

The Prevalence of Insomnia, Sleep Hygiene and Gender Differences among College Students in Southwest China

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ABSTRACT: Insomnia is more frequent in women than in men throughout all age groups. Thus, insomnia resembles other psychiatric disorders that occur more frequently in women. As insomnia is frequently a symptom of anxiety and depression, it remains an open question whether the comorbidity with psychiatric disorders fully explains the gender differences in the prevalence of insomnia or whether gender influences sleep independently from psychiatric conditions. Sleep complaints are prevalent among college students and they frequently report difficulties falling asleep, daytime hyper somnolence, and fatigue. The study looked into gender differences, sleep hygiene behaviors and their associations with prevalence of insomnia severity of college students (N=302; Male; 174 (57.6%) Female; 128 (42.4%) from five universities 18-38 years (M=2.42, SD=1.26) in Southwest China. College students reported insomnia; (M=11.79, SD=6.58), a sub-threshold insomnia and sleep hygiene (M=37.87, SD=8.43) indicating slight bad sleeping hygiene. Pearson correlations (insomnia and sleep hygiene (r 0.44, p=.01) were significant and positively inter-correlated. College students reported frequent engagement in inconsistent sleep-wake schedules, lounging and worrying about important matters on the bed. Improper sleep scheduling, behaviors that promote arousal near bedtime, staying longer in bed, using bed other than sleeping or sex and uncomfortable sleeping environments were positively associated with cross-sectional insomnia severity. We recommend college students in Southwest China to maintain sleep-wake patterns, avoid: devices such as mobile phones, laptops and tablets when about to sleep; drinking caffeinated drinks after lunch and binge sleeping during weekends.

KEY WORDS: College Students, Southwest China, Insomnia, Sleep Hygiene, Gender Differences

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I. INTRODUCTION

The term insomnia fundamentally refers to difficulty sleeping. Yet, insomnia as a clinical diagnosis is subtyped according to frequency of occurrence, duration (acute versus chronic) and etiology. The diagnosis of insomnia can be made according to different classification systems: the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10) (World Health Organization (WHO) 2010), but other classification systems such as the *International Classification of Sleep Disorders* (ICSD-2) (American Academy of Sleep Medicine (AASM) 2005), and the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV and DSM-V) (American Psychiatric Association (APA) 2000a and 2013b), are commonly used in other countries. All four classification systems consider the presence of difficulties initiating sleep and/or difficulties maintaining sleep and/or non-restorative sleep and daytime impairments as cornerstone diagnostic criteria for insomnia. (APA) 2000a, 2013b).

The prevalence of insomnia symptoms in the general population, such as difficulty initiating sleep, maintaining sleep, and non-restorative sleep, has been reported to be about 33% (Ohayon, 2002). A higher prevalence of insomnia in women compared to men also seems to be a common finding across countries and cultures (Ohayon, 2002; Broman, Lundh & Hetta, 2006; Doi et.al, 2000; Leger et.al, 2000; Hajak, 2001; Bixler et.al, 2002; Ling, Wing & Fong, 2002; Leger, Masuel & Metlaine, 2006; Ozminowski, Wang & Walsh, 2007; Perreti-Watel, 2009), and a meta-analysis of 29 studies with more than 1.2 million participants indicated that women are 40% more likely to suffer from insomnia more than men (Zhang & Wing, 2006). A crucial question that remains to be answered is why women are more susceptible to insomnia than men (Ling, Wing & Fong, 2002; Lindberg et.al, 1997; Chen et.al, 2005; Sekine et.al 2006 & Hale et.al 2009). There are three possible explanations for this gender difference in the prevalence of insomnia: biological differences, prevalence of psychiatric illnesses, and sociological differences (Chen et.al, 2005 & Hale et.al, 2009). The biological explanation posits that innate physiological differences between men and women are responsible for gender differences in sleep initiation, maintenance, and quality. It has been indicated that sex steroids such as progesterone, estrogen, and testosterone influence differences in the sleep patterns of men and women (Manber

& Armitage, 1999). Psychiatric illnesses, such as affective and neurotic disorders, are more common in women than in men (Vazquez-Barquero et.al, 1992; Piccinnelli & Wilkinson, 2000) and are commonly associated with sleep disturbance (Breslau, Roth, Rosenthal & Andreski, 1996; Taylor et.al, 2007 & Buysse et.al, 2008). However, it remains controversial as to whether a history of mental illness explains gender disparities in insomnia symptoms. Three epidemiological studies revealed no correlation (Bixler et.al, 2002; Ling, Wing & Fong, 2002 & Lindberg et.al, 1997) while one study indicated a positive result (Hale et.al, 2009).

