Prevalence and Correlates of Frequent Nightmares: A Community-Based 2-Phase Study

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Study Objectives: To determine the prevalence of frequent nightmares and their correlates in a large community-based cohort of middle-aged Hong Kong Chinese.

Design: A 2-phase design involving a cross-sectional survey of 8558 subjects (men, 47.6%) with a mean age of 40.9 years (SD 5.5, range 20-78) and subsequently followed by a detailed clinical evaluation of the psychopathology and personality profile of 252 subjects.

Setting: Community.

Interventions: N/A.

Measurements and Results: The prevalence of frequent nightmares, as defined by at least once per week, was 5.1%. Female sex, low monthly family income, insomnia symptoms, sleep-disordered breathing symptoms, and sleep-related daytime consequences were significantly associated with nightmare frequency. The risk of having a psychiatric disorder was 5.74 times greater for subjects with frequent nightmares (95% confidence interval 2.03-16.26), especially mood disorders (odds ratio = 15.57, 95% confidence interval 3.77-64.37). After exclusion of concomitant psychiatric morbidities, subjects with frequent nightmares still scored significantly higher on neuroticism in the personality scale (P < 0.05).

Conclusions: Frequent nightmares were not uncommon in the general population and were associated with a constellation of factors, including sociodemographic characteristics and comorbid sleep and psychiatric disorders. Moreover, frequent nightmares were independently related to the neuroticism personality trait, irrespective of psychiatric diagnosis. Prospective studies should be conducted to investigate various predisposing, precipitating, and perpetuating factors and the associated repercussions of nightmares.

Keywords: Nightmare, epidemiology, socioeconomic status, personality, psychopathology

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NIGHTMARES ARE TYPICALLY DEFINED AS FRIGHTENING DREAMS THAT AWAKEN AN INDIVIDUAL FROM RAPID EYE MOVEMENT SLEEP.[1] THE DISTURBING and vivid dream contents can often be clearly recalled upon awakening. There has been a dispute on the operational definition of nightmares in the research field, including the discrepancies on the use of *waking* and *fear* as defining criteria.[2-4] Hence, depending on different criteria, methodologies, and study populations, there have been diverse reports of nightmare prevalence in previous research. Prevalence estimates of nightmares based on a student population vary from 30% to 55% on a monthly basis and 8% to 38% on a weekly basis.[2,5-9] There have been limited community-based epidemiologic studies conducted.[10-13] Janson et al.[10] and Hublin et al.[11] found that 1% to 7% of adults have weekly nightmares. Without specification of nightmare frequency and defining waking criteria, Bixler et al.[13] found that 5.3% of the general population has a current nightmare problem.

Not only do chronic and repetitive nightmares pose personal distress, but they have also been linked to a board spectrum of psychopathologies and a prognostic significance in predisposing an individual to having an increased risk of attempting suicide.[14-16] Thus, apart from being classified as a core clinical symptom of posttraumatic stress disorder (PTSD),[1] nightmares have been variably associated with anxiety and depressive symptoms[12,17] and psychotic features.[18-22] Nonetheless, most previous studies on the association between nightmares and psychopathologies have rested upon 2 different and highly selected sample populations: young healthy college undergraduate students[5,8,17,23,24] and clinical samples of frequent nightmare sufferers.[18,20-22] In addition, the investigation of associated psychopathologies has been predominantly based on self-reported questionnaire measures (e.g., Minnesota Multiphasic Personality Inventory, Symptom Checklist)[5,17,23,24] or hospitalization records without individual clinical diagnostic assessment.[11] Hence, limited systematic studies with clinical assessment of psychopathology in relation to frequent nightmares have been conducted in the general population.

On the other hand, situational anxiety and intensified stress have been found to precipitate the occurrence of nightmares.[25-27] In the general population, a possible source of stress may be reflected by lower socioeconomic status, which is often associated with more financial strain and fewer social resources.[28] Studies have shown that poor sleep quality is associated with lower education attainment, unemployment, and low income.[29-31] To date, however, few studies have explored the relationship between nightmare and socioeconomic circumstances, which often perturb sleep continuity and quality.

Apart from the etiologic association of stress and psychopathologies, accumulating evidence suggests that certain personal-

ity dimensions might predispose individuals to having frequent nightmares.[2,7,18,32-34] However, the existing findings are heterogeneous and inconclusive.[8,23,24] These conflicting results might be due to different criteria and measurements used across studies and the fact that psychiatric disturbances as a confounding factor has not been well clarified. Thus, the question of whether frequent nightmares are related to particular personality dimensions independent of psychiatric problems remains unanswered.

