

A PRIORI SELF-ASSESSED SENSITIVITY TO SLEEP DEPRIVATION CORRELATES WITH INDIVIDUAL COGNITIVE PERFORMANCE IMPAIRMENT DURING PROLONGED WAKEFULNESS

Eva Hennecke¹, Eva-Maria Elmenhorst¹, David Elmenhorst², Andreas Bauer², Daniel Aeschbach¹

¹German Aerospace Center (DLR), Institute of Aerospace Medicine, ²Research Center Jülich, Institute of Neuroscience and Medicine (INM-2)

Research question: Differences exist in the individual susceptibility to performance impairments induced by sleep deprivation. Identifying people who are at high risk for such impairments prior to exposure to prolonged wakefulness would offer the possibility to increase safety. This study investigated the relationship between cognitive performance impairment during 58 h of sustained wakefulness and self-assessed sensitivity to sleep deprivation based on prior experience. In addition, cognitive performance impairment was compared with subjective fatigue and sleepiness during the sleep deprivation.

Methods: 17 healthy, male volunteers (mean age 27 ± 5 SD, age-span 19-36 years) participated in the study. At the beginning of the study, participants answered a self-assessment questionnaire about their sensitivity to sleep deprivation. During sleep deprivation, fatigue and sleepiness were assessed in 6-h-intervals by the Fatigue Checklist and Karolinska Sleepiness Scale, respectively; cognitive performance was measured by the sum of correct responses in the N-Back Task. The differences in the aforementioned measures between 2 and 50 h of wakefulness and the self-assessed sensitivity to sleep deprivation were used for correlation analysis.

Results: The decrease of correct responses in the N-Back Task showed a significant correlation with the sensitivity to sleep deprivation (Spearman's $r_s(17) = .59$, $p = .01$) which was based on prior experience. There was no significant correlation between cognitive performance impairment and either fatigue ($r_s(17) = .19$, $p = .46$) or sleepiness ($r_s(17) = -.00$, $p = .99$).

Conclusion: Participants who rated themselves as sensitive to sleep deprivation performed worse in the cognitive test than those who rated themselves as less sensitive. Whereas acute performance impairments during prolonged wakefulness were not paralleled by changes in subjective fatigue and sleepiness, individuals appear to be capable of predicting such impairments based on prior experience with exposure to sleep deprivation. Possibly, performance under sleep deprivation can be predicted on the basis of a few questions on sensitivity to sleep deprivation.