# Nocturnal Sleep Disturbances as a Predictor of Suicide Attempts Among Psychiatric Outpatients: A Clinical, Epidemiologic, Prospective Study

Shirley X. Li, MA; Siu P. Lam, MRCPsych, FHKAM (Psych); Mandy W. M. Yu, MPH, RPSGT; Jihui Zhang, MD; and Yun K. Wing, FRCPsych, FHKAM (Psych)

***Objective:*** Nocturnal sleep disturbances, including insomnia and recurrent nightmares, represent common distressing sleep complaints that might have important prognostic and therapeutic implications in psychiatric patients. The present study aimed at investigating nocturnal sleep disturbances in relation to the risk of suicide attempts in a consecutive cohort of psychiatric outpatients.

***Method:*** Participants attending a psychiatric outpatient clinic in Hong Kong were recruited into the study with a detailed sleep questionnaire assessment. The questionnaire was distributed between May and June 2006. Relevant clinical information, with a comprehensive clinical history of patients since their attendance at psychiatric services and 1 year after completion of their questionnaires, was reviewed.

***Results:*** The final study population consisted of 1,231 psychiatric outpatients with a mean age of 42.5 years (SD = 11.3; range, 18–65). Both frequent insomnia and recurrent nightmares were significantly and independently associated with an increased incidence of suicide attempts 1 year after questionnaire assessment (insomnia: OR = 6.96; 95% CI, 1.21–39.97; recurrent nightmares: OR = 8.17; 95% CI, 1.06–63.13) and an increase in lifetime prevalence of suicide attempts (insomnia: OR = 1.55; 95% CI, 1.06–2.25; recurrent nightmares: OR = 2.43; 95% CI, 1.51–3.91). Comorbid insomnia and nightmares had increased odds of lifetime prevalence (OR = 2.43; 95% CI, 1.53–3.85) and 1-year incidence of suicidal risk (OR = 17.08; 95% CI, 2.64–110.40). Antidepressants, particularly selective serotonin reuptake inhibitors (OR = 1.52; 95% CI, 1.02–2.25), serotonin-norepinephrine reuptake inhibitors (OR = 2.10; 95% CI, 1.15–3.83), heterocyclics (OR = 2.78; 95% CI, 1.21–6.42), and non-benzodiazepine hypnotics (OR = 1.54; 95% CI, 1.02–2.33) were independently associated with recurrent nightmares after adjustment for confounding variables.

***Conclusions:*** Nocturnal sleep disturbances, particularly frequent insomnia and recurrent nightmares, were independently associated with enhanced suicidal risk among psychiatric patients. Future studies are warranted to investigate the underlying pathophysiologic mechanism and interventional responses.

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***Corresponding author:*** *Yun K. Wing, FRCPsych, FHKAM (Psych), Sleep Assessment Unit, Department of Psychiatry, Faculty of Medicine, The Chinese University of Hong Kong, Shatin, Hong Kong SAR (ykwing@cuhk.edu.hk).*

Nocturnal sleep disturbances are among the most prevalent and prominent presenting symptoms of psychiatric disorders. In particular, insomnia and recurrent nightmares are 2 common sleep complaints. They are often associated with a constellation of detrimental effects, including profound personal distress,[1,2] susceptibility to future psychiatric illness,[3,4] exaggeration of other clinical symptoms, and conspicuous impairment of social and occupational functioning.[5] Several recent studies suggested important prognostic and therapeutic implications of sleep disturbances, particularly a potential link in predicting suicidality.[6–9] Nonetheless, most previous studies were constrained by either cross-sectional design[6,7] or reliance on a small number of selected clinical samples (eg, depressive patients).[8,9] Two population-based cohort studies conducted in Finland[10] and Japan[11] revealed that subjects having repetitive nightmares or difficulty maintaining sleep at baseline had higher risk of completed suicide over 10 years of follow-up as compared to those without sleep disturbances. While these 2 studies may provide community-based data on the prospective association between sleep and suicide in the distant future, little is known regarding the magnitude of this relationship in the short term, within the context of routine psychiatric settings. As one of the most difficult challenges faced by clinicians is immediate suicide risk assessment and intervention, better understanding of the association between sleep disturbances and suicide risk may have important clinical implications for future management of psychiatric illness and prevention of suicide.