The research paradigm for the present study involved 2 phases. The aim of phase 1 of the study was to investigate the prevalence of nightmares and the correlates of nightmares in a general population. The second phase was to investigate the risk of psychiatric disorders and to scrutinize the relationship between frequent nightmares and personality features after controlling for underlying psychopathology.

METHODS

Overview of the Project

The present study was part of a large-scale epidemiologic study of sleep problems in Hong Kong Chinese families, which was approved by the Institutional Ethics Committee. An envelope containing a set of sleep questionnaires and an invitation letter were sent to students and their parents in 13 randomly selected local primary schools. Detailed procedures of the current study can be found elsewhere.[35-38] The target population of the current study consisted of parents of 9172 primary-school–aged children. Written informed consent was collected with the returned questionnaire.

Procedures and Instruments

The present study was conducted in 2 phases.

Phase 1 study

Sleep questionnaires were collected from 6447 (70.3%) primary-school–aged students and 10381 of their parents (67.9%, 4977 fathers and 5404 mothers). Data analysis in the present study was based only on questionnaires returned from parents. The following questionnaires were excluded from the analysis: those containing grossly incomplete or missing data on frequency of nightmares (n = 1239) and those duplicate copies from the same parent of a child's siblings (n = 584). The remaining questionnaires from the respondents (n = 8558, 4077 men and 4481 women) represented the eligible study population.

Sleep questionnaire

The sleep questionnaire was modified from the questionnaire used in our previous epidemiologic studies[31,39] and was specifically developed for the purpose of the present study. It has been demonstrated to have satisfactory validity and internal consistency (Cronbach α coefficient = 0.846).[35] The 14 items in this questionnaire covered a wide range of clinical features of sleep problems, such as difficulty initiating sleep, difficulty maintaining sleep, early morning awakening, snoring, restless sleep, dry mouth, nightmares, morning headache, morning unrefreshness, and daytime fatigue. Factor analysis revealed 3 factors, including insomnia symptoms, sleep-disordered breathing symptoms, and sleep-related daytime consequences, that accounted for 55.8% of the scale variance.[35] The question that was used

to elicit subjects' responses was: "During the past 12 months, how often have you had the following sleep symptoms?" The item we used to assess nightmare was the term "nightmares (in Chinese)," without a particular definition given. Subjects were asked to indicate the frequency of different sleep disturbances in the previous year on a 5-point scale (0 = none, 1 = less than once per month, 2 = 1-2 times per month, 3 = 1-2 times per week, 4 = equal or more than 3 times per week). Additional questions on individuals' lifestyle included frequency of tea, coffee, and alcohol drinking; smoking habit; and chronic use of medication.

Phase 2 study

Study subjects in Phase 1 were selected and invited by phone to take part in the Phase-2 assessment, which was originally designed to study habitual sleep duration in relationship to stress and personality.[40] Subjects on chronic medical treatment, as reported in the Phase 1 questionnaire, were excluded. Three groups of habitual sleepers with normal (8-9 hours), short (< 8 hours), and long (> 9 hours) sleep duration were randomly selected. Of 540 subjects contacted, 252 (46.7%) agreed to participate in the Phase 2 study, which involved a comprehensive clinical interview and completion of a packet of questionnaires. The Semistructured Clinical Interview for DSM-IV (Diagnostic and Statistical Manual of Mental Disorder, 4th Edition) was used to conduct diagnostic assessment by a qualified psychiatrist, and detailed sleep, physical, and psychiatric histories were obtained. A battery of questionnaires, including the Depression Anxiety Stress Scale,[41,42] Eysenck Personality Questionnaire,[43] Beck Depression Inventory,[44,45] State/Trait Anxiety Inventory,[46] and Recent Life Changes Questionnaire,[47,48] were completed by the recruited subjects. The above inventories have been translated and validated in Chinese.[49-52]

Statistical Analysis

The χ^2 test was used for categorical variables, whereas t test or analysis of variance test was used for continuous responses, where appropriate. Correlations between the frequency of nightmares and other sleep symptoms were assessed using Spearman correlation coefficients. Multinomial logistic regression model with backward stepwise procedure was constructed to evaluate the associations between nightmare frequency and sociodemographic characteristics, as well as sleep-related symptoms. In the logistic analyses, we combined subjects who had no nightmares and subjects who reported nightmares of less than once per month into 1 category (None/seldom group). To be in line with most reported studies,[10,11,21,22] we defined frequent nightmares as having nightmares at least once per week. A nonparametric test (i.e., Mann-Whitney test) was used to compared subjects with frequent nightmares and those without frequent nightmares on various psychosocial measures. An additional logistic regression analysis was performed to test the association between frequent nightmares and psychiatric disorders after controlling for sex, age, sociodemographic characteristics, and the presence of insomnia symptoms. The results of logistic regression analyses are presented as odds ratios (OR) and their 95% confidence intervals (CI). All statistical analyses were conducted using Statistical Package for Social Science 15.0 (SPSS, Chicago, IL).

