**A Basic Sleep Science**

**Conclusion:** Increases in LF/HF ratio is generally thought to indicate either an increase in sympathetic activation or a decrease in parasympathetic activation. The results may indicate that participants following a night of sleep demonstrated an appropriate increase in sympathetic activation following the social stress task while autonomic changes were blunted in the sleep deprived group. However, these changes may be related to time awake and not relative sleepiness.

**Support (If Any):** Faculty Research Support Fund (FRSF) from UHCL

0270

**SLEEP DEPRIVATION INDUCES PERCEPTIONS OF GREATER TASK DIFFICULTY AND USE OF HEURISTICS**

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**Introduction:** This study examined whether sleep deprivation leads to perception of greater task difficulty and increased heuristics use. Research suggests a link between sleep quality and perception of difficulty. Engle-Friedman et al. (2010) found that less sleep and earlier wake time were associated with perception of greater difficulty of skating maneuvers in adolescent athletes. Individuals may employ heuristics (mental shortcuts) when faced with challenging situations (Shah & Oppenheimer, 2008). This study assessed whether sleep deprivation results in a greater perception of task difficulty and use of heuristics.

**Methods:** Participants were screened for eligibility and randomly assigned to the Fully Rested (FR, n = 18) or Sleep Deprived (SD, n = 16) group. The FR group slept at home while SD participants remained awake overnight. The following morning, participants took assessments evaluating perception of task difficulty and use of heuristics.

**Results:** SD participants rated an article as significantly more difficult (p = .03) and requiring significantly more time to read (p = .01) than FR participants. Regarding heuristics, SD participants rated an image of an unattractive refrigerator with a positive consumer review as significantly lower quality (p = .002) and were significantly less likely to purchase this refrigerator (p = .02) than the FR group. SD males were more likely to bypass instructions preceding a reading passage compared to FR males (p = .04).

**Conclusion:** Results suggest that sleep loss leads to changes in perceptions and an increase in the use of heuristics. Sleep-deprived individuals seem to be aware of the limitations in capacity caused by the loss of sleep and use mental shortcuts to reduce cognitive demands. Using heuristics rather than fully engaging cognitive processes when sleep deprived may implicate outcomes in circumstances under which life and safety are at risk.

0271

**MULTIPLE CONSECUTIVE SHIFTS AND COGNITIVE IMPAIRMENT FROM SLEEP RESTRICTION IN WILDLAND FIREFIGHTERS**

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**Introduction:** Wildland firefighters in British Columbia commonly work 12 hours daily, for 14 consecutive days. Working multiple consecutive shifts in a physically and psychologically demanding occupation could compromise vigilance, daily sleep opportunity, and ultimately worker safety. We hypothesized that cognitive impairment, assessed with the Psychomotor Vigilance Test (PVT), would increase as the number of consecutive firefighting shifts increased. As well, total sleep time (TST) and sleep quality would be associated with increased cognitive impairments over the 14 consecutive days worked.

**Methods:** We recruited 39 wildland firefighters between July 2015 and August 2015 on-site, at two separate wild fires. Each participant completed a full 14-day work cycle followed by a 3-day rest period. Participants completed the 5-min PVT each day immediately after their shift. Throughout the work and rest cycle we measured TST objectively using wrist worn actigraphy (wGT3X-BT) and subjective sleep quality using a 5-point Likert scale. Paired sample t-tests were conducted to examine changes in TST and PVT across the work cycle. A Pearson product-moment correlation coefficient was conducted to evaluate the association between PVT and sleep quality scores.

**Results:** We found a significant increase in mean PVT reaction time (reflecting a deterioration in psychomotor vigilance) from Day 1 (M = 278.92, SD = 38.41) to Day 14 (M = 299.86, SD = 60.19); t (38) = -2.388, p = .022. There were no significant changes in TST from Day 1 (M = 391.90 min, SD = 39.85) to Day 14 (M = 394.21 min, SD = 76.130). A significant negative association was observed between daily mean PVT scores (M = 289.50, SD = 50.94) and subjective sleep quality (M = 3.04, SD = .94); r = - .261, p = .05.

**Conclusion:** Working 14 consecutive firefighting shifts is associated with reaction time impairment. Although firefighters had no significant decreases in TST across the work cycle, they still showed a decline in vigilance consistent with chronic sleep restriction. Subjective sleep quality was associated with reduced psychomotor vigilance on the PVT in wildland firefighters during a work cycle.

**Support (If Any):** This work was supported by WorkSafeBC and the Wildfire Management Branch of British Columbia.

0272

**SLEEP QUALITY IN CREWMEMBERS OF US NAVY SHIPS WHILE UNDERWAY**

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**Introduction:** Work in naval environments is characterized by restricted sleep opportunities and frequent sleep disturbances. It is not surprising that sailors often report poor sleep quality. In this retrospective analysis, we assessed subjective sleep quality in a large sample of active duty sailors underway on United States Navy (USN) ships using the Pittsburg Sleep Quality Index (PSQI).