Several studies have reported that college women experience more insomnia than college men (Brown et al., 2001; Buboltz, Brown, & Soper, 2001). Tsai and Li (2004b) observed that women had longer sleep onset latency, more nighttime awakenings, and overall poorer sleep quality than men. Lund and colleagues (2010) found women were found to report more stress-related sleep disturbances than men. Sleep hygiene (SH) is an effective approach for improving sleep quality (Stepanski & Wyatt, 2003). SH operates under the assumption that behavioral and environmental conditions can be modified to enhance sleep quality. Inadequate SH is characterized by practices that produce increased arousal and practices that contradict the known principles of sleep organization. Studies show that SH status can be negatively impacted by substances such as caffeine, tobacco, and alcohol (AASM, 2001). Stress and excitement also contribute to reduced SH and include stimulating activities occurring within close proximity to sleep time such as intense physical activity, involved mental tasks, or social events. Environmental arousers for example, allowing light to seep into the bedroom are also labeled as SH disruptors. The biological processes that regulate sleep are also susceptible to inadequate SH. Spending too much time in bed, excessive variation in sleep/wake time, and taking naps throughout the day are considered indicators of poor SH. 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 10 years between 1979 and 1989, whereas the number of students reporting having sleep problems increased from 26.7% to 68.3% between 1982 and 1992 (Jensen, 2003). In another study, 75% of a college sample reported having occasional sleep problems and 15% poor sleep quality (Buboltz, Brown & Soper, 2001).

Young adults are at greater risk than other age groups for developing first onset psychopathology, which possibly could direct to lesser social and academic performance and worse long-term outcomes, such as dropout and under-employment (Christie, Burke, Regier, & Rae, 1988; Kessler, Chiu, Demler, Merikangas, & Walters, 2005). Thus, it is vital to determine what modifiable risk factors are associated with psychopathology in young adults, in exception of budding prevention programs to decrease the onset of psychopathology, and hopefully avert the negative secondary outcomes. Current studies, suggest that as many as 70 percent of university students qualify as sleep deprived (Hicks & Pellegrini, 2001; Kloss, Nash, Horsey, & Taylor, 2011). Deficiency in worth sleep can extensively have an effect on students' physical and cognitive functioning, mainly in terms of information processing, problems with concentration and recall (Backhaus et al., 2006). Factually, many students may be finding the middle ground for their education and unconsciously harm their future by not paying adequate attention to their need for quality and restorative sleep. Those who do realize the importance of proper sleep hygiene may not have the resources to address this trouble and may end up relying on ineffective, if not possibly harmful, approaches such as abusing medications. The relationship between insomnia, academic performance, and quality of health cannot be over looked (Lund, Reider, Whiting, & Pichard, 2010).

College students are an ideal population to examine insomnia and mental health correlation. University students are also in general physically healthy and represent the majority of the young adult population, as 68% of high school graduates go on to college (U.S. Census Bureau, 2005). As many as 16% to 23% of young adults report insomnia symptoms (Bixler, Vgontzas, Lin, Vela-Bueno, & Kales, 2002; Cukrowicz et al., 2006; Hardison, Neimeyer, & Lichstein, 2005; Karacan et al., 1976), which is equal to the occurrence in the general population (i.e., 9%–15%; Ohayon & Roth, 2003). Indeed, 7% to 20% of people report their insomnia symptoms started before age 20, and another 11.4% report their symptoms started when they were 21 to 30 years old (Bixler, Kales, Soldatos, Kales, & Healey, 1979; Kales et al., 1984). Despite the high prevalence of insomnia in the mature population, the disorder is a beneath problem in this group (Buboltz, Brown, & Soper, 2001; Hardison et al., 2005). This might explain why the relationship between sleep and mental health in young adults has been understudied. These previous studies of relating insomnia symptoms and mental health used varying degrees of specificity in defining insomnia: from an affirmative answer to a lifetime history of insomnia symptoms, to a cut-off score on a symptom questionnaire, which bring in significant variance and makes complicated to compare results to more recent studies that use more specific research or quantitative diagnostic criteria for insomnia (Edinger et al., 2004; Lichstein et al, 2003). In addition, they frequently focused only on specific disorders (e.g., depression and suicidality), which confines our span of knowledge.