Table 1—Sociodemographic characteristics of study subjects

		Nightmare frequency				
Characteristic	All subjects	None/ seldom	1-2 times/mo	1-2 times/wk	≥ 3 times/wk	P Value
No. of subjects (%)	8558	7087 (82.8)	1036 (12.1)	262 (3.1)	172 (2.0)	
Age, y	41.0 ± 5.5	41.14 ± 5.49	40.06 ± 5.45	40.08 ± 5.34	40.06 ± 5.87	< 0.001
Female	4481 (52.4)	3577 (50.5)	625 (60.3)	156 (59.5)	123 (71.1)	< 0.001
Employment status						< 0.001
Employed	5415 (68.8)	4546 (69.8)	630 (65.2)	158 (66.7)	81 (52.6)	
Education level						0.069
≤ Primary school	1456 (18.2)	1210 (18.3)	151 (15.1)	45 (18.4)	50 (31.4)	
Secondary school	5513 (68.8)	4541 (68.7)	704 (70.6)	170 (69.4)	98 (61.6)	
≥ Tertiary school	1043 (13.0)	860 (13.0)	142 (14.2)	30 (12.2)	11 (6.9)	
Housing type						0.55
Private	3286 (38.9)	2701 (38.7)	421 (41.0)	106 (40.6)	58 (33.9)	
Public	2911 (34.5)	2411 (34.5)	331 (32.2)	94 (36.0)	75 (43.9)	
Semipublic/Other		1870 (26.8)	275 (26.8)	61 (23.4)	38 (22.2)	
Monthly family income, HK$						0.049
≤ 10,000, unstable, or on CSSA	2445 (29.4)	2010 (29.2)	281 (27.7)	81 (31.5)	73 (42.9)	
10,001-20,000	3020 (36.3)	2534 (36.8)	331 (32.6)	97 (37.7)	58 (34.1)	
≥ HK$20,001	2861 (34.4)	2341 (34.0)	402 (39.6)	79 (30.7)	39 (22.9)	
Living area, square meters						0.029
≤ 400	2549 (30.5)	2081 (30.1)	306 (29.9)	85 (33.1)	77 (45.3)	
401-600	2789 (33.4)	2346 (34.0)	315 (30.7)	81 (31.5)	47 (27.6)	
≥ 601	3021 (36.1)	2480 (35.9)	404 (39.4)	91 (35.4)	46 (27.1)	

Data are presented as number (%), except age, which is mean ± SD. Comprehensive Social Security Assistance (CSSA) is the financial assistance provided by Hong Kong government to bring the income of those needy individuals and families up to a prescribed level to meet their basic needs. US$1.00 = HK$7.80

Table 2—Correlation between nightmares frequency and other sleep symptoms

Variables	Nightmare frequency, r^a
Insomnia symptoms	
Difficulty initiating sleep	0.403[b]
Difficulty maintaining sleep	0.487[b]
Early morning awakening	0.373[b]
Restless sleep	0.385[b]
Sleep-disordered breathing symptoms	
Dry mouth	0.302[b]
Nocturnal sweating	0.265[b]
Mouth breathing	0.195[b]
Snoring	0.077[b]
Sleep-related daytime consequences	
Morning unrefreshness	0.391[b]
Daytime fatigue	0.382[b]
Morning headache	0.345[b]
Difficulty getting up in the morning	0.334[b]
Daytime sleep attack	0.199[b]

[a]Spearman rank correlation coefficients; [b]P < 0.001

RESULTS

Phase 1

Sociodemographic characteristics of the study subjects in Phase 1 are summarized in Table 1. The prevalence of frequent nightmares, as defined by nightmares occurring at least once per week, was 5.1%. The prevalence of frequent nightmares was higher among women than among men (6.2% vs 3.8%, $\chi^2 = 25.49$, df = 1, P < 0.001). Subjects with frequent nightmares were slightly younger, as compared to those without frequent nightmares (mean ± SD: 40.1 ± 5.6 vs 41.0 ± 5.5, P < 0.01).

