Time-in-Bed Restriction to Improve Cognition in Older Adults

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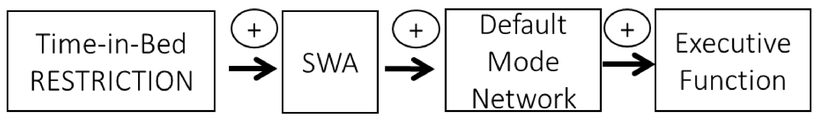
Background

- Sleep changes parallel cognitive changes that are found with aging and Alzheimer's disease.
- Slow-wave activity (SWA) during non-rapid eye movement sleep may be particularly important in restoring cognitive function.
- SWA reflects large-scale neural synchrony primarily among prefrontal connections. Such neural synchrony may reorganize networks to make them more efficient.
- Increases in SWA have been associated with improved memory and executive function.
- Long sleep time is rarely associated with better cognition.

Aims: Determine whether TIB restriction:

- **Increases sleep efficiency and SWA**
- **Improves performance on executive function tasks**
- **Increases connectivity of intrinsic functional networks important for executive function (default mode network, DMN)**



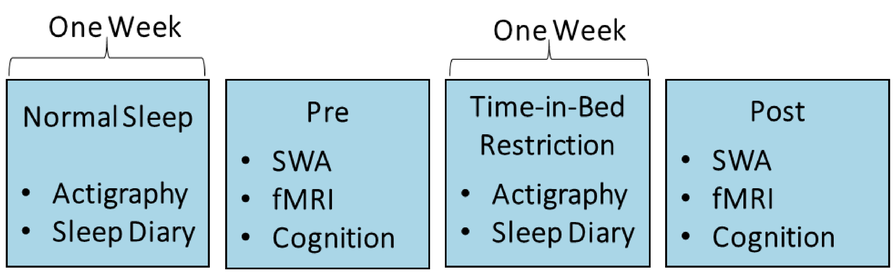
Methods

Participants:

- Older adults ages 55-80 with <90% sleep efficiency
- No Dementia or other neurodegenerative disorders
- No major psychiatric disorders

Intervention:

- 27 out of 54 randomized to TIB restriction (75% TIB)
- 4 out of 10 randomized to control (100% TIB)



Methods, Continued

Measures:

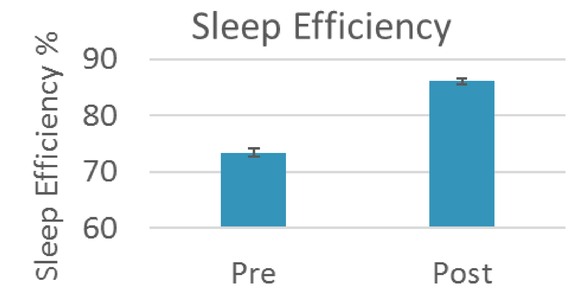
Sleep- Overnight Polysomnography
Sleep Efficiency
Slow-wave Activity
Executive Function
Inhibition (Stroop)
Task-switching
Working Memory (Sternberg)
fMRI Functional Connectivity
Default Mode Network
Executive Control Network

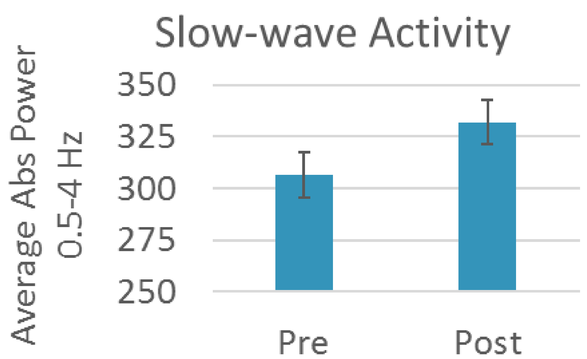
Statistical Analyses:

- T-tests and repeated measures ANOVAs testing main effects of time-point on sleep, cognition, and connectivity measures. Future analyses will test the group × time interaction and associations with changes in SWA

Preliminary Results

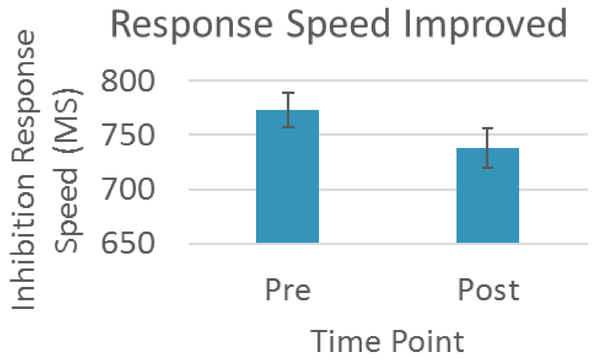
TIB restriction increases sleep efficiency and SWA

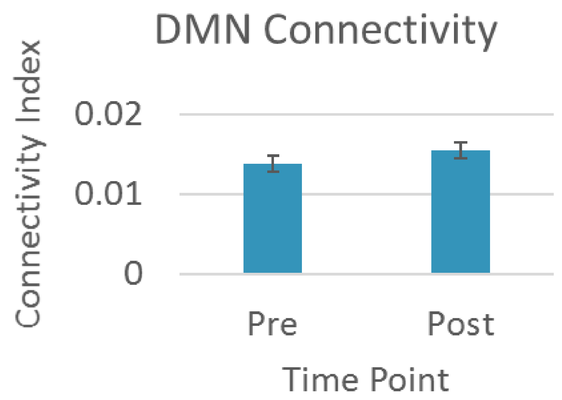




Preliminary Results, Continued

TIB restriction is associated with improved response speed and DMN connectivity





Preliminary Conclusions

- TIB restriction increased sleep efficiency and SWA as hypothesized.
- TIB restriction was associated with improved response speed, but there was no effect on accuracy
- TIB restriction was associated with increased connectivity of the DMN which is often greater in those with better cognitive performance and is negatively impacted by Alzheimer's disease
- Future work will definitively assess whether TIB restriction improves executive function AND early behavioral, brain, and biomarkers of Alzheimer's disease.