

## Prevalence of and Screening for Mental Disorders in a Sleep Clinic

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**Study Objectives:** Patients seen in sleep clinics have been reported to have a high prevalence of mental disorders, but there is no recommended method for screening. We sought to assess the prevalence of mental disorders, using a validated screening instrument, among referrals to a sleep clinic and to determine whether referred patients with mental disorders were less likely to have an underlying diagnosis of sleep-disordered breathing.

**Methods:** Consecutive adult new referrals to a sleep clinic at a tertiary care center were invited to participate in this cross-sectional assessment of mental and sleep disorders. All patients were screened for mental disorders with the Primary Care Evaluation of Mental Disorders prior to their appointment with the sleep provider. Sleep disorders were diagnosed as per the sleep provider's judgment, usually by polysomnography.

**Results:** From 217 invited participants, 171 completed the survey and could be linked to clinical data. Eighty-one percent underwent polysomnography, and most (83%) had a diagnosis of sleep-disordered breathing. Thirty-eight patients (22%) had at least 1 mental disorder, and 17 (10%) had 2. Eleven percent of patients had major depression, 7% minor depression, 3% panic disorder, and 12% anxiety not otherwise specified. Patients with an under-

lying mental disorder were significantly less likely to have a diagnosis of sleep-disordered breathing, compared to those without an underlying mental disorder (66% vs 87%,  $P = .004$ ).

**Abbreviations:** MMPI, Minnesota Multiphasic Personality Inventory; MOS SF-6, Multiple Outcomes Study Short Form 6; OSA, Obstructive sleep apnea; PHQ-9, Patient Health Questionnaire-9; PHQ-15, Patient Health Questionnaire-15; PRIME-MD, Primary Care Evaluation of Mental Disorders; RDI, Respiratory Disturbance Index; SCL-90, Symptom Distress Check List

**Conclusions:** Mental disorders are common in adults referred to sleep clinics. Those with a mental disorder are less likely to have a diagnosis of sleep-disordered breathing. A negative sleep study should prompt clinicians to consider possible underlying psychiatric disease.

**Key Words:** Mental disorders, sleep disorders, depression, obstructive sleep apnea

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Previous studies have explored the prevalence of mental disorders among sleep clinic patients. Certain diagnoses, such as insomnia, have been reported to be associated with mental disorders in more than half of the patients.<sup>1-5</sup> However, for other sleep disorders, such as obstructive sleep apnea (OSA), the range is wide, from 10% to 63%.<sup>1,6-20</sup> As implied by the wide range of estimates, the exact prevalence of mental disorders among patients in a sleep clinics is unknown. Further, while a recent paper<sup>18</sup> and accompanying editorial<sup>21</sup> recommend screening for mental disorders among patients in sleep clinics, it is not clear how this should be done in clinical practice.

Clinicians may use a variety of available scales to assess for mental disorders. Most such tools were initially developed by researchers to measure mental health responses to treatment or to assess disease burden, rather than as instruments to make clinical diagnoses. These instruments rely on scores with cutpoints beyond which clinicians should consider testing for the presence of a mental disorder. Common ones used in previous studies in sleep clinics include the Minnesota Multiphasic Personality

Inventory<sup>1,3,6,7,13</sup> and the Symptom Distress Check List.<sup>13,22</sup> Other studies have used screening instruments that assess specifically for depression, such as the Beck Depression Inventory,<sup>15,18,20</sup> the Center for Epidemiological Studies Depression Scales,<sup>10,11</sup> and the Zung self-rated depression score.<sup>8,16,19</sup> While valid, these surveys measure symptom burden but do not make diagnoses of mental disorders.<sup>6,23-25</sup> Compounding the psychiatric screening problem, previous studies have often used different cutpoints to determine the presence of mental disorders, making comparisons difficult. This partially explains the wide range in previously published estimates of mental disorders among patients at sleep clinics. Only 3 previous studies used a structured interview to make the diagnosis of mental disorders.<sup>9,14,17</sup> Of these, 1 report is only in abstract form,<sup>14</sup> the second examined few ( $n = 25$ ) patients,<sup>17</sup> and the third had a low prevalence of sleep-disordered breathing diagnoses due to self-referral.<sup>9</sup> Thus, the true nature of mental disorders in patients referred to sleep clinics is unknown.

