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Brief Report

Subjective Versus Objective Sleep in Vietnam Combat Veterans Hospitalized for PTSD

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Twenty-five Vietnam combat veterans with chronic severe posttraumatic stress disorder (PTSD) completed a sleep self-report questionnaire on admission to an inpatient treatment program. Between 1 and 2 months later each spent 3 or more nights in the sleep laboratory. When self-report and laboratory findings were compared, significant relationships were observed between sleep schedule items such as time-to-bed/time-out-of-bed and polysomnographic measures of sleep. In contrast, global ratings of sleep quality were generally unrelated to polysomnographic measures. These findings may have implications for survey research assessing sleep quality in traumatized populations.

KEY WORDS: sleep; PTSD; subjective.

Clinicians and researchers working in the area of posttraumatic stress disorder (PTSD) must frequently rely upon patients' subjective reports of sleep quality. However, studies have cast doubt upon the validity of these reports. Subjects with sleep complaints consistently underestimate sleep duration and overestimate sleep latency (Carskadon et al., 1976; Frankel, Coursey, Buchbinder, & Snyder, 1976; Lewis, 1969). Notwithstanding the absolute inaccuracy of subjective sleep reports, many of the same studies have reported that correlations computed over subjects between subjective and objective estimates of sleep are both significant

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and in the predicted directions (Carskadon et al., 1976; see also Coates et al., 1982; Johns, 1975; Frankel et al., 1976; Lewis, 1969). Thus, while subjects have overestimated their sleep latencies by ten to thirty minutes in absolute terms (depending upon the study), those reporting the longest subjective latencies have tended to demonstrate the longest latencies in the lab. The same has generally proved true for time asleep. Dagan and Lavie (1991) have suggested that a different situation obtains in combat-related PTSD patients, reporting that neither sleep latency nor sleep efficiency (the ratio of time asleep to time in bed) measured in the lab correlated in the expected directions with sleep self-reports culled from the Symptom Check List-90 (SCL-90; Derogatis, 1983), the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979), and the PTSD module of the Structured Interview for the DSM-III-R (SCID; Spitzer, Williams, Gibbon, & First, 1990). However, the sleep-related items in these psychiatric assessment instruments are global in character, e.g., "I had trouble falling or staying asleep—not at all/rarely/sometimes/often" (from the IES), and include no reference to concrete or specific aspects of sleep behavior. These self-reports may therefore be vulnerable to contamination by the subject's globalized perception of his/her psychiatric status and/or reporting biases. In an earlier study, we observed a very strong relationship between wholesale MMPI/MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989) elevation and subjective sleep quality (Arsenault, Richardson, & Woodward, 1992). The data presented below suggest that if concrete time-based self-reports of sleep behavior are obtained, a pattern of significant correlations in predicted directions is observed between self-reports and laboratory sleep in combat-related PTSD patients as in earlier samples. These data would also seem to reconfirm that the manner in which one obtains sleep self-reports strongly influences their validity.

Method

All patients were recruited from the Specialized Inpatient PTSD Unit at the DVAMC, Palo Alto. All underwent extensive structured and unstructured diagnostic interviews with clinicians experienced in PTSD. All met DSM-III-R criteria for PTSD. Most also met criteria for at least one of the psychiatric diagnoses commonly associated with PTSD (major depressive disorder, substance abuse/dependence, panic disorder without history of agoraphobia, agoraphobia without history of panic). All had abstained from alcohol and illicit drug intake for at least 6 weeks and none had engaged in alcohol intake greater than 5 ounces per day for 30 consecutive

days during the prior 6 months. None were taking psychotropic medication. None met objective criteria for sleep apnea. The final sample size was 25 patients.

On first entering the program, subjects filled out a brief Sleep History questionnaire (available on request) including questions about subjective sleep quality ("good," "satisfactory," "poor," "very poor"), time-to-bed and arousal times (The actual questions were "I usually go to bed at _____." and "I usually get out of bed (for the last time or in the morning) at _____."), nightmare types and frequencies, and other sleep-relevant behaviors and conditions. Approximately 6 weeks later, subjects spent at least 3 nights sleeping in the lab. Manual sleep stage scoring of paper records was performed by sleep technicians following the Rechtschaffen and Kales (1968) criteria applied to 30-sec epochs. All objective sleep variables represent the means of 2 postadaptational nights.

