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Relationship between Poor Sleep Quality and Psychological Problems among Undergraduate Students in the Southern Thailand

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Abstract

We conducted this study to fill the noted gap in the available literature by evaluating the prevalence of poor sleep quality in this understudied population and to explore the relationship between sleep quality and psychological problems among undergraduates in Thailand. This study used a cross-sectional survey. Self-administrated questionnaires included the Pittsburgh Sleep Quality Index (PSQI), the Epworth Sleepiness Scale, the Depression, Anxiety and Stress Scale and the Thai General Health Questionnaire. The study group included 1,055 undergraduates, aged 18-25 years. The prevalence of poor sleep quality was 42.4%. Students classified as poor quality sleepers reported significantly more psychological problems, indicating a linear trend of progressively worse global sleep quality associated with greater mood and anxiety symptomatology. Prospective studies that include objective measures of sleep duration and quality are needed to more fully develop focused health promotion strategies for Southeast Asian undergraduates.

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Keywords

low quality of sleep; psychological problems; undergraduates; southern Thailand

Introduction

Reduced sleep duration and quality are considered to be endemic in modern society. Troubled sleep is considered both a predictive sign and symptom of many illnesses, and is associated with substantial decrements in the quality of life [1,2]. Sleep disturbances are so commonly seen as symptoms of certain psychiatric disorders that they are listed as diagnostic criteria under Diagnostic and Statistical Manual of Mental Disorders, fourth Edition (DSM-IV) [3]. According to study results from the Centers for Disease Control's National College Health Risk Survey (NCHRS) 76.6% of undergraduates at a large southeastern university in the USA reported occasional sleep problems and 11.8% experienced poor sleep quality [4]. Health risk behaviors appear to be associated with poor sleep quality including physical and psychological health problems such as chronic illness, drowsy driving, fighting, smoking, alcohol use, symptoms of anxiety, tension, academic stress, somatic pain, depression and suicide ideation [1,4,5]. It is a common belief that a night of poor quality sleep increases irritability and negative emotion [6]. Students who report poor sleep quality tend to demonstrate a high level of psychosocial distress, manifesting as increased irritability, anxiety, tension, depression, confusion, and general health problems [7,8]. However, there are few published studies of poor sleep quality and psychological problems among Thai undergraduates [9,10]. The aim of this study was to fill the noted gap in the available literature by evaluating the prevalence of poor sleep quality in this understudied population. We also sought to explore the relationship between sleep quality and psychological problems among undergraduate students in southern Thailand. We reasoned that results from this study will motivate the development of health and wellness programs designed to address the needs of young adults in Thailand and other Southeast Asian countries.

Materials and methods

Research design and sample

This cross-sectional study was conducted in January 2011. Approximately 75.3% of 1,500 (N=1,130) undergraduate students from one autonomous university and who were invited to participate in our survey agreed to enroll in the present study. Participants were male and female undergraduate students. Vision impaired students, those unable to read the content and questionnaire forms were not eligible for this study. Part-time and/or distance learning students were also not eligible for this study. Flyers that described the study and study procedures were distributed and posted around campus. All participants received a small incentive (color pen highlighter). All of the participants were well informed about the content and the aim of the questionnaire. All participants gave written informed consent. After obtaining written informed consent about the study, an anonymous questionnaire was distributed to individual subjects. All study procedures were reviewed and approved by the Walailak University's Ethical Clearance Committee on Human Rights Related to Research

Involving Human Subjects and jointly by the Human Subjects' Committee at the University of Washington. The data collection involved completion of a self-administered questionnaire. Seventy-five questionnaires with incomplete information on sleep quality (6.6% of 1,130) were excluded, leaving a final analytical sample size of 1,055 undergraduate students.

Questionnaires

The self-reported questionnaire was comprised a demographic including lifestyle data (e.g., smoking, energy drink and alcohol use), the Pittsburgh Sleep Quality Index (PSQI) [11] scale, the Epworth Sleepiness Scale (ESS) [12], the Depression, Anxiety and Stress Scale (DASS 21) [13] and the Thai General Health Questionnaire (Thai GHQ-12) [14].