In addition to a close association with a broad spectrum of psychopathology, etiologic factors that were associated with sleep disturbances included demographic characteristics,[2,12,13] stress,[14–16] personality features,[17,18] and medical disorders.[19] On the other hand, there has been increasing awareness of psychotropic-related sleep disruptions in psychiatric patients.[20–22] Several studies have suggested that non-benzodiazepine hypnotics might increase individual susceptibility to nightmares.[23–25] In addition, antidepressants, particularly selective serotonin reuptake inhibitors (SSRIs), have been associated with clusters of side effect

**For Clinical Use**

- Frequent insomnia and recurrent nightmares could have a clinically prognostic significance in predicting suicide attempts in psychiatric outpatients.
- There is a necessity for enhancement of integrated management of sleep problems in psychiatric patients.

symptoms, including insomnia[26] and nightmares.[27–29] Nonetheless, there is a paucity of systematic studies looking into the association between the common sleep complaint (ie, recurrent nightmares) and psychopharmacologic treatment from a clinical and epidemiologic perspective.

The aim of the current study was to prospectively investigate the association between nocturnal sleep disturbances, particularly frequent insomnia and recurrent nightmares, and suicide attempts over 1 year of follow-up and to conduct a retrospective evaluation on several clinical correlates of nocturnal sleep disturbances and their association with lifetime history of suicide attempts in a consecutive cohort of psychiatric outpatients.

## METHOD

### Procedure and Study Participants

The current study was part of a clinical epidemiologic study on sleep problems among psychiatric outpatients, which was approved by an institutional ethics committee. Detailed procedures of the study can be found in our previous publication.[20] In brief, the current study was conducted in the psychiatric outpatient clinic of a regional public hospital, serving 8.9% (0.6 million) of the total population in Hong Kong. A sleep questionnaire was distributed to all eligible patients aged 18–65 years old attending the clinic from May to June in 2006. Collateral information on participants' sleep habits and problems was obtained from their family or cohabitants whenever possible. Patients were excluded from the study if they met the following criteria: (1) being unable to provide a valid informed consent; (2) being mentally handicapped or having organic brain syndrome; (3) having a hearing or speech deficit; and (4) attending a sleep clinic. Written informed consent was collected with completed questionnaires from all study participants.

Each study participant was diagnosed by the attending psychiatrists in accordance with the *International Classification of Diseases*, Tenth Revision (*ICD-10*), criteria. Relevant clinical information of the study participants was reviewed in the Clinical Management System (CMS), an integrated computerized clinical workstation that is being used in all public hospitals in Hong Kong. The CMS is intended to document a comprehensive and detailed clinical history of a patient. Information collected for the study included socioeconomic status, medical history, duration of mental illness, prescription of psychotropic medications, documented lifetime history of suicide attempt(s), and suicide attempt(s) over 1 year of follow-up after assessment. A suicide attempt was defined as an act of intentional self-harm to end one's life, as documented by case notes.[30,31] Collection of data on history of suicide attempts was carried out in 2008. Documentation of suicide attempts from July 2006 to June 2007 was used to analyze the prospective association between nocturnal sleep disturbances, as reported in 2006, and suicide attempts 1 year after assessment.

### Instrument

The sleep questionnaire used in the current study has been validated locally and was designed to collect information on sleep-related behavioral factors over lifetime and 1-year basis.[20] It consisted of items on demographic characteristics, sleep habits, and specific sleep problems, including insomnia, nightmares, and other sleep symptoms. Frequency of sleep disturbances, including insomnia and nightmares over the previous year, was determined on a 5-point scale (0 = none, 1 = rarely, 2 = at least once per month, 3 = 1–2 times per week, 4 = more than 3 times per week). The Chinese version of the questionnaire has been validated for assessing different sleep disorders among psychiatric populations.[20] The English version of the questionnaire was translated by the authors (eAppendix 1).

### Statistical Analysis

In all analyses, frequent insomnia was defined by having problems in 1 or more of 3 sleep domains at least 3 times per week: difficulty initiating sleep, difficulty maintaining sleep, and early morning awakening.[32,33] Recurrent nightmares were defined as having nightmares of at least once per week.[33] The presence of recurrent nightmares and frequent insomnia in the year prior to June 2006 was used to retrospectively evaluate 1-year prevalence rates of nocturnal sleep disturbances. The bivariate relationship between nocturnal sleep disturbances and sociodemographic characteristics, major psychiatric diagnoses, prescription of psychotropic medications, and history of suicide attempts was assessed using *t* test and $\chi^2$ test, where appropriate. In an exploratory analysis using a multiple logistic regression model with backward stepwise procedure, we investigated whether particular psychotropic medications were significantly associated with recurrent nightmares, after controlling for sociodemographic characteristics, major psychiatric diagnoses, duration of mental illness, presence of insomnia, comorbid medical illness, and use of more than 1 psychotropic medication. An additional multiple logistic regression model was constructed to evaluate the strength of the association between recurrent nightmares and type of antidepressant and hypnotic, adjusting for the same potential confounding factors



