Suicidality and Sleep Disturbances

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Study Objectives: A growing body of research indicates that sleep disturbances may be specifically linked to suicidal behaviors. It remains unclear, however, whether this link is largely explained by depressive symptoms. The present study investigated the relationship between suicidality, depression, and sleep complaints in a clinical outpatient setting.
Design and Setting: Upon admission, 176 outpatients completed measures on sleep disturbances, suicidal symptoms, and depression. Several sleep disturbances were evaluated with regard to suicidal ideation, including insomnia, nightmares, and sleep-related breathing symptoms.
Measurements and Results: Regression analyses revealed that insomnia and nightmare symptoms were associated with both depressive symptoms and suicidality. Sleep-related breathing symptoms were associated with depressive symptoms, but did not show an association with suicidal ideation. After controlling for depressive symptoms, only nightmares demonstrated an association with suicidal ideation. This relationship emerged as a nonsignificant trend (P = .06). Nightmares were particularly associated with suicidality among women compared with men. Posthoc analyses revealed that, after controlling for sex and depressive symptoms, nightmare symptoms were significantly associated with suicidality (P = .04).
Conclusions: Although insomnia and nightmares were significantly associated with depressive and suicidal symptoms, after controlling for additional variables, such as depression and sex, only nightmares remained associated with suicidality. This association was slightly stronger among women compared with men.
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INTRODUCTION

SUICIDE IS A LEADING CAUSE OF DEATH. APPROXIMATELY 30,000 PEOPLE DIE BY SUICIDE EACH YEAR IN THE UNITED STATES ALONE.[1] ATTEMPTED SUICIDES are believed to far exceed this number. It is estimated that 10 to 25 nonlethal suicide attempts occur for every completed suicide.[2] Improvements in the identification of risk factors for suicidal behavior ultimately enhance our ability to intervene and prevent death by suicide. Increasing evidence suggests that sleep disturbances are associated with an elevated risk for suicidal behavior. Sleep disorders and general sleep complaints appear to be linked to greater levels of suicidal ideation and depression.[3,4] Several studies have also demonstrated that disturbed sleep is related both to suicide attempts and to completed suicide.[5,6]

In 1990, Fawcett and colleagues conducted one of the first studies to prospectively examine sleep, depression, and suicide.[7] In a group of depressed patients, symptoms of global insomnia were more severe among those who completed suicide within a 13-month period. This finding suggested that insomnia may be considered a clinical indicator of acute suicidal risk, particularly when it appears in the midst of a depressive episode. Agargun, Kara, and Solmaz[8] demonstrated a similar link between suicidality, depression, and sleep complaints. Depressed subjects suffering from either hypersomnia or insomnia showed significantly higher scores on measures of suicidality. In a separate study, these authors also examined self-reported sleep quality among depressed patients.[4] Subjective sleep quality was significantly more disturbed among suicidal versus nonsuicidal patients. Next, an association between poor sleep quality and suicide has been prospectively studied in at least 1 community sample of men and women. Turvey and colleagues[6] assessed numerous health variables among a large group of elderly subjects. Poor self-reported sleep quality was linked to suicide within 10 years. Although depression showed the strongest relationship with suicide, poor sleep quality increased the risk for suicide by 34%.

Sleep abnormalities in depression and suicide have also been investigated using objective measurements of sleep. In a retrospective analysis of sleep architecture, Sabo et al[5] compared depressed patients with and without a history of suicide attempts. Electroencephalographic sleep studies revealed that those with a history of suicide showed a lower sleep efficiency, a longer sleep latency, and fewer late-night delta counts. More recently, Agargun and Cartwright[9] investigated the relationship between rapid eye movement (REM) sleep, dream variables, and suicidality in depression. Compared with nonsuicidal subjects, suicidal patients averaged a shorter sleep latency, a higher REM percentage, and a more negative dream-like quality of REM.

