

## Sleep Questionnaire Versus Sleep Diary: Which Measure Is Better?

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*One questionnaire about a typical week's sleep is more convenient than asking individuals to complete daily sleep diaries. Yet, most clinical evaluations and much sleep and insomnia research rely upon self monitoring via daily sleep diaries. These are often problematic to administer and can be reactive. Therefore, we investigated comparability of two measurement modalities (self monitoring and questionnaire) in a sample of 156 community dwelling older adults, both good and poor sleepers. Results indicate significant and high correlations between corresponding scores on a retrospective sleep questionnaire and on 7 days of self monitoring on a daily sleep diary, thereby suggesting that the two measurement modalities are tapping the same domains. There were, however, significant differences between means on several variables, but there was no systematic pattern to the differences. These findings illustrate the need to tailor measurement modality—retrospective or ongoing—to the setting and the purpose of the evaluation.*

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**KEY WORDS:** Measures; sleep; diary; questionnaire.

It is possible to measure sleep parameters, such as total sleep time (TST), sleep onset latency (SOL), wakening after sleep onset (WASO), and sleep efficiency in several ways (cf. Fichten *et al.*, 2000). Variation in measurement technique involves two concepts. One is the issue of objective measurement (e.g., night-time sleep monitoring in a sleep laboratory through polysomnography) versus self report (e.g., questionnaire, daily self monitoring). The second issue is which type of self report is the better measure: retrospective questionnaire administered at a single point in time, which asks about various aspects of the sleep experience “in general,” or ongoing self monitoring (i.e., daily sleep diaries). Recently, the Standards of Practice Committee of the American Sleep Disorders Association (1995) concluded that self report is a more valid means of evaluating the complaint of insomnia than is polysomnography. Therefore, our goal here is to address the remaining issue: retrospective questionnaire versus daily sleep diary.

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When conducting assessment, it is more convenient to administer a single questionnaire about a typical week's sleep than to ask individuals to self monitor by completing daily sleep diaries for up to 2 weeks. Yet, in most clinical evaluations and in much sleep and insomnia research, clinicians and researchers use daily sleep diaries to evaluate insomnia. Data reduction typically involves averaging daily scores. Some studies use only 1 to 3 nights for evaluation although recent clinical outcome studies often report up to 1 or 2 weeks. When there are discrepancies between daily sleep diary and retrospective questionnaire scores, the usual assumption is that the daily sleep diaries provide more accurate information than that provided via retrospective questionnaire. We contend that this is not necessarily the case. For example, self monitoring may involve an atypical period in an individual's life. Also, there is significant night-to-night variability in sleep parameters (Babkoff *et al.*, 1995; Bootzin *et al.*, 1995; Edinger *et al.*, 1991). Although the optimal number of nights of self monitoring remains unknown, some studies suggest that certain key sleep parameters, such as time spent awake after sleep onset (WASO), may require as many as 3 weeks to achieve adequate stability in poor sleepers (Wohlgemuth *et al.*, 1999). Perhaps most important, self monitoring can be a reactive process in a variety of contexts and it may cause either improvement or deterioration (e.g., Fichten *et al.*, 1991; Mahoney, 1977; Tarrrier *et al.*, 1999), thereby affecting the very variables it is meant to assess.

Therefore, we designed this study to answer the questions: "Do retrospective questionnaires and daily sleep diaries provide similar results?" and "Which measure is the better of the two?"

## METHOD

### Subjects

Participants were 156 community-dwelling older adults. Mean age of the 52 males and 104 females was 69 (range = 55–87). All were participating in a large comprehensive study conducted over a number of years on various aspects of sleep and aging (e.g., Fichten *et al.*, 1995; Libman *et al.*, 1997)

We recruited both good and poor sleepers through media publicity consisting of press releases, presentations and mailings to seniors' groups, and notices in community clinics and residences for older adults. Selection criteria were (a) age 55 and over; (b) community resident; (c) prescription sleep medication, if used, currently taken less than 3 nights per week; (d) psychological status: currently not receiving psychiatric or psychological care, no evidence of psychopathology or depression; (e) physical status: absence of major illness or drug use directly associated with sleep disturbance; (f) no evidence of physically based sleep disturbance (e.g., sleep apnea, restless leg/periodic limb movements disorder) based on subjects' self-reported history; and (g) no evidence of parasomnias or sleep phase disorder (e.g., phase delay, phase advance, or deregulation of circadian cycles).

