Types of Coping Strategies are Associated with Increased Depressive Symptoms in Patients with Obstructive Sleep Apnea

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Study Objectives: Some, but not all, researchers report that obstructive sleep apnea (OSA) patients experience increased depressive symptoms. Many psychological symptoms of OSA are explained in part by other OSA comorbidities (age, hypertension, body mass). People who use more passive and less active coping report more depressive symptoms. We examined relationships between coping and depressive symptoms in OSA.

Setting: N/A

Design/Participants: 64 OSA (respiratory disturbance index (RDI) ≥15) patients were studied with polysomnography and completed Ways of Coping (WC), Profile of Mood States (POMS), Center for Epidemiological Studies-Depression (CESD) scales. WC was consolidated into Approach (active) and Avoidance (passive) factors. Data were analyzed using SPSS 9.0 regression with CESD as the dependent variable and WC Approach and Avoidance as the independent variables.

Measures and Results: WC Approach factor (B=-1.105, ß=-.317, p=.009) was negatively correlated and WC Avoidance factor (B=1.353, ß=.376, p=.007) was positively correlated with CESD scores. These factors explained an additional 8% of CESD variance (p<.001) beyond that explained by the covariates: demographic variables, RDI, and fatigue (as measured by the POMS).

Conclusions: More passive and less active coping was associated with more depressive symptoms in OSA patients. The extent of depression experienced by OSA patients may not be due solely to effects of OSA itself. Choice of coping strategies may help determine who will experience more depressive symptoms.

Key words: Obstructive sleep apnea; depression; coping; mood; personality

INTRODUCTION

OBSTRUCTIVE SLEEP APNEA (OSA) HAS SUBSTANTIAL PSYCHOSOCIAL COMORBIDITIES.1 Affecting up to 9% of middle-aged adults and higher percentages in the elderly, OSA is a devastating illness that leaves patients exhausted from sleep deprivation.2-4 An OSA patient experiences multiple periods during the night in which the airway collapses and breathing stops (over 100 events per hour in severe cases) resulting in repeated disruption of normal sleep patterns. In addition to significant daytime fatigue, this disruption can lead to serious decreases in blood oxygen levels with potentially life-threatening cardiovascular consequences.

The literature is mixed regarding the role played by psychosocial factors in OSA (for review, see Bardwell et al 1999).1 Many researchers have found associations between OSA and overall psychosocial distress and, more specifically, clinical depression,5-8 or increased levels of depressive symptoms.9-15 Others have reported that patients with sleep apnea do not show clinically significant levels of depression or have levels of depressive symptoms no higher than control groups16-18 or patients with other chronic illnesses.19

We have reported previously that many psychosocial symptoms of OSA can be explained in part by other OSA comorbidities (e.g., age, hypertension, body mass).1 We wondered if aspects of behavior and personality might also play a role in determining the extent of depressive symptoms experienced by OSA patients. One factor frequently associated with depression involves the choice of coping strategies for dealing with stress.

Coping strategies are defined as "conscious, rational ways for dealing with the anxieties of life"20 and are often categorized into active (or approach) and passive (or avoidance) strategies. The Ways of Coping Questionnaire-Revised21 is one of the more frequently used instruments for assessing coping strategies. Active strategies include confrontive coping, seeking social support, planned problem solving and positive reappraisal. Passive strategies include distancing, self-control, accepting responsibility, and escape/avoidance. These strategies are defined in Table 1.

The use of more passive and less active coping strategies has been shown to be associated with higher levels of depressive symptoms in patients having various chronic illnesses, including HIV22,23 and breast cancer.24 We wondered if these relationships would hold in a population of OSA patients. We examined relationships between coping and depressive symptoms in OSA patients, while controlling for OSA severity and fatigue to ensure that choice of coping strategies wasn't simply a matter of illness severity or lack of energy.

METHODS

Sixty-four men and women with OSA were recruited by advertising and word of mouth to participate in our research on sympathetic nervous system physiology in OSA. To qualify, participants had to be between 100% and 150% of ideal body weight as determined by Metropolitan Life Insurance tables.25 Although OSA is more common among the obese, those participants who...
were more than 150% of ideal body weight were excluded due to the possibility of confounding by other conditions associated with obesity. Potential participants were also excluded if they had major medical illnesses other than OSA: congestive heart failure, pulmonary disease requiring ongoing treatment, symptomatic coronary or cerebral vascular disease (history of myocardial infarction, angina, stroke, transient ischemic attack), history of life-threatening arrhythmias, cardiomyopathy, history of psychosis, current drug or alcohol abuse, known secondary hypertension, creatinine levels >1.4mg%, kidney disease, renal bruit on physical examination, prior diagnosis or treatment of diabetes, fasting blood glucose >120mg%, other known sleep disorder (e.g., narcolepsy). The protocol was approved by the University of California, San Diego, Human Subjects Committee and written consent was obtained from all participants prior to enrollment.

