Prevalence of insomnia and its psychosocial correlates among college students in Hong Kong

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Abstract

Objective: This study examined the prevalence of insomnia and its psychosocial correlates among college students in Hong Kong. **Participants:** A total of 529 Hong Kong college students participated in the study. **Methods:** Participants completed a self-reported questionnaire that included the Pittsburgh Sleep Quality Index (PSQI), Revised Life Orientation Test (LOT-R), Perceived Stress Scale (PSS) and Beck Depression Inventory (BDI-II) and questions about sociodemographic and lifestyle factors. A PSQI global score equal to or greater than 5 indicated insomnia. **Results:** Results indicated that 68.6% of the participants were insomniacs. Adjusted regression analyses revealed that optimism, stress and depression significantly predicted insomnia ($p < 0.01$). **Conclusions:** Our results suggest that insomnia is very common among Hong Kong college students and associated with other psychosocial factors. This study provides preliminary data on sleep quality and risk factors for insomnia, which may be used to guide sleep hygiene promotion and intervention among college students.

Keywords: insomnia; psychosocial correlates; college students; Chinese.

The prevalence of insomnia among adult populations has been widely reported. Nearly 58% of a sample of nationally representative British adults reported having one or more sleep difficulties, with women reporting more severe difficulties.[1] Another cross-sectional study revealed that 37% of a sample drawn from the general population of England, Wales and Scotland had insomnia, with 12% experiencing moderate to severe symptoms, 13% experiencing insomnia with fatigue and 5% fulfilling the DSM-IV criteria for having primary insomnia.[2] In a study assessing gender differences in insomnia in a Hong Kong Chinese population, 11.9% of the sample reported having insomnia at least three times per week, and insomnia was found to be more common among women than men.[3] Approximately 17% of adults in South Korea reported having insomnia symptoms at least three nights per week, with women showing greater vulnerability to insomnia.[4]

Early research indicates that college students are prone to suffer from sleep problems. A systematic review of studies of sleep problems among college students revealed that the average number of hours of sleep decreased from 7.3 to 6.87 hours in the ten years between 1979 and 1989, while the number of students reporting having sleep problems increased from 26.7% to 68.3% between 1982 and 1992.[5] In another study, 75% of a college sample reported having occasional sleep problems and 15% poor sleep quality.[6] Sleep problems and poor sleep quality were also found to be more likely to occur on weeknights compared to weekend nights in a sample of Chinese college students, with students spending significantly less time in bed, sleeping fewer hours and having less total sleep, longer sleep latency and a lower level of sleep efficacy.[7]

A number of psychosocial risk factors for insomnia have been identified. In a sample of grandmothers, individuals who were less optimistic had significantly more sleep problems and higher rates of hypertension and obsessive compulsive symptoms.[8] In a mixed sample of healthy individuals and patients with stress-related problems, higher scores on positive affect and lower scores on negative affect were associated with better sleep quality, lower levels of anxiety and depression and a higher level of optimism. The interaction of optimism with high levels of positive affect and energy has been found to result in better sleep.[9] Stress was associated with an increased risk of sleeping problems among workers. A higher prevalence of insomnia was found among

physicians with more burnout symptoms.[10] Work-school stress, family and health were found to be the precipitating factors of insomnia in a sample of clinical patients.[11]

The adverse impacts of sleep problems on physical and mental health are well documented. Chronic insomnia impaired interpersonal, somatic and psychological functioning among adolescents.[12] Individuals who reported having insomnia were more likely than those who did not experience difficulty sleeping to develop depression, anxiety disorders and other psychiatric disorders.[13] A study of suicide revealed that not only did insomnia increase suicide risk, suicide completers also had a higher rate of sleep disturbances both the week preceding death and in the current depressive episode.[14] Adequate sleep is not only an important element of healthy functioning among individuals but also a crucial factor that directly affects the academic performance of college students.[15] A previous study showed that students' grade point average (GPA) was significantly associated with sleep duration, with a longer sleep duration associated with a higher GPA.[16] Sleepiness was also found to decrease the ability of college students to perform basic academic activities such as solving mathematical problems.[17]

Although the literature shows the adverse effects of insomnia on mental and physical health, few studies have attempted to evaluate the prevalence of insomnia among Chinese college students and its associated factors. Hence, this study aimed to examine the prevalence of insomnia and its psychological correlates in a sample of Chinese college students in Hong Kong.