Insomnia is not a diagnosis, but a symptom, or more usually a symptom complex or syndrome. It is commonly defined as a perception of insufficient or deprived significant nap, regardless of a sufficient chance to take a nap, leading to a feeling of being unrefreshed on waking, during wakefulness, or in both of these situations. The relative importance of the two components of the syndrome, poor sleep at night and tiredness

during the day, varies considerably. Most insomniacs find it difficult to fall asleep during the day despite feeling tired, and therefore do not have true excessive daytime sleepiness, although 'sleep reversal' is characterized by severe insomnia at night with prominent episodes of sleep during the day. The large numbers of physiological factors that influence sleep often combine to cause a poor night's sleep. This is usually recognized as a natural response to the circumstances. A mild degree of insomnia merges into normality on the one hand, and into what can be a severe disability on the other, but the complaint of insomnia depends very much on the subject's expectations of the quality and length of sleep and of daytime tiredness. The mood, degree of boredom and medical disorders, both physical and psychological, also influence how severe insomnia is perceived to be. It therefore represents the degree of dissatisfaction with sleep or the mismatch between the expectation and reality rather than reflecting an absolute degree of sleep disturbance. It is less frequently due to organic disease than excessive daytime sleepiness, but, like its origin, this is often multifactorial. It is in this complexity that the study looked into insomnia, sleep hygiene and gender differences among college students, which could give clarity to the globe of clinical psychology and beyond.

As a college student, there could be many factors that may make maintaining a regular sleep schedule difficult due to; new environment, trying to adapt new time zone or time difference from home country. It is these factors that could lead to insomnia. This study had two primary objectives. The first objective was to identify the prevalence of insomnia and SH practices amenable to modification among college students. The second objective was to determine whether insomnia, sleep hygiene and gender were significant predictors of sleep behavior. There is an increased interest in understanding this phenomenon which validated the study as an ideal opportunity to provide empirical evidence to remedy this unique predicament.

II. MATERIAL AND METHODS

Participants

A total of $n=302$ college students participated from five universities in Southwest China, during the winter season from either in class or dormitory settings. It took about 10 minutes for the participants to complete the questionnaires.

Materials

The questionnaire comprised of demographic information such as gender, age, level of education, major and continent.

Insomnia Severity Index (ISI Morin, 1993). The ISI is a 7-item questionnaire of subjective insomnia symptom severity. Responses are provided on a Likert-scale (0–4). The total score ranges from 0 to 28, and higher scores indicate more severe problems. These symptoms included: difficulties falling asleep and/or staying asleep, waking too early in the morning; sleep dissatisfaction; degree of impairment with daytime functioning; degree to which impairments are noticeable; and distress or concern about insomnia. The ISI had good internal consistency (Cronbach $\alpha = 0.87$). There was good reliability and validity (Bastien, Vallières, & Morin, 2001). It is a recommended assessment tool for insomnia research (Buysse et al., 2006), and its fast time management makes it useful for clinical use too.

Sleep Hygiene Index (SHI) (Mastin, Bryson, & Corwyn, 2006) was selected to measure sleep practices for this study. SHI is a self-rated 13 item instrument which assesses sleep hygiene behaviours. Participants were required to indicate how frequently they engage in specific behaviours and indicate the frequency: always, frequently, sometimes, rarely, or never. Each item was then coded with scores ranging from 5 (always) to 1 (never). (Cronbach $\alpha = 0.80$).

Procedure

After being granted permission from the respective Universities, the willing college students from various Universities were randomly approached for participation in the study. The purpose of the study was introduced and all questions raised were adequately answered. The questionnaire included an explanation of the principle of confidentiality and informed consents, thus a space was provided for students to sign in order to fulfill the principle of informed consents.