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**Table 1. Demographic and Clinical Characteristics of Psychiatric Outpatients Participating in the Study**

| Characteristics | Total (N = 1,231) | With Recurrent Nightmares (n = 267) | Without Recurrent Nightmares (n = 964) | With Frequent Insomnia (n = 451) | Without Frequent Insomnia (n = 780) |
|---|---|---|---|---|---|
| Age, mean (SD), y | 42.5 (11.3) | 42.5 (11.4) | 42.5 (10.9) | 45.3 (10.6)*** | 40.9 (11.3) |
| Gender, female, n (%) | 839 (68.2) | 202 (75.7)* | 637 (66.1) | 325 (72.1)** | 514 (65.9) |
| Marital status, n (%) | | | | | |
| Single | 411 (33.4) | 62 (23.2)*** | 349 (36.2) | 93 (20.7)*** | 318 (40.8) |
| Married | 626 (50.9) | 156 (58.4)* | 470 (48.8) | 269 (59.8)*** | 357 (45.8) |
| Divorced/widowed | 193 (15.7) | 49 (18.4) | 144 (15.0) | 88 (19.6)* | 105 (13.5) |
| Education level, n (%) | | | | | |
| Primary or below | 338 (27.7) | 83 (31.4) | 255 (26.7) | 164 (36.5) | 174 (22.6) |
| Secondary | 712 (58.4) | 148 (56.1) | 564 (59.1) | 238 (53.0) | 474 (61.6) |
| Tertiary | 169 (13.9) | 33 (12.5) | 136 (14.2) | 47 (10.5) | 122 (15.8) |
| Employment status, unemployed, n (%) | 780 (63.6) | 183 (68.8)** | 597 (62.2) | 317 (70.3)*** | 463 (59.7) |
| Alcohol consumption, n (%) | | | | | |
| None | 1,062 (86.7) | 227 (85.3) | 835 (87.1) | 380 (85.0) | 682 (87.7) |
| Sometimes | 141 (11.5) | 32 (12.0) | 109 (11.4) | 55 (12.3) | 86 (11.1) |
| Always | 22 (1.8) | 7 (2.6) | 15 (1.6) | 12 (2.7) | 10 (1.3) |
| Principal psychiatric diagnosis, n (%) | | | | | |
| Depressive spectrum disorders[a] | 419 (34.0) | 140 (52.4)*** | 279 (28.9) | 226 (50.1)*** | 192 (24.6) |
| Bipolar affective disorders[b] | 145 (11.8) | 12 (4.5)*** | 133 (13.8) | 24 (5.3)*** | 121 (15.5) |
| Psychotic spectrum disorders[c] | 412 (33.5) | 39 (14.6)*** | 373 (38.7) | 84 (18.6)*** | 328 (42.1) |
| Anxiety spectrum disorders[d] | 182 (14.8) | 57 (21.3)* | 125 (13.0) | 83 (18.4)* | 99 (12.7) |
| Psychoactive substance abuse | 24 (1.9) | 7 (2.6) | 17 (1.8) | 9 (2.0) | 15 (1.9) |
| Eating disorders | 9 (0.7) | 2 (0.7) | 7 (0.7) | 3 (0.7) | 6 (0.8) |
| Other[e] | 40 (3.2) | 10 (3.7) | 30 (3.1) | 22 (4.9)** | 19 (2.4) |
| Duration of mental illness, mean (SD), mo | 97.0 (94.5) | 75.4 (74.1)*** | 102.9 (98.6) | 81.8 (83.0)*** | 105.7 (99.5) |
| Comorbid physical illness, n (%) | 249 (20.2) | 66 (24.7)** | 183 (19.0) | 116 (25.7)*** | 133 (17.1) |
| Psychotropic medication, n (%) | | | | | |
| Antidepressant | 664 (53.9) | 209 (78.3)*** | 455 (47.2) | 332 (73.6)*** | 332 (42.6) |
| Hypnotic | 208 (16.9) | 75 (28.1)*** | 133 (13.8) | 143 (31.7)*** | 65 (8.3) |
| Antipsychotic | 645 (52.4) | 102 (38.2)*** | 543 (56.3) | 178 (39.5)*** | 467 (59.9) |
| Mood stabilizer | 226 (18.4) | 26 (9.7)*** | 200 (20.7) | 58 (12.9)*** | 168 (21.5) |
| Use of more than 1 psychotropic medication, n (%) | 713 (57.9) | 175 (65.5)* | 538 (55.8) | 327 (72.5)*** | 386 (49.5) |
| Lifetime history of suicide attempt(s), n (%) | 252 (20.5) | 80 (30.0)*** | 172 (17.8) | 106 (23.5)** | 146 (18.7) |
| Lifetime history of multiple suicide attempts, n (%) | 71 (5.8) | 27 (10.1)* | 44 (4.6) | 31 (6.9) | 40 (5.1) |
| Suicide attempt(s) in the year after questionnaire assessment, n (%) | 12 (1.0) | 6 (2.2)** | 6 (0.6) | 8 (1.8)** | 4 (0.5) |