Another instrument, the Primary Care Evaluation of Mental Disorders (PRIME-MD), has been used reliably for both screening and diagnosing mental disorders.<sup>26,27</sup> Previous studies that have used this instrument in primary care settings have found a *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) diagnosis in about a quarter of the patients screened.<sup>27,28</sup> In our previous work with the PRIME-MD, we found that referrals to several subspecialty clinics have a higher prevalence of mental disorders than do patients in primary care.<sup>29-31</sup> Among new referrals to our neurology, rheumatology, and gastroenterology clinics, the prevalence of mental disorders was 39%, 40%, and 60%, respectively, higher than the 25% seen

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in primary care.<sup>29-31</sup> Moreover, the presence of a mental disorder was consistently associated with a significant decrease in the likelihood of having a subspecialty disorder. Patients with psychiatric disorders were less likely to have a neurologic (*RR*: 0.66, 95% confidence interval [CI]: 0.48-0.90), rheumatologic (*RR*: 0.24, 95% CI: 0.09-0.62), or gastroenterologic diagnosis (*RR*: 0.25, 95% CI 0.05-0.92).<sup>29-31</sup> The reason for this concentration of mental disorders among new referrals to these subspecialty clinics was multifactorial. Patients with mental disorders typically present with physical rather than emotional complaints.<sup>32</sup> As a result, clinicians often exhaustively pursue organic rather than mental explanations for patient complaints. This is reinforced because patients may be reluctant to accept such diagnoses without an exhaustive search for other medical explanations. The consequence, in these studies, was a concentration of mental disorders among new referrals to these subspecialty clinics.

Since patients with mental disorders commonly have difficulty sleeping and frequently complain of fatigue and low energy, we speculated that mental disorders might be common among referrals to a sleep clinic and, when present, might also be associated with a lower likelihood of having an underlying sleep disorder. Hence, our study objectives were to (1) describe the prevalence of mental disorders among referrals to our sleep clinic using the PRIME-MD, a validated screening instrument that provides DSM-IV diagnoses, and (2) assess whether referred patients with underlying mental disorders were less likely to have a diagnosis of sleep-disordered breathing.

## METHODS

### Study Population and Clinic Setting

Consecutive new referrals who were at least 18 years old and presenting to the sleep clinic at Walter Reed Army Medical Center, a military tertiary care facility, for any sleep medicine appointment were invited to participate. The clinic's patient population includes active-duty military personnel, military dependents (eg, spouses and children), and those retired from military service. Patients seen in the military healthcare system have been previously demonstrated to be similar to those seen in civilian settings.<sup>33-35</sup> Specifically, the rates of mental disorders in our institution have been shown to be similar to those in civilian practice, in several studies to mirror those of civilian clinic settings, with no evidence of underreporting of mental disorder symptoms.<sup>26,28,34</sup> All patients must have a physician referral to be seen in the clinic; self-referrals are not seen.

### Data Collection

Prior to being seen by the sleep provider, all patients completed a sleep history questionnaire, the Multiple Outcomes Study Short Form-6 (MOS SF-6) functional status scale, and a screen for mental disorders with a version of the PRIME-MD.<sup>26,27</sup> Sleep providers caring for the patients were blinded to results from the MOS SF-6 and the PRIME-MD. At the conclusion of the patients' initial visit, sleep providers completed a form indicating whether they thought the patients' sleep complaints were due to an organic cause alone, psychiatric cause alone, both, or neither and whether or not the patient was to undergo polysomnography. Demographic information was collected from the patient's charts.

This protocol was approved by our institution's investigational

review board. There were no external sources of funding.

