



Sleep Hygiene for Sleep Health in the General Population: What Does Consumer Sleep Technology Data Tell Us?

Elie Gottlieb¹, Luke Gahan¹, Nathaniel F. Watson², Roy J. Raymann¹

¹SleepScore Labs, Carlsbad, CA ²Department of Neurology, University of Washington School of Medicine, Seattle, WA

Introduction

- Despite being used and widely recommended since the 1970s, few studies have examined whether adherence to sleep hygiene practices affect objectively measured sleep in non-clinical populations.
- Here, we examined the association between self-reported sleep hygiene practices and objectively measured sleep from consumer sleep technology in a general population.

Materials & Methods

Data

- Responses to an 18-item survey on sleep hygiene adapted from the Sleep Hygiene Index¹ were used and matched with objective sleep data, resulting in data from 720 users (mean age: 52.5 + 15.9, 63.4% female).
- Objective sleep data across 92,808 nights were included in the analysis from the PSG-validated² and free to download SleepScore Mobile Application, which uses a non-contact sonar-based method to objectively capture objective sleep-related metrics and self-reported lifestyle.

Analysis

- Descriptive statistics and linear regressions were used for the analysis, controlling for age and gender.
- Objective sleep data were aggregated per user and compared to both cumulative sleep hygiene scores and individual sleep hygiene factors.

Conclusion

- Higher (worse) composite sleep hygiene scores were associated with poorer objectively measured sleep (lower SleepScore and shorter total sleep time) and worse self-reported sleepiness and stress.
- There was no relationship between individual sleep hygiene factors and sleep, suggesting sleep health may not be defined by one single behavior, but rather by the sum of its parts.