[a]Depressive spectrum disorders include depression (single and recurrent) and dysthymia.
[b]Bipolar affective disorders include bipolar I and bipolar II.
[c]Psychotic spectrum disorders include schizophrenia, schizoaffective disorder, and delusional disorder.
[d]Anxiety spectrum disorders include panic disorder, agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder, posttraumatic stress disorder, and adjustment disorder.
[e]Other disorders include personality disorder and somatoform disorders.
*$P < .01$; **$P < .05$; ***$P < .001$.

as in the previous exploratory analysis. The associations between nocturnal sleep disturbances (ie, nightmares only, insomnia only, and comorbid insomnia and nightmares) and lifetime suicide attempts as well as 1-year prospective risk of suicide attempt (from July 2006 to June 2007) were assessed by multiple logistic regression after controlling for sociodemographic characteristics, psychiatric diagnoses, and duration of mental illness. Selection of covariates was based on preliminary univariate and bivariate statistical results as well as potential relationships, as described in previous research.[34,35] All statistical analyses were conducted using SPSS 15.0 (SPSS Inc, Chicago, Illinois). A *P* value below .05 (2-tailed) was considered significant. Results were presented as unadjusted and adjusted odds ratios (ORs) with 95% CIs.

## RESULTS

During the 4-week study period, 2,121 psychiatric outpatients attended the clinic. Ninety-nine participants were excluded according to study criteria. The target population consisted of 2,022 participants, and 61.1% (n = 1,235) of the participants completed the questionnaire assessment. Four participants were excluded from further analysis due to incorrect information as identified during retrieval of clinical information from CMS. The final study population consisted of 1,231 psychiatric patients with a mean age of 42.5 years (SD = 11.3, range, 18–65). There was no significant difference in age between recruited participants and those who refused participation in the study. However, recruited participants consisted of slightly more women (68.2% vs 60.7%, $\chi^2_1 = 11.48$, $P < .01$) with more depressive (34.0% vs 28.0%, $\chi^2_1 = 8.14$, $P < .01$) and anxiety spectrum (14.8% vs 11.1%, $\chi^2_1 = 5.65$, $P < .05$) disorders but with fewer psychotic spectrum disorders (33.5% vs 38.2%, $\chi^2_1 = 4.69$, $P < .05$) than those who refused participation in the study.

Demographic and clinical characteristics of study participants according to presence of recurrent nightmares and frequent insomnia in the past year are shown in Table 1. Lifetime prevalence rates of frequent insomnia and recurrent

**Table 2. Association Between Recurrent Nightmares and Individual Use of Antidepressants and Hypnotics[a]**

| Type of Psychotropic Medication | With Recurrent Nightmares (n = 267) | Without Recurrent Nightmares (n = 964) | Crude OR (95% CI) | Adjusted OR (95% CI) |
|---|---|---|---|---|
| Model 1[b] | | | | |
| Antidepressant, n (%) | | | | |
| SSRI | 136 (50.9) | 302 (31.3) | **2.28 (1.73–3.00)** | **1.52 (1.02–2.25)** |
| SNRI | 26 (9.7) | 41 (4.3) | **2.43 (1.46–4.05)** | **2.10 (1.15–3.83)** |
| NaSSA/NDRI | 10 (3.8) | 29 (3.0) | 1.17 (0.54–2.50) | 0.74 (0.33–1.68) |
| TCA | 34 (12.7) | 94 (9.8) | 1.35 (0.89–2.05) | 1.04 (0.63–1.73) |
| Heterocyclic | 14 (5.2) | 14 (1.5) | **3.76 (1.77–7.98)** | **2.78 (1.21–6.42)** |
| Model 2[c] | | | | |
| Hypnotic, n (%) | | | | |
| Benzodiazepine | 108 (40.4) | 337 (35.0) | 1.26 (0.96–1.67) | 1.11 (0.75–1.64) |
| Non-benzodiazepine | 75 (28.1) | 133 (13.8) | **2.44 (1.77–3.37)** | **1.54 (1.02–2.33)** |

[a]Data in bold typeface are significant at $P < .05$.
[b]Adjusted for age, gender, marital status, employment status, duration of mental illness, psychiatric diagnosis (depression, bipolar, psychosis, and anxiety spectrum disorders), comorbid physical illness, presence of insomnia, and use of hypnotics and more than 1 psychotropic medication.
[c]Adjusted for age, gender, marital status, employment status, duration of mental illness, psychiatric diagnosis (depression, bipolar, psychosis, and anxiety spectrum disorders), comorbid physical illness, presence of insomnia, and use of antidepressants and more than 1 psychotropic medication.
Abbreviations: NaSSA = noradrenergic and specific serotonergic antidepressant, NDRI = norepinephrine-dopamine reuptake inhibitor, SNRI = serontonin-norepinephrine reuptake inhibitor, SSRI = selective serotonin reuptake inhibitor, TCA = tricyclic antidepressant.