Ethical considerations

Permission to conduct the study was obtained from the ethics committee of the university, and the study protocol (Touitou et al., 2006). An information sheet describing the nature and purpose of the study as well as an explanation that participation was voluntary accompanied each questionnaire. The respondents remained anonymous and were assured that their responses would be kept confidential.

Statistical analysis

Analyses were performed with IBM Windows *Statistical Package for the Social Science* SPSS (version 25, IBM Corp., Armonk, NY, USA). Descriptive statistics, such as means and standard deviations for continuous variables, frequencies and percentages for categorical variables, were computed for the observed variables. Pearson correlations, were computed to examine which demographic variables were related to estimate the proportion of explanatory variables in relation to the outcome variable. A simple linear regression was computed for model analyses. Cronbach’s alphas were computed on major study variables to determine the internal consistency of the scales.

III. RESULTS

The sample comprised $n=302$ college students from five universities ($M=3.31$, $SD=1.50$). Gender; Males $n=174$ (57.6%) and females $n=128$ (42.4%). Males were highly affected by insomnia while females were highly affected by sleep hygiene. Age ($M=2.42$, $SD=1.26$); 18-21 (22.2%), 22-25 (43.0%), 26-29 (16.9%), 30-33 (8.9%), 34-37(6.0%) and Over 38 (3.0%). Level of Education ($M=1.74$, $SD=0.79$); BA/Sc (47.0%), MA/Sc (33.4%), Ph.D (18.5%) and Others (1.0%). Major($M=4.75$, $SD=3.81$); Economics and Management (18.2%), Medicine (18.5%), Engineering (21.9%), Computer and Information Science (7.6%), Humanities (6.0%), Law and Political Science (0.3%), Architecture (0.3%), Science and Mathematics (0.7%), Biological sciences (3.0%), Education (4.6%), Chinese and Linguistics (15.2%), and Others (3.6%). Continent; ($M=1.52$, $SD=1.06$); Asia (64.9%), Africa (30.1%), Australia (0.7%), North America (0.7%), Europe (1.7%), South America (0.7%), Caribbean Islands (0.7%) and Others (0.7%). Insomnia and sleep hygiene highly affected Asians followed by African students respectively. See Table 1

Table 1. Descriptive Summary Statistics

	Gender	N	Mean	SD	SE
Insomnia	Male	174	12.12	7.01	.531
	Female	128	11.34	5.94	.525
Sleep hygiene	Male	174	37.62	9.03	.684
	Female	128	38.21	7.55	.668
Insomnia		302	11.79	6.58	.378
Sleep hygiene		302	37.87	8.43	.485
University		302	3.31	1.50	
Age		302	2.42	1.26	
Level of education		302	1.74	.792	
Major		302	4.75	3.80	
Continent		302	1.52	1.06	

3.1 Insomnia ($M=11.79$, $SD 6.58$)

Majority of students reported that they are (Moderately Satisfied=36.1%) by their current sleep patterns ($M=1.90$, $SD=1.16$); Extent on how sleep interferes with their daily functioning (A Little=24.2%) ($M=1.86$, $SD=1.27$); Problems waking up too early (None=23.2%) ($M=1.77$, $SD=1.35$); How noticeable to others their sleep problem impairs their quality of life (A Little=27.5%) ($M=1.70$, $SD=1.25$); How worried they were about their current sleep problem (A Little=26.8%) ($M=1.58$, $SD=1.28$); Difficulty falling asleep (Moderate=27.5%) ($M=1.58$, $SD=1.28$); Difficulty staying asleep (None=31.8%) ($M=1.40$, $SD=1.22$). The overall mean score was $M=11.79$, which indicated that the college students have a sub-threshold insomnia. See Table 2

Table 2. Insomnia Severity Items

	<i>Mean</i>	<i>SD</i>	<i>N</i>
<i>Difficulty falling asleep</i>	1.58	1.28	302
<i>Difficulty staying asleep</i>	1.40	1.22	302
<i>Problems waking up too early</i>	1.77	1.35	302
<i>How satisfied/dissatisfied are you with your current sleep pattern</i>	1.90	1.16	302
<i>How noticeable to others do you think your sleep problem is</i>	1.70	1.25	302
<i>How worried are you about your current sleep problem</i>	1.58	1.28	302
<i>What extent do you consider your sleep problem interferes with daily functioning</i>	1.86	1.27	302