Results

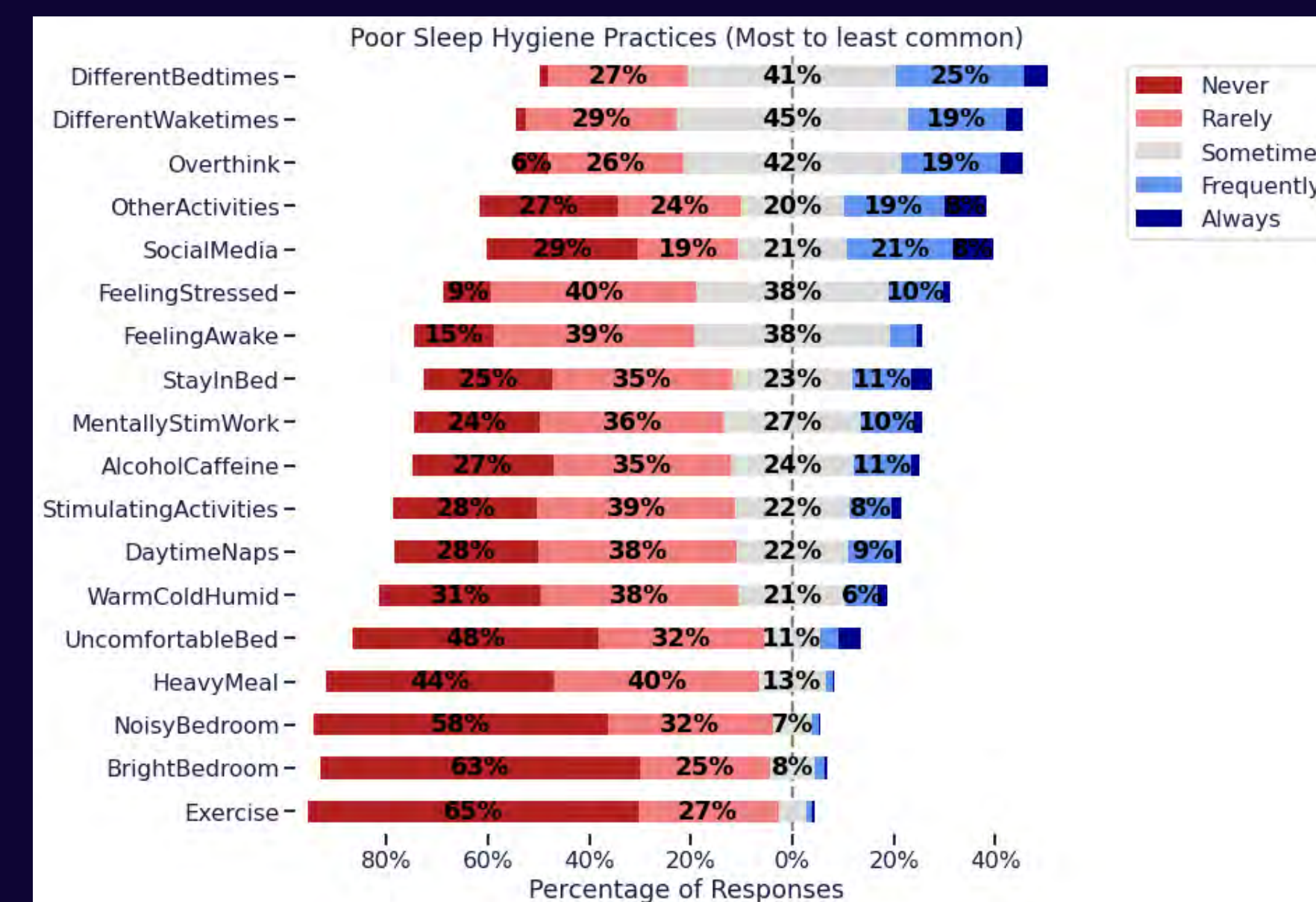


Figure 1. Sorted Likert plot of responses. Overall, the top three most frequented poor sleep hygiene practices were going to bed at different times, waking up at different times, and overthinking/worrying in bed.