### Classification of Sleep Disorders

Sleep-disorder diagnoses were made as according to the *International Classification of Sleep Disorders*.<sup>36</sup> Most patients had polysomnography in our laboratory, which incorporated 12 channels including right and left electrooculogram, electroencephalogram (C3A2, O1A2), electromyogram (chin and leg), electrocardiography, flow, effort (thorax and abdomen), oxyhemoglobin saturation, and snore channels. The sleep provider's diagnosis was used as the final sleep disorder diagnosis if the sleep provider did not order polysomnography. If a participant had polysomnography ordered but not completed within 6 months, or multiple sleep studies were performed with conflicting results, no diagnosis was recorded. For all other patients, the polysomnography results were used for the final sleep-disorder diagnosis.

The diagnosis of OSA was made in the usual manner. A respiratory disturbance index (RDI) of 0 to 5 was normal, 6 to 14 was mild OSA, 15 to 30 was moderate OSA, and > 30 was severe OSA. Esophageal manometry (multiport system by Gael-Tec, Hackensack, NJ) was used to diagnosis upper airway resistance syndrome.

### Determination of Mental Disorders and Scoring Surveys

Mental disorders were diagnosed by the PRIME-MD, which has been previously demonstrated to be both reliable and valid.<sup>26,27</sup> The original PRIME-MD contained modules on mood, anxiety, alcohol, eating disorders, and somatoform disorder. For our study, we only used the mood module, the anxiety module, and a portion of the somatoform module (the Patient Health Questionnaire (PHQ-15), which is an assessment of the 15 most common physical symptoms in primary care).<sup>37</sup> Further, the mood module was modified slightly in a subsequent version of the PRIME-MD, and we used this later version (called the PHQ-9) in our study (Appendix).<sup>26</sup> Thus, we could diagnose major and minor depression (via the updated mood module, the PHQ-9), panic disorder and anxiety not otherwise specified (via the anxiety module) and determine symptom burden (via the PHQ-15). Functional status was determined by summing the 6 items from the MOS SF-6, giving a range from 6 (bad) to 31 (good).<sup>38</sup>

### Statistical Analysis

Univariate analyses were done with  $\chi^2$  and Student *t* test, as appropriate (STATA 8.0, College Station, TX). Logistic regression was used to adjust for potential confounding (age, sex, functional status) relationships between diagnoses of sleep-disordered breathing and mental disorders.

## RESULTS

Two hundred and seventeen consecutive new referrals were invited to participate, and 182 returned the study questionnaire (84% response rate). Eleven of the patients who returned the study questionnaire could not be linked to their clinical data due to clerical errors, which left data from 171 patients for analysis. The patients were mostly men, with a mean age of 49 (Table 1). In all but 7 cases, polysomnography was ordered to make the diagnosis, and, of these, 139 (85%) completed it. Three patients

had conflicting polysomnography results such that no diagnosis could be recorded. Thus, there are 143 patients with a final sleep diagnosis: 136 patients by polysomnography and 7 patients by the sleep provider’s diagnosis.

### Sleep Disorders

Of those who received a final sleep diagnosis, most had a diagnosis of sleep-disordered breathing. One hundred and fifteen (80%) patients were diagnosed with OSA. Three (2%) had upper-airway resistance syndrome. Four had insomnia, 3 primary snoring, and 3 restless legs syndrome (Table 2). Twenty-eight (16%) patients were not given a diagnosis. The presence of a mental disorder did not affect whether or not a patient underwent polysomnography, as requested by the sleep clinician (mental disorder 29 of 34 (85%), no mental disorder 110 of 130 (85%),  $P = .92$ ).

### Prevalence of Mental Disorders

Mental disorders were common. Thirty-eight patients (22%) had at least 1 mental disorder, and 17 patients (10%) had 2. The most common diagnosis was anxiety not otherwise specified ( $n = 20$ , 12%), followed by major depression ( $n = 18$ , 11%), minor depression ( $n = 12$ , 7%), and panic disorder ( $n = 5$ , 3%). Most patients with restless legs syndrome ( $n = 2$  of 3, 67%) and insomnia ( $n = 3$  of 4, 75%) had concomitant mental disorders.