**Table 3. Multiple Logistic Regression Analysis on the Association Between Nocturnal Sleep Disturbances and Risk of Suicide Attempts**

| Model[a] | Suicide Attempt(s) in the Year After Assessment, OR (95% CI) | Lifetime Suicide Attempt(s), OR (95% CI) |
|---|---|---|
| Frequent insomnia only[b] | 6.96 (1.21–39.97) | 1.55 (1.06–2.25) |
| Recurrent nightmares only[c] | 8.17 (1.06–63.13) | 2.43 (1.51–3.91) |
| Comorbid frequent insomnia and recurrent nightmares | 17.08 (2.64–110.4) | 2.43 (1.53–3.85) |

[a]Adjusted for gender, age, marital status, employment status, duration of mental illness, and psychiatric diagnosis (depression, bipolar, psychosis, anxiety spectrum disorders).
[b]Frequent insomnia was defined as having difficulty initiating sleep, or difficulty maintaining sleep, or early morning awakening at least 3 times per week in the previous year.
[c]Recurrent nightmares were defined as having nightmares at least once per week in the previous year.

nightmares were 39.1% and 22.5%, respectively. One-year prevalence rates of insomnia and nightmares were 36.6% and 21.7%, respectively. Approximately one-third (32.6%) of insomniac participants had comorbid nightmares, and about half of the participants with recurrent nightmares (55%) reported comorbid insomnia in the past year. Participants having either recurrent nightmares or insomnia shared similar sociodemographic characteristics: they were predominantly female ($\chi^2_1 = 8.84$, $P < .01$ and $\chi^2_1 = 5.00$, $P < .05$, respectively), married ($\chi^2_1 = 7.74$, $P < .01$ and $\chi^2_1 = 22.4$, $P < .001$, respectively), and unemployed ($\chi^2_1 = 3.93$, $P < .05$ and $\chi^2_1 = 13.7$, $P < .001$, respectively). Recurrent nightmares and insomnia were more prevalent among participants with depressive and anxiety spectrum disorders (recurrent nightmares in depressive disorders: $\chi^2_1 = 51.9$, $P < .001$ and in anxiety disorders: $\chi^2_1 = 11.7$, $P < .01$; insomnia in depressive disorders: $\chi^2_1 = 82.3$, $P < .001$ and in anxiety disorders: $\chi^2_1 = 7.40$, $P < .01$).

Results from multiple logistic regression analysis suggested that antidepressants and hypnotics were significantly associated with recurrent nightmares (antidepressants: OR = 1.83; 95% CI, 1.18–2.83, $P < .05$; hypnotics: OR = 1.48; 95% CI, 1.03–2.12), even after controlling for potential confounding factors, including sociodemographic characteristics, psychiatric diagnoses, duration of mental illness, comorbid medical illness, presence of insomnia, and polypharmacy. Further analysis of the specific association between recurrent nightmares and individual antidepressants and hypnotics revealed that SSRIs (OR = 1.52; 95% CI, 1.02–2.25), serotonin-norepinephrine reuptake inhibitors (SNRIs) (OR = 2.10; 95% CI, 1.15–3.83), heterocyclics (OR = 2.78; 95% CI, 1.21–6.42), and non-benzodiazepine hypnotics (OR = 1.54; 95% CI, 1.02–2.33) were independently related to increased risk of recurrent nightmares after adjustment for confounding variables (Table 2).

Lifetime prevalence and prospective 1-year incidence rates of suicide attempts in study participants were 20.5% and 1.0%, respectively. Table 3 presents the association between nocturnal sleep disturbances in the past year and risk of suicide attempts. Recurrent nightmares were significantly associated with lifetime suicide attempts (OR = 2.43; 95% CI, 1.51–3.91) and incidences of suicide attempts in the year after questionnaire assessment (OR = 8.17; 95% CI, 1.06–63.13). The strength of the relationship between insomnia and lifetime suicide attempts was also comparable (lifetime: OR = 1.55; 95% CI, 1.06–2.25; in the year after assessment: OR = 6.96; 95% CI, 1.21–39.97). In addition, comorbidity of frequent insomnia and recurrent nightmares was significantly associated with enhanced risk of suicide attempts (lifetime: OR = 2.43; 95% CI, 1.53–3.85; within 1 year after assessment: OR = 17.08; 95% CI, 2.64–110.4). Moreover, participants reporting more frequent lifetime nocturnal sleep disturbance were more likely to have lifetime suicide attempt(s) (insomnia: $P < .05$; recurrent nightmares: $P < .001$, linear-by-linear association). Table 4 presents the associations between lifetime frequency of nocturnal sleep disturbances and lifetime risk estimates of suicide attempts. A graded risk estimate was observed across increasing severities of nocturnal sleep disturbances.