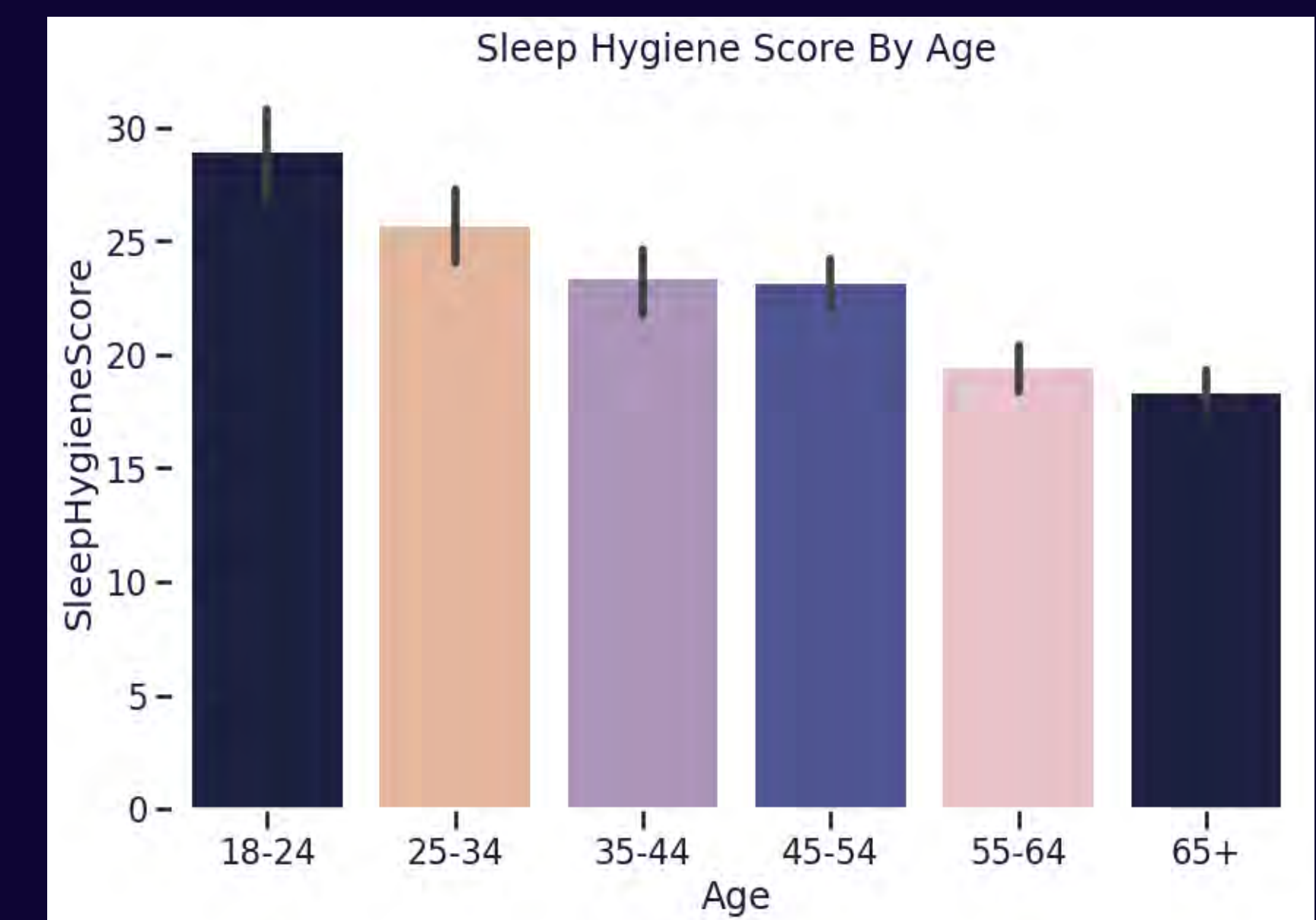


Figure 2. Bar graph of sleep hygiene scores and bucketed age groups. In general, younger people had higher sleep hygiene scores, reflecting worse sleep hygiene. Linear regressions also revealed a negative association between sleep hygiene scores and age ($\beta = -0.42$, $SE = 0.59$, $p < 0.001$).