3.2 Sleep Hygiene (M=37.87, SD=8.43)

Respondents were requested to rate their frequency of engagement in behaviors purported to impact SH as measured by the SHI (1=Never, 5=Always). Examining individual items comprising the SHI, *stress-related factors* including “I go to bed feeling stressed, angry, upset, or nervous (M=2.50 , SD=1.14)”, “I think, plan, or worry when I am in bed (M=3.40 , SD=1.13)”, “I do something that may wake me up before bedtime, i.e. play video games, use the internet, clean (M=3.33, SD=1.34)”, and “I do important work before bedtime (M=3.51 , SD=1.12)”, were the most frequently cited disruptors of positive SH status. *Irregular* sleeping patterns including “I go to bed at different times from day to day (M=3.40 , SD= 1.09)”, “I get out of bed at different times from day to day (M=3.26 , SD=1.07)”, “I stay in bed longer than I should two or three times a week (M=3.10 , SD=1.20)”, and “I take daytime naps lasting two or more hours (M=2.95, SD=1.18)” were also common among the sample. *Environmental* determinants of SH including “I sleep in an uncomfortable bedroom, i.e., too bright, too stuffy, too hot, too cold, or too noisy (M=2.35, SD=1.25)”, “I sleep on an uncomfortable bed i.e., poor mattress or pillow, too much or not enough blankets (M=2.43, SD=1.23)” were also influential on the samples’ SH status; particularly, the item “I use my bed for things other than sleeping or sex, i.e. watch television, read, eat, or study (M=3.40, SD=1.26)”. In regards to stimulants and sedatives, the item “I use alcohol, tobacco, or caffeine within four hours of going to bed or after going to bed (M=1.89, SD=1.29)” indicated infrequent behavior among the participants. The item “I exercise to the point of sweating within one hour of going to bed (M=2.34, SD=1.26)” was infrequently reported by the respondents. Summated, the SHI had a possible range of 13 to 65 with higher scores reflecting a more positive SH status with a mean of 37.87 and a standard deviation of 8.43. *See Table 3*

Table 3. Sleep Hygiene Items

	<i>Mean</i>	<i>SD</i>	<i>N</i>
<i>I take daytime naps lasting two or more hours</i>	2.95	1.18	302
<i>I go to bed at different times from day to day</i>	3.40	1.09	302
<i>I get out of bed at different times from day to day</i>	3.26	1.07	302
<i>I exercise to the point of sweating within one hour of going to bed</i>	2.34	1.26	302
<i>I stay in bed longer than I should two or three times a week</i>	3.10	1.20	302
<i>I use alcohol, tobacco or caffeine within four hours of going to bed or after going to bed</i>	1.89	1.29	302
<i>I do something that may wake me up before bedtime e.g. use the internet, play video games</i>	3.33	1.34	302
<i>I go to bed feeling stressed,angry,upset or nervous</i>	2.50	1.14	302
<i>I use my bed for things other than sleeping or sex</i>	3.40	1.26	302
<i>I sleep on an uncomfortable bed e.g. poor mattress</i>	2.43	1.29	302
<i>I sleep in an uncomfortable bedroom</i>	2.35	1.25	302
<i>I do important work before bedtime</i>	3.51	1.12	302
<i>I think,plan or worry when Iam in bed</i>	3.40	1.13	302

One sample t-test indicated that insomnia $t(301) = 31.16, p = .001$ and sleep hygiene $t(301) = 78.11, p = .001$ were both statistically significant. See Table 4

Table 4. One-Sample Test

	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>	<i>Mean Difference</i>	<i>95% Confidence Interval of the Difference</i>	
					<i>Lower</i>	<i>Upper</i>
<i>Insomnia</i>	31.159	301	.000	11.791	11.05	12.54
<i>Sleep Hygiene</i>	78.107	301	.000	37.871	36.92	38.83

Pearson correlations of the two variables were significant and positively inter-correlated. Insomnia; sleep hygiene ($r = 0.44, p = .01$). Insomnia was only significant with age ($r = 0.15, p = .008$). Sleep hygiene was significant with age ($r = 0.16, p = .007$); level of education ($r = 0.12, p = .032$); and major ($r = 0.14, p = .019$). On both sleep hygiene and insomnia, there were correlations and no significant differences on gender. See Table 5