Assessment of sleep quality

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). The PSQI is appropriate for 18-year-old or older individuals and assesses sleep quality over a time interval of 1 month [5,7]. The PSQI consists of 7 components related to sleep habits within the past month including duration of sleep, sleep disturbance, sleep latency, habitual sleep efficiency, use of sleeping medicine, daytime dysfunction and overall sleep quality. A global score was defined as a continuous variable (range 0 - 21), with higher scores reflective of poorer sleep quality, and also as a dichotomous variable. A global score greater than 5 was regarded as indicative of a poor-quality sleeper, whereas a score of 5 or less was regarded as indicative of a good-quality sleeper [1]. The internal consistency reliability of a global PSQI has been shown to be 0.71 in previously published reports [5]. Similarly, a Cronbach's alpha for the PSQI instrument has been reported to be 0.71. Sleep duration was assessed using the PSQI questionnaire that queried how many hours of actual sleep the participants got at night during the month prior to study participation. We computed two variables: (1) a continuous variable indicating hours of sleep duration as defined by the Pittsburgh Sleep Quality component [15]; and (2) a dichotomous variable of optimal and suboptimal sleep duration (>7 vs. ≤7 h).

Daytime sleepiness was measured using the Epworth Sleepiness Scale (ESS). This instrument was used to identify excessive sleepiness associated with accumulated sleep dept or clinical sleep disorders [1]. The ESS was used to rank participants' likelihood of falling asleep in different situations. This 8-item scale was scored on a 4-point scale. An aggregate of all 8 items produced a score between 0 - 24, with scores greater than 9 regarded as significant levels of daytime sleepiness. The internal consistency for the ESS estimated by a Cronbach's alpha is 0.75 [1]. The coefficient alpha of the ESS for the current sample was 0.63.

Assessment of psychological problems

The short form of Depression, Anxiety and Stress Scale (DASS 21) is designed to assess the student's symptoms of depression, anxiety and stress [13]. The DASS 21 is a 21-item, 4-point scale to indicate the presence of a symptom over the previous week. For each scale (Depress, Anxiety and Stress) the scores were summed for identified items. The high scores on each scale indicated high levels of severity of a range of symptoms. The scale has high

internal consistency with Cronbach's alphas ranging from 0.81 to 0.94 for the subscales, and adequate validity using a variety of non-clinical samples [16]. In this study, the subscale had moderate to high internal consistency with a Chronbach's alpha of 0.73 for anxiety and 0.80 for depression and stress. The internal consistency for total scores was high with a Chronbach's alpha of 0.90.

The Thai General Health Questionnaire (Thai GHQ-12) was used as a self-administrative screening instrument for mental health problems during the month prior to study participation. The Thai GHQ-12 is a short form version that includes 12 items. The Thai GHQ-12 scores 2 or greater than 2 points are considered high scores of having psychological distress. Reliability of the Thai GHQ-12 has been reported in Thailand, with a Cronbach's alpha coefficient of 0.84. The instrument is regarded as appropriate for use in the Thai population [14]. The internal reliability of the Thai GHQ-12 for the current study was 0.82.

Statistical analysis

STATA (version 10) software package was used for all statistical analyses. Standard analyses of proportions and continuous variables were performed. Pearson's correlation coefficients were used to determine the relationship between sleep quality and psychological problems.

Results and discussion

Results

Of all undergraduate students 84.8% were citizens of southern Thailand. Participants were 20.17 ± 1.22 years of age (range 18 - 25 years), and 804 (76.2%) were women. Of these participants, 35.2% percent of students were sophomores, 30.7% were freshmen, 27.1% juniors, and 7% seniors. Approximately 32% of students reported bedtime in the past month was at midnight and 26% reported that they awoke at 7:00 am. Approximately 76% of participants reported suboptimal sleep (duration ≤7 h/night) and the mean hours of sleep duration was 6.64 (standard deviation 1.40).The average global PSQI score for all participants (mean ± standard deviation, 5.50 ± 2.46, range 0 - 18) was above the >5 cutoff for poor sleep quality. Overall, 42.4% of participants were classified as poor sleepers. Students classified as poor sleepers reported sleeping an average of 6.0 h per night (standard deviation 1.43, range 1.5-13.0). The prevalence of poor sleep quality was similar for men and women (42.6 and 42.3%). The mean Epworth Sleepiness Score was 7.44 ± 3.36 (range 0 - 18). Excessive daytime sleepiness (ESS >9) occurred in 26.2% of students. Forty-two percent of all participants reported regular alcohol consumption in the previous 12 months and 3.6% reported being current cigarette smokers. Approximately 51% percent of participants reported consuming energy drinks. The Thai GHQ-12 categories score was 1.22 ± 0.42, 22.0% of respondents had psychological distress (Thai GHQ-12 score 2 or greater than 2; Table 1).