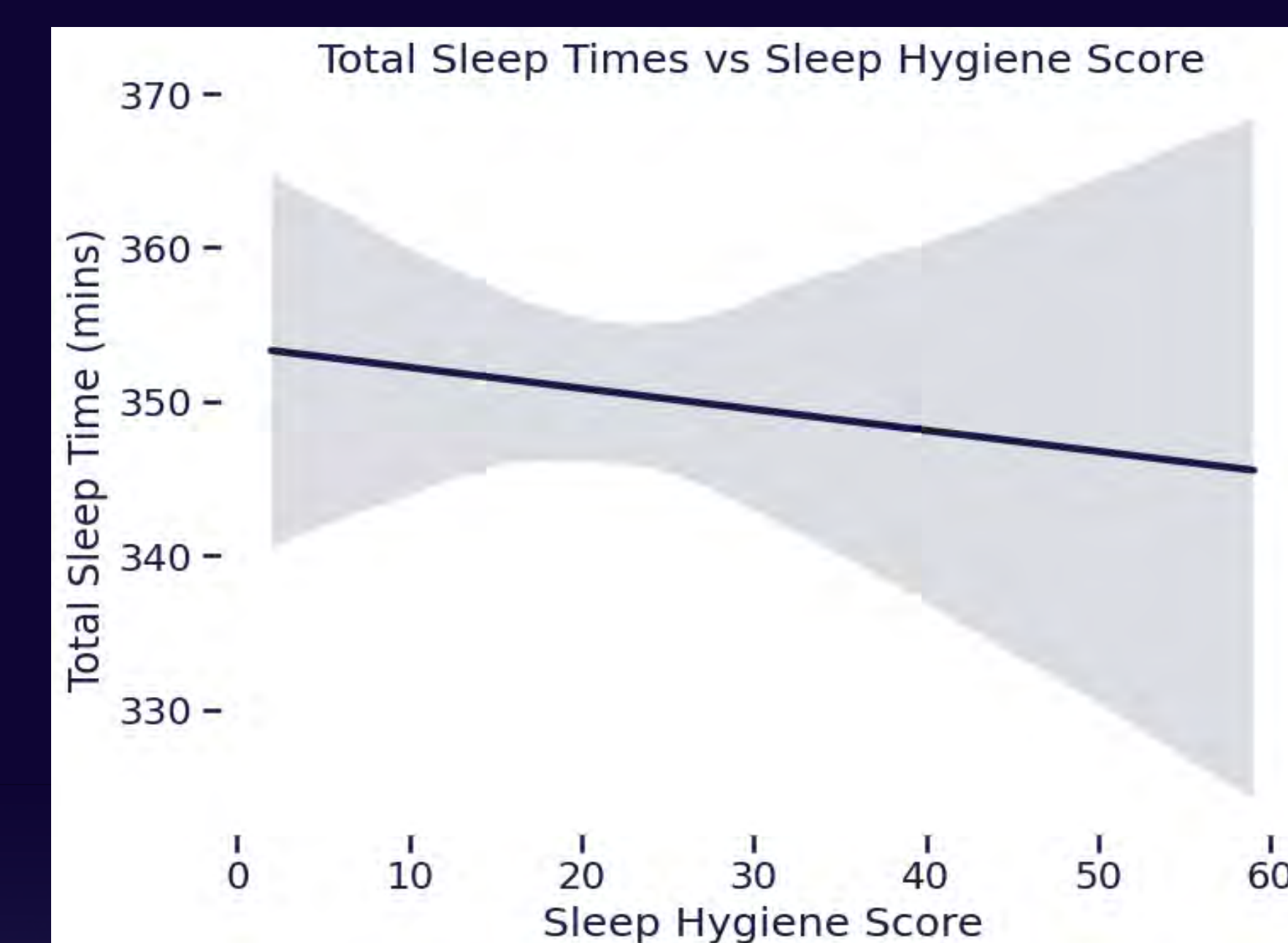


Figure 3. Linear regression revealed a significant negative association between total sleep time and composite sleep hygiene, whereby higher (worse) sleep hygiene scores were associated with shorter total sleep time ($\beta = -0.89$, $SE = 0.33$, $p < 0.01$).