Nightmares appear to be more common among suicidal versus nonsuicidal subjects with major depression. Depressed patients with self-reported repetitive and frightening dreams are more likely to be classified as suicidal, compared with those without frequent nightmares.[10] A similar relationship recently emerged in a prospective, population-based study conducted in Finland. Tanskanen et al[11] revealed an association between nightmare frequency at baseline and completed suicides at follow-up, roughly

14 years later. Compared with subjects reporting no nightmares, those reporting occasional nightmares were 57% more likely to commit suicide. Among those with frequent nightmares, the risk for suicide increased dramatically; individuals reporting frequent nightmares were 105% more likely to commit suicide compared with individuals reporting no frightening dreams.

Apart from nightmares and insomnia, other sleep complaints, such as sleep-disordered breathing, have been researched even less frequently with regard to suicidality and depression. To our knowledge, only 1 study has investigated the relationship between sleep-disordered breathing, suicidal ideation, and depressive symptoms. Krakow et al[3] examined subjective sleep disturbances in 153 female sexual assault survivors with posttraumatic stress disorder. Each woman completed various questionnaires assessing sleep quality, depressive symptoms, and suicidality. Participants were originally recruited for a nightmare-treatment program, which may have inflated the prevalence of other co-occurring sleep complaints. Nonetheless, results indicated that women who experienced a potential sleep-related breathing disorder also suffered significantly greater levels of depression and suicidality. Problematic breathing during sleep is often associated with frequent arousals throughout the sleep period. These authors speculated that physiologic sleep fragmentation might contribute to "emotional exhaustion," which has been reported in patients exhibiting suicidal behavior.

Taken together, sleep is a topic that deserves considerable attention in suicide research. Despite the connection observed between sleep and suicide, it remains relatively unclear how these 2 constructs relate to one another after controlling for depression. In several reports, the association between sleep and suicide did not appear to be entirely independent of depressive symptoms.[3,4] Although sleep disturbances are linked to suicidality, this relationship may often be accompanied by higher depression ratings. At least 1 study demonstrated a connection between suicide and sleep complaints that was not explained by depression. Keshavan and colleagues[12] examined REM sleep in psychotic patients with and without a history of suicide attempts or ideation. Patients with a history of suicidal behavior showed more REM activity, and REM sleep parameters were not correlated with depression scores. Also, when depression ratings were covaried out, these differences in sleep remained.

Teasing apart potentially important sleep variables could lead to better prognostic indicators for suicidal patients. This study examined how specific symptoms of sleep disturbance relate to suicidal symptoms when controlling for depression. Given the paucity of research that has looked at the relationship between nightmares, depression, and suicidality, this study examined how both insomnia and frightening dreams relate to suicidality. Self-reported breathing symptoms during sleep were also evaluated with regard to suicidal ideation and depressive symptoms. We hypothesized that specific sleep problems, including insomnia, nightmare frequency, and sleep-related breathing problems, would be associated with depressive symptoms. Next, we predicted that insomnia, nightmare frequency, and sleep-related breathing symptoms would be associated with suicidality. Finally, these relationships were expected to exist even after controlling for depressive symptoms.

Table 1—Sample Diagnostic Characteristics

Diagnosis	Overall %	No.
Anxiety Disorder	23.0	41
Panic Disorder	4.8	8
Generalized Anxiety Disorder	13.0	23
Social Phobia	0.5	1
Specific Phobia	0.5	1
Posttraumatic Stress Disorder	2.3	4
Obsessive Compulsive Disorder	0.5	1
Anxiety Disorder NOS	1.7	3
Mood Disorder	39.0	69
Major Depressive Disorder	22.0	39
Bipolar I Disorder	2.8	5
Bipolar II Disorder	3.4	6
Dysthymic Disorder	9.7	17
Depressive Disorder NOS	0.5	1
Mood Disorder Due to Medical Condition	0.5	1
Eating Disorder	5.7	10
Bulimia Nervosa	1.7	3
Anorexia Nervosa	1.1	2
Eating Disorder NOS	2.8	5
Schizophrenia Disorder	1.1	2
Schizophrenia, Undifferentiated Type	0.5	1
Schizophrenia, Paranoid Type	0.5	1
Substance-Related Disorder	21.0	37
Alcohol Abuse or Dependence	10.0	18
Cocaine Abuse or Dependence	3.4	6
Cannabis Abuse or Dependence	5.1	9
Sedative/Hypnotic Dependence	1.1	2
Substance-Induced Mental Disorder	1.1	2
Other Disorders or Conditions	22.0	39
Attention Deficit or Disruptive Disorder	3.4	6
Adjustment Disorder	3.4	6
Learning Disorder	10.8	19
Pervasive Developmental Disorder	0.5	1
Impulse-Control Disorder	1.1	2
Communication Disorder	0.5	1
Relational, Academic, or Grief Problems	1.7	3