Table 5. Pearson correlations coefficients of demographics

		<i>Gender</i>	<i>Age</i>	<i>Education</i>	<i>Major</i>	<i>Insomnia</i>	<i>Sleep Hygiene</i>
<i>Gender</i>	<i>r</i>	1	-.220**	-.069	.125*	-.058	.035
	<i>Sig. (2-tailed)</i>		.000	.235	.030	.311	.548
	<i>N</i>	302	302	302	302	302	302
<i>Age</i>	<i>r</i>	-.220**	1	.716**	.059	-.152**	-.155**
	<i>Sig. (2-tailed)</i>	.000		.000	.303	.008	.007
	<i>N</i>	302	302	302	302	302	302
<i>Education</i>	<i>r</i>	-.069	.716**	1	.084	-.069	-.124*
	<i>Sig. (2-tailed)</i>	.235	.000		.146	.234	.032
	<i>N</i>	302	302	302	302	302	302
<i>Major</i>	<i>r</i>	.125*	.059	.084	1	-.098	-.135*
	<i>Sig. (2-tailed)</i>	.030	.303	.146		.088	.019
	<i>N</i>	302	302	302	302	302	302
<i>Insomnia</i>	<i>r</i>	-.058	-.152**	-.069	-.098	1	.441**
	<i>Sig. (2-tailed)</i>	.311	.008	.234	.088		.000
	<i>N</i>	302	302	302	302	302	302
<i>Sleep Hygiene</i>	<i>r</i>	.035	-.155**	-.124*	-.135*	.441**	1
	<i>Sig. (2-tailed)</i>	.548	.007	.032	.019	.000	
	<i>N</i>	302	302	302	302	302	302

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

3.3 Linear regression

A significant regression was found ($R^2 = .19, F(1,300) = 72.31, p < .01$). A simple linear regression was calculated to predict number of college students Sleep Hygiene based on Insomnia, $\beta = .44, t(300) = 2.51, p < .01$. College students predicted Sleep Hygiene is equal to $29.69 + 1.03(\text{Gender}) + .57(\text{Insomnia})$. Both Sleep

Hygiene and Insomnia were significant predictors except gender.

IV. DISCUSSION

It is clear from the literature that getting sufficient sleep is crucial for human health and wellbeing. In that light, it is surprising to see that prior research on sleeping behavior has largely focused on specific subsamples such as sleep disorder patients, nightshift workers, or children, while far less is known about insufficient sleep among people who do not suffer from sleeping disorders or external factors affecting their sleep. This study was conducted to examine the relation between self-reported insomnia and sleep hygiene tendencies among college students. The current study found that insomnia and sleep hygiene is prevalent among the college students in Southwest China.

This is in addition supported by the various studies which identified female gender as a strong risk factor for insomnia (Ford & Kamerow, 1989; Klink et al., 1992; Li et al., 2002), and community-based studies that examined gender differences in insomnia complaints have consistently shown a higher prevalence of insomnia among women than among men (Radecki & Brunton, 1993; Foley et al., 1995; Ancoli-Israel, 2000; Bixler et al., 2002; Rocha et al., 2002). This study did not strongly support the previous studies but revealed that although they fall under the same category of diagnosis, which is sub-threshold insomnia 8-14, most males (12.12) had slighter scores than their females (11.34) counterpart in insomnia. This meant that none of the gender had a criteria to be fully diagnosed as an insomniac scores of (>14). However, this means that males were affected by insomnia more than females. Although the current study did not support previous studies. It indicated that most of the males indicated they had difficulty in falling/staying asleep, problems of waking up too early and sleep problem interfering with their daily functioning such as daytime fatigue, mood, and ability to function at daily chores, concentration and memory. This was a clear indication that insomnia had adversely affected their mental health. Males indicated that their sleep problem was a little noticeable to others yet contrary, their scores were quite higher than those of females.

