in risk is hypothesized to result from a series of negative changes in mood, reward processing, and executive function that occur at night and increase the propensity for dysregulated and violent behaviors. Although the unadjusted incidence of dying by homicide is elevated at night, no existing studies of time-of-day and death by violent crime have adjusted for population wakefulness.
Methods: Data from 48,486 homicide victims with a known time of fatal injury were collected from the National Violent Death Reporting System (NVDRS) for 2003-2017, tabulated by clock hour, age, sex, race, and ethnicity, and combined with population wakefulness data from the American Time Use Survey (ATUS) for the same years. Homicide counts were additionally characterized by the proportion of cases with blood alcohol level (BAL) of 0, <80mg/dl, or ≥80mg/dl at autopsy and modeled using robust Poisson regression with population wakefulness entered as an offset term, thus producing hourly incident risk ratios (IRR).
Results: Homicide counts were lowest in the morning (6AM-7AM) and highest at night (10PM-11PM). After adjusting for population wakefulness, the incident risk for death by homicide was elevated between 10PM and 5AM compared to the 24-hour average, with the highest risk between 2AM (IRR: 8.25 [6.62-10.3]) and 3AM (IRR: 7.22 [6.04-8.64]). Moreover, the adjusted risk of dying by homicide was significantly greater at night for those with a BAL≥80mg/dl, such that the risk at 2AM was 13.8-fold greater than the 24-hour average (IRR: 13.8 [10.6-18.1]).
Conclusion: The risk of homicide death is higher at night after adjusting for population wakefulness and especially among those with alcohol intoxication. Although homicide victims do not choose when to die (unlike suicide victims), neurophysiological changes at night may promote risky behaviors or put victims in more dangerous circumstances than they would be otherwise. Future research should examine sociodemographic, clinical, and circadian risk factors for death by homicide, as well as examine time-of-day patterns in other violent crimes.
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SLEEP DIFFICULTY AND WEEKLY SEDENTARY MINUTES

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Introduction: Decreased energy and activity may be a mechanism linking poor sleep health and cardiometabolic risk. This study aimed to examine, at the national level, whether poor sleep quality

was associated with more sedentary time (as opposed to less exercise, which has been difficult to establish).
Methods: Data from the 2017 - March 2020 National Health and Nutrition Examination Survey was used. A linear regression analysis was completed to assess the relationship between sedentary minutes and self-reported sleep difficulties. These were assessed by self-report of difficulty "falling asleep, staying asleep, or sleeping too much" over the past 2 weeks, with options for "never," "less than half the days," "more than half the days" and "almost always." Covariates included sex, age, race/ethnicity, education level, and relationship status. Results are unweighted; weighted results are forthcoming.
Results: All groups experiencing self-reported sleep difficulties demonstrated increased sedentary minutes when compared to those that do not experience sleep difficulties. More specifically, unadjusted results show 21.5 more sedentary minutes (B: 21.5, [95%CI:10.8,32.2], p<0.001) for those that have sleep problems several days a week, 21.8 more sedentary minutes (B:21.8, [95%CI:4.90,38.7], p<0.001) for those that have sleep difficulties more than half the days in a week, and 42.3 minutes (B: 42.3, [95%CI:26.8,57.8], p<0.001) for those that have sleep difficulties nearly every day during the week. Once adjusted for covariates, results showed 17.6 more sedentary minutes (B:17.6, [95%CI:6.76,28.3], p<0.001) for those that have sleep difficulties several days a week, 18.3 more minutes (B:18.3, [95%CI:1.45,35.1], p<0.001) for those that have sleep difficulties more than half the days in a week, and 48.4 more sedentary minutes (B:48.4, [95%CI:32.8,63.9], p<0.001) for those that have sleep difficulties nearly every day during the week.
Conclusion: Those with general sleep difficulties were more likely to report more sedentary minutes per day. Although previous efforts have focused on improving physical activity directly, perhaps future efforts could target sleep health as a way to reduce sedentary behavior.
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DROWSY DRIVING IN A COMMUNITY SAMPLE: ASSOCIATIONS WITH SLEEP DURATION, INSOMNIA SEVERITY, DAYTIME SLEEPINESS, AND FATIGUE