METHODS

Participants and Procedures

Data were collected in an outpatient mental health clinic (Psychology Clinic, Florida State University) from January 2003 to November 2003 (N = 176). Study procedures were thoroughly described, and written informed consent was obtained from all participants. Upon admission to the clinic, outpatients completed clinical intake measures on insomnia (Insomnia Severity Index; ISI), nightmares (Disturbing Dreams and Nightmare Severity Index; DDNSI), sleep-related breathing symptoms, depression (Beck Depression Inventory; BDI), and suicidality (Beck Suicide Scale; BSS).

Though university-affiliated, the Psychology Clinic primarily services nonstudents who present with clinical disorders typical of those seen in a community-based outpatient mental health setting (see Table 1 for diagnostic information). Only minimal exclusionary criteria are employed; patients with psychotic-spectrum disorders or bipolar disorders are referred elsewhere unless and until they are stabilized on medications. Patients who are at a clear and imminent risk to themselves or others are referred to inpatient hospitalization.

Table 2—Clinical Severity Descriptives		
Clinical Severity	**%**	**N**
Beck Depression Inventory		
Minimal Symptoms	46.3	81
Mild Symptoms	16.0	28
Moderate Symptoms	22.3	39
Beck Suicide Scale		
Mild Symptoms	84.1	148
Moderate Symptoms	10.2	18
Moderate-Severe Symptoms	5.7	10
Insomnia Severity Index		
No Clinically Significant Insomnia	35.4	62
Subthreshold Insomnia Scores	34.3	60
Clinical Insomnia, Moderate	22.3	39
Clinical Insomnia, Severe	8.0	14
Disturbing Dreams and Nightmare Inventory		
Non-Clinical Symptoms	71.8	125
Clinically Significant Symptoms	23.0	40
Clinical Symptoms, Severe	5.2	9
Breathing Subscale*		
Item Number 1		
Yes	19.9	35
No	77.8	137
Item Number 2		
Yes	9.1	16
No	89.9	158
Item Number 3		
Yes	8.5	15
No	89.8	158

*The Breathing Subscale consists of 3 total items: Item 1: Would others say that you snore loudly?; Item 2: Have you or others moved from the bedroom because of your snoring?; Item 3: Would you or others say that you have trouble breathing while you sleep, such as stopping breathing, choking, or gasping for breath?

MATERIALS

Insomnia Severity Index

The ISI is a 7-item self-report scale that assesses subjective symptoms of insomnia, including the degree of distress caused by this particular sleep complaint. Each item is scored on a 0 to 4 scale, with a maximum total scale score of 28. A higher score represents greater severity of insomnia. More specifically, lower scores typically indicate no clinically significant insomnia (0-7) or subthreshold insomnia (8-14). Higher scores indicate clinical levels of insomnia that are either moderate (15-21) or severe (22-28). A cut-off score of 14 is generally consistent with clinical insomnia.[13] In our sample, 30% of patients (n = 53) scored in the clinical range (See Table 2 for Clinical Severity Descriptives). The internal consistency of this questionnaire and convergence with other insomnia measures have been well supported.[14,15] The internal consistency of this scale for our sample was .89.

Breathing Symptoms Subscale

Three additional items were administered on the ISI form to assess snoring, breathing problems, and sleep disruption due to breathing problems. These items comprised the Breathing Symptoms Subscale. This 3-item subscale assesses snoring and other nighttime respiratory irregularities (eg, witnessed apnea) that may disrupt sleep. The questions posed on this scale are likely to screen for more-severe patterns of sleep-disordered breathing, such as obstructive sleep apnea. The subscale includes the following 3 questions: (1) Would others say that you snore loudly? (2) Have you or others moved from the bed/bedroom because of your snoring? and (3) Would you or others say that you have other trouble breathing while you sleep, such as stopping breathing, choking, gasping, or struggling for breath? Roughly 78% of clients did not endorse sleep-related breathing symptoms; 12.1% endorsed 1 item, 3.4% endorsed 2 items, and 6.3% endorsed all 3 items (See Table 2 for Clinical Severity Descriptives). The internal consistency of this scale for our sample was .79.