Results

Self-reported habitual time-in-bed was calculated from habitual to-bed and morning arousal times. Subjects' self-reports of habitual time-in-bed were observed to be positively and significantly correlated with the observed MINUTES IN BED and with MINUTES ASLEEP ($r_{\text{Spearman}} = .49, p < .01$). Self-reported typical sleep latency was positively correlated with observed SLEEP LATENCY and also with MINUTES AWAKE ($r_{\text{Spearman}} = 0.53, p < .01$). It is apparent from scatterplots of these bivariate relationships (Figure 1) that the ranges of self-reported and lab-observed values diverged markedly, especially at their upper bounds. While observed MINUTES IN BED ranged from 275 to 480 min, self-reported values ranged from 120 to 800 min. Similarly, while observed SLEEP LATENCY ranged from 2 to 19 min, self-reported sleep latency ranged from 1 to 120 min. The mean subjective sleep latency was approximately 40 min longer than the mean observed sleep latency. Thus, the subjective judgment error appeared somewhat longer than that in earlier studies.

Polysomnographic measures of sleep architecture were also compared across subgroups reporting different levels of global subjective sleep quality. The only polysomnographic variable to significantly differ in the expected direction across these subgroups was MINUTES AWAKE ($F(2, 22) = 6.6$, $p = .01$). Though monotonic trends in the expected directions were exhibited by MINUTES ASLEEP, STAGE 2 MINUTES, STAGE REM MINUTES (lower values associated with subjectively worse sleep), PERCENT STAGE 1 and STAGE CHANGES PER HOUR (higher values associated