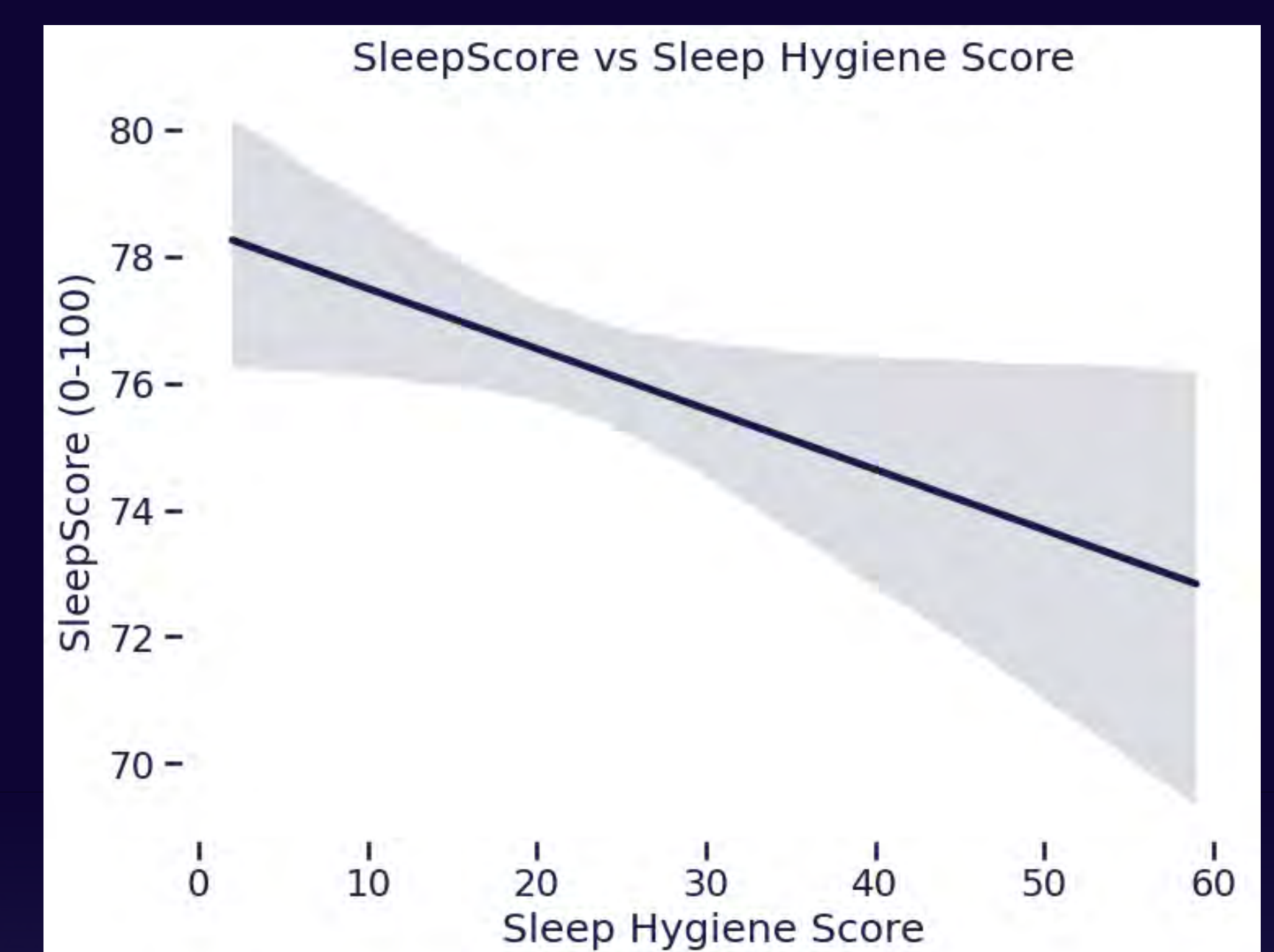


Figure 4. Linear regression revealed a significant negative association between SleepScore, an aggregate objective sleep quality score, and composite sleep hygiene, whereby higher (worse) sleep hygiene scores were associated with lower SleepScores ($\beta = -0.15$, $SE = 0.05$, $p < 0.01$).