Nightmare frequency was variably related to the frequency of other sleep symptoms (Table 2). The correlation coefficients between nightmares and insomnia symptoms were of larger effect size (r = 0.373-0.487, P < 0.001), whereas the magnitude of the relationship between nightmares and symptoms of sleep-disordered breathing was relatively small (r = 0.077-0.302, P < 0.001). In addition, nightmare frequency was positively correlated with different sleep-related daytime consequences, including morning unrefreshness, daytime fatigue, morning headache, and difficulty getting up in the morning.

Table 3 presents the result of multinomial logistic regression analysis of the association between nightmares frequency and sociodemographic characteristics as well as other sleep problems. Female sex and low monthly family income were significantly associated with nightmare frequency. In the logistic model adjusted for sociodemographic characteristics and chronic and frequent use of medication, there was a dose-response relationship between nightmare frequency and other sleep-related symptoms, especially related to insomnia and daytime symptoms (Table 3).

Phase 2

When compared with the subjects who were not recruited for Phase 2 of the study, the recruited subjects were slightly younger (mean ± SD: 41.0 ± 5.52 vs 40.3 ± 4.58 years, P = 0.03) and included more women (51.8% vs 69.5%, $\chi^2 = 30.13$, df = 1, P < 0.001). There was a higher prevalence of frequent nightmares among study subjects, as compared with those not recruited (10.3% vs 5.2%, P < 0.001). Of the 252 study subjects,

24 (9.5%) met the DSM-IV criteria for an axis I diagnosis (Table 4). The risk of having a psychiatric disorder was 5.74 times greater for subjects with frequent nightmares than for those without frequent nightmares (95% CI 2.03-16.26) after controlling for age, sex, presence of insomnias, and monthly family income. In particular, mood disorders were significantly associated with frequent nightmares (OR = 15.57, 95% CI 3.77-64.37).

Table 5 depicts the psychosocial and psychological profiles of the subjects with and without frequent nightmares after excluding those with psychiatric disorders (n = 228). There was no significant difference in various psychological measures except that subjects with frequent nightmares had a higher score on the personality scale of neuroticism, as compared with those without frequent nightmares (P < 0.05).

DISCUSSION

The present study extended previous nightmare research through a systematic investigation of frequent

Table 3—Multinomial logistic regression analysis of the association between nightmare frequency and sociodemographic characteristics and other sleep-related symptoms

	Nightmare frequency					
	1-2 times/mo		1-2 times/wk		≥ 3 times/wk	
Variables	OR[a]	95% CI	OR[a]	95% CI	OR[a]	95% CI
Model 1						
Age	0.97[c]	0.96-0.99	0.98	0.96-1.01	0.99	0.96-1.02
Sex						
Female	1.38[c]	1.19-1.60	1.23	0.92-1.64	2.10[c]	1.43-3.07
Male	1		1			
Family income, HK$						
≤ 10,000, unstable, or on CSSA	0.86	0.73-1.03	1.20	0.85-1.68	2.31[c]	1.51-3.55
10,001-20,000	0.77[d]	0.65-0.90	1.05	0.76-1.45	1.47[f]	0.95-2.27
≥ 20,001	1		1		1	
Model 2[b]						
Insomnia symptoms	1.21[d]	1.18-1.23	1.31[d]	1.26-1.36	1.38[d]	1.31-1.45
Sleep-disordered breathing symptoms	1.03[c]	1.01-1.06	1.04[e]	1.01-1.09	1.04	0.98-1.09
Sleep-related daytime symptoms	1.08[d]	1.06-1.10	1.12[d]	1.08-1.16	1.17[d]	1.11-1.22

Comprehensive Social Security Assistance (CSSA) is the financial assistance provided by Hong Kong government to bring the income of those needy individuals and families up to a prescribed level to meet their basic needs. US$1.00 = HK$7.80. OR refers to odds ratio; CI, confidence interval.
[a]Reference category: nightmare frequency = none/seldom; [b]Adjusted for demographic characteristics including age, sex, and family income, and chronic and frequent use of medication; [c]P < 0.001; [d]P < 0.01; [e]P < 0.05; [f]P = 0.086.