Poor sleep quality was statistically significantly associated with symptoms of depression, anxiety and stress (Table 2). The prevalence of mild to extremely severe symptoms of depression, anxiety and stress scores which were 54.3, 67.0, and 43.8% respectively among male students who were classified as poor sleepers. The corresponding prevalence of mild to

extremely severe symptoms of depression, anxiety and stress scores were 42.7, 72.0, and 41.8% respectively, among female students classified as poor sleepers. The PSQI score was significantly associated with daytime sleepiness (R=0.17; $p < 0.001$), mental health problems (R=0.36; $p < 0.001$), the level of symptoms of depression (R=0.34; $p < 0.001$), anxiety (R=0.35; $p < 0.001$) and stress (R=0.38; $p < 0.001$); indicating progressively worse global sleep quality associated with higher levels of daytime sleepiness, and higher symptomatology of mood and anxiety disorders (Table 3).

Discussion

This study extends the literature to include evaluation of the prevalence and associations of sleep quality with psychological problems among Thai young adults. Overall, our findings are consistent with results from previous studies indicating that many undergraduate students report poor sleep quality [1,4, 17,18]. Low sleep quality, sleep disturbances, and at least occasional sleep dissatisfaction are prevalent among most undergraduates across diverse global setting and across multiple racial and ethnic groups [19]. Previous study from a large state university in southeastern United States found that 1,845 college students reported sleeping an average of 6.8 h sleep per night on a typical school or work night [20]. Our findings indicate that students reported average sleep durations of 6.6 h despite requiring 7-9 h of sleep for optimal functioning [21,22]. In addition, our findings support the thesis that young adulthood is accompanied by sleep pattern changes that often result in decreased sleep quality and consequent increased daytime sleepiness [23]. In our study, we noted that 32.7 % of students classified as poor quality sleepers reported excessive daytime sleepiness. This observation is consistent with findings from a previous study of Malaysian medical students. Notably, investigators have reported that 35.5% of Malaysian medical students experienced excessive daytime sleepiness [23]. However, this result is lower than a previous study of Thai medical students and students from the Faculty of Humanities in one public university in 2010 [9]. Among Thai medical students and students from the Faculty of Humanities, the prevalence of excessive daytime sleepiness was 48.9 and 49.4% [9]. Additional studies have reported that undergraduate students have a high prevalence of excessive daytime sleepiness caused by their academic and social activities [8,10].

Our findings are consistent with previous studies indicating that poor sleep quality was associated with significantly higher self-reported negative moods [1,9,24,25]. Steptoe and colleagues, for example, noted that young adults who reported ≤7 h sleep per night were more likely to have poorer self-rated health [25]. Undergraduate students categorized as having poor-quality sleep had significantly greater negative moods such as anger, confusion, depression, fatigue, and tension. In this study, 22% of undergraduates had psychological distress, according to a previous study, 29.1% in medical students in southern Thailand [26]. Moreover, in our study, students classified as poor quality sleepers had the high prevalence of depression about 45.5%. We found that male undergraduates who are classified as poor quality sleepers reported moderate depression (26.7%), moderate anxiety (29.3%) and moderate stress (22.9%). Female students who had poor sleep quality reported a higher prevalence of moderate anxiety (31.9%), higher than their male counterparts.