Disturbing Dreams and Nightmare Severity Index

The DDNSI is a 5-item self-report scale that addresses disturbing dreams and nightmares. This scale is a revised version of the Nightmare Frequency Questionnaire.[16] The DDNSI provides an index of global nightmare severity by measuring the number of nights of nightmares per week (0-7), the number of nightmares experienced per week (0-14), the frequency of awakenings due to nightmares (0 = never to 4 = always), the severity of the nightmare problem (0 = no problem to 6 = very severe), and the intensity of the nightmares (0 = not intense to 6 = extremely severe intensity).[17] The scale is summed to produce an overall index of nightmare severity (range = 0-37). Scores above 10 are consistent with clinical levels of disturbing dreams and nightmares. Scores above 20 are generally consistent with a more severe nightmare disorder. Approximately 27.8% of clients (n = 49) scored in the clinical range for nightmare symptoms; 22.7% (n = 40) showed scores consistent with a nightmare disorder, and 5.1% (n = 9) showed scores consistent with a more severe nightmare disorder (See Table 2 for Clinical Severity Descriptives). The internal consistency of this scale for our sample was .84.

Beck Depression Inventory

The BDI is a 21-item self-report inventory that is used to assess the presence of depressive symptoms. Participants are asked to indicate which statement best describes the way they have been feeling over the past 2 weeks. Each question is scored on a 0 to 3 scale. Total scores on the BDI can range from 0 to 63, with higher scores reflecting greater levels of depressive symptoms. Although the BDI is not indicative of the full clinical syndrome of depression, it has yielded adequate reliability estimates, and it has been well validated as a measure of depressive symptomatology.[18,19] In our patients, 46.3% showed minimal symptoms (scores 0-13); 16% showed mild symptoms (scores 14-19); 22.3% showed moderate symptoms (scores 20-28); and 15.4% showed severe depressive symptoms (scores 29-63). (See Table 2 for Clinical Severity Descriptives).

Beck Scale for Suicide Ideation

The BSS is a 21-item self-report instrument that assesses the severity of suicidal ideation.[20] Participants circle statements that best describe their feelings over the past week, and each item is scored on a 0 to 2 scale. The first 19 items are scored, whereas the last 2 items, which inquire about the history of suicide attempts, are not scored. Total scores on the BSS can thus range from 0 to 38 points, with higher scores indicating greater levels of suicidality. The BSS has demonstrated strong reliability and validity.[21,22]

In our sample, 84.1% scored in the mild range (scores 0-4), 10.2% scored in the moderate range (scores 5-15), and 5.7% scored in the moderate to severe range for suicide risk (scores 16-23). (See Table 2 for Clinical Severity Descriptives).

Sample Characteristics

Age and Ethnicity

The average age in this sample was 26.9 years (SD = 9.2), and patients ranged in age from 18 to 60 years. Women comprised approximately 60% of this sample. The ethnic composition of this group was 84.4% Caucasian, 6.3% Hispanic, 6.3% African-American, and 3.1% Asian-American.

Marital Status

Roughly 77% of the sample had never been married, 6.8% were married, 7.4% were divorced, 2.3% were separated, 1.1% were widowed; the remainder were of unknown marital status.

Clinical Severity and Comorbidity

According to ratings from the Clinical Global Impression (CGI), the majority of patients in this sample were considered moderately ill. At intake, therapists assigned CGI ratings using 7 clinical categories; these ratings range from 1 (normal) to 7 (among the most extremely ill patients). Approximately 12.6% were judged to be "normal, not ill at all;" 8.9% were considered "borderline mentally ill;" 16.3% were considered "mildly ill;" 38.5% were judged to be "moderately ill," and 17% were judged to be "markedly ill." Roughly 6.7% were considered "severely ill," whereas no clients were rated "among the most extremely ill patients." Comorbidity was common in this sample. Roughly 35% of our sample had 2 or more diagnoses across Axis I and Axis II, 35.2% had one diagnosis, and 33.5% of the sample did not have a clinical disorder across Axis I or Axis II.