### Procedure

Participants completed the Sleep Questionnaire, a brief objective measure that inquires about usual sleep experiences during the past typical month (e.g., Fichten *et al.*,

1995; Libman *et al.*, 1997), under supervision of a research team member as part of a battery of measures for the comprehensive investigation. At this time, participants received a 7 day supply of Daily Sleep Diaries (a modified version of Lacks' [Lacks, 1987, 1988] measure) which participants were to take home, complete each consecutive morning, and return at a second questionnaire session, which was also a part of the comprehensive study.

Both the Sleep Questionnaire and the Daily Sleep Diaries contained questions related to the following variables of interest to the present investigation: (a) total sleep time (TST): respondents' perception of how long they slept during the night, (b) sleep onset latency (SOL), (c) waking after sleep onset (WASO): duration of nocturnal arousals, (d) total wake time (TWT), (e) difficulty falling asleep, (f) number of mornings per week waking up too early, (g) sleep efficiency (SE): percent of bedtime spent asleep, (h) bedtime, (i) arising time (time out of bed), (j) total time in bed, (k) medication use: number of nights per week participants used sleep medication, (l) naps: number of days napped per week, and (m) frequency of nocturnal arousals (FNA): number of awakenings per night.

## RESULTS

Table I shows the mean scores on sleep/wake parameters and sleep medication use as measured by both questionnaire and sleep diary and indicates the correlations between corresponding scores. Results show significant and high correlations between corresponding scores on the retrospective and ongoing measures. Paired *t*-tests, however, show significant differences on several variables; there is no discernible pattern to the differences (i.e., no systematic over- or underestimation by either measure).

## DISCUSSION

Correlations between corresponding scores on the retrospective and on-going measures were significant and high, suggesting that the two measurement modalities were tapping the same domains. The means on these two forms of measurement, however, differed in a somewhat random fashion, with neither measure showing consistent over- or underestimations. This pattern of findings does not dictate which method provides the most "accurate" picture.

Each method has its own benefits and drawbacks. For example, a retrospective questionnaire provides a useful rapid overall view of the nature and extent of an insomnia problem. As such, we believe that it can profitably be useful for research as well as for screening and assessment. Daily sleep diary scores, however, can pinpoint variations in night-to-night sleep experience, shed light on sequences of events, and monitor progress in therapy. Therefore, when undertaking treatment or obtaining a baseline, it would likely be best to use daily sleep diaries.

Table II summarizes pros and cons associated with choosing each technique and highlights the conclusion that the best measurement modality to select—retrospective or ongoing—when evaluating sleep in older adults will depend upon setting and purpose of the evaluation.

**Table I.** Sleep Parameters Assessed During Retrospective (Sleep Questionnaire) and Ongoing (Daily Sleep Diary) Measures

Variable	Mean		<i>t</i> -test	
	Questionnaire	Daily sleep diary	<i>t</i>	Significance ( <i>p</i> )
Sleep TST (total sleep time)	.832***	5.92 hr (1.50)	2.73	.007
Wake		6.11 hr (1.31)		
SOL (sleep onset latency)	.644***	.58 hr (0.82)	1.29	.198
WASO (waking after sleep onset)	.691***	Different response scale <sup>a</sup>		
Total wake time (TWT; SOL + WASO)	.721***	Different response scale <sup>a</sup>		
Difficulty falling asleep	.694***	Different response scale <sup>a</sup>		
Wake early (number of mornings up too early/week)	.437***	4.15 (2.48)	3.20	.002
Arousals				
Number of Nights of arousal/week	.469***	5.03 (2.64)	6.02	.000
Frequency of nocturnal arousals (FNA: number of awakenings/night)	.551***	1.96 (1.46)	3.21	.002
Sleep lifestyle				
Sleep efficiency (SE %)	.772***	75% (19)	1.70	.091
Time to bed	.722***	11.22 p.m. (0.86 hr)	2.08	.040
Time out of bed	.770***	7.40 a.m. (1.01 hr)	3.29	.001
Total time in bed	.769***	8.09 hr (1.67 hr)	1.52	.130
Medications: number of nights medications used/week	.682***	0.40 (0.92)	0.50	.620
Naps: number of days napped/week	.669***	1.89 (2.28)	1.52	.131

*Note.* A significance level of  $p < .004$  is needed after a Bonferroni correction to the alpha level. Standard deviations in parentheses.

