

Why lose sleep for work if sleep works for you? Neurocognitive affective benefits of home-based sleep extension in chronically sleep-restricted emerging adults

Sleep restriction is common in modern societies, particularly among emerging adults. Previous studies have demonstrated both the consequences of inadequate sleep and the benefits of short-term sleep extension. However, little is known about the effects of sleep gain in neurocognitive-affective functions over a longer period, mimicking a more meaningful, ecologically-valid habit change. In this project we will implement a two-week (plus one-month follow-up), home-based, nighttime 90-minute sleep extension (SE) program including evidence-based motivational interviewing processes and habit-change strategies in 150 chronically/habitually sleep-restricted (≤ 5.5 hours nightly sleep) emerging adults and compare them with 75 randomized controls who only undergo sleep hygiene education (SH). The study protocol consists of four phases spanning 2 months: 1-week home-based baseline monitoring (pre-test), 1-week SH (sleep stabilization period), 2-week SE for the SE group only (post-test), and 1-month maintenance period (follow-up). We will apply ambulatory monitoring of sleep and a combination of in-lab and ambulatory neural and behavioral measures of neurocognitive and affective functions as follows: (a) at T1 (Day 1), demographics, baseline mood and sleep; (b) at T2 (Day 7, pre-test), experimental tasks of vigilance, working memory, planning, inhibitory control on emotional stimuli, emotional reactivity, and regulation (with EEG/ERP), followed by polysomnography at home; (c) at T2-4 (weeks 2-4), actigraphy, sleep diary, and daily experience sampling; (d) at T4 (end of week 4, post-test), repeat T2 assessments; (e) at T5 (end of week 5), follow-up online survey of mood and sleep, and feedback of participants on the feasibility and acceptability/usability of the program. With a 2x2 factorial design (pretest/posttest, SH/SE), we hypothesize that SE would: (i) lengthen sleep duration, improve sleep quality, lower subjective sleepiness, and heighten vigilance; (ii) augment neurocognitive functions; (iii) improve affective functions; (iv) enhance neurocognitive functions beyond heightened vigilance; and (v) improve affective functions beyond lowered subjective sleepiness. With a theory-based and evidence-based method, lengthened protocol and maintenance period, and a broad yet targeted scope of functions assessed using a multi-method approach, our findings will advance understanding of the effects of sleep on neurocognitive-affective functions. Methodologically, we will also pioneer the assessment of cognitive-affective functions via home-based ambulatory monitoring and conduct a meta-analytic factor analysis of the Pittsburgh Sleep Quality Index (PSQI), thereby equipping sleep scientists and practitioners with low-cost mobile tools and the most evidence-based way of characterizing sleep quality in our target population of emerging adults who are typically sleep-restricted and poor sleepers.