### Comparisons of Patients With and Without a Mental Disorder

Patients with mental disorders differed from those without mental disorders. Patients with mental disorders were younger ( $P = .064$ ), tended to be women ( $P = .094$ ), had greater somatization (3.6 vs 1.4 very bothersome symptoms on the PHQ-15), and had worse functional status on the MOS SF-6, as compared with patients without mental disorders (Table 3). Among those with OSA, there was no difference in the RDI between those with and without a mental disorder. There was also no difference in the RDI between patients with or without major depression (mean RDI, depressed vs nondepressed, 38.3 vs 37.6,  $P = .94$ ).

Among those who received a sleep diagnosis, patients with mental disorders were significantly less likely to have a diagnosis of sleep-disordered breathing, as compared with those without an underlying mental disorder (66% vs 87%, RR 0.75, 95% CI: 0.58-0.97,  $P = .004$ ). One can also express this relationship as the prevalence of mental disorders in those with sleep-disordered breathing being 18% (21 of 118) versus in those without sleep-disordered breathing as 44% (11 of 25). In the 7 patients in whom the sleep diagnosis was made on clinical grounds alone, 4 had a mental disorder (57%). If these patients are excluded, patients

with mental disorders were still less likely to have a diagnosis of sleep-disordered breathing (75% vs 90%,  $P = .04$ ).

On multivariate analysis, we explored the relationship between mental disorders and sleep-disordered breathing. After controlling for functional status, age, sex, and number of bothersome symptoms, only the presence of a mental disorder ( $P = .014$ ) and possibly sex ( $P = .06$ ) were able to predict the subsequent diagnosis of sleep-disordered breathing. The odds of having sleep-disordered breathing were 3.3 (95% CI: 1.3-8.3) times greater if a mental disorder was absent and 2.4 (95% CI: 0.96-6.2) times more likely if the patient was a man. Put another way, men without a mental disorder had a sleep-disordered breathing diagnosis 92% of the time (79 of 86); women without a mental disorder, 72% (18 of 25), men with a mental disorder, 65% (13 of 20); and women with a mental disorder, 67% (8 of 12).

Among patients shown to have a mental disorder by PRIME-MD, sleep providers suspected a mental disorder in 47% (18 of 38) of them. Sleep provider’s detection rates of mental disorders were similar (near 50%) for the 4 types of mental disorders (major depression, minor depression, panic disorder, and anxiety disorder) in this study.

### Screening for Depression With the PHQ-2

The PRIME-MD test for depression includes 9 questions. The first 2 questions are commonly referred to as the PHQ-2. A positive answer (more than half the days or nearly every day) to a least 1 of these 2 questions, “Over the last two weeks, how often have you been bothered by little interest in doing things?” or “Over the last two weeks, how often have you been bothered by feeling down, depressed, or hopeless?” is required for a DSM-IV diagnosis of major depression. In the present study, a positive answer to either question was 100% sensitive and 91% specific for depression. Given the prevalence of major depression in this cohort (11%), the positive predictive value was 56%, and the negative predictive value was 100%.

## DISCUSSION

Surprisingly, our study found that the prevalence of mental disorders among patients referred to the sleep clinic were similar to

**Table 2**—Sleep Disorder Diagnoses of 143 Patients from the Walter Reed Army Medical Center Sleep Clinic in 2003, by Presence of a Mental Disorder\*

Sleep Diagnosis	Mental Disorder	
	Yes n = 32	No n = 111
Sleep-disordered breathing	21 (66)	97 (87) <sup>†</sup>
Obstructive sleep apnea	21 (66)	94 (85) <sup>‡</sup>
Upper airway resistance syndrome	0 (0)	3 (3)
Restless legs syndrome	2 (6)	1 (1)
Primary snoring	0 (0)	3 (3)
Insomnia	3 (9)	1 (1)
Other	6 (19)	9 (8)

\*Data are presented as number(%). Does not include the 28 patients who did not have a final sleep diagnosis.

