Association Between Media Use and Poor Sleep Quality Among Senior High School Students in Ratchaburi Province, Thailand: A Cross-Sectional Study

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Abstract

Background: Poor sleep quality (PSQ) is an increasing health problem and adolescents also constitute risk groups. Portable mobile and media devices have become a part of children's lives and may affect their sleep duration and quality. This study aimed to explore the prevalence of PSQ and identify the association between media use and PSQ among adolescents studying in high school grades 10-12.

Methods: This cross-sectional study was conducted in Ratchaburi Province. A multi-stage sampling technique was used to enroll 777 adolescents from 8 schools from August-October 2016. The research instruments comprised factors of demographics and consumption behaviors and the questionnaire of Pittsburgh Sleep Quality Index. Multivariable logistic regression was used to calculate adjusted odds ratios (OR_{adj}) and 95% Confidence Intervals (CI).

Results: Prevalence of PSQ was 56.24%. The study subjects were mostly 16-17 years old (67.82%) and female (70.39%). Multivariable logistic regression, after controlling for possible confounders, there was an increased odds of PSQ in those who used a social media device ($OR=1.34$, $95\%CI=0.97-1.87$), and it showed a higher proportion of social media use among PSQ group.

Conclusions: The surveillance system of media use and PSQ should be conducted accompanied by knowledge sharing on media use among parents, teachers and adolescents. To determine causal relationships, further longitudinal studies will be required to test for the association between media users and PSQ. This study may also provide some implications for health promotion on sleep quality of senior high school students.

Introduction

Sleep is an essential part of life and plays roles in physical and mental health [1, 2]. Adolescents experience significant changes including to body and mind associated with sex hormones [3]. Insufficient sleep has been one of the most important public health problems among adolescents. Concerning the aspect of sleep, a few of studies have found that PSQ was associated with the amount of daytime sleep, exhaustion, weight gain, obesity, impaired memory and motor vehicle accidents [4–6]. PSQ is currently a widespread issue in most societies. The prevalence of PSQ among adolescents was reported as ranging from 32 to 62% [7–11] reflecting a wider range of PSQ prevalence. In Thailand, the prevalence of PSQ among adolescents was reportedly 32 to 48% [7, 8]. Sleep insufficient not only has impacts on the personal level, but also can cause major impact on a larger scale through a high burden of non-communicable diseases [12], many events such as motor vehicle crashes [13], workplace accidents, increased mortality and reduced quality of life [14]. Media use such as watching TV and using electronic devices are activities that affect poor sleep quality in children and adolescents. Especially among school age group, such as having a TV in the bedroom can disturb sleep as a result decreasing of sleep duration and insufficient sleep. Some studies showed the association of media use related to PSQ [15–17].

Hence, the aims of the present study were to seek the prevalence of PSQ and determine its association with media use among senior high school students in Ratchaburi Province. The author selected Ratchaburi Province as the area of study because of its characteristics as a proxy of western provinces of Thailand. Ratchaburi is one of the western provinces of Thailand with an area of about 5,196 sq km. It lies 80 km west of Bangkok, the capital of Thailand and borders Myanmar to the west with the Tenasserim Hills as a natural border containing a population of 871,714 and density 170/km² in 2017 [18, 19].

Methodology

Study design and setting

A cross-sectional study was conducted during August-October 2016 to explore PSQ and identify the association between media use and PSQ occurrence among senior high school students in Ratchaburi Province, Thailand.

Sample size and sampling technique

The sample size was calculated using a formula to estimate the population proportion with specified absolute precision [20] according to the following assumption: 32% of PSQ among adolescents (P) [7], with 95% confidence interval and 5% specified absolute precision (d). As a multistage sampling technique was employed to identify study subjects, a design effect of 2 was used. The calculated sample size was 709. Also, approximately 10% was added to adjust for nonresponses. Thus, the final sample size was at least 777.

A multi-stage stratified sampling technique was used to identify study subjects from senior high schools in Ratchaburi Province. Schools were stratified by student numbers, namely, extra large (>2,500), large (1,500-2,499) and medium (500-1,499). We randomly selected at least one school from the list of three school categories: urban and rural public schools and private schools. The selection of schools was based on a list of schools obtained from the Provincial Education Offices and willingness of school administrators to participate in the study. For each of the schools, the student sample size was calculated proportional to the size of the schools.