Participants had their sleep monitored all night in the Clinical Research Center with polysomnography, which included standard central and occipital electroencephalogram (EEG); bilateral electrooculogram (EOG); submental electromyogram (EMG); nasal/oral airflow using a thermistor; thoracic and abdominal electrooculogram (EOG); submental electromyogram (EMG); nasal/oral airflow using a thermistor; thoracic and abdominal excursions with Respitrace respiratory inductive plethysmography; and bilateral tibialis EMG. Tracings were scored according to the criteria of Rechtshaffen and Kales 26 and the number of apneas/hypopnea events was recorded. Apneas were defined as decrements in airflow of ≥90% from baseline for a period of ≥10 seconds. Hypopneas were defined as decrements in airflow of ≥50% but <90% from baseline for a period of ≥10 seconds. The majority of subjects had solely obstructive type events; only a few subjects showed evidence of central apneas. Potential participants who showed predominant central apneas (>50% of total apneas) were excluded from this study. The number of apneas and hypopneas per hour were calculated to obtain the respiratory disturbance index (RDI). OSA was defined as RDI ≥15.

Participants completed the Ways of Coping Questionnaire-Revised (WC), 21 the Center for Epidemiological Studies-Depression (CESD) Scale, 27 and Profile of Mood States (POMS). 28 The WC is used to gauge how participants respond to stressful situations and is a process-oriented measure of coping activity. 21 After writing about a particularly stressful situation of their choice, participants were asked to respond to a series of 66 questions, using a 0—3 scale. This instrument yields eight subscales derived from factor analysis: confrontive coping, seeking social support, planned problem solving, positive reappraisal, distancing, self-control, accepting responsibility, escape avoidance. Data from this instrument were consolidated into Approach and Avoidance factors, as demonstrated by Patterson et al. 22 These factors can be thought of as representing active and passive coping strategies, respectively. Approach coping includes the first four subscales, while Avoidant coping includes the remaining four subscales listed above. 22 Both factors were dichotomized into Hi/Lo groups using median splits.

The WC has been shown to be an adequately reliable and valid instrument which has been used to assess coping strategies in a variety of general and patient populations. 21 It has also been used in patients living with a variety of chronic illnesses having a significant fatigue component, such as HIV, 22,30 multiple sclerosis and spinal cord injury, 31 and chronic fatigue syndrome. 32 We are unaware of studies that have used the WC to assess coping strategies in OSA patients.

The CES-D is a frequently used 20-item self-report scale that has been shown to be reliable and valid for assessing depressive symptoms. 22 In a variety of populations, a large percentage of subjects with a score ≥16 have been shown to meet diagnostic criteria for dysthymia or major depression. 33,34 When used with medically ill patients, depression rating scales are sometimes

### Table 1—Description of coping scales

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<thead>
<tr>
<th>Active (Approach) Strategies</th>
<th>Description of coping scales</th>
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<tr>
<td>Confrontive Coping:</td>
<td>Describes aggressive efforts to alter the situation and suggests some degree of hostility and risk-taking.</td>
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<tr>
<td>Seeking Social Support:</td>
<td>Describes efforts to seek informational support, tangible support, and emotional support.</td>
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<tr>
<td>Planful Problem Solving:</td>
<td>Describes deliberate problem-focused efforts to alter the situation, coupled with an analytic approach to solving the problem.</td>
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<tr>
<td>Positive Reappraisal:</td>
<td>Describes efforts to create positive meaning by focusing on personal growth. It also has a religious dimension.</td>
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<tr>
<th>Passive (Avoidant) Strategies:</th>
<th>Description of coping scales</th>
</tr>
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<tbody>
<tr>
<td>Distancing:</td>
<td>Describes cognitive efforts to detach oneself and to minimize the significance of the situation.</td>
</tr>
<tr>
<td>Self-Controlling:</td>
<td>Describes efforts to regulate one’s feelings and actions.</td>
</tr>
<tr>
<td>Accepting Responsibility:</td>
<td>Acknowledges one’s own role in the problem with a concomitant theme of trying to put things right.</td>
</tr>
<tr>
<td>Escape-Avoidance:</td>
<td>Describes wishful thinking and behavioral efforts to escape or avoid the problem. Items on this scale contrast with those on the Distancing scale, which suggest detachment.</td>
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From: Folkman & Lazarus, 1988.21; Patterson et al., 1993.22
**Table 2**—Subject characteristics (mean±standard deviation).