<sup>†</sup> $P = .004$

<sup>‡</sup> $P = .02$

**Table 1**—Baseline Characteristics of 171 Patients From the Walter Reed Army Medical Center Sleep Clinic in 2003

Characteristic	Results
Male, no. (%)	130 (76)
Mean age, y (SD)	49 (15)
Mental Disorder, no. (%)	38 (22)
Mean MOS SF-6 (SD)	24 (5)
Polysomnography requested, no. (%)	164 (96)

MOS SF-6 refers to Multiple Outcomes Study Short Form 6.



the high rate seen in primary care. More than 1 in 5 new referrals to the sleep clinic had a depressive or anxiety disorder. There did not appear to be a concentration of patients with mental disorders among new referrals to the sleep clinic, as was seen in neurology, rheumatology, and gastroenterology clinics.<sup>29,31</sup> We did find that patients with mental disorders were less likely to have an underlying diagnosis of sleep-disordered breathing. However, other subspecialty clinics had a greater reduction in the likelihood of a subspecialty disorder with the presence of a mental disorder than was seen in the present study.<sup>29,31</sup>

Our rate of mental disorders was 22%. Previous studies of patients in sleep clinics found comparable rates, ranging from 10% to 63%.<sup>1-3,5-20,39,40</sup> The wide range is likely explained by the differences in populations studied and the instruments used. The patients in our study all required a referral to be seen, which would eliminate the self-referral bias. Also, 80% of the patients in our study had OSA, a diagnosis with a lower percentage of associated mental disorders than some other sleep disorders. Finally, most previous studies measured symptoms of mental disorders, not diagnoses, which may account for the lower percentages seen in our analysis.

When comparing this study to others that have used the PRIME-MD, the rates of mental disorders more closely resemble rates among patients in primary care than other specialty clinics. In the original PRIME-MD study, a multicenter study that included patients from the primary care clinic at our institution, the rates of major depression (12% vs 11% in our study), minor depression (6% vs 7%), anxiety not otherwise specified (9% vs 12%), and panic disorder (4% vs 3%) were similar to those in this sleep clinic.<sup>27</sup> Another study of primary care patients had similar results (major/minor depression 19% vs 18% and anxiety disorders 13% vs 15%).<sup>32</sup> However, in other specialty clinics, the rates of mental disorders were higher. In a study of patients in the rheumatology clinic, more patients had depressive disorders (25% vs 18%) and anxiety disorders (27% vs 15%).<sup>29</sup> Similar findings were seen in a neurology clinic (depressive disorders 25% vs 18% and anxiety disorders 10% vs 12%) and in a gastroenterology clinic (depressive disorders 29% vs 18% and anxiety disorders 19% vs 12%).<sup>30,31</sup>

**Table 3**—Comparison of 171 Patients With and Without Mental Disorders at Walter Reed Army Medical Center in 2003, by the PRIME-MD

Characteristic	Mental Disorder		P value
	Yes	No	
Total patients, no. (%)	38 (22)	133 (78)	
Male, no. (%)	25 (66)	105 (79)	.09
Age, y	45 (15)	50 (15)	.06
Sleep-disordered breathing diagnosis, no. (%) <sup>†</sup>	21 (66)	97 (87)	.004
Respiratory disturbance index <sup>‡</sup>	35 (31)	38 (30)	.67
MOS SF-6 Functional Status score	18 (5.1)	25 (4.0)	< .0001
Number of “bothered a lot” symptoms	3.6 (2.9)	1.4 (1.6)	< .0001

\*Data are presented as mean (SD) unless otherwise specified. The  $\chi^2$  test used for proportional comparisons and Student *t* test used for continuous comparisons.