For the males, they mostly indicated very severe they had difficulty falling asleep and problems waking up too early. In addition, they were very dissatisfied with their current sleep pattern. Some would admit they knew they had sleep problems which affected them during the day but they were not worried about their sleep problem and not at all noticeable to others. Biological differences in sex steroids may also contribute to gender differences in insomnia. For some women, during the reproductive years, sleep problems may arise secondary to menstrual symptoms (e.g., cramping, bloating, headaches, and tender breasts), symptoms associated with premenstrual dysphoric disorder (Shaver, 2002). In addition to hormonal changes that occur during menopausal transition, numerous other factors have been postulated as potential contributors to sleep related problems in women; these include social changes, re-entry into the workforce, or separation from life partners due to death or divorce (Shaver, 2002; Polo-Kantola & Erkkola, 2004). Thus, a perceived "poor" sleep could be associated with higher levels of psychological distress (Shaver & Paulsen, 2011). One finding that we did not anticipate was the college students' perceptions of sleep quantity differed for weekdays, but not for weekends. Students perceived themselves as getting less sleep during the week than the actual amount that they reported, although the students desired more sleep on weekends than they got during the week. These perceptions of sleep quantity by students may lead to more difficulties for students; those who believe that they are not getting enough sleep during the week may act as if they should be tired.

According to previous studies, older persons sleep less during the night, have more fragmented sleep and sleep less deeply. They also tend to stay longer in bed and usually take short daytime naps (Neubauer, 1999; González Solanellas et al., 2004; Baena Díez et al., 2006). Difficulty in falling asleep is common in the older population and is often attributed to the changes in sleep architecture and circadian rhythm due to age. These changes, however, do not necessarily cause sleep disorders and lead to insomnia (Byles et al., 2003; Mazza et al., 2004). Despite this, it is often reported that insomnia is a common problem in older adults that is not sufficiently recognized and is often under diagnosed and under treated (Roth et al., 2002; Folks, 2005). Interestingly, this study found that the older college students (majority of the graduate students) had less insomnia than the undergraduate college students. This also reflected when it came to the ages, the younger the college students were, the more they experienced insomnia, rumination and bad sleep hygiene and the vice versa was that the older the college students were, they had less insomnia and bad sleep hygiene. This is the opposite from the literature studies which should pave way for the true experiment to be conducted in future research.

Sleep hygiene behaviours as measured by the Sleep Hygiene Index are relatively stable over time for a nonclinical population. Results confirmed the finding by Brown *et al.* (2002) that sleep hygiene is strongly related to sleep quality. The findings suggest that having good sleep-hygiene knowledge is weakly associated with good sleep-hygiene practices but is not directly related to overall sleep quality. However, sleep practices are strongly related to overall sleep quality. These findings suggest that knowing about proper habits does not necessarily influence sleep quality, whereas practicing proper habits is strongly related to good overall sleep quality. For the first time, we are able to report that sleep hygiene is modestly related to perceptions of daytime

sleepiness as would be expected in that poor sleep hygiene is thought to be related to poor sleep quality. The Sleep Hygiene Index instrument established corresponding psychometric dimensions with additional evidence of validity and a clear item selection rationale. The extent, to which the Sleep Hygiene Index results could be generalized across age groups, level of education and major for example, is unknown. This is because SH affected and differed on age groups, level of education and major. Possessing a valid and reliable instrument may be necessary, but may not be sufficient in understanding and modifying sleep hygiene behaviours. An incongruity between sleep hygiene knowledge and practices in clinical (Lacks and Rotert, 1986) and non-clinical populations (Brown *et al.*, 2002) suggests that an understanding of sleep hygiene in context may be important. We suggest that clinically it is important to understand that sleep hygiene does not exist in isolation and may be better understood when considering the psychosocial context of the patient (e.g., precipitation and/or maintenance of maladaptive sleep hygiene behaviours may not be addressed by education alone). Further, it is likely to be unnecessary to create a core, or alternately, a comprehensive list of sleep hygiene behaviours in the pursuit of a quantitative assessment of sleep hygiene. Our findings support the use of the sleep-hygiene practices (Lacks & Rotert, 1986) but not the use of the caffeine.