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>N</strong></td>
<td>64</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>49.3+7.9</td>
</tr>
<tr>
<td><strong>Body Mass Index</strong></td>
<td>29.8+4.5</td>
</tr>
<tr>
<td><strong>Respiratory Disturbance Index</strong></td>
<td>51.5+28.5</td>
</tr>
<tr>
<td><strong>Mean Oxygen Saturation</strong></td>
<td>91.8+4.0</td>
</tr>
<tr>
<td><strong>Center for Epidemiological Studies-Depression</strong></td>
<td>12.5+10.9</td>
</tr>
<tr>
<td><strong>Profile of Mood States-Fatigue</strong></td>
<td>10.8+7.2</td>
</tr>
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</table>

Influenced by the symptoms of their illness. For example, mood-related observations in OSA patients could be confounded by the fatigue/sleepiness they experience. However, the CES-D primarily taps the cognitive/affective symptoms of depression and has been shown to be useful in chronically ill groups experiencing fatigue (e.g., HIV, cancer),³⁵,³⁶ including OSA patients.¹,³⁷

The POMS is a well-established factor analytically derived measure of psychological distress for which high levels of reliability and validity have been documented.²⁸ The POMS consists of 65 adjectives that are rated on a 0—4 scale. Data from this instrument can be consolidated into six subscales: fatigue-inertia, vigor-activity, tension-anxiety, depression-dejection, anger-hostility, confusion-bewilderment. The POMS has been used in a variety of chronically ill and well populations,²⁸,³⁸–⁴⁴ including OSA patients.⁴⁵–⁴⁷ We were particularly interested in controlling for scores on the fatigue-inertia subscale. This subscale measures weariness, inertia, and low energy level (states commonly experienced by OSA patients) and has been validated as a separate factor in several studies.²⁸ Norms have been published for a variety of patient and non-patient groups. For example, depressed patients reported a mean POMS Fatigue score of 14.7 while normal females and males reported mean scores of 8.4 and 7.0, respectively.²⁸

Data were analyzed using SPSS 9.0 software (1999) linear regression. The CES-D was used as the dependent variable and WC Approach, WC Avoidance, and the WC Approach X WC Avoidance interaction as independent variables. The interaction term was entered because we hypothesized that patients who used more passive and less active coping strategies would show the highest levels of depression.

Several covariates were also employed in these models. Because our sample varied in terms of RDI and fatigue, and because it seems plausible that fatigue could influence the preference for active vs. passive coping strategies, we wanted to ensure that coping strategy selection was not simply a reflection of the patients' degree of illness. Therefore, RDI and POMS Fatigue were employed as covariates, along with mean O₂ saturation levels, gender, age, and body mass index (BMI). Gender, BMI, and age differences have been previously reported in studies of OSA, depression, and coping strategies. In linear regression, all the covariates were entered in the first block, then the continuous versions of the WC Approach and Avoidance factors were entered, followed by the Approach X Avoidance interaction.

Initially, we conducted the analysis using only RDI and POMS Fatigue as covariates. To be more conservative, as a check to ensure that demographic differences were not driving the results, the other covariates were included in the model. Because results did not differ meaningfully, the more conservative model that includes the full set of covariates is reported below.

**RESULTS**

Table 2 shows demographic and other subject characteristics. Subjects included 54 men and 10 women averaging 49.3 years of age (range 32-64 years) with a mean BMI of 29.8. Mean RDI was 51.5 (range 15-142) with a mean O₂ saturation of 91.8. One third of the subjects had a CESD score ≥16, suggesting the presence of a diagnosable mood disorder. POMS Fatigue scores averaged 10.8 with 30% of subjects exceeding the mean score of 14.7 from the POMS normative sample for depressed patients.

Table 3 shows Pearson correlations for demographic variables vs. CESD and the WC Approach and Avoidance factors. Significant correlations emerged for gender, age, BMI, and mean O₂ saturation levels, which were entered as covariates along with RDI and POMS Fatigue. In the regression analysis, the covariates were entered in the first block, accounting for 48.7% of the variance in CESD (F=8.242, p<.001). Next, the WC Approach (B=-1.105, ß=-.317, p=.009) and WC Avoidance (B=1.353, ß=.376, p=.007) factors were entered, accounting for an additional 8.0% of the variance in CESD (F=8.177, p<.001). Lower scores on WC Approach and higher scores on WC Avoidance were associated with higher CESD scores. The interaction term did not account for a statistically significant amount of variance in CESD.