Suicidal Symptoms

Although current suicidal symptoms were the primary focus of the present study, a past history of suicidal behaviors provides additional information regarding clinical severity. A brief screening questionnaire was administered to assess past history of suicide attempts. Roughly 15.3% of patients reported at least 1 past suicide attempt. Of those who had previously attempted suicide, 15% had attempted within the past month; 19% had attempted within the last year; 33% had attempted within the last 5 years, and the remaining 33% had attempted more than 5 years prior to the study.

Statistical Analyses

Analyses were conducted to investigate the association between specific sleep disturbances, depressive symptoms, and suicidal ideation. First, 3 simple linear regressions were conducted to determine whether correlations between variables were statistically significant. These were performed to determine if insomnia, sleep-related breathing symptoms, and nightmare symptoms were associated with depressive and suicidal ideation symptoms.

Next, 3 multiple standard regressions were performed to assess the link between sleep disturbances, depression, and suicidality.

Table 3—Correlations and Descriptive Statistics

	1.	2.	3.	4.	5.
1. ISI	---				
2. DDNSI	.43***	---			
3. BS	.21**	.21**	---		
4. BSS	.20**	.30***	.02	---	
5. BDI	.54***	.49***	.18*	.43***	---
Mean	10.79	5.82	0.38	2.24	16.08
SD	6.91	7.51	0.83	4.81	11.09

*P < .05
**P < .01
***P < .001

ISI refers to Insomnia Severity Index; DDNSI, Disturbing Dreams and Nightmare Severity Index; BS, Breathing Subscale; BSS, Beck Scale for Suicidal Ideation; BDI, Beck Depression Inventory.

For example, a multiple regression was performed to determine (a) if all 3 sleep variables, taken as a set, would be associated with depressive symptoms and (b) whether each specific sleep variable (insomnia, nightmares, sleep-related breathing symptoms) would be associated with depressive symptoms, controlling for each of the other sleep variables. Another multiple regression was performed to (a) determine if all 3 sleep variables, taken as a set, would be associated with suicidal symptoms and (b) determine whether each specific sleep variable (insomnia, nightmares, sleep-related breathing symptoms) would be associated with suicidality symptoms, controlling for each of the other sleep variables. A final multiple regression was performed to assess the link between sleep disturbances and suicidality, controlling for depressive symptoms. For this regression analysis, our dependent variable was BSS scores. Block 1 included the following independent variable: BDI scores. Block 2 consisted of the following independent variables: ISI, DDNSI, and Breathing Subscale scores.

To control for possible confounding of independent variables, posthoc analyses included 1 multiple regression. The following covariates were entered into Block 1 of the regression: age, sex, BDI scores, and diagnostic groupings. Block 2 consisted of the following independent variables: ISI, DDNSI, and Breathing Subscale scores. In this analysis, similar to previous analyses, the dependent variable included BSS scores. To control for Axis I and Axis II diagnoses in the regression, 3 new variables were created to designate broad diagnostic groupings: mood disorder diagnosis (yes/no), anxiety disorder diagnosis (yes/no), and personality disorder diagnosis (yes/no). These variables were dummy coded (1 = yes, 0 = no). Thirty-nine percent (n = 69) of the sample had a mood disorder diagnosis; 23.3% (n = 41) had an anxiety disorder diagnosis; and 12.5% (n = 22) had a personality disorder diagnosis. Personality disorders included avoidant personality disorder (n = 1), borderline personality disorder (n = 7), personality disorder not otherwise specified (n = 6), histrionic personality disorder (n = 2), dependent personality disorder (n = 2), narcissistic personality disorder (n = 1), obsessive compulsive personality disorder (n = 2), and antisocial personality disorder (n = 2).