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Table 4. Multiple Logistic Regression Analysis on the Association Between Lifetime Frequency of Nocturnal Sleep Disturbances and Lifetime History of Suicide Attempt(s)

| Frequency | n | Crude OR (95% CI) | Adjusted OR[a] (95% CI) |
|---|---|---|---|
| Insomnia | | | |
| Never/seldom | 468 | 1.00 | 1.00 |
| ≥1×/mo | 130 | 1.29 (0.79–2.10) | 1.45 (0.86–2.40) |
| ≥1×/wk | 151 | 1.43 (0.91–2.25) | 1.70 (1.06–2.74) |
| ≥3×/wk | 480 | 1.48 (1.07–2.04) | 1.78 (1.23–2.57) |
| Nightmares | | | |
| Never/seldom | 811 | 1.00 | 1.00 |
| ≥1×/mo | 141 | 1.32 (0.85–2.05) | 1.37 (0.87–2.16) |
| ≥1×/wk | 104 | 1.80 (1.12–2.88) | 1.94 (1.18–3.17) |
| ≥3×/wk | 173 | 2.33 (1.62–3.37) | 2.40 (1.60–3.60) |

[a]Adjusted for gender, age, marital status, employment status, duration of mental illness, and psychiatric diagnosis (depression, bipolar, anxiety, and psychosis spectrum disorders).

## DISCUSSION

The present study presents clinical correlates of nocturnal sleep disturbances and demonstrates an elevated risk of suicide attempts among psychiatric outpatients with disrupted sleep. To the best of our knowledge, this is the first large-scale clinical epidemiologic study that has supplemented other community-based and cross-sectional case-control studies to provide 1-year prospective data on the association between nocturnal sleep disturbances and suicide attempts, as well as retrospective data on the association between nocturnal sleep disturbances and lifetime history of suicide attempts.

### Comorbidity of Nocturnal Sleep Disturbances in Psychiatric Patients

Nocturnal sleep disturbances, including recurrent nightmares and insomnia, were highly prevalent in our study cohort, particularly in depressive and anxiety spectrum disorders. Lifetime and 1-year prevalence of frequent insomnia (39.1% and 36.6%, respectively), as found in our study, were higher than those of community-based studies (9%–19%).[12,36,37] Similarly, lifetime and 1-year prevalence of recurrent nightmares (22.5% and 21.7%, respectively) were remarkably higher than those in the general population (1%–6%) using similar defining criteria.[13,38–40] It is noteworthy that comorbid insomnia and nightmares was also a pervasive condition in psychiatric patients. The close association between nightmares and insomnia may be due to the disruptive nature of nightmares on sleep continuity and, consequently, sleep-related arousal and anxiety contribute further to the development of insomnia.[41] This vicious cycle of sleep disturbances typically perpetuates the psychopathological mechanism of posttraumatic stress disorder (PTSD).[41] Alternatively, the association between nightmares and insomnia may also be partly related to heightened dream recall frequency as a result of enhanced nocturnal awakenings in insomniacs.[42] Future prospective study is warranted to delineate the interactive relationship between nightmare and insomnia in the context of psychopathology.

### Nocturnal Sleep Disturbances in Association With Suicidal Risk

Our findings supplemented those of previous research[6–9,43,44] by demonstrating recurrent nightmares and insomnia as independent and synergistic risk factors, in a dose-response manner, for suicide attempts in psychiatric outpatients. In particular, not only was the presence of nocturnal sleep disturbances associated with a lifetime risk of suicide attempts but it also predicted a much-enhanced risk (7–8 times ORs) for new incidence of suicide attempts in the year after the questionnaire assessment. More importantly, a heightened risk of suicide attempt was observed in patients with comorbid insomnia and nightmares. The exact pathophysiologic mechanism of this relationship remains elusive, despite some evidence suggesting a shared neurobiological basis and a modulating role for serotonin dysfunction in both sleep maintenance[45] and suicidal behaviors.[46] Nonetheless, findings on the association between sleep disturbances and suicidal risk may have important clinical and therapeutic implications. Given that suicide is often the most serious complication of psychiatric disorders,[47,48] clinicians often encounter a challenge to identify individuals with suicidal risk in a timely way. Increasing numbers of studies suggesting a close interplay between sleep disturbances and the clinical course of psychiatric disorders[3,4,49–52] provide evidence that sleep symptoms deserve much more imperative attention in the treatment progress and prevention of suicide. In particular, there is a necessity for enhancement of integrated management of sleep complaints in psychiatric disorders. Albeit there has been recent attention to reconceptualizing insomnia as a comorbid condition in conjunction with psychiatric disorders,[21,49,52] our study emphasized recurrent nightmares as a sparsely explored but an equally important area for treatment targets in psychiatric disorders. Recurrent nightmares may constitute one of the cardinal symptoms of depression and anxiety disorders that indicate severity of mental illness, residual symptoms, or independently represents a comorbid sleep disorder. Current treatment options for nightmares include pharmacologic therapies such as prazosin[53,54] and cyproheptadine,[55,56] which have shown some promise in reducing nightmares and improving sleep quality. Nonpharmacologic approaches, including imagery rehearsal therapy,[57] have been suggested as adjunctive treatments for nightmares, particularly PTSD-related nightmares. Nonetheless, with such a high prevalence rate in the clinical population and close association with suicidal risk, further studies are warranted to provide additional evidence for the clinical efficacy of nightmare-focused and insomnia-focused therapy among the therapeutic milieu in the management of psychiatric disorders.