Measures

Information was collected using a self-administered, anonymous questionnaire comprising three parts, namely, demographics, consumption behaviors relating to sleep quality, sleep quality assessment and media-used evaluation. Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI) translated to Thai with a cutoff point of scores greater than five and classified as poor sleepers [21-23], reliability was tested revealing a Cronbach's alpha of 0.86.

Data analysis

Categorical variables were given as frequency and percentage, crude odds ratio (OR_c), 95 % CI of OR and p-value. Moreover, numerical variables were expressed as mean, median, minimum and maximum, standard deviation and quartile deviation. Univariate analysis was performed using univariable logistic regression to differentiate proportional exposures between poor and good sleepers for categorical variables. Adjusted odds ratio (OR_{adj}) and 95% CI of OR were calculated from multivariable logistic regression to examine associations between media use and PSQ occurrence, adjusted for potential confounders. All statistics were performed using two-sided tests, and a criteria of $p < 0.05$ was judged to be statistically significant.

Results

Demographic characteristics

Seven hundred seventy-seven students were selected for the present study. The majority were female (70.39%), aged 16–17 years (67.82%) mean age was 16.51 (SD = 0.96) years, studying in Grades 12 (35.39%), GPA 3.01–3.50 (40.14%), monthly family income $\leq$ 10,000 baht (44.67%), no smoking (98.33%) and no alcohol consumption (85.33%), as shown in Table 1.

Table 1
Demographic characteristics of senior high school students

Variables	No. (%)
Sex (n = 777)	
Female	547 (70.39)
Male	230 (29.61)
Age (yr) (n = 777)	
<16	123 (15.83)
16–17	527 (67.82)
>17	127 (16.35)
Mean (SD)	16.51 (0.96)
Min - Max	14–19
Education level (Grade) (n = 777)	
10	247 (31.79)
11	255 (32.82)
12	275 (35.39)
Parental marital status (n = 777)	
Married	517 (66.54)
Widowed, divorced, separated	260 (33.46)
Monthly family income (THB) (n = 647)	
≤10,000	289 (44.67)
10,001–30,000	280 (43.28)
30,001–50,000	47 (7.26)
50,001–70,000	9 (1.39)
>70,000	22 (3.40)
Median	10,000
Min-Max	1,800 – 300,000
Grade point average (n = 715)	

Variables	No. (%)
<2.50	58 (8.11)
2.51–3.00	242 (33.85)
3.01–3.50	287 (40.14)
≥3.50	128 (17.90)
Mean (SD)	3.09 (0.42)
Median (QD)	3.10 (0.29)
Min-Max	1.33–3.99
Underlying diseases (n = 777)	
No	668 (85.97)
Yes	109 (14.03)
Smoking (n = 774)	
No	764 (98.33)
Yes	10 (1.67)
Alcohol consumption (n = 777)	
No	663 (85.33)
Yes	114 (14.67)
Illness history during last month (n = 777)	
No	537 (69.11)
Yes	240 (30.89)

The prevalence of PSQ was 56.24%. Using a univariable logistic regression analysis, associated demographic factors of PSQ among adolescents included illness history during the last month, coffee and tea consumption, reading, annoyance, poor ventilation, stress depression and sleep duration ($p < 0.05$), as shown in Table 2. In case of media use, we found the association between social media use and PSQ (OR = 1.53, 95%CI = 1.13–2.08), as shown in Table 3. Multivariable logistic regression analysis, association between social media use and PSQ among adolescents (adjusted for potential confounders), social media users were 1.34 times at risk compared with those of non- users (OR = 1.34, 95%CI = 0.97–1.87) but it did not reach significance, as shown in Table 4. Comparing between PSQ group and GSQ group, most commonly activities before bed time was social media (44.56%, 37.38%) and television watching (20.78%, 30.29%) respectively, and we found a higher proportion of social media use among PSQ group, as shown in Table 5.