RESULTS

Correlations between variables and other descriptive information are presented in Table 3. Regression analyses were used to determine whether insomnia, nightmares, and sleep-related

Table 4—Descriptive Statistics by Sex

Sex	No.	ISI Mean (SD)	DDNSI Mean (SD)	BS Mean (SD)	BSS Mean (SD)	BDI Mean (SD)
Women	104	11.4 (6.8)	7.6 (8.3)***	.31 (.78)	2.6 (5.2)	18.7 (11.0)***
Men	72	9.9 (6.9)	3.2 (5.3)	.50 (.91)	1.7 (4.2)	12.5 (10.2)

***P < .001. Posthoc analyses show significantly different scores on the Beck Depression Inventory (BDI) and Disturbing Dreams and Nightmare Severity Index (DDNSI) between men and women.
ISI refers to Insomnia Severity Index; BS, Breathing Subscale; BSS, Beck Scale for Suicidal Ideation.

Table 5—Descriptive Statistics Across Broad Diagnostic Groupings

	No.	ISI Mean (SD)	DDNSI Mean (SD)	BS Mean (SD)	BSS Mean (SD)	BDI Mean (SD)
All Diagnoses	176	10.8 (6.9)	5.8 (7.5)	.38 (.83)	2.2 (4.8)	16.1 (11.1)
Mood Disorder Diagnosis						
Yes	69	12.9 (6.7)	7.9 (8.0)	.39 (.87)	4.2 (6.4)	21.6 (9.5)
No	107	9.4 (6.7)	4.5 (6.9)	.37 (.81)	.99 (2.8)	12.6 (10.6)
Anxiety Disorder Diagnosis						
Yes	38	13.4 (6.5)	9.2 (6.9)	.57 (.93)	2.6 (4.6)	18.4 (7.8)
No	138	10.1 (6.9)	4.9 (7.4)	.33 (.80)	2.1 (4.9)	15.5 (11.8)
Personality Disorder Diagnosis						
Yes	22	13.6 (6.8)	8.1 (8.0)	.32 (.78)	4.1 (7.1)	18.3 (11.3)
No	154	10.4 (6.9)	5.5 (7.4)	.39 (.84)	2.0 (4.4)	15.7 (11.0)

ISI refers to Insomnia Severity Index; DDNSI, Disturbing Dreams and Nightmare Severity Index; BS, Breathing Subscale, BSS, Beck Scale for Suicidal Ideation; BDI, Beck Depression Inventory.

breathing symptoms were significantly associated with depressive symptoms. In support of the hypotheses, all sleep variables were individually associated with depressive symptoms (see Table 3). Next, a regression analysis was performed to determine the unique contribution of each sleep variable, controlling for the other 2, to the statistical prediction of depressive symptoms. Results revealed that the ISI, the DDNSI, and the Breathing Subscale, as a set, were significantly associated with scores on the BDI (R^2 = .38, $F_{3,166}$ = 34.46, P < .001). This analysis revealed that, in contrast with the ISI (ß = .43, t = 6.26, P < .001) and the DDNSI (ß = .29, t = 4.26, P < .001), the Breathing Subscale did not significantly contribute to the variance beyond that contributed by insomnia and nightmares (ß = .04, t = .62, P = .53).

Additional analyses revealed that insomnia symptoms and nightmares were significantly associated with suicidal ideation, as measured by the BSS. In contrast with these variables, sleep-related breathing symptoms were not associated with suicidal ideation (see Table 3). When all 3 sleep variables were entered simultaneously into the regression, these items were significantly associated with scores on the BSS (R^2 = .10, $F_{3,167}$ = 6.48, P < .001). This analysis revealed that insomnia symptoms (ß = .10, t = 1.23, P = .21) and sleep-related breathing problems (ß = -.06, t = -.798, P = .43) did not contribute to the variance beyond that contributed by the DDNSI (ß = .28, t = 3.37, P = .001).

A final regression analysis was performed to determine if suicidality was associated with sleep disturbances after controlling for depression. This was a particularly stringent requirement considering the strong association between depression and suicidal symptoms. In our analysis, the BSS was included as the dependent variable. To control for depression, the BDI was entered into Block 1 of the regression equation. Block 2 consisted of the following independent variables: the ISI, the DDNSI, and the Breathing Subscale. Results indicated that, after controlling for depressive symptoms, insomnia and sleep-related breathing

problems were not significantly associated with suicidality (ISI: ß = -.07, t = -.848, P = .39; Breathing: ß = -.45, t = -1.08, P = .28). Results did suggest, however, that the presence of nightmares uniquely contributed to suicidality, even after controlling for depression. Before controlling for gender, this effect was a non-significant trend (ß = .15, t = 1.88, P = .06). Interestingly, after controlling for sex, the association between nightmares and suicidality was statistically significant (ß = .17, t = 2.07, P = .04). In general, sex was associated with higher mean depression and nightmare scores (See Table 4). Finally, all associations remained significant after controlling for age and broad diagnostic groupings (mood disorder, anxiety disorder, and personality disorder diagnoses) (See Table 5).

