

Effect of smartphone overuse on sleep problems in medical students

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Abstract

Background: Smartphones are used worldwide. Consequently, it does seem to be having an impact on health-related problems if overused. However, it is uncertain whether it is associated with sleep problems or poor learning.

Objective: To determine the association between smartphone overuse and sleep problems in medical students as primary outcome and poor learning as secondary outcome.

Methods: A cross-sectional study was conducted in 89 students having their own smartphones, at Hatyai Medical Education Centre, Thailand. The habits of using smartphone were obtained. Smartphone overuse during bedtime was defined as using longer than 1 hour according to Smartphone Addiction Scale (SAS). The primary outcome was napping in a classroom that was defined as a problem if it happened more than 20% of the time attending class. Sleep problems using Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) were obtained by self-assessment. Learning outcome measured by grade point average was the secondary outcome. Multivariable analysis was performed for the association between smartphone overuse and sleep problems.

Results: Of all students, 77.5% had sleep problems and 43.6% had napped in the classroom. No personal characteristics, daily life behaviours, and physical environments were associated with sleep problems. 70.8% of all students found to over use smartphones during bedtime. The Facebook website was the most popular. Smartphone overuse was significantly associated with poor sleep quality (odds ratio= 3.46) and napping in the classroom (odds ratio=4.09) but not grade point average.

Conclusion: Smartphone overuse during bedtime in medical students is associated with sleep problems but not learning achievement.

Keywords: *Napping in Classroom, Sleep Problems, Smartphone Overuse*

Practice Highlights

- The smartphone is a useful and essential tool for communication, it should be used smartly for appropriate purposes.
- Smartphone overuse during bedtime has a significant effect on sleep quality and consequently napping in the classroom.
- No significant association between smartphone overuse and learning outcome was found.

I. INTRODUCTION

Smartphones are now used in everyday life and offer a substantial variety of mobile applications for information, communication, education, and entertainment purposes. Most students also use them for hours and some tend to have the addiction to smartphones. By the Smartphone Addiction Scale (SAS), the incidence of smartphone addiction is as high as 16.9% and the duration of smartphone screen-time increases the incidence of addiction (Haug et al., 2015).

Based on the definition of internet addiction, smartphone overuse may disturb users' daily lives such as learning performance and sleep quality. College students spent almost nine hours daily on their cell-phones (Roberts, Yaya, & Manolis, 2014). Consequently, smartphones or computers have an impact on physical health-related problems such as blurred vision, myofascial pain syndrome at wrists and neck if overused (Ganeriwal, Biswas, & Srivastava, 2013). A previous survey of smartphone screen-time in general population showed

that there was a significant association between screen time and poor sleep (Christensen et al., 2016). The prevalence of excessive daytime sleepiness in medical students was reported as high as 30.6% (Ramamoorthy, Mohandas, Sembulingam, & Swaminathan, 2014). But it is uncertain regarding the association between smartphone overuse and sleep problems or poor learning. The objective of this study is to determine the association between smartphone overuse and sleep problems in medical student as primary outcome and poor learning as a secondary outcome.

II. METHODS

A cross-sectional study was conducted in 89 Year-4 and Year-5 medical students at Hatyai Medical Education Centre, Thailand. All students having their own smartphones were included. Fifty-three students (58.4%) were male. Data were obtained using a questionnaire for student characteristics, habits of using a smartphone, self-assessment for sleep quality using Pittsburgh Sleep Quality Index (PSQI), and sleep problems using Epworth Sleepiness Scale (ESS). Recall information was filled out.

Smartphone overuse was defined as using longer than 1 hour during bedtime according to the previous study showing that it increased the incidence of smartphone addiction by Smartphone Addiction Scale (SAS) (Haug et al., 2015). The primary outcome was collected as the incidence of napping in the classroom defined as a problem if it happened more than 20 percent of the numbers of total class attending. The numbers of classroom absences in each student were not counted in the total class attending for the denominator. However, there were only a few students who did not attend completely in every session due to personal reasons such as illness, but they attended more than 90% of all sessions.

Nap means to sleep for a brief period, often during the day; doze or to be unaware of imminent danger or trouble. Learning achievement using grade point average (GPA) in last academic year was a secondary outcome. Data analysis were performed using multivariable

logistic regression to find out the association between smartphone overuse among sleep problems and GPA.

III. RESULTS

Most of the students use expensive smartphones. Sixty-five percent of students have phones costing more than 560 USD, 29.4% having phones costing 560-280 USD, the rest having phones costing less than 280 USD. They bought expensive smartphones because of more options and more attractive features. All of 66.7% medical students usually take them all day.

The survey of internet access showed that the top 5 favourite rankings were Facebook, phone calls, non-academic searching, academic searching and LINE chatting. The other option was taking a photograph. The common periods of using smartphone were 9 pm until after midnight, 6pm-9pm, and all day equal 41%, 38%, and 21% respectively. Most students sleep lately. All of 78.6% sleep after midnight.

