The effect of sleep on human cognition

Michael Voloshin, Assel Al-Bayati, B. Marius 't Hart, Denise Y.P. Henriques
Centre for Vision Research, York University, Toronto, ON, Canada

Does sleep affect executive function performance?

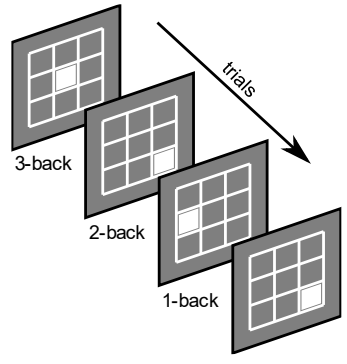
Online browser study. Participants (N>460; M_{age}= 21.5, SD_{age}= 5.31; M >120, F >340) completed a sleep questionnaire along with a battery of tasks assessing two specific components of executive function: working memory and cognitive flexibility.

Participants were grouped based on their calculated Pittsburgh Sleep Quality Index (PSQI) scores and their reported sleep last night.

Good Sleep: PSQI score 8≤; **Poor Sleep:** PSQI score 4≥; **7≤ Hours:** 7 or more hours of sleep last night; **7> Hours:** Less than 7 hours of sleep last night

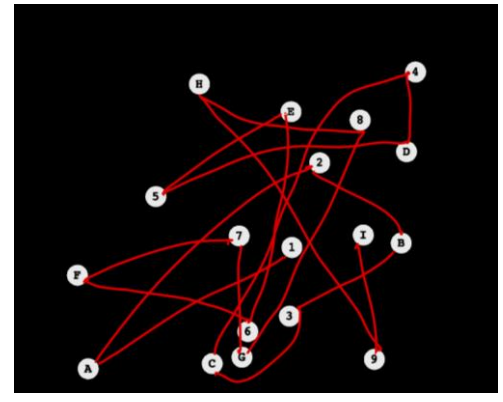
Visuospatial Working Memory: n-back

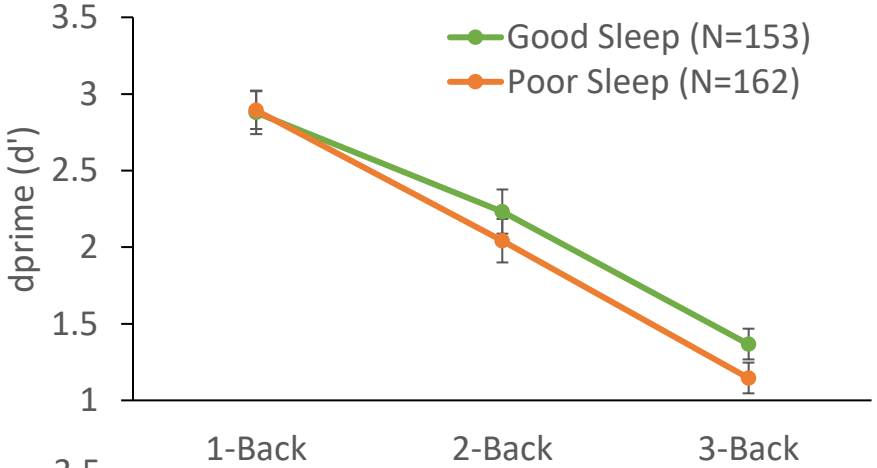
Participants were tasked with responding whenever a highlighted square in a grid matched that appearing in an earlier trial. Each level of 'n' corresponds to the number of trials 'back' that had to be recalled.