Method

Participants

A total of 529 Chinese college students comprising undergraduates and junior college (higher diploma or associate degree) students were recruited from four universities in Hong Kong. Students completed the questionnaire as part of their course requirements, and were assured of anonymity and the confidentiality of the data collected. Ethics approval was obtained from the Institutional Review Board.

Measures

Insomnia: The International Statistical Classification of Disease and Related Health Problems, Tenth Revision (ICD-10)[18] and Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)[19] define insomnia according to three criteria: (1) the presence of a subjective, sleep-related problem, (2) the presence of one or more of the following symptoms: difficulty falling asleep, intermittent awakening, early morning awakening and a feeling of light overnight sleep, and (3) the presence of one or more of the following after-effects of sleep disturbance: lethargy, tardiness, inefficiency at work, dozing or napping, proneness to error and overly sleepy. As the Pittsburgh Sleep Quality Index (PSQI)[20] was developed based on the above criteria, it was employed in the present study to estimate the prevalence of insomnia and assess sleep quality and patterns. The PSQI was designed to assess seven components of sleep quality over a one-month period: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, the use of sleeping medication and daytime dysfunction. Nineteen items are rated on a 4-point Likert scale (0 = Not during the past month; 3 = Three or more times a week) and the total PSQI score ranges from 0-21, with a global score equal to or greater than 5 indicating poor sleep quality.[21] The PSQI has been psychometrically validated, obtaining acceptable internal consistency ($\alpha = 0.83$) and validity and test-retest reliability among sleep-disorder patients and healthy subjects.[20] The Chinese version of the PSQI has also obtained good overall reliability ($r = 0.82$-0.83) and test-retest reliability ($r = 0.77$-0.85).[20] A PSQI global score greater than 5 yielded a sensitivity of 98% and specificity of 55% as a marker of poor sleep among primary insomniacs versus healthy controls.[20]

Stress: The Perceived Stress Scale (PSS) was used to measure the level of stress. Items are rated on a 5-point Likert scale (0 = never; 4 = very often), with higher scores indicating greater perceived stress. The PSS has obtained satisfactory reliability ($r = 0.78$) and validity.[22] The PSS has been translated and validated for use in Chinese.[23]

Optimism: The level of optimism was measured using the Revised Life Orientation Test (LOT-R), which consists of six items that are rated on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree).[24] A higher mean score indicates a higher level of perceived optimism. Good reliability ($r = 0.76$) and test-retest

correlation (r = 0.79) over a four-week period have been reported for this instrument.[24] The Chinese version of the LOT-R (CLOT-R) obtained satisfactory reliability (r = 0.69) in a sample of college students and working adults.[25]

Depression: The Beck Depression Inventory-II (BDI-II) is a self-reported, 4-point Likert rating scale composed of 21 items, which was developed for assessing the severity of depressive symptoms.[26] The prevalence of the depressive symptoms, which are classified into three categories, is based on three cut-off values. A total score of 0-12 indicates minimal depression; 13-18, mild depression; 19-28, moderate depression and 29-63, severe depression. The BDI-II has been psychometrically validated among both psychiatric and healthy adults. The Chinese version of the BDI-II has been validated, yielding good internal consistency.[27]

Sociodemographic and lifestyle characteristics

The last section of the questionnaire included questions on gender, age, education level and other lifestyle characteristics such as smoking (never smoked; quit smoking; smoking, tried to quit; smoking, trying to quit; smoking, never quit), drinking (never; less than once a month; 1-3 times a month; once a week; 1-2 times a week; 3-5 times a week; daily) and exercise habits (never; less than once a month; 1-3 times a month; 1-2 times a week; 3-5 times a week; daily).

Statistical analysis

Descriptive statistics were used to assess sociodemographic and lifestyle characteristics, and sleep quality and patterns among the sample. Gender differences were examined using independent-sample *t*-test for assessing mean differences and chi-square test for proportional differences. Multivariate regression analysis was used to evaluate factors associated with insomnia. Sociodemographic factors (including age, sex and education) were entered in the model, followed by lifestyle factors (including smoking habit, alcohol consumption and exercise habit) and psychosocial factors (including stress, optimism and social support) (Figure 1). Data analysis was carried out using SPSS Windows 15.0. The results are presented using the 95% confidence level, and a *p*-value of less than 0.05 is considered statistically significant.

Results

Sample characteristics

Table 1 shows the sociodemographic and lifestyle characteristics of the sample. A total of 529 students, almost half of whom were males, participated in this study. The mean age of participants was 21.01 years (*SD* = 1.77), and 78.3% of them were undergraduates and 21.2% were junior college students enrolled in associate degree or higher diploma programs.

