

## **PREVALENCE OF EXCESSIVE DAYTIME SLEEPINESS, PSYCHOMOTOR VIGILANCE PERFORMANCE AND SLEEP HABITS OF ACTIVE DUTY NAVAL PERSONNEL DURING SHIPBOARD OPERATIONS**

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**INTRODUCTION:** Members of the US military have long duty hours in dangerous environments, often using work/rest schedules that run counter to a 24-hr circadian day. Almost all members of the US Navy are rotating shift workers with insufficient opportunities to sleep; in addition, the sleep that they receive is often in poor berthing conditions. All these factors contribute to elevated levels of fatigue, chronic sleep debt, lower morale and degraded performance. Researchers at the Naval Postgraduate School have examined the work and rest patterns of US Navy Sailors in an attempt to address the unique challenges posed by this operational environment.

**METHODS:** Active duty service members (N=432) from three USN ships participated in assessments of approximately two weeks in length. Crewmembers completed a survey which included demographic questions, the Epworth Sleepiness Scale (ESS), and the Pittsburg Sleep Quality Index (PSQI). Sleep was assessed with wrist-worn actigraphy and activity logs. Performance was assessed with the Psychomotor Vigilance Task (PVT) administered before and after standing watch. All studies were approved by the Naval Postgraduate School Institutional Review Board.

**RESULTS:** On a daily basis, crewmembers worked  $11.7 \pm 3.4$  hrs and slept  $6.62 \pm 1.03$  hours split into 1.6 episodes. Approximately 63% of the participants slept less than 7 hours, the physiological threshold to maintain health. ESS scores ( $10.2 \pm 4.43$ ) indicated that 44% of the participants had excessive daytime sleepiness (ESS scores  $>10$ ), with ~11% of the participants having ESS scores of 16 or more. The average PSQI Global score ( $8.71 \pm 3.15$ ) showed that 85.2% of the participants were “poor sleepers” (PSQI score  $>5$ ). Crewmembers had an average reaction time on the PVT of  $355 \pm 158$  ms, with a 12% error rate (lapses (defined as  $>500$  msec) combined with false starts (defined as less than 100 msec)).

**DISCUSSION:** Crewmembers on US Navy ships have significant levels of fatigue and sleep deprivation due to their excessively long workdays and erratic sleep schedules. Crewmembers frequently take naps to attempt to recover from this sleep debt. They commonly report excessive daytime sleepiness and over 85% of them are classified by the PSQI as poor sleepers. These crewmembers also demonstrate slowed reaction times with higher rates of errors. This constellation of symptoms is an indication of the accumulation of both acute and chronic sleep debt that continues to plague members of our military.

Goal: To inform the audience of the prevalence of sleep and performance issues in active duty Naval personnel.

CME Question 1: Navy personnel are given adequate opportunities to sleep in ideal berthing arrangements. FALSE

CME Question 2: US Navy crew members work excessively long hours with little time for rest and recuperation. TRUE

CME Question 3: When evaluated using standard reaction time tests, these US Navy Sailors have slowed reaction times with higher error rates. TRUE