### Nocturnal Sleep Disturbances and Psychopharmacologic Treatments

Our study further strengthened the evidence for the association between increased nightmares and antidepressant usage, particularly SSRIs, SNRIs, and heterocyclics, from a clinical epidemiologic perspective.[27–29] The

neuropharmacologic action of antidepressants on dreaming is relatively unclear, yet some evidence has suggested the occurrence of intensified dreaming after use of SSRIs in healthy individuals, which may suggest a modulating role for SSRIs on dream-generating mechanisms.[58] In addition, nonbenzodiazepine hypnotics were found to be associated with recurrent nightmares in our study, which was in parallel to previous reports of such association in clinical drug trials.[23–25] Furthermore, the pervasiveness of insomnia symptoms and the common use of hypnotics, as found in our study cohort, may suggest that insomnia could persist among a high proportion of psychiatric patients, even with the prolonged prescription of hypnotics.[21] Nonetheless, there remains an uncertainty about the cause-effect relationship between sleep disturbances and use of psychotropic medications. Moreover, caution should be used when interpreting these findings, as severity of depressive and anxiety symptoms may be a potential mediating factor. In this regard, further longitudinal study with close monitoring should be conducted to determine the initiation of pharmacologic treatments in relation to changes in dreaming and the occurrence of nightmares.

### Limitations of the Study

The findings of our study should be considered in light of several caveats. Our study may be subject to sampling bias with a slight preponderance of women in the study population. In addition, participants' self-report of their sleep problems, without systemic collateral information, could be sometimes compromised due to recall bias. Moreover, our data on suicide attempt was based on case notes review, which could potentially underestimate the prevalence and incidence rate. In some cases, individuals with suicide attempts may not reveal or seek any health care assistance.[34] Nonetheless, the prevalence of lifetime suicide attempts in our study (20.5%) was comparable to data reported in previous studies by self-report (25%)[34] and diagnostic interview (16%).[59] In addition, we did not assess the family history of suicide, which may be confounding the relationship between sleep disturbances and suicidal risk.[44] Furthermore, there was a lack of real-time association between recurrent nightmares and use of antidepressants in our data, which may necessitate further prospective clinical study with close monitoring of sleep and initiation of psychopharmacologic treatment.

## CONCLUSION

Nocturnal sleep disturbances, particularly frequent insomnia and recurrent nightmares, could have a clinically prognostic significance in predicting suicide attempts. Clinicians should be more attentive to the persistence of sleep symptoms in association with enhanced suicidal risk in psychiatric patients. Future studies are warranted to investigate the persistence of nocturnal sleep disturbances and association with progress of clinical treatments, underlying pathophysiologic mechanisms, and intervention response.

***Drug names:*** prazosin (Minipress and others).
***Disclosure of off-label usage:*** The authors have determined that, to the best of their knowledge, prazosin is not approved by the US Food and Drug Administration for the treatment of nightmares.
***Author affiliation:*** Department of Psychiatry, Faculty of Medicine, The Chinese University of Hong Kong, Shatin, Hong Kong SAR.
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For the CME Posttest for this article, see pages 1558–1559.

eAppendix 1 is available at PSYCHIATRIST.COM.

