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Psychometric properties of the Medical Outcomes Study Sleep measure

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Abstract

Background and purpose: Sleep is an active and highly organized biological process that is an important component of life. Self-report measures of sleep provide information that can be useful for characterizing the quality of sleep in subgroups of the population. A 12-item self-report sleep measure, the Medical Outcomes Study Sleep measure, was developed and evaluated previously in a sample of 3445 individuals with chronic illness.

Patients and methods: In this study, we evaluate the psychometric properties of the MOS Sleep measure in a nationally representative sample of 1011 US adults aged 18 and older and in a sample of 173 adults with neuropathic pain participating in a clinical drug trial.

Results: The average age of the general population sample was 46; 51% were female and 81% were white. The average age of the sample of adults with neuropathic pain was 72; 53% were female and 95% were white. Internal consistency reliability estimates for the MOS Sleep scales were 0.73 or higher, with the exception of the daytime somnolence scale in the US general population, which was 0.63. At baseline of the clinical trial, the neuropathic pain patients reported significantly more sleep disturbance and daytime somnolence, as well as less quantity and adequacy of sleep than patients in the general US population. The MOS Sleep scales were found to be responsive to change in the clinical trial with statistically significant improvements observed after administration of pregabalin for sleep disturbance (standardized response mean, SRM = −0.76, $P = 0.0007$), shortness of breath (SRM = −0.20, $P = 0.0302$), sleep adequacy (SRM = 0.57, $P = 0.0014$), sleep quantity (SRM = 0.55, $P = 0.0086$), and sleep problems (SRM = −0.62, $P = 0.0036$).

Conclusions. This study provides further support for the reliability and validity of the MOS Sleep measure. The instrument can be used to assess important aspects of sleep perceived by adults in the general population or participating in clinical studies.

Keywords: MOS sleep measure; Self-reports; Reliability; Validity; Patient reported outcomes

1. Introduction

Sleep is an active and highly organized biological process that is an important component of life. For example, quantity of sleep has been found to be associated with quality of social interaction [1], but sleep is a multi-dimensional construct that includes how long it takes to fall asleep, the duration and quality of the sleep, and the extent to which sleep is perceived to be adequate.

A 12-item self-report sleep measure was developed in the Medical Outcomes Study (MOS) to provide a concise assessment of important dimensions of sleep, including initiation, maintenance, respiratory problems, quantity, perceived adequacy, and somnolence [2]. The MOS sleep scale was developed at the same time and is similar, but not identical, in content to the Pittsburgh Sleep Quality Index, a measure that includes several more questions about sleep disturbance and a total of seven more items overall [3]. Preliminary support for the MOS sleep measure was provided in the developmental sample of 3445 individuals with chronic illness who participated in the cross-sectional phase of the MOS. Analyses of this data set showed that insomnia had about an equal independent association with worse SF-36 scores as was found for chronic conditions such as congestive heart failure and clinical depression [4]. Similarly, a study of 70 African–Americans over the age of

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65 years found that HRQOL scores of persons with sleep apnea were similar to patients with depression and chronic obstructive pulmonary disease [5]. Manocchia et al. [6] reported that sleep problems reported on the MOS Sleep measure by chronically ill patients were associated with poorer mental health, diminished work productivity and lower work quality.

This study extends this work by evaluating the psychometric properties of the measure in the US general population and in a sample of individuals with neuropathic pain participating in a clinical trial.

2. Methods

The MOS Sleep measure yields a sleep problems index and six scale scores: sleep disturbance (have trouble falling asleep, how long to fall asleep, sleep was not quiet, awaken during your sleep time and have trouble falling asleep again), sleep adequacy (get enough sleep to feel rested upon waking in the morning, get amount of sleep needed), daytime somnolence (drowsy during day, have trouble staying awake during the day, take naps), snoring, awaken short of breath or with headache, and quantity of sleep. Answers were based on a retrospective assessment over the past 4 weeks. Quantity of sleep is scored as the average hours slept per night. The other scales and problems index are scored on a 0–100 possible range, and higher scores indicate more of the concept being measured. The MOS Sleep measure is summarized in the Appendix. It is also available online (http://www.rand.org/health/surveys/sleepscale/), and a scoring guide can be found at http://www.gim.med.ucla.edu/FacultyPages/Hays/sleep.htm.

2.1. Sample

Sample 1. Harris Interactive Inc. administered the MOS sleep measure by telephone to a nationally representative sample of 1011 US adults aged 18 and older in January 2001. The sample was selected via random digit dialing with trained interviewers at a central location who entered the responses directly into the database during the interview. The observations in this sample of 1011 US adults were weighted (using Current Population Survey data) by age, gender, race, education, number of adults and number of voice/telephone lines in the household to reflect the adult (18 and older) population.

Sample 2. The MOS Sleep measure was self-administered at baseline and 8-weeks post-baseline to 173 adults who had postherpetic (neuropathic) pain for at least 3 months and were randomized to placebo or pregabalin as part of a clinical trial [7]. Study participants were recruited from 29 research centers across the US. Previous studies have found that treatment with pregabalin reduces sleep interference due to pain.

We evaluate the internal consistency reliability [8] of the sleep scales and their intercorrelations in both samples. In addition, we evaluate the responsiveness to the change of the scales in patients before and after administration of pregabalin. The pregabalin dose was stratified to 300 or 600 mg/day, dependent on the patient's creatinine clearance, and analyzed as a single pregabalin treatment arm.

3. Results

The average age of the US general population sample was 46 (18–94 range); 51% were female and 81% were white (8% African–American, 6% Hispanic, 1% Asian, 1% Native American or Alaskan native, 3% other race). The average age of the clinical trial participants was 72 (31–100 range); 53% were female and 95% were white. Sixteen percent of the general population sample self-reported that they have a sleep problem. A larger percentage of the clinical trial participants (25%) than the general population (16%) reported that their sleep was not quiet all or most of the time.

Internal consistency reliability estimates for the MOS Sleep scales were generally acceptable: sleep disturbance (four items, alpha = 0.80 and 0.82 in sample 1 and 2, respectively), sleep adequacy (two items, alpha = 0.82 and 0.76), daytime somnolence (three items, alpha = 0.63 and 0.73), and the nine-item sleep problems index (alpha = 0.83 and 0.78). Product–moment correlations between the scales

Table 1
Product-moment correlations among MOS sleep scales in general population and in clinical drug trial

	SLPD	SLPSNR	SLPSOB	SLPQ	SLPA	SLPS	SLP9
SLPD	1.00	0.11**	0.32***	−0.35***	−0.52***	0.31***	0.88***
SLPSNR	0.10	1.00	0.13***	−0.06	−0.13***	0.14***	0.17***
SLPSOB	0.25***	0.19*	1.00	−0.12***	−0.23***	0.22***	0.45***
SLPQ	−0.40***	−0.07	0.01	1.00	0.39***	−0.13***	−0.39***
SLPA	−0.61***	−0.07	−0.18*	0.51***	1.00	−0.30***	−0.79***
SLPS	0.36***	0.14	0.22**	−0.07	−0.35***	1.00	0.54***
SLP9	0.91***	0.16*	0.46***	−0.33***	−0.62***	0.64***	1.00

Note: Correlations above diagonal are from general population; correlations below diagonal are from the clinical drug trial sample. SLPD = Sleep disturbance; SLPSNR = Snoring; SLPSOB = Respiratory/shortness of breath; SLPQ = Sleep quantity; SLPA = Adequacy of sleep; SLPS = Daytime somnolence; SLP9 = Sleep problems index. *$P<0.05$, **$P<0.01$, ***$P<0.001$.