<sup>†</sup>Does not include the 28 patients who did not have a final diagnosis

<sup>‡</sup>Includes patients with OSA and complete data (mental disorder *n* = 20, no mental disorder *n* = 92)

MOS SF-6 refers to Multiple Outcomes Study Short Form 6.

In our studies of referrals to subspecialty clinics, we found that it might be possible to avoid subspecialty referral of selected patients by screening for mental disorders.<sup>29,31</sup> However, this does not appear to be a reasonable strategy for the sleep clinic. In studies in both the rheumatology and neurology clinics, patients with an underlying mental disorder but without historical, physical-examination, or laboratory-examination findings suggestive of a neurologic or rheumatologic diagnosis were extremely unlikely to have a concomitant neurology or rheumatology problem.<sup>29,31</sup> Thus, referral may be unnecessary in these cases. While the prevalence of a sleep disorder was lower among patients with mental disorders in the current study, patients with depression or anxiety also had a diagnosis of sleep-disordered breathing in more than 60% of cases. Thus, patients with a mental disorder should still receive a subspecialty referral if OSA is suspected.

Only 3 previous studies have directly compared the rates of mental disorders between patients with OSA and another sleep disorder, and all were limited. Balan et al<sup>9</sup> studied 100 Israeli patients, who self- or physician-referred to a sleep center, using a DSM-III-R-based structured clinical interview. They found that the patients with normal polysomnography were 12 times (95% CI 4-36) more likely to have an Axis I mental disorder than were those with sleep apnea or periodic limb movements. Interestingly, none of the 31 patients with sleep apnea had major depression disorder. This study, by permitting self-referrals and having two thirds of patients with normal polysomnography, may be limited by selection bias. Two other studies relied on screens for depression rather than diagnostic instruments. Aikens et al<sup>1</sup> surveyed 108 patients referred to a United States university sleep center with the Minnesota Multiphasic Personality Inventory. Patients with “insomnia due to a mental disorder” and periodic limb movement disorder were more likely to have mental disorders than were patients with OSA or “psychophysiological insomnia.” Pillar et al<sup>22</sup> surveyed more than 2,000 Israeli patients using the Symptom Distress Check List-90 and found that patients with insomnia were more likely to have mental disorders than were those with OSA. Thus our study, using a validated screening instrument, confirms the finding that patients with OSA are less likely to have a mental disorder than are those with other disorders.

While it may seem that sleep providers performed poorly by diagnosing mental disorders only 47% of the time, this was actually better than primary care providers and other specialists. Patients presenting to primary care with a mental disorder are recognized only 35% of the time.<sup>41</sup> Another study found that after 5 years of follow-up, only 32% of primary care patients had their mental disorders diagnosed.<sup>42</sup> In studies of new referrals to rheumatology and neurology clinics, mental disorders were recognized less than one third of the time.<sup>29,31</sup> Of course, when a patient is referred to a subspecialty clinic to rule out a diagnosis of sleep-disordered breathing, the principal task is to rule out such a disorder, rather than making diagnosis of mental disorders. The 2 can coexist. In fact, this study showed that most patients with a mental disorder also had a diagnosis of sleep-disordered breathing. Thus, it may not be surprising that recognition of underlying mental disorders was infrequent.

Recognizing the presence of a mental disorder among patients with diagnoses of sleep-disordered breathing may be important for several reasons. First, patients with anxiety or depressive disorders report their symptoms to be more severe and disabling than those of patients without mental disorders.<sup>28</sup> In this study,

we showed that patients with mental health disorders report greater functional impairment and symptom severity from their sleep-disordered breathing disorders, as compared with patients without these disorders, despite a lack of difference in objective measures of sleep-disorder severity, such as RDI. In addition, other studies have shown that patients with concomitant mental disorders have worse outcomes among a wide variety of diseases, including after myocardial infarction, diabetes, congestive heart failure, and strokes.<sup>43</sup> Some studies have shown that outcomes in non-mental-health disorders are improved with treatment of the concomitant mental disorder.<sup>44</sup> Several previous studies have suggested that depressive symptoms improve with treatment of OSA.<sup>15,16,19</sup> However, it is not clear if improving depressive symptoms is adequate treatment for those with a diagnostic depressive disorder. Further studies in the sleep clinic need to be done to determine the impact of mental disorders on outcomes related to sleep diagnoses. It may be that patients with recognized mental disorders who receive simultaneous treatment for the mental disorder and the sleep disorder will have better outcomes.

