

Likert- and Slider-Type Questions May Not Be Equivalent in Assessing Relationships Between Daily Sleep and Affect



Background

- Sleep duration and quality may be associated with daily affect and health behaviors.^{1,2,3}
- Smartphone-based ecological momentary assessments (EMA) have been used to examine complex multilevel relationships.⁴
- Few studies have utilized EMA methods to examine day-to-day associations among sleep, affect, and health behaviors in the general population.

Objective

- To examine daily relationships between sleep duration and sleep quality and cancer risk behaviors in a national sample of adults in the United States.

Study Design

Participants

- The current study used data that were collected as part of a 28-day randomized controlled trial that examined factors that may impact compliance with daily EMAs.
- Participants ($n=485$) were recruited nationwide via Facebook from Dec 2021-Sept 2022.

Procedures

- Completed online screener via REDCap.
- Checks were conducted to ensure accurate participant information.
- Participants were contacted via phone to complete Informed Consent and enroll in the study. Participants then downloaded the Insight mHealth app and answered baseline questions.
- Participants completed 2-4 daily prompted EMAs for 28 days.
- Finally, participants used the Insight mHealth app to complete the follow-up assessment.

Measures

- Daily EMAs assessed happiness and stress.
 - **Affect:** Likert-type (“Right now I feel happy/stressed.”, 0=Strongly disagree, 4=Strongly agree) and slider-type questions (“Rate your current level of happiness/stress”, 0=None, 10=High) were each completed over 14 day periods.

Study Design (Cont.)

Measures

- Questions during the morning EMAs assessed various health behaviors.
 - **Nutrition:** “How many servings of fruit and vegetables did you have yesterday?” and “Yesterday, how many times did you drink... soda...? (Do not count diet soda)”
 - **Substance Use:** “How many standard drinks of alcohol did you have yesterday?”
 - **Cigarettes:** “How many cigarettes did you smoke yesterday?”
 - **Physical activity:** “How many minutes of MODERATE leisure time physical activity did you get yesterday?” and “How many minutes of VIGOROUS leisure time physical activity did you get yesterday?”
 - **Sleep:** “How many hours of sleep did you get yesterday?” (0-12 or more hours), “How would you rate your quality of sleep last night?” assessed via Likert-type responses for 14 days (0=Very poor, 4=Very good) and slider-type responses for 14 days (0-10 representing Low to High)
- All daily EMAs assessed current happiness and stress.

Analyses

- Generalized multilevel models estimated the relationships between daily health behaviors, aggregated daily happiness and stress, and the previous night’s sleep duration and quality.
- All models were adjusted for age, sex and race.

Results (Cont.)

- Sleep was not significantly related to next day health behaviors.
- Sleep duration was positively associated with next-day happiness and negatively related to next-day stress ($p's < 0.0001$).
- The Likert-type sleep quality item was significantly related to the Likert-type affect items. Specifically, greater sleep quality was related to greater next-day happiness and lower next-day stress ($p's < 0.0001$).
- The slider-type sleep quality item was significantly related to the slider-type happiness (positively) and stressed (negatively) items ($p's < 0.0001$).

Conclusions

- The findings that sleep duration/quality is associated with next day happiness and stress is supported by previous research.
- However, daily sleep quality and affect measured with Likert- versus slider-type items may not be equivalent when assessing the relationships between daily sleep and affect.
- Future work should focus on examining if there is value in selecting specific types of questions in research focused on sleep and affect.

Results

Table 1.
Descriptive statistics for variables at baseline.

Variable	Total
Sex, n (%)	
Female	370 (76.3)
Male	115 (23.7)
Age, (years), mean (SD)	48.2 (12.4)
Race, n (%)	
White	342 (70.5)
Non-White	143 (29.5)
Average amount of sleep, (hours) mean (SD)	6.63 (1.69)

Table 2.
Generalized multilevel models.

Variables	Happy (Likert)	Happy (Slider)	Stressed(Likert)	Stressed (Slider)
	β	β	β	β
Sleep Hours				
Between-Person	0.16**	0.48**	-0.24**	-0.42**
Within-Person	0.02**	0.08**	-0.06**	-0.10**
Quality of Sleep (Likert)				
Between-Person	0.56**		-0.65**	
Within-Person	0.11**		-0.15**	
Quality of Sleep (Slider)				
Between-Person		0.72**		-0.35**
Within-Person		0.13**		-0.08**

Note: ** indicates $p \leq 0.01$

References

1. Purani, H., S. Friedrichsen, and A.M. Allen, *Sleep quality in cigarette smokers: Associations with smoking-related outcomes and exercise. Addictive behaviors, 2019. 90: p. 71-76.*
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3. Song, C., et al., *Sleep quality and risk of cancer: findings from the English longitudinal study of aging. Sleep, 2020. 44(3).*
4. Hevel, D.J., G.F. Dunton, and J.P. Maher, *Acute Bidirectional Relations Between Affect, Physical Feeling States, and Activity-Related Behaviors Among Older Adults: An Ecological Momentary Assessment Study. Annals of Behavioral Medicine, 2020. 55(1): p. 41-54.*