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INSUFFICIENT SLEEP IS RELATED TO POOR INFANTRY BATTLE DRILL PERFORMANCE IN SPECIAL OPERATIONS SOLDIERS

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Introduction: Although multiple studies have documented the impact of insufficient sleep on Soldier performance, most studies have done so using artificial measures of performance (e.g., tablet or simulator tests). The current study sought to test the relationship between sleep and Soldier performance during infantry battle drill training, a more naturalistic measure of performance.

Methods: Fifteen junior special operations infantry Soldiers participated in the study. Soldiers wore Phillips Actiwatch Spectrum and reported their subjective sleep duration and quality during the week prior to Close Quarters Battle (CQB) drills. CQB training emphasizes close quarter combat tactics and requires a diverse range of cognitive skills (e.g., memory, decision-making, scanning). Each team of Soldiers performed six iterations of CQB – three using Ultimate Training Munitions (UTM; non-lethal rounds of munition) and three with live ammunition. Experienced leaders monitored each iteration and recorded errors on scorecards that are regularly used by the unit during CQB trainings.

Results: Participating Soldiers were all male and were 24.3 ± 3.82 years old. Soldiers slept an average of 6.6 hours per night leading up to the exercise and had an average sleep efficiency of 82/100%. The average number of errors committed during the UTM trials was 2.5 ± 1.9 , and the average number of errors during the live ammunition trials was 1.1 ± 1.1 . The number of errors committed during the live ammunition iterations was negatively correlated with subjective number of hours slept ($r = -.67$, $p = .006$) and subjective sleep efficiency/quality ($r = -.55$, $p = .03$). A t-test showed those with subjective sleep duration ≥ 7 hours had a significantly lower number of errors than Soldiers with subjective sleep duration < 7 hours ($t(14) = 2.26$, $p = .04$).

Conclusion: Enhancing infantry battle drill performance during training may directly translate to greater success in combat scenarios. These data preliminarily suggest that sleep quality and duration may influence subsequent performance on infantry battle drill training, particularly for Soldiers with limited experience in battle drill conduction who have not yet perfected battle drill techniques. Future studies should enact sleep augmentation to determine the causal influence of sleep on performance in this setting.

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EFFECTIVENESS-IMPLEMENTATION STUDY OF TWO NOVEL LIGHTING INTERVENTIONS FOR SHIFTWORKERS ON A SUBMARINE WATCHFLOOR

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Introduction: Shiftwork is common in the military, where around-the-clock readiness is necessary. Yet, non-standard schedules can negatively impact sleep, circadian health, and performance. Light is a leading countermeasure due to its phase shifting and alerting properties, with higher intensities and shorter wavelengths eliciting relatively greater effects. New technologies allow for deliberate spectral engineering that targets specific photobiological responses. This study examined the efficacy and implementation of two spectrally-distinct lights for improving sleep, alertness, and performance in active duty service members working nightshift schedules.

Methods: Participants were service members working 12-h shifts (0530-1730) on a high-security, submarine watchfloor (N=56, 9 females; mean+SE age= $28.95 + 0.76$). Lighting interventions included LED panels (3,721 cm²) that were either enhanced (SW+) or depleted (SW-) in short wavelength energy, while maintaining a comparable color temperature (~3000 K) and photopic illumination (~300 lux at 46 cm from eyes). For both SW+ and SW-, a bank of light panels were arranged across the front of the watchfloor and illuminated for the full duration of the nightshift. In addition, participants wore blueblocker glasses after nightshifts up until bedtime, when eye masks were worn during sleep. There were two data collection periods that coincided with existing 16-day schedule cycles: the first contained an 8-day baseline (BL1) and 8-day SW+ condition, and the second contained an 8-day baseline (BL2) and 8-day SW- condition (order within those 16-day periods was pseudo-randomized). Sleep and alertness were assessed via actigraphy, sleep diary, psychomotor vigilance test (PVT), and Karolinska Sleepiness Scale (KSS). Implementation metrics were obtained with questionnaires.

Results: All analyses are still ongoing. Preliminary examinations show higher satisfaction with the SW+ than BL1, and greater comfort and fewer symptoms under both SW+ and SW- as compared to BL1. Most felt the SW+ and SW- improved alertness on shift and expressed an interest in keeping the lights on the watchfloor.

Conclusion: Findings thus far indicate the interventions were well-received by participants. Subsequent analyses will further examine barriers to intervention use and the efficacy of the lights for improving sleep, alertness, and performance in service members working nightshifts.

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