We believe that our results are applicable to the practicing sleep clinician for 3 reasons. First, the PRIME-MD can be used efficiently (it takes the patient less than 7 minutes to complete the form in the waiting room) and reliably to determine the presence of a DSM-IV mental-disorders diagnosis on the patient's initial visit. This is in contrast to the cumbersome instruments, which do not provide a diagnosis, that have been previously studied in sleep clinics.<sup>6,23-25</sup> Also, if a sleep clinician only wished to screen for depression, this could be done with only 2 questions, the PHQ-2, and is supported by a previous study in primary care.<sup>45</sup> In our study, only 19% of patients had a positive response to the PHQ-2, significantly reducing the number of patients to probe further for other possible causes of their depressive symptoms (such as hypothyroidism or use of a  $\beta$ -receptor-blocking agent). Secondly, if patients reporting to a sleep clinic do not have sleep-disordered breathing, then it is likely (44% in our study) that they have a mental disorder, and clinicians should consider conducting an evaluation for a mental disorder in these patients. Thirdly, while not yet shown for sleep disorders, work in other disorders<sup>44</sup> suggests that treatment of mental disorders may improve a patient's organic disorder—in this case, sleep complaints.

Our study had limitations. The study was from a single site, and patients in this clinic had a high prevalence of OSA. Clinics with more patients without OSA or self-referrals may have a higher prevalence of mental disorders. Secondly, some mental disorders were likely missed, as we did not use the gold standard for diagnosing mental disorders, the structured clinical interview. However, the PRIME-MD is a validated assessment tool, as it has been compared to the structured clinical interview in several settings in more than 6,000 patients.<sup>26,27</sup> We did not measure other variables that may have confounded the relationship between mental disorders and sleep-disordered breathing, such as body mass index and neck circumference. Finally, we have no follow-up data on the effect of the mental disorder with treatment of sleep-disordered breathing. Future studies should assess whether the presence of a mental disorder decreases responsiveness of sleep symptoms to continuous positive airway pressure or whether the use of continuous positive airway pressure might be adequate treatment for mental disorders in the setting of sleep-disordered breathing.

We conclude that mental disorders are common in sleep clinics, present in more than 1 in 5 new referrals. While patients with men-

tal disorders are slightly less likely to have a diagnosis of sleep-disordered breathing, the presence of such a disorder should not preclude referral of patients with appropriate sleep-disorder symptoms for evaluation, since many have both sleep and mental disorders. The PRIME-MD, a brief instrument capable of making DSM-IV mental-disorder diagnoses, may be a useful adjunct for sleep providers as a screening tool for mental disorders, particularly for patient shown not to have sleep-disordered breathing, because the rate of mental disorders in these patients exceeds 40%. Further research is required to determine the optimal screening strategy in this setting and should explore the relationship between response to treatment of sleep disorders and mental disorders.

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**APPENDIX**

The PHQ-9

**Over the last 2 weeks, how often have you been bothered by any of the following problems?**

	<b>Not at all</b>	<b>Several days</b>	<b>More than half the days</b>	<b>Every day</b>
1. Little interest in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you have been around a lot more than usual				
9. Thoughts that you would be better off dead or of hurting yourself in some way				

A patient may be considered to have major depression if at least five of the nine responses are “more than half the days” or “nearly every day” and one of the five is question 1 or 2. Alternatively, one can total the points, with scores higher than 10 suggestive of depression.

The first two questions may be called the PHQ-2. An answer of “more than half the days” or “nearly every day” to either question is considered a positive screen for depression.

From Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606-13.