vigilant attention. We investigated whether a field-deployable light-emitting device would help to improve alertness and working memory in a real-world setting.
Methods: Thirty-five participants (18 female; 26.4 ± 6.0 y) completed an at-home, within-subject, randomized crossover study. Participants wore actiwatches during their normal sleep-wake schedule for five nights ahead of the adaptation and experimental nights. On the experimental night, participants performed baseline testing before their self-selected bedtime. Forty-five minutes after bedtime, participants received a phone call and were instructed to perform test bouts while wearing light-emitting glasses with the light either on (light condition) or off (control). A 3-minute descending subtraction task (DST) and the Karolinska Sleepiness Scale (KSS) were performed at +7, +17, +27, and +37 minutes after the call. Participants were then instructed to go back to sleep and were called 45 minutes after lights out to repeat the test bouts in the opposite condition. A series of mixed-effects models were performed with fixed effects of condition, test bout, and their interaction, and a random effect of participant. Condition order, sex, and baseline were included as covariates.
Results: There was a significant effect of test bout for DST total responses ($\chi2$ [3] = 17.42; p < .001) and total correct ($\chi2$ [3] = 21.29; p < .001) with improved performance at +27 and +37 minutes compared to +7 minutes. Sex was a significant predictor for KSS (F1,30 = 10.26; p = .003), with females (8.20 ± 0.23) rating higher sleepiness than males (7.10 ± 0.25). There were no other significant effects for DST or KSS outcomes (p > .05).
Conclusion: These results suggest that the intervention was not able to improve working memory or alertness under naturalistic at-home settings. Further analysis is needed to determine whether these results are applicable to other cognitive performance domains.
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0007

TEMPORAL ASSOCIATIONS BETWEEN ACTIGRAPHY-MEASURED DAYTIME MOVEMENT BEHAVIORS AND DAYTIME SLEEP IN EARLY CHILDHOOD

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Introduction: Although napping in early childhood is associated with some cognitive and behavioral outcomes, less is known about relations with physical health measures. Lower levels of sedentary behavior and higher levels of physical activity have been beneficially associated with sleep measures in adults. Studies exploring sleep and daytime movement behaviors (sedentary time and physical activity) in young children have had inconsistent results and primarily focused on overnight sleep. The purpose of this micro-longitudinal analysis was to determine if: 1) daytime movement behaviors predicted the likelihood of napping the next day, 2) daytime movement behaviors predicted next-day nap duration, and 3) the occurrence of a nap predicted next-day movement behaviors.
Methods: In 240 children (age=50.8±9.8 months, 49.2% female) sedentary time (% of wake time), total physical activity (counts/min), and nap duration (min) were derived from wrist-based actigraphy (mean = 9.7 days), and occurrence of a nap was recorded daily. Multilevel logistic and linear models with lagged effects were used to examine temporal within-person relations between wake behaviors and nap sleep, and adjusted for night's sleep duration of nights between days of interest (min), age (months), sex (male or female), and socioeconomic status (index). Preliminary models included interactions with nap habituality (rarely, sometimes, or frequent).
Results: Occurrence of a nap was not associated with next-day wake behaviors and previous-day wake behaviors did not predict nap duration. However, on days children napped, they were less sedentary (B=-2.09, p<0.001) and more active (B=25.8, p<0.001) the following day. Nap habituality did not moderate these associations.
Conclusion: Bidirectional associations between nap sleep and daytime wake behaviors were not evident. While daytime movement behaviors were not predictive of nap sleep, napping was beneficially associated with subsequent-day movement behaviors in preschool children. Further studies could explore specific nap sleep metrics in samples with more diverse sleep health, as well as consider the reason for daytime napping.
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0008

UNIVERSITY-WIDE CHRONOTYPING SHOWS LATE-TYPE STUDENTS HAVE LOWER GRADES, SHORTER SLEEP, AND MORE ABSENTEEISM

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Introduction: A person's preferred timing of nocturnal sleep (chronotype) has important implications for cognitive performance. Students who prefer to sleep late may have a selective learning disadvantage for morning classes due to inadequate sleep and circadian desynchrony. We tested whether late-type students perform worse only for morning classes, and we investigated factors that may contribute to their poorer academic achievement.
Methods: Chronotype was determined objectively in 33,645 university students (early, n = 3,965; intermediate, n = 23,787; late, n = 5,893) by analysing the diurnal distribution of their logins on the university's Learning Management System (LMS). Linear mixed models were used to test for differences between chronotype groups in grade point average (n = 33,645), actigraphy-estimated sleep behaviour (n = 261), and class attendance estimated using Wi-Fi connection data (n = 17,356).
Results: Late-type students had lower grades than their peers for courses held at all different times of day, and during semesters when they had no morning classes. Actigraphy studies confirmed LMS-derived chronotype was associated with students' sleep patterns. Nocturnal sleep on school days was shortest in late-type students because they went to bed later than the other chronotype groups and woke up earlier compared with non-school days. Wi-Fi connection logs for classrooms revealed that late-type students had lower lecture attendance than their peers for both morning and afternoon classes.
Conclusion: Large university-archived datasets can be used to assess relationships between chronotype and academic performance. Late-type students had lower grades, shorter sleep, and were more likely to miss classes. Shifting classes later may improve sleep and circadian synchrony in late-type students. However, this probably will not eliminate the performance gap because they still had lower grades when they only had afternoon classes. Interventions that focus on improving students' well-being and learning strategies may be important for addressing the late-type academic disadvantage.
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