Machado, Varella & Andrade (1998), who were aware of these concerns investigated the relationship of college students' course schedules, sleep-wake variations, sleep quality, and health status. They found that students with early classes during the week had greater sleep-wake variations than those whose classes were later in the day. Furthermore, the students with more variations in their sleep schedules had shorter sleep duration and greater difficulties awakening during the week (Machado, Varella & Andrade, 1998). This finding suggested that inconsistencies between students' social and academic schedules may promote variations in sleep schedules and may be a contributing factor to their sleep difficulties. Waking at the same time each day is a key ingredient in sleep hygiene instructions, a commonly used intervention to improve sleep quality. Other activities consistent with good sleep hygiene include getting regular exercise, reducing caffeine intake, taking late-afternoon naps, and curtailing alcohol consumption (Bootzin & Perlin, 1992). Indeed, drinking coffee to improve alertness, taking naps to make up for lost sleep, and drinking alcohol to promote sleepiness are common strategies students use to counter their varying sleep schedules (Pilcher, Ginter & Sadowsky, 1997). In the general population, such poor sleep-hygiene practices are associated with a greater incidence of insomnia and chronic difficulties in initiating or maintaining sleep (Lacks & Rotert, 1986). Although poor sleep habits in some students may be the result of late-night parties and an associated lifestyle of alcohol, drug, and tobacco use (Jean-Louis *et al.*, 1998) one cannot assume that this is the case with all students. Blaming students for irresponsible sleep habits does not address the problem. Many students may be unaware that their inconsistent sleep habits can perpetuate chronic sleep difficulties; they mistakenly believe they can compensate for weeknight sleep deprivation by sleeping long hours on the weekend.

The findings propose that having good sleep-hygiene knowledge is weakly associated with good sleep-hygiene practices but is not directly related to overall sleep quality. However, sleep practices are strongly related to overall sleep quality. These results suggested that knowing about proper habits does not necessarily influence sleep, whereas practicing proper habits is strongly related to good overall sleep quality. In other words, even students with relatively good sleep practices will continue to maintain some poor habits such as using caffeine or smoking cigarettes. When we considered behaviours associated with insomnia, it was clear that some behaviours is easier to change than others. Maintaining a consistent sleep-wake schedule and going to bed are relatively easy habits to change but reducing rumination before falling asleep is more complicated and could require counseling or psychotherapy. Behaviours that we found were associated with sleep quality were those endorsed by a significant percentage of the respondents. Thus, some behaviours may not occur frequently enough to have an influence on the entire sample, but they could greatly affect individuals. The findings revealed that international students had moderate bad sleep hygiene which supports the literature that most of the international students have bad sleep hygiene. However, the findings presented another view that despite the general view, salient revelations such as different universities, majors (economics and management, medicine, engineering and Chinese and linguistics) and age had impacts on college student's sleep hygiene. Due to the specificity of this study, this could be further researched on to reveal more findings.

V. LIMITATIONS

A cross-sectional design was utilized in this investigation inhibiting the ability to infer cause and effect relationships between the variables. The information drawn from this study was based on a study of college students in Southwest China, which limits the external validity of the findings to other regions, even other cities in China. Moreover, the sample obtained was not completely randomized, and, hence, the results may not be generalized to represent all of the college students. The findings of this study were based on the self-reporting accuracy, integrity, and honesty of the participants. Concurrently, misinterpretation of instrument items may have skewed participant responses. Furthermore, the data generated from the students may not have accurately reflected the sleep habits or the nature of the difficulties being experienced.

VI. CONCLUSION

The study's objectives and questions were obtained and confirmed by the high prevalence of sleep related problems among college students as reported in previous studies. Poor sleepers tend to be males, females have poorer sleep hygiene practices, and/or be involved in certain activities and online communication such as using their beds other than for sex or sleeping. There were no specific majors, level of education or gender which had a direct cause and effect on the college student's sleep hygiene and insomnia. The consequences of insomnia on males, age differences and level of education are very varied, the most significant being reduced quality of life and daytime functioning and an increased risk of developing psychological disorders and inappropriate use of sleep medication. There are differential characteristics amongst the disorders that could cause insomnia. Therefore, when encountering a college student with insomnia, it is essential to identify the true origin of the problem. The results show that sleep hygiene are just as frequent as insomnia. Our results provide a true picture of the prevalence of insomnia and sleep hygiene in college students. Finally, psycho-education is essential to maintain good sleep hygiene practices may be useful to prevent college students from developing chronic sleep disorders or adverse health effects which will not only improve their academic performance but their mental health too.

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DECLARATION OF INTEREST

The authors declare no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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