DISCUSSION

In line with expectation, results revealed that depression was associated with nightmares, insomnia, and sleep-related breathing problems. This finding is consistent with research indicating a distinct relationship between sleep disturbances and depression. Numerous sleep abnormalities are linked to depressive illness, including decreased REM latency, decreased sleep continuity, decreased slow-wave sleep (SWS), increased REM percentage, decreased sleep efficiency, and increased wakefulness.[23] In addition to these findings, several studies have reported that sleep abnormalities in SWS, REM distribution, and dream quality are linked to both depression remission and recurrence.[24-26] Specific sleep complaints appear to be a prodromal feature of depression. In recurrent depression, for example, Perlis et al[27] demonstrated that self-reported insomnia symptoms worsen just prior to the onset of the next depressive episode. Insomnia also confers considerable risk for new episodes of depression. More than 8 epidemiologic studies have shown that insomnia symptoms at baseline predict an increased risk for depression at follow up, anywhere from 1 to 3 years later.[28]

Results revealed that the 3 sleep variables, taken as a set, were associated with depressive symptoms. Analyses indicated, however, that sleep-related breathing symptoms did not contribute to the variance beyond that contributed by insomnia and nightmare symptoms. Sleep-related breathing symptoms were not significantly associated with suicidal ideation. These results contrast the findings of Krakow and colleagues,[3] who found an association between potential sleep-related breathing disorders and greater levels of suicidality and depression. Our study aimed to identify symptoms of gross sleep-related breathing disruption likely to be seen in obstructive sleep apnea. Sleep-related breathing disorders in psychiatric patients may take the more subtle form, however, of upper airway resistance syndrome, which is not typically associated with loud snoring or witnessed apneas. These distinctions may have accounted for the lack of correspondence between studies. It is also possible that an association between sleep-related breathing problems and depression and suicidality may be stronger among certain clinical populations. Krakow et al studied female sexual assault survivors suffering from posttraumatic stress disorder, whereas our study focused on a more general sample of clinical outpatients.

Our results showed that insomnia and nightmare symptoms, unlike sleep-related breathing problems, were associated with suicidal ideation. Although all 3 sleep variables were collectively associated with suicidal ideation, insomnia and sleep-related breathing symptoms did not contribute to the variance beyond that contributed by nightmare symptoms. Contrary to expectation, insomnia and sleep-related breathing symptoms also failed to show a relationship with suicidal ideation beyond depression. Results instead indicated that only nightmares were associated with suicidal ideation, although this relationship was not statistically significant at the $P < .05$ level. Before controlling for sex, a nonsignificant trend emerged between nightmare symptoms and suicidality, and this relationship remained after controlling for depression. After controlling for sex, the link between nightmare symptoms and suicidal ideation was statistically significant. This finding indicates that the association between nightmares and suicidality, while controlling for depression, was somewhat stronger among women versus among men.

To compare the magnitude of these associations, we can use standardized ß coefficients as the primary effect-size metric. The strength of the relationship between nightmares and depression appeared virtually identical to the strength of the relationship between nightmares and suicidality (ß = .29 and .28). After controlling for depressive symptoms, a connection between nightmares and suicidality remained, though the strength of this association was smaller (ß = .15). After controlling for sex, the strength of this association increased slightly (ß = .17). Overall, women showed higher mean scores for both depression and nightmare symptoms (See Table 4) than men. Such findings indicate that the relationship between nightmares and suicidal symptoms was slightly stronger among women compared with men. These associations are not likely to be explained away by the presence of posttraumatic stress disorder; posttraumatic stress disorder was, in fact, relatively rare in our sample (n = 4). Furthermore, after controlling for anxiety diagnoses, mood disorder diagnoses, and personality disorder diagnoses, these significant findings remained.

