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Partial sleep deprivation effects on dual-task cognitive-motor performance

Friday, September 12, 2025 6:00 PM (10 minutes)

While the impact of sleep quality on basic cognitive functions is well established, its effect on more complex daily activities - particularly those involving the simultaneous employment of cognitive and motor abilities (dual-tasking) - remains less understood. Interference arising from the concurrent performance of cognitive and motor tasks is commonly assessed through the dual-task effect (DTE), which compares the performance under single- and dual-task conditions. This study aims at investigating how sleep quality modulates cognitive-motor dual-tasking. In a within-subjects design, 48 participants with good sleep quality (Pittsburgh Sleep Quality Index ≤ 5) completed a cognitive-motor dual-task paradigm following two sleep conditions: normal sleep (NS; 12AM–9AM) and partial sleep deprivation (SD; 1AM–6AM). Sleep conditions were actigraphy-checked and administered in a counterbalanced order at least one week apart. After each condition, participants performed tasks assessing inhibitory control (Go/No-Go; GNG), sustained attention (Psychomotor Vigilance Task; PVT), and motor performances (Finger Tapping; FT) under single-task (ST) and dual-task (DT) modalities, with the latter combining FT with either PVT or GNG. Across both sleep conditions, the paradigm effectively elicited DTEs across cognitive domains. Notably, DT performance following SD showed significantly longer reaction times in both inhibitory control and sustained attention tasks, compared to NS. These findings highlight the adverse impact of a partial sleep deprivation on cognitive-motor performance. Understanding dual-task performance effects in sleep-deprived conditions may inform interventions for sleep-disordered conditions and guide best practices for individuals whose lifestyles or professions involve occasional or chronic sleep restriction.

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