Several limitations must be considered when interpreting the results from our study. This study was conducted at only one autonomous university; therefore the results cannot be generalized to all Thai undergraduate students. A multi-center study involving both public and private universities will greatly improve the generalizability of future studies. Also, this study consisted of a one-time survey so we are not able to specify the temporal relationship of poor sleep quality and the occurrence of new onset symptoms of mood and anxiety disorders. Finally, a laboratory study was not applied in this current study, hence were not able to assess objective measures of sleep duration, quality (e.g., fragmentation) and related neuroendocrine dysregulation. However, despite the above limitations, our study has important strengths. Firstly, the participants were recruited from across a wide variety of academic programs including the Natural Sciences, Health Sciences, Social Sciences and Technology. Secondly, the sample size was larger than all previous studies in Thailand. Lastly, the high participation rate served to attenuate concerns about selection bias.

Conclusions

In conclusion, our study revealed associations of self assessed quality of sleep with symptoms of mood and anxiety disorders. Poor global sleep quality was associated with higher prevalence and increasing severity of depressive, anxiety and stress symptoms. Our findings, along with those from other studies [1,10,27] are consistent with the notion the university health-care providers should aim to increase undergraduate students' knowledge about sleep health; and to promote individual wellness through emphasizing behaviors consistent with improving sleep hygiene.

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References

1. Lund GH, Reider DB, Whiting BA, Prichard JR. Sleep patterns and predictors of disturbed sleep in a large population of college students. J Adolesc Health. 2010; 46:124–32. [PubMed: 20113918]
2. Regestin Q, Natarajan V, Pavlova M, Kawasaki S, Gleason R, Koff E. Sleep debt and depression in female college students. Psychiatry Res. 2010; 176:34–9. [PubMed: 20079935]
3. Colten, HR.; Altevogt, BM., editors. Institute of Medicine. Committee on Sleep Medicine and Research. Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem. National Academy of Sciences Press; Washington DC: 2006.
4. Vail-Smith K, Felts WM, Becker C. Relationship between sleep quality and health risk behaviors in undergraduate college students. College Student J. 2009; 43:924–30.
5. Gregory AM, Buysse DJ, Willis TA, Rijsdijk FV, Maughan B, Rowe R, et al. Associations between sleep quality and anxiety and depression symptoms in a sample of young adult twins and siblings. J Psychosom Res. 2011; 71:250–5. [PubMed: 21911103]
6. Baglioni C, Spiegelhalder K, Lombardo C, Riemann D. Sleep and emotions: A focus on insomnia. Sleep Med Rev. 2010; 14:227–38. [PubMed: 20137989]
7. Keshavarz Akhlaghi A, Ghalebandi MF. Sleep quality and its correlation and general health in pre-university students of Karaj, Iran. Iran J Psychiatry Behav Sci. 2009; 3:44–9.