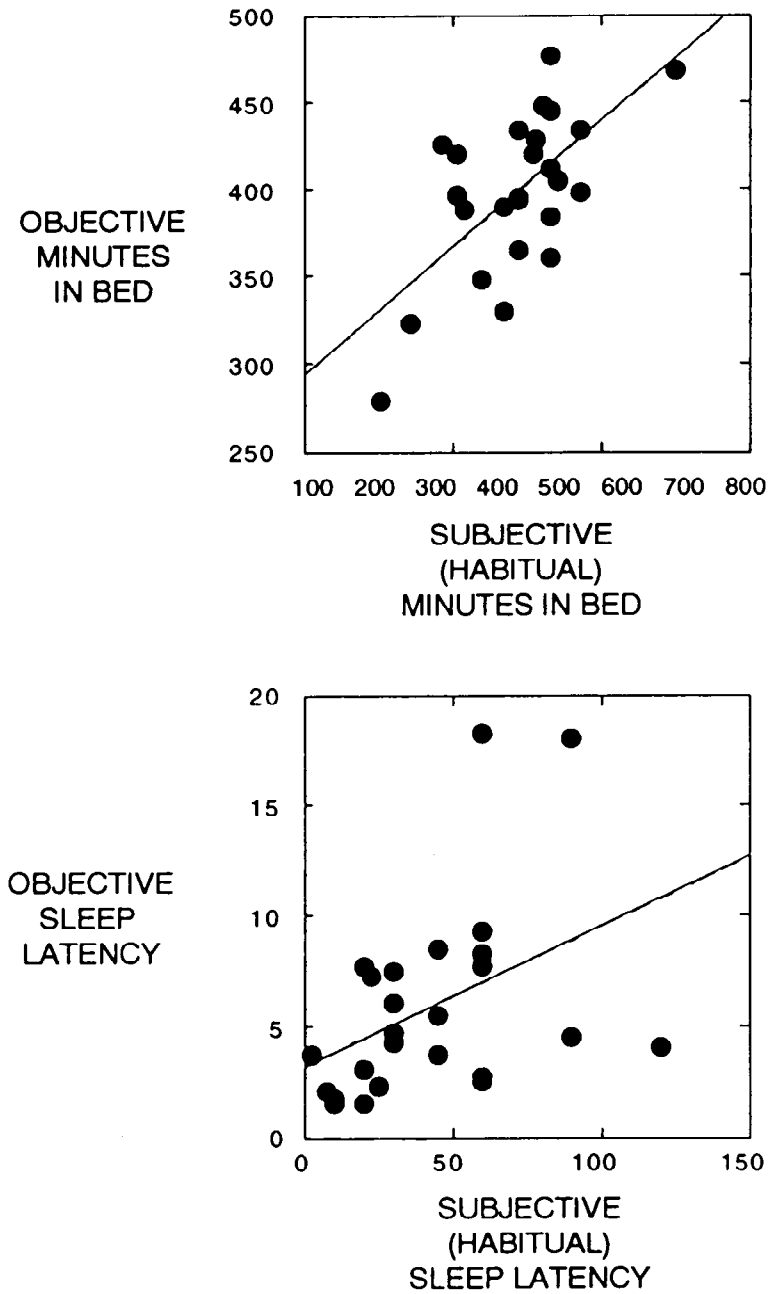

Figure 1. Top: scatterplot of self-reported typical time-in-bed by observed MINUTES IN BED. Bottom: scatterplot of self-reported typical sleep latency by observed SLEEP LATENCY.

with subjectively worse sleep), none of these was statistically significant. Neither SLEEP LATENCY, MINUTES STAGES 3 + 4, nor REM LATENCY exhibited any correspondence with global subjective sleep quality reports.

Discussion

As in earlier studies, significant positive correlations were observed between subjective and objective estimates of sleep latency and duration despite substantial absolute subjective judgment errors. PTSD patients reporting the longest times-in-bed tended to demonstrate the most time in bed in the lab, while those reporting longer sleep latencies generally demonstrated longer latencies. As these correspondences were observed in a sample exhibiting a high level of PTSD symptomatology and associated comorbidity, they are likely to generalize to less symptomatic, more homogeneous samples. Global ratings of subjective sleep quality were notably less predictive of laboratory sleep than were time-based sleep schedule reports. The low utility of global sleep quality ratings accords with the findings of Dagan and Lavie (1990) who reported no correspondence between lab sleep and endorsements of items such as "I had trouble falling or staying asleep" taken from the SCL-90, IES, and SCID.

These data suggest that time-based sleep schedule reports may have more utility in health surveys including sleep data than the subjective sleep quality items typically incorporated into psychologically oriented symptom checklists. Though sleep scheduling clearly does not provide information regarding sleep quality (for instance, apnea patients with extremely disturbed sleep can demonstrate very long sleep times), time-in-bed and sleep times typically correlate at a level in excess of $r = .90$. Much closer sleep schedule correspondences than those seen here have been reported by others (Reynolds et al., 1992). In the present study, self-reports were gathered on admission and presumably reflected sleep habits prior to hospitalization. Subjects typically participated in sleep lab assessments at least 4 weeks post-admission, over which period significant modification of their sleep schedules might have occurred. In particular, successful assimilation into the ward milieu entails the elimination of very early bed times and very late arousals. Thus, absolute differences between self-reported time-in-bed and lab MINUTES IN BED may have been to some extent veridical. Moreover, many of our patients reported sleeping better in the lab than in other settings, often making unprompted references to the presence of a technician "on guard" outside their sleeping quarters all night. Thus the discrepancy between subjective and objective estimates of sleep latency observed here may also reflect actual setting-related differences in sleep behavior.

The use of time-based metrics of sleep behavior may nullify some of the tendencies to over-and under-reporting which are reported in PTSD patients. We would also note that the standard sleep-related question used in health survey research, "How many hours of sleep do you typically get?," is also not time-based. Health behavior surveys have been applied with no-

table success to PTSD (Kulka et al., 1988; CDC, 1988a; CDC, 1988b; Litz, Keane, Fisher, Marx, & Monaco, 1992), and may yet contribute information regarding the role of sleep disturbance that is obtainable in no other way. Furthermore, because of the elevated base rates of disturbed sleep in traumatized persons, the inclusion of well-framed questions regarding sleep behavior in surveys of such samples may augment more general research on sleep and health outcomes. These recommendations accord with those of Bliwise, King, and Harris (submitted) for the inclusion of snoring items when assessing sleep via questionnaire, endorsements of which are highly predictive of obstructive sleep apnea (Bliwise, Nekich, & Dement, 1991).

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