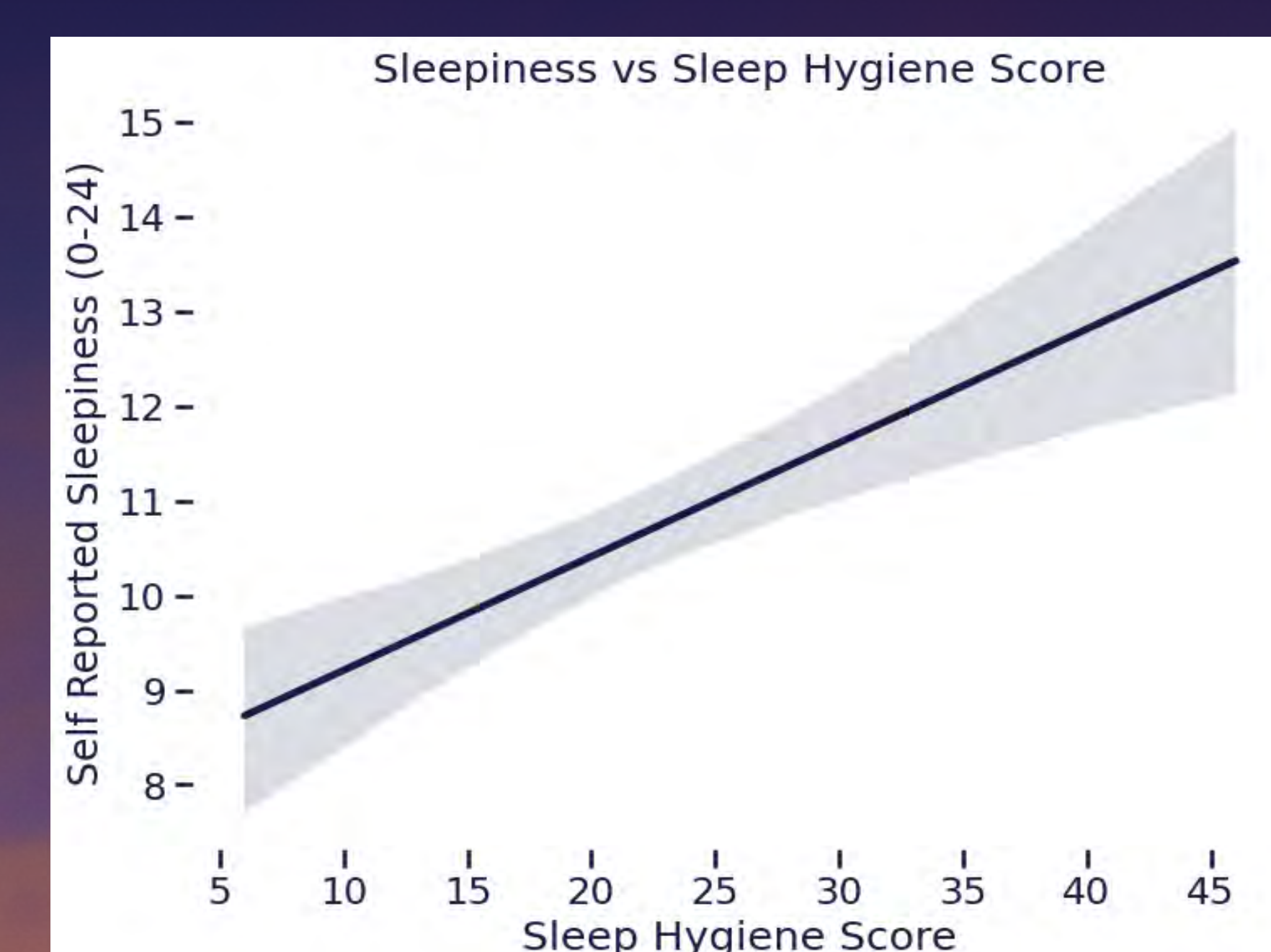


Figure 5. Linear regression revealed a significant positive association between self-reported sleepiness and composite sleep hygiene scores, whereby worse (higher) sleep hygiene scores were associated with higher levels of sleepiness ($\beta = 0.08$, $SE = 0.03$, $p < 0.05$).