nightmares in relationship to sociodemographic and psychological characteristics, psychopathology, and other comorbid sleep problems. The prevalence of frequent nightmares on a weekly basis in our study was 5.1%, comparable to the figures (1%-7%) reported by studies using similar criteria [10,11,13] but lower than the prevalence (18.3%) found by Ohayon et al.[12] This variation of prevalence may be partly explained by the fact that Ohayon's study was based on subjects with insomnia,[12] which might potentially lead to an increased report of nightmare frequency. In agreement with previous research,[11,12] our results indicate that women reported nightmares more often than did men. The sex difference in the prevalence of nightmares may be contributed by the higher rate of dream recall in women [53] and/or a different vulnerability of women to having other psychopathology and concomitant sleep problems, such as depression, anxiety disorders,[1] and insomnia.[31,54]

Consistent with the result of a prior study,[12] insomnia was found to be an important sleep correlate with nightmares. It is postulated that nightmares could disrupt sleep continuity, and the unpleasant dream content might induce arousal and sleep-related anxiety, which might contribute to the development of insomnia. This vicious cycle of sleep disturbances typically perpetuates the mechanism of pathophysiology of PTSD.[55] Alternatively, the association between nightmares and insomnia may be partly related to heightened dream-recall frequency as a result of enhanced nocturnal awakenings in insomniacs.[56] Future prospective study is warranted to delineate the interactive relationship between nightmare and insomnia. On the other hand, sleep-disordered breathing symptoms were only marginally associated with frequent nightmares. Previous findings on

the association between nightmares and sleep apnea in adult populations were conflicting.[57-61] Some studies reported that nightmare frequency was not related to snoring[57,58] and objective measures of sleep apnea syndrome severity,[59] whereas other studies on patients with PTSD suggested that successful treatment of sleep apnea was associated with a significant reduction in nightmares.[60,61] Furthermore, in our study, frequent nightmares were found to be significantly associated with several indexes of impaired sleep quality, including morning unrefreshness and daytime fatigue. Hence, frequent nightmares not only disrupted sleep continuity, but also could result in distressing daytime consequences.

As suggested by our study, lower socioeconomic status (e.g., low family income) was a risk factor for frequent nightmares. Given past evidence suggesting a link between stress and nightmares,[25-27] it is speculated that higher stress levels associated with lower socioeconomic status may predispose and precipitate individuals to more attacks of nightmares. Nonetheless, the exact pathophysiologic mechanism remains elusive because other confounding factors, including psychiatric disturbances associated with increased stress, may also be implicated. Thus, the relationship between frequent nightmares and underlying psychopathology was specifically examined in our Phase 2 study. Converging with evidences found in other studies,[2,11,12] our results showed that frequent nightmares were significantly associated with the presence of psychiatric disorders, particularly mood disorders. Frequent nightmares could be part of the symptoms of underlying psychiatric disorders,[1] whereas the presence of frequent nightmares might also independently predispose individuals to having psychiatric disturbances, for

Table 4—Psychiatric diagnosis in relation to frequent nightmares

	All	Subjects with frequent nightmares	Subjects without frequent nightmares	Adjusted OR[a] (95% CI)
No. of subjects	252	26	226	
Psychiatric diagnosis	24 (9.5)	8 (30.8)	16 (7.1)[b]	5.74 (2.03-16.26)
Mood disorder	11 (4.4)	6 (23.1)	5 (2.2)[b]	15.57 (3.77-64.37)
Anxiety disorder	16 (6.3)	4 (15.4)	12 (5.3)	3.70 (0.95-14.4)
Somatoform disorder	1 (0.4)	1 (3.8)	0	—
Schizophrenia and other psychotic disorders	1 (0.4)	0	1 (0.4)	—

Data are presented as number (%). Frequent nightmares were defined as having nightmares at least once per week. Four subjects had comorbid anxiety and mood disorder, as determined by completion of the Semistructured Clinical Interview for DSM-IV (SCID-II). OR refers to odds ratio; CI, confidence interval; [a]Adjusting for demographic characteristics, including age, sex, and monthly family income, and presence of insomnia symptoms; [b]$P < 0.001$.