The mean duration of sleep at night was 2.3±1.1 hours. A total of 77.5% had sleep problems by ESS and 45% of these had poor sleep quality by PSQI. There were 63 cases (70.8%) having smartphone overuse more than 1 hour during bedtime. Consequent napping in the classroom was found as high as 43.6% (range 0-90) and was associated with smartphone overuse during bedtime significantly (p=0.004). No other student characteristics, daily life behaviours, and classroom environments were associated with napping (Table 1).

By multivariable analysis, napping in the classroom and poor sleep problems were associated with smartphone overuse significantly (odds ratio = 4.125 and 3.373 respectively) (Table 2). No significant association between smartphone overuse and short duration of night sleep less than 3 hours was found. The mean GPA was 3.25 (range 2.02-3.91). There was a high rate of smartphone overuse in an honour group with GPA more than 3.50 and low incidence of napping in the classroom. However, there was no statistically significant association between GPA and smartphone overuse.

Student characteristics and behaviours	Category of sleepy in the classroom		p-value
	Normal	Napping	
	N=20 (%)	N=69 (%)	
Male	9 (45)	43 (62.3)	0.166
Body mass index	21.46	21.37	0.866
Smartphone overuse at bedtime	9 (45)	54 (78.3)	0.004
Tired with learning activities	10 (50)	36 (52.2)	0.860

Tired with extra-activities	10 (50)	36 (52.2)	0.860
Boring teachers	11 (55)	44 (63.8)	0.477
Stringent teachers	5 (25)	9 (13)	0.196
Environment factors	13 (65)	36 (52.2)	0.310
No breakfast	4 (20)	20 (28.9)	0.428
Too full stomach	9 (45)	19 (27.5)	0.139
Health problem	1 (5)	7 (10.1)	0.479
Sleep lately after midnight	14 (70)	56 (81.2)	0.284
Sedative medication	2 (10)	5 (7.2)	0.687
Too early morning class	4 (20)	19 (27.5)	0.498
Caffeine drinking ≥ 3 days/week	12 (60)	32 (46.4)	0.283
Exercise ≥ 3 days/week	4 (20)	24 (34.8)	0.210
Duration of night sleep (hours)	2.4	2.2	0.254

Table 1. Comparison between napping in the classroom among student characteristics and behaviours by univariate analysis

Smartphone overuse at bedtime and related variables	Odds ratio	95% CI	p-value
Napping in the classroom	4.125	1.265, 13.447	0.019
Poor sleep quality by ESS	0.914	0.245, 3.407	0.893
Sleepy problems by PSQI	3.373	1.123, 10.133	0.030
Duration of night sleep	0.835	0.518, 1.346	0.458
Grade point average (GPA)	1.515	0.440, 5.219	0.510
Male	0.535	0.176, 1.623	0.269

Table 2. Comparison between smartphone overuse among sleep characteristics and GPA by multivariable analysis

IV. DISCUSSION

Sleep problem is common in students including medical students. The prevalence of sleep problems varies from 17-70% and it was multifactorial such as poor sleep quality, inadequate sleep time, depression, fatigue etc. which is in accordance with this study for poor sleep (Azad et al., 2015).

Medical students in this study had inadequate sleep. Their sleep time duration were less 3-4 times than National Sleep Foundation's Sleep time duration recommendations suggesting that 18-25 year olds should have a sleep duration about 7-9 hours (Hirshkowitz et al., 2015). Abnormal ESS scores were associated with lower academic achievement (Hamza et al., 2012) however it was not found in this study. Previous studies showed some people having habits at bedtime such as reading, using a smartphone for relaxation. These behaviours have an effect on poor sleep quality and depression.

Smartphone overuse can lead to depression and anxiety, which can, in turn, result in sleep problems (Ahn & Kim, 2015; Alsaggaf, Wali, Alsager, Alkhamash, & Quqandi, 2014; Demirci, Akgönül, & Akpınar, 2015). University students with high depression and anxiety scores should be carefully monitored for smartphone addiction. Side effects of smartphone overuse such as a chronic headache, concentration problem, long-term memory problem, recent memory problem, insomnia and inadequate sleep have been reported among medical students (Abdulmohsen et al., 2016).

Caffeine and alcohol ingestion also affected sleep and daytime sleepiness. Sleep difficulties resulted in irritability and affected lifestyle and interpersonal relationships (Giri, Baviskar, & Phalke, 2013). This study could not find the association between smartphone overuse and learning outcome which is discordant with previous reports (Ahn, & Kim, 2015; Alsaggaf et al., 2014). It might be related to multifactorial and needs further study. The exact percentage of napping in the

classroom in this study might be slightly overestimated if all students who attended only 90% of all sessions had no more napping in the classroom when they attended completely.

V. CONCLUSION

Smartphone overuse during bedtime in medical students has an association with sleep problems but not learning achievement.

Notes on Contributors

Pairaj Boonluksiri, a paediatric neurologist, works at Medical Education Centre, Hatyai Hospital, Thailand and is responsible for medical teacher and educator. Assessment is his favourite field in medical education. He has got a certificate of fellowship in medical education (assessment), at the University of Illinois at Chicago, the USA since 2003.

Ethical Approval

The Institutional Review Board for Human Research of Hatyai Hospital approved this study.

Declaration of Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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