<sup>a</sup>Quantification of these variables proceeded differently on the two measures. For example, one measure assessed Difficulty Falling Asleep based on frequency and the other measure used intensity.

\*\*\* $p < .001$ .

**Table II.** Advantages and Disadvantages of Retrospective and Ongoing Measurement

Measure	Retrospective	On-going
Pros	Provides a “snapshot” of extent of insomnia Useful for screening and assessment Inexpensive Few compliance problems Represents “typical” sleep Easy scoring	Can reflect night-to-night variability Useful for tracking sequences of events Good for monitoring therapeutic progress Measures taken close in time to the events of interest
Cons	Susceptible to memory distortion	May reflect atypical sleep experiences Number of nights needed for “accuracy” not known May be reactive Compliance problems Complicated scoring

## REFERENCES

- Babkoff, H., Weller, A., and Lavidor, M. (1995). A comparison of prospective and retrospective assessments of sleep. *J. Clin. Epidemiol.* 48: 1–9.
- Bootzin, R. R., Bell, I. R., Habisch, R., Kuo, T., Wyatt, J. K., Roder, S. P., and Manber, R. (1995). Night-to-night variability in measures of sleep and sleep disorders: A six night PSG study. In *Proceedings of 9th Annual Meeting of the APSS*, Rochester, MN, APSS.
- Edinger, J. D., Marsh, G. R., McCall, W. V., Erwin, C. W., and Lininger, A. W. (1991). Sleep variability across consecutive nights of home monitoring in older mixed DIMS patients. *Sleep* 14: 13–17.
- Fichten, C. S., Creti, L., Amsel, R., Brender, W., Weinstein, N., and Libman, E. (1995). Poor sleepers who do not complain of insomnia: Myths and realities about psychological and lifestyle characteristics of older good and poor sleepers. *J. Behav. Med.* 18(2): 189–223.
- Fichten, C. S., Libman, E., Amsel, R., Creti, L., Weinstein, N., Rothenberg, P., Liederman, G., and Brender, W. (1991). Evaluation of the sexual consequences of surgery: Retrospective and prospective strategies. *J. Behav. Med.* 14(3): 267–285.
- Fichten, C. S., Libman, E., Bales, S., and Alapin, I. (2000). Characteristics of older adults with insomnia. In Lichstein, K. L., and Morin, C. M. (eds.), *Treatment of Late Life Insomnia*, Sage, New York, pp. 37–79.
- Lacks, P. (1987). *Behavioral Treatment for Persistent Insomnia*, Pergamon Press, New York.
- Lacks, P. (1988). Daily sleep diary. In Hersen, M., and Bellack, A. S. (eds.), *Dictionary of Behavioral Assessment Techniques*, Pergamon, New York, pp. 162–164.
- Libman, E., Creti, L., Amsel, R., Brender, W., and Fichten, C. S. (1997). What do older good and poor sleepers do during periods of nocturnal wakefulness? The Sleep Behaviors Scale: 60+. *Psychology and Aging* 12(1): 170–182.
- Mahoney, M. J. (1977). Some applied issues in self monitoring. In Cone, J. D., and Hawkins, R. P. (eds.), *Behavioral Assessment: New Directions in Clinical Psychology*, Brunner/Mazel, New York, pp. 241–254.
- Standards of Practice Committee of the American Sleep Disorders Association. (1995). Practice parameters for the use of polysomnography in the evaluation of insomnia. *Sleep* 18: 55–57.
- Tarrier, N., Sommerfield, C., Reynolds, M., and Pilgrim, H. (1999). Symptom self monitoring in the treatment of posttraumatic stress disorder. *Behav. Ther.* 30: 597–606.
- Wohlgemuth, W. K., Edinger, J. D., Fins, A. I., Sullivan, R. J., Jr. (1999). How many nights are enough? The short-term stability of sleep parameters in elderly insomniacs and normal sleepers. *Psychophysiology* 36: 233–244.