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Introduction: Drowsy driving is an important public health concern. Yet, real-world data on drowsy driving patterns remains relatively scarce. The present study aimed to investigate reports of drowsy driving in a general community sample and whether these are associated with daytime and nighttime sleep health risk factors.
Methods: Data were obtained through the Sleep and Health Activity, Diet, Environment, and Socialization (SHADES) study, which recruited N=1,007 working-age adults from the Philadelphia area. Drowsy driving was assessed with the item from the CDC BRFSS, "During the past 30 days, have you ever nodded off or fallen asleep, even just for a brief moment, while driving?" Responses were coded as "yes" or "no" (or "don't drive," which was excluded). Sleep-related factors included sleep duration (NHANES item, assessed in hours), insomnia (Insomnia Severity Index [ISI]), sleepiness (Epworth Sleepiness Scale [ESS]), fatigue (Fatigue Severity Scale [FSS]), and sleep medication use (PSQI item). Covariates included age, sex, education, income, race/ethnicity, employment, body mass index, and stress (Perceived Stress Scale).
Results: The sample consisted of N=738 adults, excluding those who did not drive in the past 30 days. After adjustment for covariates, each hour of sleep duration was associated with a 23% reduction in likelihood of drowsy driving (OR=0.77; 95%CI[0.66,0.89]; p<0.0005). Likelihood of drowsy driving increased with each point on the ISI by 8% (OR=1.08; 95%CI[1.04,1.13]; p<0.0005), with each point on the ESS by 19% (OR=1.19; 95%CI[1.13,1.26]; p<0.0005), and with each point on the FSS by 4% (OR=1.04; 95%CI[1.02,1.06]; p<0.0005). Sleep medication use was not associated with drowsy driving. In a post-hoc model that combined duration, insomnia, sleepiness, and fatigue, unique effects were seen for sleepiness (OR=1.17; 95%CI[1.10.1.23]; p<0.0005) and sleep duration (OR=0.82; 95%CI[0.70,0.98]; p=0.026).
Conclusion: Drowsy driving in a community sample is associated with less sleep duration and more insomnia, sleepiness, and fatigue. These effects may overlap, though daytime sleepiness emerged as the most robust risk factor. The combined model showed that sleep duration also contributed variance that was otherwise unexplained by the other factors. Drowsy driving prevention efforts should focus on sufficient sleep and daytime sleepiness as screening and prevention targets.
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INVESTIGATION OF SEASONAL CHANGES IN SELF-REPORTED SLEEP QUALITY AND PSYCHOMOTOR VIGILANCE TASK OUTCOMES: RESULTS FROM THE ULTRA LONG-TERM SLEEP (ULTS) STUDY

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Introduction: Although sleep is fundamental for human well-being, factors that contribute to an individual's experience and report of sleep quality remain poorly understood. Utilizing that sleepiness is known to impact vigilance performance, this study sets out to explore how self-reported sleep quality changes with behavioral performance and how this variation is affected by seasonal changes.
Methods: This work is an interim analysis of self-reported sleep quality and behavioral performance data collected in the Ultra Long-term Sleep (ULTS) study (ClinicalTrials.gov Identifier: NCT04513743). In the study 20 healthy participants (average 33±13 years of age) were enrolled for 365 continuous days to observe the seasonal variation in sleep and cognitive performance. The outcome from the daily psychomotor vigilance task (PVT) and sleep questionnaire is analyzed and reported. The sleep questionnaire is a composite of questions from the Sleep Satisfaction Tool, the Karolinska Sleep Diary, questions regarding feelings of pain and outside disturbances, easiness of waking up, and the Karolinska Sleepiness Scale (KSS). The PVT was designed for self-administered high-frequency testing and has a short 3-minute test period. Monthly changes were examined from June to November. This period was chosen since all subjects were active.
Results: The first eight participants have now completed the study. Repeated measures correlations between KSS and mean PVT reaction time showed moderate but highly robust associations between