8. Doghramji, PP. [Dec 2012] Sleep problems in college students. Available at: http://www.collegehealthadvisor.com/downloads/pdf/sleep-problems.pdf
9. Kongsomboon K. Psychological problems and overweight in medical students compared to students from Faculty of Humanities, Srinakharinwirot University, Thailand. J Med Assoc Thai. 2010; 93:S106–13. [PubMed: 21302403]
10. Chahamanee P, Taboonpong S, Intanon T. Sleep quality and related factors among university students in southern Thailand. Songkla Med J. 2006; 24:163–73.
11. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Res. 1989; 28:193–213. [PubMed: 2748771]
12. Johns MW. Reliability and factor analysis of the Epworth Sleepiness Scale. Sleep. 1992; 15:376–81. [PubMed: 1519015]
13. Lovibond, SH.; Lovibond, PF. Manual of the Depression Anxiety Stress Scales. 2nd. Sydney: Psychology Foundation of Australia; 1995.
14. Nilchaikovit T, Sukying C, Silpakit C. Reliability and validity of the Thai version of the General Health Questionnaire. J Psychiatr Assoc Thailand. 1996; 41:2–17.
15. Bidulescu, A.; Din-Dzietham, R.; Coverson, LD.; Chen, Z.; Meng, Y-X.; Buxbaum, SG., et al. Interaction of sleep quality and psychosocial stress on obesity in African Americans: the Cardiovascular Health Epidemiology Study (CHES). BMC Public Health; Available at: http://www.biomedcentral.com/1471-2458/10/581 [November 2011]
16. Antony MM, Bieling PJ, Cox BJ, Enns MW, Swinson RP. Psychometric properties of the 42- item and 21-item version of the Depression Anxiety Stress Scales in clinical groups and a community sample. Psychol Assess. 1998; 10:176–81.
17. Kang, J-H.; Chen, S-C. Effects of an irregular bedtime schedule on sleep quality, daytime sleepiness, and fatigue among university students in Taiwan. BMC Public Health; Available at: http://www.Biomed.central.com/1471-2458/9/248 [September 2010]
18. Orzech MK, Salafsky BD, Hamilton AL. The state of sleep among college students at a large public university. J Am Coll Health. 2011; 59:612–9. [PubMed: 21823956]
19. Clegg-Kraynok MM, Mc Bean LA, Montgomery-Downs EH. Sleep quality and characteristics of college students who use prescription psychostimulants nonmedically. Sleep Med. 2011; 12:598–602. [PubMed: 21645874]
20. Gaultney FJ. The prevalence of sleep disorders in college students: Impact on academic performance. J Am Coll Health. 2010; 59:91–7. [PubMed: 20864434]
21. Carskadon, M. Adolescent sleep patterns: biological, social, and psychological influences. New York: Cambridge University; 2002.
22. National Sleep Foundation. [May 2012] Available at: http: //www.sleepfoundation.org/article/how-sleep-works/how-much-sleep-do-we-really-need
23. Zailinawati HA, Teng LC, Chung CY, Teow LT, Lee NP, Jagmohni SK. Daytime sleepiness and sleep quality among Malaysian medical students. Med J Malaysia. 2009; 64:108–10. [PubMed: 20058567]
24. Everhart ED. Sleep disorders in children: Collaboration for school-based intervention. J Educ Psychol Cons. 2011; 21:133–48.
25. Steptoe A, Peacy V, Wardle J. Sleep duration and health in young adults. Arch Int Med. 2006; 166:1689–92. [PubMed: 16983045]
26. Kunadison W, Pitanupong J. Mental health and associated factors in Prince of Songkla University medical student. Songkla Med J. 2010; 28:139–44.
27. Tsai L-L, Li S-P. Sleep patterns in college students gender and grade differences. J Psychosom Res. 2004; 56:231–7. [PubMed: 15016583]

Table 1

Characteristics of study participants according to sleep quality and sleep duration categories

	PSQI Categories (number, %)			Sleep Duration Categories (number, %)		
	Good Sleep Quality	**Poor Sleep Quality**	***P* value**	**≤ 7 hrs**	**> 7 hrs**	***P* value**
Gender			0.937			0.797
Missing	1	1		total missing 53		
Men	143 (57.43)	106 (42.57)		178 (75.42)	58 (24.58)	
Women	464 (57.71)	340 (42.29)		584 (76.24)	182 (23.76)	
Age			0.779			0.448
Missing	0	0		total missing 51		
18-20	388 (57.31)	289 (42.69)		498 (76.85)	150 (23.15)	
≥21	220 (58.20)	158 (41.80)		266 (74.72)	90 (25.28)	
Academic Seniority			0.764			0.258
Missing	0	0		total missing 51		
First to Second year	403 (57.99)	292 (42.01)		511 (77.19)	151 (22.81)	
Third year and above	205 (56.94)	155 (43.06)		253 (73.98)	89 (26.02)	
Smoking Behaviors			0.764			0.143
Missing	0	0		total missing 51		
No	587 (57.72)	430 (42.28)		741 (76.47)	228 (23.53)	
Current	21 (55.26)	17 (44.74)		23 (65.71)	12 (34.29)	
Energy Drink Behaviors			< 0.01			0.245
Missing	0	0		total missing 51		
No	312 (62.90)	184 (37.10)		359 (76.06)	113 (23.94)	
Current	285 (52.58)	257 (47.42)		390 (75.58)	126 (24.42)	
Do not know	11 (64.71)	6 (35.29)		15 (93.75)	1 (6.25)	
Alcohol Use Behaviors			0.598			0.059
Missing	0	0		total missing 51		
No	354 (58.32)	253 (41.68)		457 (78.25)	127 (21.75)	
Current	254 (56.70)	194 (43.30)		307 (73.01)	113 (26.90)	
Daytime Sleepiness			< 0.001			< 0.01
Missing	1	4		total missing 56		