## eAppendix 1. Sleep Survey in Psychiatric Outpatients[a]

Department of Psychiatry
The Chinese University of Hong Kong

**Personal Information** (Please put an "X" in the appropriate boxes and fill in the appropriate blanks.)

Name: _____

Gender: ☐ Male ☐ Female

Living condition: ☐ Living alone ☐ Living with family or friend(s) ☐ Living in hostel

Drinking habit: ☐ Nondrinker ☐ Sometimes ☐ Often

Do you comply with your doctor's prescription of psychotropic medications? ☐ Not at all ☐ Sometimes ☐ Often

What time do you usually go to bed? _____ Hours _____ Minutes

What time do you usually get up? _____ Hours _____ Minutes

Do you need to do overnight shift work? ☐ No ☐ Sometimes ☐ Regularly

Your shift work schedule is from _____ to _____

**Questions on Sleep Problems**

1. (a) Have you had insomnia?
   - ☐ No (Please go to question 2.)
   - ☐ Rarely
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) What kind of insomnia have you had? (You may choose more than 1 option.)
   - ☐ Difficulty falling asleep
   - ☐ Difficulty maintaining sleep
   - ☐ Wake up too early in the morning and can't go back to sleep

   (c) When did this sleep problem start? _____ years ago

   (d) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

2. (a) Have you experienced snoring?
   - ☐ No (Please go to question 3.)
   - ☐ Mild but not disturbing others
   - ☐ Moderate and disturbing others
   - ☐ Severe and can be heard by people in other room(s)

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

3. (a) Have you had nightmares?
   - ☐ No (Please go to question 4.)
   - ☐ Rarely
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

4. (a) Have you experienced sleep talking?
   - ☐ No (Please go to question 5.)
   - ☐ Rarely
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

5. (a) Have you ground your teeth at night?
   - ☐ No (Please go to question 6.)
   - ☐ Rarely
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

6. (a) Have you had night terrors (ie, a sudden episode of awakening from sleep usually accompanied by a cry or loud scream without full consciousness and no recall of such episode in the morning)?
   - ☐ No (Please go to question 7.)
   - ☐ Once in my life
   - ☐ A few times in my life
   - ☐ Once or more than once per year
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

7. (a) Have you ever had periods of mental confusion on awakening from sleep (ie, with disorientation to time and place, slow mentation and speech, or strange behaviors)?
   - ☐ No (Please go to question 8.)
   - ☐ Once in my life
   - ☐ A few times in my life
   - ☐ Once or more than once per year
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

   (d) What time did it usually happen?
   - ☐ When you were about to fall asleep
   - ☐ In the middle of the night
   - ☐ When you were just waking up

8. (a) Have you ever had any sleepwalking (including sitting up, leaving your bed, or carrying out acts during sleep that you were not in full awareness of and of which you had little recall on waking up)?
   - ☐ No (Please go to question 9.)
   - ☐ Once in my life
   - ☐ A few times in my life
   - ☐ Once or more than once per year
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

   (d) Do any of your family members have this problem?
   - ☐ No
   - ☐ Yes

*(continued)*


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eAppendix 1 (continued): Sleep Survey in Psychiatric Outpatients[a]

9. (a) Have you ever consumed food or drinks during sleep that you were not in full awareness of?
   - ☐ No (Please go to question 10.)
   - ☐ Once in my life
   - ☐ A few times in my life
   - ☐ Once or more than once per year
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

   (d) Do any of your family members have this problem?
   - ☐ No
   - ☐ Yes

10. (a) Have you ever fallen from bed and inflicted injuries on yourself or others during your sleep?
   - ☐ No (Please go to question 11.)
   - ☐ Once in my life
   - ☐ A few times in my life
   - ☐ Once or more than once per year
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

   (d) Which of following conditions did you have? (You may choose more than 1 option.)
   - ☐ Fell from bed
   - ☐ Injured yourself
   - ☐ Injured others

11. (a) Have you ever seen, heard, or sensed something weird or unusual while you were sleeping?
   - ☐ No (Please go to question 12.)
   - ☐ Once in my life
   - ☐ A few times in my life
   - ☐ Once or more than once per year
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

   (d) What time did it usually happen?
   - ☐ When you were about to fall asleep
   - ☐ In the middle of the night
   - ☐ When you were just waking up

12. (a) Have you ever experienced "sleep paralysis" (ie, a period of inability to move your body when you were about to fall asleep or upon awakening?
   - ☐ No
   - ☐ Once in my life
   - ☐ A few times in my life
   - ☐ Once or more than once per year
   - ☐ Once or more than once per month
   - ☐ 1–2 times per week
   - ☐ More than 3 times per week

   (b) When did this sleep problem start? _____ years ago

   (c) Have you been having this sleep problem over the past year?
   - ☐ No
   - ☐ Yes

   (d) What time did it usually happen?
   - ☐ When you were about to fall asleep
   - ☐ In the middle of the night
   - ☐ When you were just waking up

—THE END—

Thank you very much for your cooperation!

Please kindly return the questionnaire to our staff in the clinic.



[a]This questionnaire was originally developed in Chinese, and the English version was translated by the authors. The original Chinese version is available on request.


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