

The Influence of Social Media on Sleep Quality: A Study of Undergraduate Students in Chongqing, China

Xiang-Long Xu¹⁻³, Run-Zhi Zhu¹⁻³, Manoj Sharma⁴ and Yong Zhao^{1-3*}

¹School of Public Health and Management, Chongqing Medical University, China

²Research Center for Medicine and Social Development, Chongqing Medical University, China

³The Innovation Center for Social Risk Governance in Health, Chongqing Medical University, China

⁴Department of Behavioral and Environmental Health, Jackson State University, USA

*Corresponding author: Yong Zhao, School of Public Health and Management, Chongqing Medical University. No. 1 Yixueyuan Road, Yuzhong District, Chongqing 400016, China; Tel: 13883460842; E-mail: zhaoyongzb@qq.com

Received date: Feb 17, 2015; Accepted date: Apr 21, 2015; Published date: Apr 29, 2015

Copyright: © 2015 Xu XL et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Objectives: We aimed to identify the influence of using social media on the sleep quality of undergraduate students in Chongqing, China.

Methods: A cross-sectional study was performed on undergraduate students in Chongqing, China. A multistage stratified sampling was adopted. The study population was composed of 1,444 (72.97%) females and 535 (27.03%) males.

Results: More than half of undergraduates who used social networking service websites (66.25%), Fetion (82.68%) microblogs (66.43%), QQ (66.38%), WeChat (63.56%), post bars (62.89%), forums (58.70%), SNS website (37.30) and blogs (27.00%) reported poor sleep quality. We found respondents who were from university of foreign languages or used WeChat were less likely to have poor sleep quality. Further, undergraduates who spent 0.5 to 2 hours before bedtime or above per day on social media were more likely to have poor sleep quality.

Conclusions: More than half of undergraduates who use social media experience poor sleep quality. Undergraduates at University of Foreign languages may be less likely to experience poor sleep quality. Using WeChat may be less likely to experience poor sleep quality.

Keywords: Social media; Sleep quality; Undergraduate; China

Background

Social media generally refers to a kind of technology and Web site that provides a platform for accessing information, sharing ideas and promoting communication [1]. Over half of adults worldwide use social media platforms [2]. The young users of social media in China account for a large number of proportion. To note, there are a variety of social media in China, and each of them is in possession of a vast number of young users. QQ is ranked as the most popular social media platform in China, followed by WeChat [3]. In addition, Fiction, Microblogs, Post bars, Social networking service (SNS) websites, forums, and blogs are also popular among young people.

Previous research studies have shown that overuse of electronic media is related to sleep disorders [4,5]. Moreover, some research studies show that there is an association between Facebook dependence and poor quality of sleep [6]. Mechanisms of the association are diverse and addiction theory is commonly accepted [7]. Poor sleep quality influence daytime functioning, working memory, and mood of individuals, the academic results of young students, and interfered with their interpersonal interactions [8,9]. However, few college students are aware of the seriousness of poor sleep [10].

At present, little is known about the potential association between social media and sleep of undergraduates because the levels of physical activity do not show its beneficial effect to poor sleep quality [11]. Therefore, it is necessary to identify the sleep quality of social media user and how social media interrupt their sleeping behaviors in China, especially undergraduate users. Considering the variety of social media in China, we take more than one social media into study. The purpose of this study was to estimate the influence of social media on the sleep quality of undergraduate students in China by addressing four research questions:

1. Do social media affect the sleep quality of undergraduate students?
2. Which kind of social media affect the sleep quality of undergraduate students?
3. How time spent on using social media relates to the sleep quality in undergraduate students?
4. What factors affect poor sleep quality of undergraduate students?

Methods

Study design

A cross-sectional study was conducted on undergraduates in Chongqing. Chongqing University Town is located in the Shapingba

district, about 15 km far from the downtown area of Chongqing. In 2010, there were more than 150,000 students in the 17 universities and colleges located in the Chongqing University Town. Multistage stratified sampling was adopted. The 17 universities in Chongqing University Town were classified according to school type. The school was used as the primary sampling unit. We choose five different universities, namely, Chongqing Science and Technology University, Chongqing Normal University, Chongqing Medical University, Sichuan International Studies University, and Chongqing University. Freshman, sophomore, and junior students were extracted from each university. Class was used as the secondary sampling unit, and we drew two classes for each grade.