Gender differences in sociodemographic and lifestyle characteristics

As shown in Table 1, females were significantly more educated than males (χ^2 = 18.35, $p < 0.05$). Gender differences were found to be significant ($p < 0.05$) for all lifestyle characteristics. Significantly more males (8.3%) were current smokers compared to females (2.7%; χ^2 = 15.44, $p < 0.05$). They also had a higher level of alcohol consumption. In the current sample, 40.4% of males consumed alcohol on a regular basis, from one to three times per month to daily, which was nearly two fold the level of alcohol consumption of females (20.5%; χ^2 = 45.16, $p < 0.05$). Among males, 70.5% reported having exercise on a regular basis, from one to three times per month to daily, a percentage significantly greater than that of females (40.6%) (χ^2 = 74.96, $p < 0.05$).

Prevalence of insomnia and sleep quality and patterns of the entire sample

As shown in Table 2, 68.6% of the sample were insomniacs, with 67.5% and 69.3% of males and females, respectively, experiencing difficulty sleeping. The mean PSQI global score was 6.01 (*SD* = 2.78), and no significant difference was found between the two genders ($p > 0.05$). About 60% of the participants reported having excellent to good sleep quality, while 40% rated their sleep quality as bad or poor. The mean sleep latency, which defined as the length of time individuals accomplish the transition from full wakefulness to sleep, was 0.93, and 18.8% of the sample had a sleep latency of more than 30 minutes. The average sleep duration of the sample was 7.01 hours (SD = 1.40), with 16.7% classified as short sleepers (≤ 6 hours) and 39.6% as long sleepers (>7 hours). Sleep efficiency among participants was fairly good, with 86.2% having sleep efficiency

greater than 75%. Regarding falling/staying asleep, 86.2% of the sample revealed having no difficulty or difficulty less than once a week, while 13.8% had difficulty one to two times or more than three times a week. Nearly all of the participants (97.5%) reported they had never used sleeping medication or used it less than once a week, and only 2.5% had used sleep medication. Only 7.4% of the participants reported that they had never experienced daytime dysfunction due to lack of sleep, while the remaining 92.6% reported that they had occasional daytime dysfunction ranging from less than one time per week to more than three times per week. Among the seven components of sleep quality, a significant difference was found only for use of sleep medication, with significantly more males than females reporting more frequent use of sleep medication (χ^2 = 18.08; $p < 0.05$).

Comparison of lifestyle characteristics and psychosocial status between non-insomniacs and insomniacs

The majority of the sample, both non-insomniacs and insomniacs, were non-smokers, with 91% of the former and 83.2% of the latter reporting that they had never smoked (Table 3). A slightly higher number of insomniacs (30%) than non-insomniacs (24.1%) reported consuming alcohol on a regular basis, from one to three times per month to daily. Interestingly, a slightly higher number of insomniacs than non-insomniacs were physically active. About 55% of insomniacs indicated that they exercised on a regular basis, from one to three times per month to daily, while 52.4% of non-insomniacs reported the same. However, no significant difference was found between the two groups for any of the lifestyle characteristics. Significant differences were found for optimism (t = 3.40, $p < 0.001$), stress (t = -4.98, $p < 0.001$) and depression (t = -5.32, $p < 0.001$), which suggests that insomniacs are less optimistic and experience higher levels of stress and depressive symptoms compared to non-insomniacs.

Factors associated with insomnia

The results of multivariate regression analysis showed that whereas none of the lifestyle factors assessed were significantly associated with insomnia, among the three psychosocial factors assessed, stress (Std β = 0., $p < 0.001$) and depression (Std β = 0.21, $p < 0.001$) were significantly associated with insomnia ($p < 0.001$),

which indicates that higher levels of stress and depression are associated with increased risk of insomnia.

Discussion

The results of this study revealed that the prevalence of insomnia among a sample of Chinese college students was high (68.8%), and that many were generally poor sleepers (*M* = 6.01, *SD* = 2.78). About 60% reported sleeping fewer than eight hours a day, and 92.6% reported having at least one occasion of daytime dysfunction due to lack of sleep. No gender differences were found in either sleep quality or sleep patterns except for use of sleep medication.