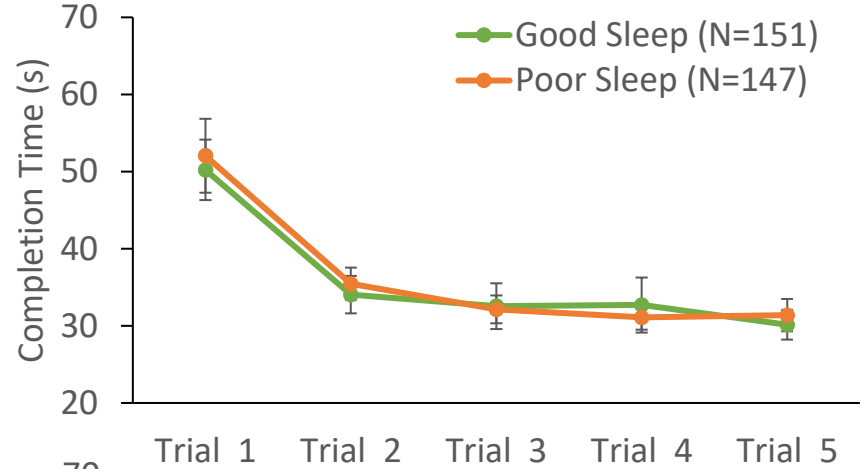


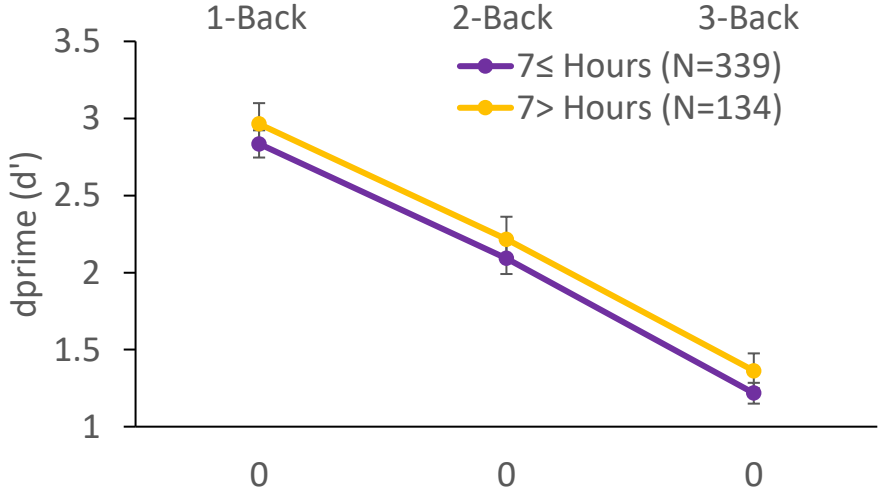
Cognitive Flexibility: Trailmaking

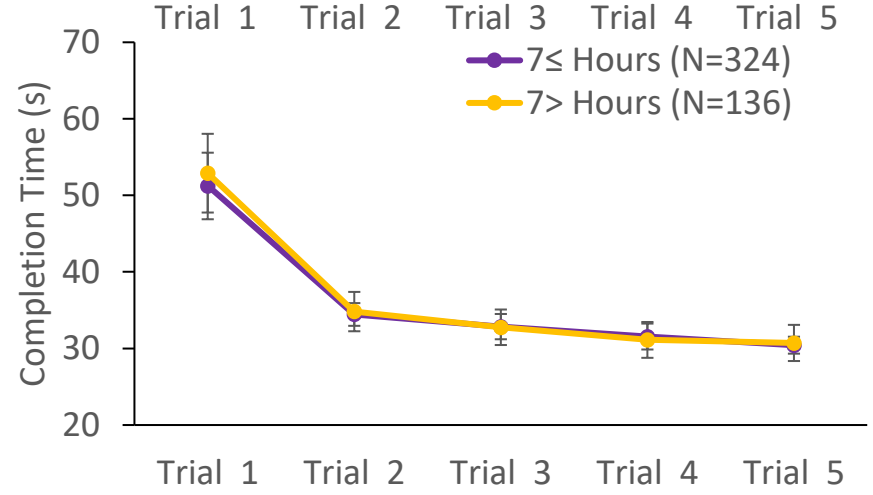
Participants used their mouse to connect alphanumeric labeled circles, alternating between letters and numbers (e.g. 1A, 2B) as fast as possible.











No difference between good sleep and poor sleep nor more than 7 and less than 7 hours of sleep last night.

Conclusions and Future Work

- **Sleep does not affect the visuospatial working memory and executive function performance of healthy adults.**
- **Suggests age-based tolerance for young adults.**
- **Precise thresholds for optimal sleep, sleep deprivation, and poor sleep should be established to avoid conflicting findings.**
- **Use these findings to tweak larger questionnaire and task battery, enhancing its ability to identify causal relationships between demographics and lifestyle factors, and cognitive and motor function.**

Contact: mvoloshi@my.yorku.ca