0196

WHIRLED PEAS: TIME AWAKE, SLEEP PROBLEMS, AND LANGUAGE ERRORS

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Introduction: Few studies have considered the effects of sleep loss on expressive and receptive language. We investigated written language errors that are produced by individuals who report sleep loss or extended wakefulness compared to those with sufficient sleep or less time awake.

Methods: Participants (20–50 years of age) completed the study online. They reported a minimum of 12 years of education, < 3 prescription medications, and an absence of sleep or language disorders, learning disabilities, psychiatric disorders, or traumatic brain injury. Those who passed qualifying questions and data reliability checks (n = 232) completed questionnaires on sleep (PSQI), circadian preference (Owl-Lark), tasks targeting working memory, attention, and verbal ability, and produced two typing samples: copying and producing original text. They also completed multiple-choice tasks measuring technical, grammatical, and syntactical errors, plus the Brief Symptom Inventory (BSI).

Results: Those who were awake longer committed more spelling errors (p < .05) and errors in syntax and word usage (p < .05). They typed more slowly (p < .001) and typed fewer characters (p < .001). Time awake did not reliably predict when the first error occurred either when copying or producing text, however. Higher morning preference was associated with fewer language errors (p < .05), but also lower typing speed and accuracy (p < .001). Older and female participants were generally more accurate on language measures. Finally, BSI scores were higher in those who reported longer time awake (p < .05) and in individuals with higher PSQI global scores (p < .001).

Conclusion: Prolonged wakefulness was associated with language errors, typing speed, and increased self-report of psychiatric symptoms. Surprisingly, larks did worse on the typing task than did owls, although not when producing original text. Increased BSI scores in those awake longer may represent a response bias.

Support (If Any): None to report.

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ASSOCIATIONS BETWEEN SLEEP AND EMOTION REGULATION IN ISOLATED, CONFINED, AND EXTREME ENVIRONMENTS

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Introduction: Understanding interactions between sleep and emotion in isolated, confined, extreme environments (ICEs) is relevant to multiple populations (e.g., military personnel, off-shore workers, astronauts). Little is known about risk and resilience factors affecting sleep in these environments; however conditions (e.g., loss of natural light, communication delays) are conducive to sleep, circadian, and emotional disturbances. This study assesses sleep, neurobehavioral and emotion regulation factors in the Human Exploration Research Analog (HERA), a highly controlled, 3-story analog, simulating human exploration into space.

Methods: Sixteen participants (9 male) aged 29–52 (M=36.38, SD=7.11) completed a 30-day mission in HERA. Actigraphy data was collected continuously, including 11 days pre-mission. Subjective sleep complaints (Sleep Self-Assessment Scale; pre-mission, mission day 7 (D7), and D14), neurobehavioral symptoms (Neurobehavioral Checklist [NBCL]; pre-mission, D4, D11, D18), and pre-mission emotion regulation (including Anxiety Sensitivity Index and Difficulties in Emotion Regulation Scale) were also measured. Analyses included data from D0-D24, after which a sleep manipulation occurred.

Results: Pre-mission, positive adaptation was negatively associated with subjective sleep complaints (r_t= -.47, p=.02). Variability in total sleep time (TST) was negatively associated with emotion regulation difficulties (r_t= -.494, p=.02) and poor self-regulation (r_t=-.55, p=.02), whilst individuals with higher anxiety sensitivity showed increased sleep percentage (r_t=.45, p=.04) and decreased wake after sleep onset (r_t= -.43, p=.05).

During mission, TST increased, with a significant overall change from pre-mission to D18 (F(2.26, 27.16)=8.91, p=.001, $\eta^2_{partial}$=.45). Early in the mission (D1-D4), subjective sleep complaints were positively associated with poor self-regulation (r_t=.56, p=.005). During D1-D4, sleep onset latency (SOL) was negatively associated with anxious apprehension (r_t=-.46, p=.02) and marginally associated with poor self-regulation (r_t=-.31, p=.11). In subsequent mission days (D4-D11 and D11-18) the negative association between poor self-regulation and SOL was maintained (r_t=-.47, p=.02 and r_t=-.47, p=.01 respectively).

Conclusion: Associations identified between emotional functioning and sleep provide potential indicators of individual risk and resilience patterns within ICEs. Such findings await replication in larger samples and across different environmental conditions.

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THE EFFECTS OF INTERMITTENT LIGHT ON SLEEPINESS, SLEEP QUALITY AND SLEEP INERTIA

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Introduction: To explore the effects of intermittent light in the evening on sleepiness, sleep quality, and sleep inertia, we compared sleepiness, assessed by KSS, self-evaluated sleep quality using VAS and subsequent sleep inertia measured by KSS, PANAS, PVT, and facial expression recognition task among three conditions of light exposure (for 3 hours): intermittent bright light (30-minute pulse of bright light [~1000 lux] alternating with 30-minute dim light [~5 lux] for three times), continuous bright light, and continuous dim light.

Methods: Fifteen healthy participants (20 ± 3.4 years; 7 males) were included and scheduled to stay in sleep laboratory for 4 nights (one for adaptation), with a period of one week between nights. Baseline levels of sleepiness, emotion and performance for sleep inertia were measured after subjects came to lab, followed by 2 hours of goggle wearing to dispel effects of daytime light. Then, sleepiness just was assessed before and after light exposure. Subjects were then allowed to go to sleep at habitual bedtime. Upon awakening, sleepiness, emotion, performance and sleep quality were measured immediately.