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	PSQI Categories (number, %)			Sleep Duration Categories (number, %)		
	Good Sleep Quality	**Poor Sleep Quality**	***P* value**	**≤ 7 hrs**	**> 7 hrs**	***P* value**
Normal	477 (61.63)	297 (38.37)		545 (73.85)	193 (26.15)	
Excessive daytime sleepiness	130 (47.10)	146 (52.90)		216 (82.76)	45 (17.24)	
General Health Scores			< 0.001			0.447
Missing	6	6		total missing 63		
Normal	526 (64.86)	285 (35.14)		581 (75.45)	189 (24.55)	
Psychological distress	76 (32.76)	156 (67.24)		173 (77.93)	49 (22.07)	

Note PSQI Categories scores: Pittsburgh Sleep Quality Index Categories Scores

Table 2

The differences between gender and sleep quality in the severity of the core symptoms of depression, anxiety and stress

		Gender and PSQI Categories Scores (number, %)					
		Male (N=249)			Female (N=804)		
		Good Sleep Quality	Poor Sleep Quality	*P* value	Good Sleep Quality	Poor Sleep Quality	*P* value
DASS Depression	Missing	2	1	< 0.001	5	3	< 0.001
	N	141	105		459	337	
	Normal	108 (76.60)	48 (45.71)		361 (78.65)	193 (57.27)	
	Mild	19 (13.48)	23 (21.90)		60 (13.07)	61 (18.10)	
	Moderate	12 (8.51)	28 (26.67)		32 (6.97)	60 (17.80)	
	Severe	2 (1.42)	5 (4.76)		4 (0.87)	18 (5.34)	
	extremely severe	0 (0.00)	1 (0.95)		2 (0.44)	5 (1.48)	
DASS Anxiety	Missing	0	0	< 0.05	8	1	< 0.001
	N	143	106		456	339	
	Normal	76 (53.15)	35 (33.02)		225 (49.34)	95 (28.02)	
	Mild	18 (12.59)	14 (13.21)		58 (12.72)	38 (11.21)	
	Moderate	32 (22.38)	31 (29.25)		129 (28.29)	108 (31.86)	
	Severe	8 (5.59)	10 (9.43)		28 (6.14)	44 (12.98)	
	extremely severe	9 (6.29)	16 (15.09)		16 (3.51)	54 (15.93)	
DASS Stress	Missing	0	1	< 0.001	3	4	< 0.001
	N	143	105		462	335	
	Normal	118 (82.52)	59 (56.19)		366 (79.22)	195 (58.21)	
	Mild	11 (7.69)	14 (13.33)		52 (11.26)	62 (18.51)	
	Moderate	13 (9.09)	24 (22.86)		38 (8.23)	49 (14.63)	
	Severe	1 (0.70)	8 (7.62)		5 (1.08)	22 (6.57)	
	extremely severe	0 (0.00)	0 (0.00)		1 (0.22)	7 (2.09)	

Note. PSQI Categories scores: Pittsburgh Sleep Quality Index Categories Scores; DASS: Depression, Anxiety and Stress Scale Scores

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Table 3

Pearson's correlation coefficients between the main variables

	Age	Daytime Sleepiness	Mental Health Problems	DASS Depression	DASS Anxiety	DASS Stress	PSQI Scores
Age	---						
Daytime Sleepiness	0.051	---					
Mental Health Problems	0.043	0.191*	---				
DASS depression	0.004	0.284*	0.583*	---			
DASS anxiety	-0.029	0.282*	0.453*	0.658*	---		
DASS stress	0.005	0.300*	0.541*	0.731*	0.705*	---	
PSQI scores	-0.002	0.166*	0.361*	0.339*	0.350*	0.379*	---

Note. PSQI scores: Pittsburgh Sleep Quality Index Scores; DASS: Depression, Anxiety and Stress Scale Scores; p-value from correlation coefficients:

* $p < 0.001$.