These results are consistent with previous research showing a link between self-reported frightening dreams and suicidality. In 1998, Agargun et al[10] reported that depressed individuals experiencing frequent nightmares were more likely to be classified as suicidal versus nonsuicidal. Tanskanen et al[11] demonstrated that this relationship may be extended to completed suicides. In a population-based study, nightmare frequency at baseline was associated with suicide completion more than a decade later. A more recent study investigated nightmares and suicidal ideation in patients with dissociative disorders.[29] Nightmare disorders were present in over half of dissociative patients. Compared with patients without nightmares, subjects with a nightmare disorder had higher rates of self-mutilation. Moreover, those with nightmare disorders were more likely to have attempted suicide within the last year.

Research investigating the association between nightmares and suicidality is relatively sparse. Our study adds to the literature in several ways. First, it supports earlier investigations reporting a link between nightmares and suicidality. Next, it indicates that this relationship is not entirely explained by depression. Nightmares, unlike insomnia symptoms and sleep-related breathing problems, showed some association with suicidal ideation. Although this connection emerged as a nonsignificant trend, it is striking that a link between nightmares and suicidality remained after the removal of a variable (depression) that is closely intertwined with both suicidality and sleep problems. To our knowledge, this is the first study to examine the connection between nightmares and suicidality in adults after specifically accounting for depressive symptoms. A recent study found a similar association in an adolescent sample in China. Liu[30] (2004) conducted a questionnaire study among 1,362 young adults (aged 12-18 years) to assess the relationship between sleep disturbances and suicidal behaviors. Liu reported a significant link between nightmares and suicidal ideation, even after controlling for age, sex, and demographic variables. This group also reported a significant link between insomnia symptoms and suicidal ideation; however, after controlling for depressive symptoms, the significance of the association between insomnia and suicidality disappeared.

Our study suggests that nightmares, in particular, deserve more rigorous attention in both suicide and sleep research. Fawcett and colleagues[7] previously identified insomnia as 1 of several "modifiable risk factors" for suicidal behavior. Global insomnia was described as a symptom that may be clinically targeted to reduce suicidal risk. Our study indicates that it may be appropriate to treat nightmares as an equally important clinical risk factor for suicidality. Moreover, recent therapeutic advances have demonstrated the relative ease of decreasing nightmares using cognitive-imagery techniques[31] or using the agent, Prazosin.[32] In our study, nightmares were particularly associated with suicidal ideation among female patients. As a result, the thorough assessment of nightmare symptoms, alongside the careful clinical assessment of suicidal symptoms, may be especially important or informative among women. To further elucidate the role of nightmares in suicide, future investigations could specifically examine nightmares, sex, and suicidal behaviors in randomized controlled trials—using evidence-based nightmare interventions.

Limitations

First, our reliance on self-reported indices of sleep, particularly when evaluating sleep-related breathing problems, may limit the findings of this study. Although our investigation aimed only to measure symptoms of sleep-related breathing problems, our 3-

item subscale may have been insufficient to adequately detect this specific sleep disturbance. Our Breathing Subscale has not been formally validated, and, as a result, it may have provided an incomplete or inaccurate assessment of sleep-related breathing symptoms. Moreover, unlike clinical insomnia and nightmare disorders, the diagnosis of sleep-related breathing disorders customarily requires polysomnography monitoring.[33,34] It may be clinically useful, therefore, to determine whether our findings on sleep-related breathing, insomnia, and nightmare symptoms could be replicated using either more comprehensive questionnaires or objective measurements of sleep. Second, our analyses investigated the link between insomnia symptoms and depression, perhaps suggesting that such symptoms are orthogonal. In fact, at the diagnostic level, insomnia is considered to be a symptom of depression. This overlap is important to acknowledge; nevertheless, it is unlikely to explain away our key finding between nightmare symptoms and suicidal ideation. Sleep problems were not included in our suicidal ideation measure, and, yet, nightmare symptoms showed some association with suicidality. Finally, due to the cross-sectional design of our study, a causal link between nightmares and suicidal ideation cannot be established. Prospective, longitudinal studies will be necessary to thoroughly evaluate causal relationships between nightmare symptoms, depression, and suicidality.

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