The prevalence of insomnia in the current sample was higher than that reported in previous studies.[1,3-4] It was comparable with that of a sample of US college students (68.6% vs. 75%)[6] and higher (68.6% vs. 57.5%) than that obtained in a similar study conducted in Hong Kong.[28] The sleep efficiency of the college students in the current study (*M* = 75%) was greater than that of a sample of clinical patients(*M* = 67.7%).[11] The sleep duration of the present sample (*M* = 7.01 hours) was longer than that of a Japanese sample (*M* = 6.88 hours) and shorter than that of a mainland Chinese sample (*M* = 8.07).[29]

In line with the findings of previous studies,[11,30] the results of regression analysis showed a significant association between stress and insomnia. A number of explanations of the possible underlying mechanism of the stress-insomnia link have been suggested. Insomniacs have been found to have an elevated metabolic rate and general hyperarousal disorder, which contribute to sleep problems.[31]Insomniacs engage in active thinking, worrying, planning and analyzing at bedtime.[32] These pre-sleep cognitions are found to be correlated with sleep problems.[33] Emotional arousal might also contribute to sleep problems in an indirect way, as pre-sleep cognitions may make individual feels anxious, remorseful or dysphoric, producing an emotional arousal that interferes with sleep.[34] Misperceptions about sleep, including those of total sleep duration and quality, how much sleep is needed, consequences of insufficient sleep, factors that lead to good or poor sleep and cognitions about one's daily functioning are all cognitive processes that may affect sleep.[34] These misperceptions about

sleep may interact with sleep-interfering processes, such as cognitive and emotional arousal, leading to sleep problems.[34]

Depression was also significantly associated with insomnia in the present sample of Chinese college students. Previous research suggests that insomniacs tend to have cognitive biases towards negativity.[35] Individuals who are prone to ruminate when confronted with stressors tend to focus on their negative emotional state.[36] However, sleep problems are also found to be a common complaint among depressed individuals.[37] Lack of sleep can lead to a depressed mood and affect the ability of individuals to regulate their emotions, which can further interrupt sleep and produce a vicious cycle of sleep and depression.[38] Research suggests that Chinese individuals have a tendency to experience somatic symptoms of depression,[39] and that Chinese people have a higher tendency for somatization.[40-41] Hence, sleep problems could be the result of an existing mental problem.

In contrast to existing findings,[42] the association between optimism and insomnia was found to be non-significant. Optimists were found to have positive expectations about the future, which helps them to avoid engaging in negative thinking.[43] Pessimists, however, have higher levels of worry, which may affect sleep.[44] In addition, because of their greater propensity to engage in negative thinking, pessimists are prone to ruminate about the negative consequences of insufficient sleep, which interferes with their sleep. Future studies should validate the current findings using different measures.

Previous studies show that insomniacs are more likely to be smokers and less physically active compared to non-insomniacs.[44-47] Excessive alcohol consumption has also been found to disrupt sleep.[48-50] However, the current study found no association between lifestyle characteristics and insomnia. The discrepancy in findings may be due to differences in sample characteristics (e.g., lifestyles) and cultural norms about alcohol consumption may also contribute to the discrepancies. The relationship between these lifestyle characteristics and insomnia awaits further investigation.

Comment

Caution is warranted in interpreting and generalizing the findings reported in this study. The cross-sectional design of this study did not allow the determination of the time course; hence, we cannot infer causality between insomnia and associated psychosocial factors. A more rigorous design is needed in future work to delineate the causal associations between insomnia and lifestyle and psychosocial variables and their underlying mechanism in other populations. One important reason for the discrepancy between the findings of this study and those of previous research is the different sampling method and measurements used to assess insomnia, optimism and lifestyle characteristics. To address these shortcomings, future studies should employ standardized measures. In addition, covariates other than stress, optimism and depression may be involved in insomnia. The possible range of interactions among variables that can result from the link between insomnia and stress and depression is therefore wide. This should also be addressed in future studies. Future investigation is also needed to determine the extent to which psychiatric illness and somatization contributed to the prevalence of insomnia and mediated the insomnia-depression link.

The study findings shed tentative light on the unidirectional relation of insomnia with stress and depression, but the extent to which these psychosocial variables interact with each other in influencing insomnia is unclear. Future examinations of the bi-directional interaction of sociodemographic, psychosocial and sleep variables could be conducted using analytic approaches such as structural equation modeling. Our conclusions, as with those of all studies, should be treated as tentative until replicated.

Nevertheless, results from our study of a Chinese sample revealed that a substantial proportion of college students suffer sleep problems who might not seek help from specialists. Psychosocial factors, including stress and depression, were important factors associated with insomnia. These findings suggested that insomnia can be a symptom of an underlying psychological or mental health problem. School-based intervention can target on these factors to help reducing the alleviating trend of sleep and mental health problem among college students.

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