Table 5—Psychosocial and psychological profiles of Phase 2 study subjects excluding those with psychiatric diagnoses

	All	Subjects with frequent nightmares	Subjects without frequent nightmares
No. of subjects (%)	228	18 (7.9)	210 (92.1)
DASS, score			
Total	13.37 ± 12.31	14.57 ± 4.69	13.28 ± 12.70
Depression	2.86 ± 4.09	3.29 ± 2.14	2.83 ± 4.20
Anxiety	3.51 ± 3.77	3.71 ± 2.29	3.49 ± 3.86
Tension/stress	7.00 ± 5.63	7.57 ± 3.74	6.96 ± 5.76
STAI, score			
Total	69.41 ± 16.13	72.56 ± 20.59	69.13 ± 15.78
State total	33.50 ± 8.65	35.56 ± 10.73	33.31 ± 8.49
Trait total	35.91 ± 8.30	37.00 ± 10.28	35.81 ± 8.16
BDI total, score	2.72 ± 3.44	2.83 ± 2.69	2.71 ± 3.51
EPQ, score			
Psychoticism	3.50 ± 2.23	3.76 ± 2.62	3.48 ± 2.21
Extraversion	9.62 ± 4.53	9.85 ± 3.72	9.61 ± 4.59
Neuroticism	7.84 ± 4.67	10.69 ± 5.75	7.64 ± 4.54[a]
L-scale	12.50 ± 3.35	12.77 ± 4.42	12.48 ± 3.28
RLCQ, score			
0.5 y	34.51 ± 65.38	56.50 ± 82.23	32.75 ± 64.03
1.0 y	53.47 ± 115.70	71.63 ± 112.62	52.02 ± 116.38
1.5 y	81.28 ± 134.42	105.88 ± 149.76	79.31 ± 133.75
2.0 y	122.93 ± 175.03	196.00 ± 189.37	117.08 ± 173.52

Frequent nightmares were defined as having nightmares at least once per week. DASS refers to the Depression Anxiety Stress Scale; STAI, Spielberger State/Trait Anxiety Inventory; BDI, Beck Depression Inventory; EPQ, Eysenck Personality Questionnaire; RLCQ, Recent Life Changes Questionnaire, measures change in situations over the time frames, .5 years, 1 year, 1.5 years, and 2 years; [a]$P < 0.05$.

example, via sleep disruption. Because our subjects with frequent nightmares were recruited from the general population rather than from mental health or sleep-disorder services, the association between psychiatric disturbances and frequent nightmares was further strengthened. Hence, clinicians should be more attentive to nightmare complaints in association with psychiatric disturbances.

Our study excluded those subjects with psychiatric disorders before the analysis of personality profiles. Notably, neuroticism remained as a distinct personality feature in this group of presumably "healthy" subjects with frequent nightmares. In addition, comparing our results on frequent nightmare sufferers with those of Berquier and Ashton's study,[18] we found that the subjects with frequent nightmares in our study scored slightly lower on the Eysenck Personality Questionnaire neuroticism scale (Mean ± SD: 16.9 ± 4.1 vs 10.69 ± 5.75). The higher score in their study may be partially related to the presence of psychopathologic symptoms in their nightmare subjects, which was evident by their higher scores on 8 Minnesota Multiphasic Personality Inventory clinical scales, as compared with their control subjects' scores. Hence, our finding may bridge the gap of previous research on nightmares with regard to personality dimensions. That is, frequent nightmares can be independently related to neuroticism personality trait irrespective of psychiatric disorders. In parallel with the growing evidence supporting a genetic basis of personality trait[62] and preliminary evidence suggesting nightmares as a stable trait,[11,63] there could be a distinct possibility of a genetic vulnerability trait for frequent nightmares. In this regard, further prospective study in a longitudinal course of frequent nightmares with respect to the predisposing, precipitating, and perpetuating factors is needed.

The major strength of the current study was the recruitment of community-based samples with a 2-phase study design to elucidate the relationship between nightmares and their correlates in a general population. Nevertheless, the study subjects consisted only of a cohort of middle-aged Hong Kong Chinese. This may limit our ability to generalize the results to individuals of other ages (e.g., children, elderly). Despite the dispute that remains over the operational definition used for nightmares, we adopted a loose definition of nightmares in the current study, which might, therefore, include both bad dreams and nightmares.[2] In addition, subjects' reports were based on retrospective estimation and could be compromised due to recall bias. However, practical consideration might preclude the use of daily dream logs in a large group of community-based samples. Furthermore, as compared with that of general population, a higher prevalence of frequent nightmares was found in subjects recruited for the Phase 2 study, which might be due to more women and younger participants. Nonetheless, the associations between frequent nightmares and personality dimension and psychopathology were preserved.

In conclusion, our study results suggest that frequent nightmares are not uncommon in the general population; are associated with a constellation of demographic characteristics, socioeconomic status, and psychiatric disorders; and could be independently related to neuroticism person-

ality trait. Prospective studies in various populations should be conducted to enhance our understanding of the etiology of nightmares and the associated repercussion of nightmares.

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DISCLOSURE STATEMENT

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