**DISCUSSION**

Obstructive sleep apnea is a potentially devastating chronic illness marked by significant levels of daytime fatigue. Findings have been equivocal, however, in terms of other psychosocial complications of this illness. For example, while many studies

**Table 3**—Pearson correlations (r, p): demographic variables vs. ways of coping factors

<table>
<thead>
<tr>
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<th>Center for Epidemiological Studies-Depression</th>
<th>Ways of Coping Approach Factor</th>
<th>Ways of Coping Avoidance Factor</th>
</tr>
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<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>.27, .025*</td>
<td>.21, .086</td>
<td>.08, .516</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>-.19, .127</td>
<td>-.15, .241</td>
<td>-.35, .004**</td>
</tr>
<tr>
<td><strong>Body Mass Index</strong></td>
<td>.28, .021*</td>
<td>.09, .490</td>
<td>.28, .021*</td>
</tr>
<tr>
<td><strong>Respiratory Disturbance Index</strong></td>
<td>.05, .705</td>
<td>-.05, .674</td>
<td>.04, .781</td>
</tr>
<tr>
<td><strong>Mean Oxygen Saturation</strong></td>
<td>-.17, .181</td>
<td>-.22, .089</td>
<td>-.46,&lt;.001**</td>
</tr>
</tbody>
</table>

*p<.05 ** p<.01
have reported higher levels of depression or depressive symptoms in OSA patients, some researchers have concluded that OSA patients do not show higher levels of depressive symptoms than controls. In those studies which did find increased psychosocial distress in OSA, it is unclear how much of this distress was a direct result of the illness itself and how much could be attributed to behavioral or personality characteristics.

According to Folkman and Lazarus (1988), "it is how individuals cope with stress, not stress per se, that influences their psychological well-being, social functioning, and somatic health." Choice of coping strategies is an important behavioral aspect of personality that has been examined in studies of depression and chronic illness. As shown in Table 1, coping strategies vary considerably, with some including elements of hostility and risk-taking and others reflecting aspects of resignation and withdrawal. While crucial in managing the anxieties of everyday life, coping strategies become even more important in the face of the additional distress of living with a chronic illness.

The use of less active and more passive coping strategies has been associated with increased symptoms of depression in patients living with chronic illness, including illnesses that have a substantial fatigue component. We are unaware, however, of any previous studies that have examined the role of coping strategies vis-à-vis depressive symptoms experienced by OSA patients. Therefore, we hypothesized that OSA patients who employed less active and more passive coping techniques would be at higher risk for depressive symptoms than OSA patients who used strategies that are thought to be more enhancing of mental health (i.e., more active, less passive).

In testing this hypothesis, we wanted to ensure that the choice of coping strategies was not simply a result of OSA severity, fatigue or demographics. After controlling for these variables, we observed that passive coping was positively correlated and active coping was negatively correlated with CES-D scores: the more passive and the less active coping strategies reported by OSA patients, the greater the level of depressive symptoms they reported experiencing.

Therefore, we conclude that the extent of depressive symptoms experienced by OSA patients may not be due solely to the effects of the illness itself. Rather, behavioral and personality characteristics (i.e., choice of coping strategies) may play an important role in determining which OSA patients will experience greater disturbance of mood. This finding may explain, at least in part, some of the disparate observations in the OSA-depression literature.

**Limitations of the Study**

Our correlational design does not allow us to conclude directionality in the relationship between coping and depression. It is possible that depression leads to the choice of more passive and less active coping strategies. Longitudinal studies of these variables are required to shed light on the direction of causality. Sample size is also an area of concern. While larger than most studies of OSA patients, our sample size of 64 is still somewhat limited. Findings, particularly interaction effects, can be unstable in studies with relatively small sample sizes. Finally, reflecting the relatively higher prevalence of OSA among men in the general population, our sample included only 10 women. Six of these women fell in the Hi Approach/Hi Avoidance cell. It is possible that this unequal distribution of gender skewed our findings. Therefore, while our results suggest that coping strategies are associated with level of depressive symptoms experienced by OSA patients, replication of these results is warranted.

**Summary**

Obstructive sleep apnea is a relatively common chronic illness having the potential for disturbing psychosocial sequelae. We believe it is sometimes assumed that OSA patients will automatically experience significant mood symptoms, given the degree of sleep disruption and concomitant fatigue they frequently experience. However, illnesses occur in people having premorbidly varying resilience and ability to cope with life stress in general and illness-related stress in particular. Such personality and behavioral patterns may play an important role in determining which OSA patients will experience higher levels of depressive symptoms. Therefore, the assessment of coping strategies in OSA patients could help identify those patients who might benefit most from the direct treatment of mood symptoms in addition to treatment of the sleep disturbed breathing itself.

**REFERENCES**