



Acute Effects of Sleep Deprivation on Domain-Specific Cognitive Performance in Young Adults

Vipin Bahuleyan, Gintarė Daukšaitė 

Lithuanian Sports University, Kaunas, Lithuania

Background and Aim. Acute sleep deprivation has been shown to impair cognitive functioning; however, domain-specific vulnerability remains incompletely understood. This study examined the acute effects of sleep deprivation on multiple cognitive domains in young adults using the Automated Neuropsychological Assessment Metrics (ANAM) battery.

Methods. Ten healthy young adults (mean age 22.5 ± 1.90 years) participated in a within-subject repeated-measures design under acute sleep deprivation (8.0 ± 1.56 hours, total deprivation). Cognitive performance was assessed across six domains: Simple Reaction Time (SRT), 2-Choice Reaction Time (CRT), Continuous Performance Test (CPT), Code Substitution Learning (CSL), Code Substitution Delayed (CSD), and Code Substitution Immediate (CSI). Accuracy percentages were analysed using repeated measures ANOVA with Greenhouse–Geisser correction.

Results. A significant main effect of cognitive domain was observed, $F(1.63, 17.93) = 13.11, p = .001$, with a large effect size (partial $\eta^2 = .54$). Reaction time and attention measures demonstrated relatively preserved accuracy (SRT: $M = 91.67\%$; CPT: $M = 89.95\%$), whereas delayed and immediate memory domains showed markedly lower performance (CSD: $M = 66.03\%$; CSI: $M = 66.10\%$), representing approximately 20–25% reduction compared to reaction-based tasks.

Conclusion. Acute sleep deprivation differentially impacts cognitive domains, with higher-order memory processes appearing particularly vulnerable, while basic reaction time functions remain relatively preserved.

Keywords: Sleep deprivation; cognitive performance; memory impairment; ANAM battery

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Informed Consent Statement: This study was approved by the Ethics Committee of Lithuanian Sports University (No. MNL-SVA (M)-2026-866). All participants provided written informed consent prior to participation. The study was conducted in accordance with the Declaration of Helsinki.



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