**Methods:** This work is based on responses from 432 active duty USN crewmembers including 261 sailors from the USS NIMITZ and 171 from two Arleigh Burke-class destroyers (USS JASON DUNHAM, n = 111; USS BENFOLD, n = 60). Participants were actigraphs and completed activity logs. PSQI questionnaires were completed at the end of the data collection period.

**Results:** Participants were predominantly male (79.6%) and young in age (26.7 ± 5.62 years). No substantive differences in age and gender were identified among the subsamples. Crewmembers stuck on either fixed circadian or rotating non-circadian-based schedules. Participants (n = 363) slept on average 6.63 ± 1.03 hours daily (ranging from 1.83 to 9.52 hours) split into 1.59 ± 0.482 episodes (ranging from 0.909 to 3.67). The average PSQI Global score was 8.71 ± 3.15, ranging from 1 to 18. PSQI scores indicated that 85.2% of participants were "poor sleepers" (PSQI score > 5). Adjusted for age and gender, multiple regression analysis showed that PSQI scores increased with number of
sleep episodes per day (p < 0.001) but decreased when crewmembers worked fixed watchstanding schedules (p = 0.004).

**Conclusion:** Results indicate that in the naval operational environment, FSQI scores are associated with watchstanding schedule, daily duration of watchstanding, and the number of sleep episodes per day. Reported sleep quality deteriorated when crewmembers stand watch for long hours, when sleep is split into multiple episodes, and when standing watch on rotating schedules. In contrast, sleep quality is improved when crewmembers stand watch using fixed schedules and sleep is consolidated into fewer daily sleep episodes.

**0273**

**SLEEP DEPRIVATION AND DRIVING IN ADOLESCENTS AND YOUNG ADULTS**

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**Introduction:** Sleep-deprived driving is the operation of a motor vehicle while being cognitively impaired by a lack of sleep. Sleep deprivation is a major cause of motor vehicle accidents, and it can impair the human brain as much as alcohol. It has been estimated that between 16% and 60% of all accidents have sleep deprivation as a cause. Adolescents and young adults frequently complain of symptoms of sleep disorders and suffer from chronic sleep deprivation. There is an absence of evidence in the literature regarding sleep deprivation in young novice drivers versus young adults. This study employing functional MRI during driving simulation aims to quantify the effect of sleep deprivation on driving function.

**Methods:** Our study is a prospective cohort study of two subject groups (adolescents versus young adults) with each subject serving as their own control. The enrolled subjects are 16 - 26 years old, right-handed, with driving experience either less than 6 months or ≥ 4 years of driving experience. Participants with a chronic or acute ongoing health condition which might affect the study results were excluded. Study procedures were following: actigraphy, polysomnography, multiple sleep latency test, driving simulator testing, functional MRI brain scan and driving simulation test with and without sleep deprivation.

**Results:** The preliminary results showed the total collisions was 0.2 during the control driving simulation test and 1.2 after 22 hours sleep deprivation. The total number of centerline crossings was 3.32 and 6.76 respectively and the total number of crossing out of the road outline was 3.32 and 5.6 respectively.

**Conclusion:** The sleep deprivation significantly impairs the driving function in adolescents and young adults. The more detailed study data analysis is in progress. The preliminary results suggest that the sleep impact is greater in adolescent versus young adults.

**0274**

**WEEKEND RECOVERY SLEEP AFTER A WORK WEEK OF SHORT SLEEP**

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**Introduction:** Chronic sleep loss affects millions of Americans each year with many individuals maintaining short sleep schedules during the work week and extending their sleep on the weekend. Sleep loss has been shown to shorten sleep latency, decrease wakefulness after sleep onset (WASO), and to a point preserve slow wave sleep (SWS) time predominantly at the cost of Stage 2 and REM sleep. In most prior studies that examined recovery sleep, the duration of the sleep opportunity was limited. Therefore, the aim of the current investigation was to examine changes in total sleep time and in NREM and REM sleep architecture during ad libitum weekend recovery sleep.

**Methods:** 36 (18 females) healthy adults (aged 25.5 ± 4.7y mean ± SD) completed three baseline days (9h sleep/night) and then were randomly assigned to one of three conditions: control (9h sleep/night), sustained sleep loss (5h sleep/night) or weekend recovery sleep (five days of 9h sleep/night [simulated work-week], then two days ad libitum weekend recovery sleep).

**Results:** There was a significant interaction between study day and condition for sleep onset latency and time spent in Stages 1, 2, and REM sleep, WASO and total sleep time (TST) (p < 0.05). No significant change was observed for SWS time. Sleep restriction reduced sleep onset latency, time in Stages 1, 2, and REM sleep, and WASO (p < 0.05 versus control); whereas weekend recovery sleep increased time in Stage 2, REM and TST (average sleep duration of ~10h) on the first weekend recovery night, and increased time in REM and WASO on the second weekend recovery night (p < 0.05 versus control).

**Conclusion:** Increased TST, Stage 2, and REM sleep time during ad libitum weekend recovery sleep suggests a NREM and REM sleep rebound on the weekend after a work-week (5 days) of sleep loss.

**Support (If Any):** R01 HL109706 and TR001082