Table 2
Univariable logistic regression analysis of factors associated with PSQ among senior high school students

Variables	Poor sleep quality/total	%	ORc	95%CI	p-value
Age group (yr) (n = 777)	59/123	47.97	1	0.99–2.18	0.056
<16	303/527	57.49	1.47		0.079
16–17	75/127	59.06	1.57	0.95–2.58	
>17					
Sex (n = 777)	308/547	56.31	1	0.72–1.37	0.982
Female	129/230	56.09	0.99		
Male					
Education level (Grade) (n = 777)	131/247	53.04	1	0.59–1.19	0.323
10	148/255	58.04	0.84		0.873
11	156/275	56.73	1.03	0.73–1.45	
12					
Parental marital status (n = 774)	284/517	54.93	1	0.62–1.17	0.351
Married	151/257	58.75	0.86		
Widowed, divorced, Separated					
Family members (n = 629)	271/346	78.32	1	0.87–1.56	0.319
Father and mother	166/283	58.66	1.16		
Father or mother only					
Relative/Friend					
Monthly family income (THB) (n = 647)	171/289	59.17	1	0.52–1.05	0.091
≤10,000	145/280	51.79	0.74		0.914
10,001–30,000	28/47	59.57	1.02	0.52–2.00	0.942
30,001–50,000	18/31	58.06	0.96	0.43–2.16	
>50,000					
ORc = crude odds ratio, CI = confidence interval					
*Statistically significant (p < 0.05)					

Variables	Poor sleep quality/total	%	ORc	95%CI	p-value
Grade point average (n = 715)	76/128	59.38	1	0.89–1.78	0.188
≥3.50	146/287	50.87	1.26		0.403
3.01–3.50	137/242	19.01	1.24	0.72–2.25	0.109
2.51-3.00	33/58	50.00	1.41	0.93–2.15	
<2.50					
Underlying diseases (n = 777)	370/668	55.39	1	0.85–1.95	0.279
No	67/109	61.47	1.29		
Yes					
Smoking (n = 774)	430/764	56.28	1	0.47–7.06	0.527
No	7/10	70.00	1.81		
Yes					
Alcohol consumption (n = 777)	368/663	55.51	1	0.82–1.84	0.318
No	69/114	60.53	1.23		
Yes					
Illness history during the last month (n = 777)	283/537	52.70	1	1.18–2.20	< 0.001*
No	154/240	64.17	1.61		
Yes					
Coffee consumption (n = 777)	385/702	54.84	1	1.12–3.10	0.022*
No	52/75	69.33	1.86		
Yes					
Tea consumption (n = 777)	216/412	52.43	1	1.05–1.85	0.027*
No	221/365	60.55	1.39		
Yes					

ORc = crude odds ratio, CI = confidence interval

*Statistically significant (p < 0.05)

Variables	Poor sleep quality/total	%	ORc	95%CI	p-value
Reading (n = 777)	428/751	56.99	1	0.18–0.91	0.024*
No	9/26	34.62	0.40		
Yes					
Annoyance (n = 777)	352/658	53.49	1	1.39–3.41	< 0.001*
No	85/119	71.43	2.17		
Yes					
Poor ventilation (n = 777)	393/719	54.66	1	1.36–5.08	0.002*
No	44/58	75.86	2.61		
Yes					
Stress (n = 777)	69/195	35.38	1	2.24–4.41	< 0.001*
No	368/582	63.23	3.14		
Yes					
Depression (n = 777)	276/565	35.38	1	2.32–4.72	< 0.001*
No	161/212	63.23	3.31		
Yes					
Sleep duration (hrs) (n = 777)	54/254	21.26	1	5.21–169.49	< 0.001*
>7	297/435	68.28	19.98		
6–7	86/88	97.73	159.26	39.82–1354.78	< 0.001*
<6					
ORc = crude odds ratio, CI = confidence interval					
*Statistically significant (p < 0.05)					

Table 3

Univariable logistic regression analysis of media use associated with PSQ among senior high school students

Variables	Poor sleep quality/total	%	ORc	95%CI	p-value
Video gaming (n = 777)	386/690	55.94	1	0.71–1.75	0.635
No	51/87	58.62	1.12		
Yes					
Phone calling (n = 777)	402/724	55.52	1	0.87–2.80	0.139
No	35/53	66.04	1.56		
Yes					
Music listening (n = 777)	396/707	56.01	1	0.67–1.83	0.681
No	41/70	58.57	1.11		
Yes					
Social media use (n = 777)	274/519	52.79	1	1.13–2.08	0.006*
No	163/258	63.18	1.53		
Yes					
Television watching (n = 777)	361/624	57.85	1	0.50–1.03	0.068
No	76/153	49.67	0.72		
Yes					
ORc = crude odds ratio, CI = confidence interval					
*Statistically significant (p < 0.05)					

