The Association Between Sleep Efficiency and Cognitive Impairment Using A Wearable Sleep Device

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Introduction

- Previous studies have shown that sleep impairments may be associated with mild cognitive impairment (MCI) and Alzheimer's Disease (AD).[1]
- One of these impairments is sleep inefficiency, the ratio of total sleep to total time dedicated to sleep (minutes spent in bed, regardless of sleep/wake status).
- Approximately 75% or less shows a clear trend with abnormal levels of amyloid beta 42 (Aβ42), which is an indicator of AD.[2]
- Current tests for AD (MRIs, PET scans, biomarker analyses), are expensive and typically used in later AD stage.[3]

Figure 1. SleepImage Ring.[4]

- Inexpensive and widely-available assessment tools are needed to measure changes in sleep data that could predict cognitive decline.
- **Objective**: Examine whether sleep efficiency is associated with cognitive impairment.

Methods

Participants: 112

Analyses: Multivariable Logistic Regression, adjusting for age and sex

Predictor variable: Sleep Efficiency

Outcome variable: Cognitive Impairment

- 112 participants from the Boston University Alzheimer's Disease Research Center (BU ADRC) Clinical Core.
- The ring collects heart rate and oxygen data, which is used to calculate variables including sleep efficiency.
- The first night of the ring usage was used in the analysis.
- Cognitive impairment in participants was determined by the BU ADRC through an annual consensus review with neuropsychologists and neurologists including blood draws, MRI testing, and neuropsychological tests.

References

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Results

Variable	Not Cognitively Impaired N = 106	Cognitively Impaired N = 6	All N = 112
Age, m (sd)	72.77 (9.21)	65.33 (9.61)	72.38 (9.34)
Education in years, m (sd)	17.10 (2.08)	16.33 (1.51)	17.06 (2.06)
Sex, N (%)			
Male	47 (44.34)	1 (16.67)	48 (42.86)
Female	59 (55.66)	5 (83.33)	64 (57.14)
Sleep efficiency %, m (sd)	80.46 (14.20)	86.50 (7.82)	80.79 (13.98)
Sleep duration (hrs) night 1, m (sd)	7.13 (2.20)	7.64 (0.95)	7.16 (2.15)

Figure 2. Demographics table.

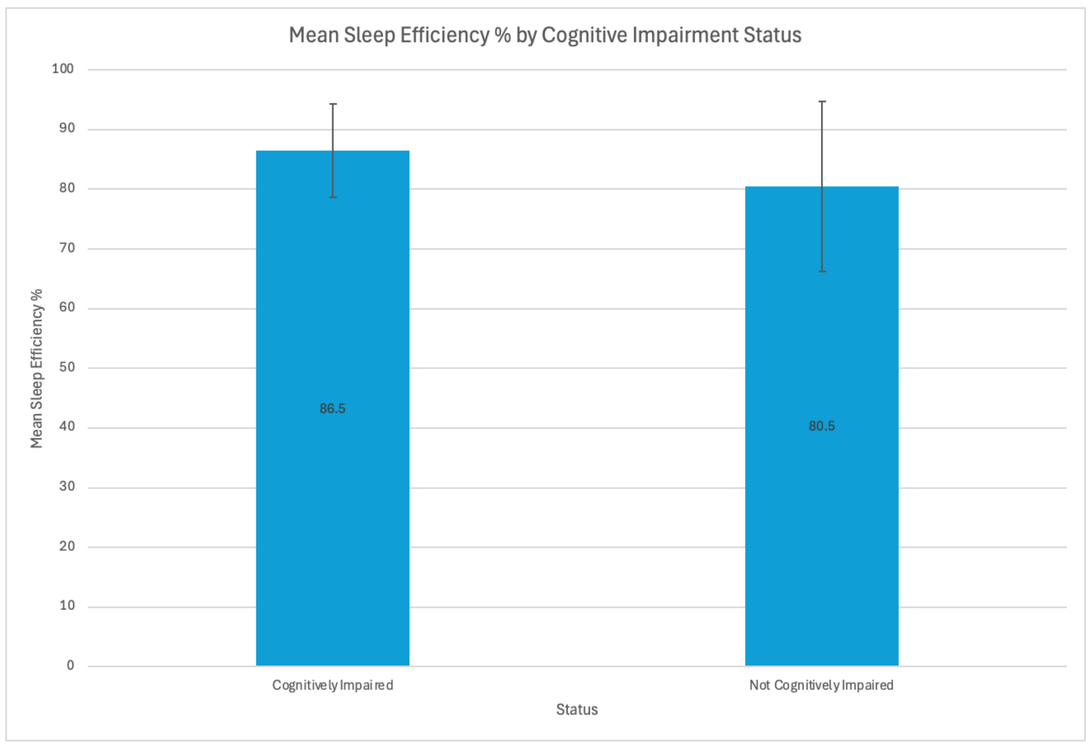

Figure 3. The mean sleep efficiency % is similar between cognitively impaired and non-cognitively impaired participants.

Discussion

- This study did not demonstrate a correlation between lower levels of sleep efficiency and cognitive impairment.

Conclusion

- It is important to understand whether using a wearable device can help detect changes in sleep data in an inexpensive and accessible way.
- Future analyses should consider a larger sample size and examining longitudinal changes in sleep efficiency.