Results: Differences in the changes of sleepiness from before light exposure to after light exposure were significant (F (2,28) =3.515, p

=.043, η^2 =.201), with changes smaller in intermittent condition than in continuous (*p* =.01) and dim (*p* =.036) light conditions. However, the main effects of lighting conditions on sleep quality were not significant. As for sleep inertia, compared with baseline levels, in the morning, KSS scores were higher (F (1,14) =19.547, p =.001, η^2=.583), with scores of positive subscale of PANAS lower (F (1,14) =14.851, p=.002, η^2 =.515), the lapses and median RTs in PVT significantly larger and the accuracies smaller in intermittent (p =.019) and dim (p =.021) light conditions in facial expression task.

Conclusion: Intermittent light exposure was more effective than continuous light in attenuating the increase of sleepiness along the night, but exposing to bright light in the evening did not influence self-reported sleep quality, neither strengthened sleep inertia intensity.

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0199

EFFECT OF SHORT-TERM AMBIENT LIGHT EXPOSURE ON SUBJECTIVE SLEEPINESS

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Introduction: Since the discovery of intrinsically photosensitive retinal ganglion cells, researchers found that light exerts powerful non-visual effects on numerous biological functions and behaviors in human, including circadian phase resetting, melatonin suppression, and enhancement of alertness. Of which, the alertness or sleepiness are most sensitive to short-wavelength light, and many studies focused on the effects of light exposure on sleepiness. However, few studies had investigated the effects of after short-term light exposure on sleepiness. Therefore, the study aimed to explore whether individual sleepiness would decrease after different short-term ambient light exposure in young adults.

Methods: Eighty-seven healthy young adults (38 males, Mean age = 19.95 years, SD = 1.94 years) participated the 3 (ambient light) x 2 (order) within-subject design experiment. Three different ambient lights were red light (2.9 × 10^{13} photons/cm^2/s, 632nm, 110 lx), blue light (2.9 × 10^{13} photons/cm^2/s, 459 nm, 45 lx) and white light (110 lx) respectively. The Karolinska Sleepiness Scale (KSS) was used to assess subjective sleepiness. Participants completed KSS in white light first, then they were exposed to different ambient light to do same cognitive tasks for approximately 40 mins, and reported their subjective sleepiness again.

Results: Repeated measure ANOVA indicated that neither significant main effect of ambient light (p = .232) or interaction effect of ambient light and order (p = .835) were found; while there was a significant main effect of order (p < .001, η_p^2 = 0.549) on subjective sleepiness, that is, participants' subjective sleepiness increased significantly after completing 40 mins cognitive tasks independent of ambient light.

Conclusion: These results suggest that there was no non-visual effect appeared after 40 mins light exposure, for subjective sleepiness increased in all three ambient light. Thus, it seems that people should take a break after about 40 mins continuous work to relieve fatigue, whether in the white, red or blue light.

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0200

THE EFFECTIVENESS OF CAFFEINE GUM IN REDUCING SLEEP INERTIA FOLLOWING A 30MIN NIGHTTIME NAP OPPORTUNITY: PRELIMINARY RESULTS

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Introduction: Many shiftworkers take short naps on nightshift to reduce the detrimental effects of sleep loss. However, sleep inertia resulting from napping can have deleterious effects on performance. Caffeine may be a useful countermeasure for sleep inertia. This study examined the effectiveness of 200mg caffeine gum in reducing sleep inertia following a 30min nighttime nap opportunity at 0200h.

Methods: N=5 subjects (3F, M=22.2±SD3.8y) took part in a 2-day laboratory study, with a randomised double-blind, placebo-controlled crossover design following one-week abstaining from caffeine consumption. The study involved one simulated nightshift with a 30min nap opportunity at 0200h. Immediately after waking from the nap, subjects were administered caffeinated gum or placebo gum. Subjects undertook a 3min psychomotor vigilance task (PVT) at 10min pre-nap (0150h) and 5, 15, 25 and 35min post-wakeup. Subjects returned one-week later to undertake the alternate caffeine/placebo condition. Linear mixed model ANOVA assessed differences in PVT lapses (response times >355msec) between caffeine and placebo conditions post-nap. Planned contrasts were conducted to assess differences in each post-nap PVT trial (5,15,25,35min) compared to pre-nap (0150h).

Results: There was a significant main effect of condition ($F_{1,37}$=23.06, p<0.001), with fewer lapses post-nap in the caffeine condition (M=11.9, SE=4.4) compared to placebo (M=18.7, SE=4.5 lapses), but no significant effect of trial or condition*trial interaction. Planned contrasts revealed that compared to pre-nap, there were significantly more lapses at 25- and 35min (p<0.05) post-nap in the placebo condition, but no differences in the caffeine condition (p>0.05).

Conclusion: Following a 30min nap opportunity at 0200h, 200mg of caffeinated gum attenuated performance decrements that were apparent from 25- to 35min post-wakeup in the placebo condition. Caffeine gum may be an effective countermeasure for mitigating performance deficits on nightshift, and appears to take 15-25min to take effect. Future analyses should investigate whether the alerting effects of caffeine gum also protect against performance deficits following longer and/or later nap opportunities, and whether any benefits last towards the end of the nightshift.

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0201

SELF-REPORTED SLEEP, ACTIGRAPHY AND MENTAL HEALTH DURING PRE-MISSION QUALIFICATION TRAINING IN THE MILITARY

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Introduction: Research has shown that sleep loss increases the risk for mental health problems, but very little work has examined this relationship during *real-world* military operations. The current study measured sleep via self-report and actigraphy, as well as indicators