Table 4

Multivariable logistic regression of social media use associated with PSQ among senior high school students

Variables	ORc	95%CI	ORadj	95%CI	p-value
Social media use	1	1.13–2.08	1	0.97–1.87	0.079
No	1.53		1.34		
Yes					
ORc = crude odds ratio, ORadj = adjusted odds ratio for illness history during the last month, coffee consumption, tea consumption, reading, annoyance, poor ventilation, stress and depression					

Table 5
Percent of media use before bed time

Variables	PSQ (%)	GSQ (%)
Social media use	44.56	37.38
Television watching	20.78	30.29
Video Gaming	13.94	14.17
Music listening	11.20	11.41
Phone calling	9.52	6.75
PSQ = poor sleep quality, GSQ = good sleep quality		

Discussion

Our findings demonstrated that the prevalence rate of PSQ was about 56% higher than related studies conducted in Thailand [7, 8]. Evidence from related studies on PSQ among college students showed the prevalence of PSQ was approximately from 32 to 62% [7–11]. The difference of PSQ occurrence might have stemmed from various factors, namely, environment, lifestyle, household characteristics, social media and activities, and health behaviors etc. Univariable analysis showed that social media use played a critical role in the development of PSQ among adolescents (OR = 1.53, $p = 0.006$). However multivariable logistic regression analysis didn't reach significant difference (OR = 1.34, 95%CI = 0.97–1.87). Some studies indicated adolescents who had social media use before bed time had lower sleep efficiency [15–17, 24, 26, 27]. Use of mobile phones among young students for daily calling and text messaging were associated with short sleep duration, PSQ, excessive daytime sleepiness and having insomnia symptom [15]. Concerning on higher frequency and volume of social media use had significantly greater odds of having sleep disturbance among young adults [24], while a study showed a better sleep quality among users [25]. The present study showed the prevalence of social media use before bed among PSQ group was approximately 44.56%. Half of social media users spent time over 2 hours/day. On the average time for social media use was 3.58 hours/day, it might be affected on sleep pattern. A previous study showed users who spent time 0.5-2 hours on social media were more likely to have poor sleep than those of spent time less than 0.5 hours [27]. In addition, a meta-analysis study reported social media users before bed were more likely to have insufficient sleep and tend to have PSQ [26]. Some previous studies suggested blue light emitted from smart phone might be disturb sleep [28, 29]. Therefore, monitoring social media use among adolescents, and cooperating with parents, caregivers, teachers and also the adolescents themselves is recommended to reduce PSQ problem.

Study Limitations

This study encountered a few limitations that need to be addressed. First, cross-sectional survey reduced the ability of the study to make direct causal inferences. Second, these data apply only to those aged 14

to 19 years as the study subjects; therefore, they could not represent all adolescents. Moreover, data collection might have excluded subjects absent from schools. Finally, all data were based on a self-report method.

Conclusion

The surveillance system of PSQ should be established along with a knowledge sharing program about associated factors of PSQ among adolescents with their parents and teachers.

Abbreviations

CMB
the China Medical Board, GPA:grade point average, OR_{adj}:adjusted odds ratio, OR_c:crude odds ratio, PSQ:Poor Sleep Quality, GSQ:Good Sleep Quality, PSQI:the Pittsburgh Sleep Quality Index

Declarations

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Authors' contributions

WC and JS collected the data, searched the literature and drafted the manuscript. PS, SP and SK participated in the design of the study, and performed the statistical analysis. All authors conceived of the study, and participated in its design, and coordinated and helped to draft the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

Authors present the data on the main paper.

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki, and the protocol was reviewed and approved by the Ethics Committee for Research in Human Subjects of the Faculty of Public Health, Mahidol University (COA. No. MUPH 2016-097). The purpose of this study was explained to school

principals and teachers of the target schools. Permission was obtained from these schools and students, eligible to participate, informed consent was provided or consent was obtained from their parents or legal guardians after informing the study details. Parents or legal guardians were told that participation in the survey was voluntary and the survey would remain anonymous. Confidentiality was maintained throughout the study using anonymous technique (schools and respondents were identified by code numbers to ensure confidentiality and the results were analyzed as a whole group).

Consent for publication

All authors consent to publish the manuscript.

Competing interests

The authors declare no conflict of interest.

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Figures

Figure 1

Map of Ratchaburi Province Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.