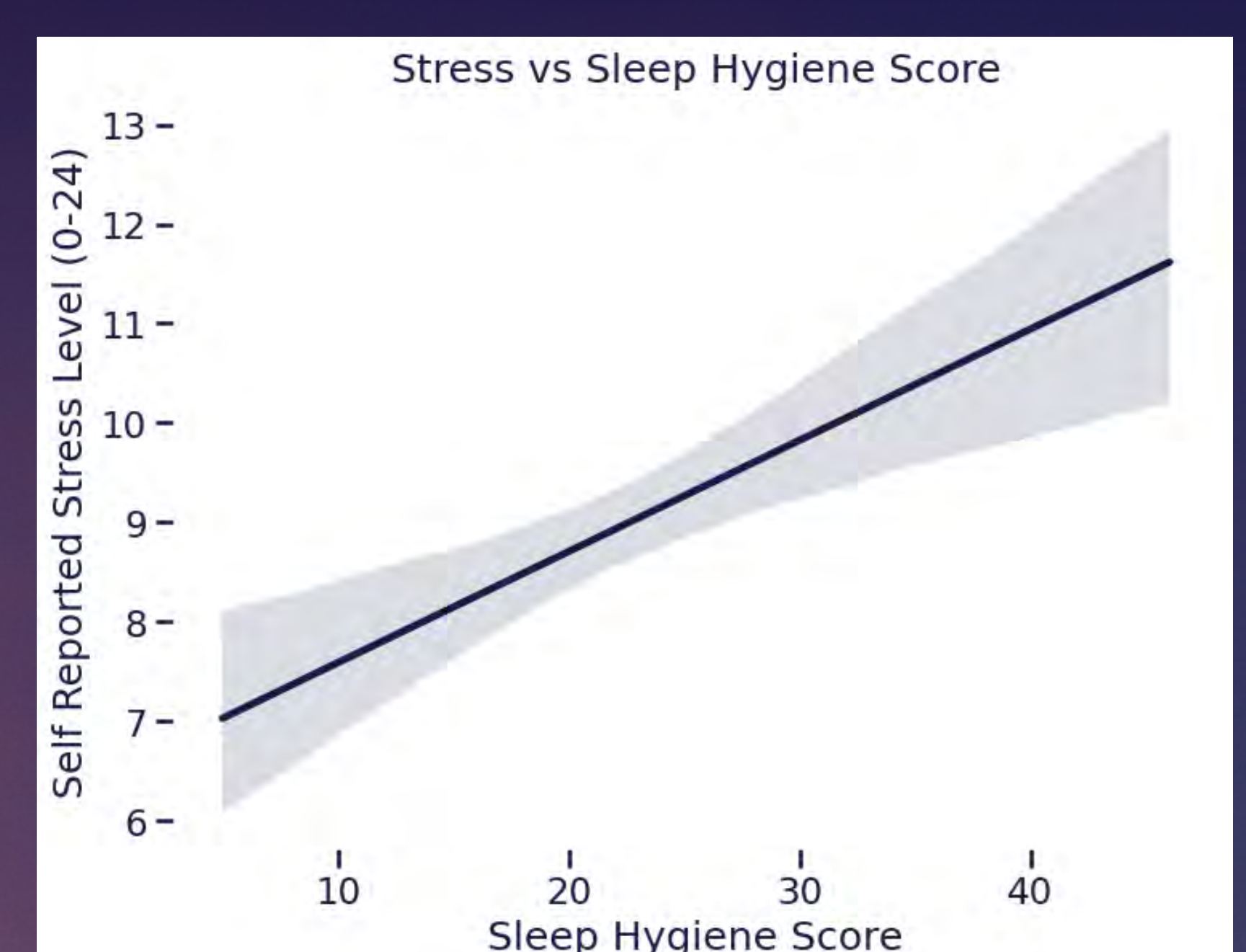


Figure 6. Linear regression revealed a significant positive association between self-reported stress levels and composite sleep hygiene scores, whereby worse (higher) sleep hygiene scores were associated with higher levels of stress ($\beta = 0.10$, $SE = 0.03$, $p < 0.01$).

Reference

¹Mastin, D. F., Bryson, J., & Corwyn, R. (2006). Assessment of sleep hygiene using the Sleep Hygiene Index. *Journal of behavioral medicine*, 29, 223-227.
²Zaffaroni, A., Coffey, S., Dodd, S., Kilroy, H., Lyon, G., O'Rourke, D., ... & Penzel, T. (2019, July). Sleep staging monitoring based on sonar smartphone technology. In 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (pp. 2230-2233). IEEE.