Ethical approval

This study was approved by the Ethics Committee of Chongqing Medical University. A written informed consent was obtained from all participants.

Population and sample

According to the literature [6], the prevalence of poor sleep quality was 55.0% among the total students population. We set $P=0.55$. ($P=0.55$; $Q=1-P=1-0.55=0.45$) margin of error $d=0.1$. $P=0.1 \times 0.50=0.05$, $Z_{\alpha}=1.96$; sampling size=380). Participants were all students attending the eight selected classes. The Participants include 2,100 volunteer undergraduate students, who were selected via probability proportionate sampling. Among the 2,100 students, the response rate is 2,088(99.43%), 9 responses were deleted due to missing data, resulting in a final sample of 1,979 (94.24%) in the analysis. The questionnaire was administered to 5 groups of 10 undergraduate students. The first group comprised students from the Faculty of Medicine. The second group included students from the Faculty of Technology; the third comprised students from the Faculty of Language; the fourth included students from the Faculty of Science and Technology; and the fifth comprised students from the Faculty of Comprehensive. The questionnaire survey administered in June 2014 generated representative data from Chongqing University Town in China. Students were contacted in their classrooms before or after the lectures delivered by a trained student helper. After obtaining written consent, a self-administered questionnaire was offered to the participants for data collection in the classroom. The respondents took 10 to 15 minutes to complete the questionnaire. The student helper quickly reviewed the responses for completeness of answers.

Questionnaire

The questionnaire was developed based on social media and sleeping and designed for the target population. The questionnaire was finalized after repeated discussions with experts and after a pilot investigation. A questionnaire, designed based on probes evidence of social media influence on sleep quality among undergraduate students in Chongqing, China, 2014. The first part—demographic characteristics—gender (male/female), Age(year), Grade(Freshman/Sophomore/Junior), The only child (Yes/No), Monthly living expense(Less than 500 Yuan/500 Yuan to 800 Yuan/800 Yuan to 1,000 Yuan/More than 1,000 Yuan) Type of University school (Comprehensive University/Medical University/University of foreign languages/Technological University/Normal University). The second part—The questionnaire provided a screening instrument for using social media: 1. Do you use one of the social media platforms (SNS websites, microblogs, QQ, Fetion, WeChat, post bars, forums, and

blogs) more than once in the recent week? 2. Do you use one of the social media platforms (SNS websites, microblogs, QQ, Fetion, WeChat, post bars, forums, and blogs) more than one hour in the recent week? Respondents who answered "yes" to the two criteria were classified as social media users. The third part—How social media affect sleep quality, including sleep onset latency, multiple arousals during sleep, waking up in the morning, memory, mood and fatigue at work, and feeling upset in the daytime. The present study use the Pittsburgh Sleep Quality Index (PSQI) was created at the University of Pittsburgh to measure the sleep quality of college students, which was used to describe sleep quality as either good or bad and has acceptable validity and reliability. The main outcome of was sleep quality, which is defined as good or poor according to the PSQI [12]. A global score of 6 or greater was defined as the cutoff in determining poor sleep quality [13,14].

Survey implementation

A pilot study was conducted in June 2014 to test the feasibility of the proposed study. The pilot test was conducted in a medical university. Sixty individuals participated in the pilot test. During the actual data gathering, participants were randomly selected at each survey site and politely asked about their willingness to participate in the campaign. Those who consented were interviewed face-to-face by researchers to answer every item in the questionnaire. Each interview lasted for approximately 10 to 20 minutes.

Procedures and data collection

A complete census was planned to enroll the appropriate sample size. Based on the experience of the pilot study, students were contacted in their classroom before or after lectures by a trained student helper in the current study. The student helper explained the research objectives, and distributed the questionnaire to students who gave written consent to participate. Students were contacted in their classrooms before or after lectures. After informed consent was given, a self-applied questionnaire was provided to the participants for information and data collection. This process took around 10 to 15 minutes. Afterward, a quick review of the questionnaire with the participants was performed to guarantee completeness.

Data analysis

The data gathered from the questionnaires were carefully checked before being entered into the database using Epi-data3.1 software. The data were meticulously sorted, cleaned, and analyzed using Statistical Analysis System Software (Version 9.1; SAS Institute, Cary, NC). Incomplete or missing data were excluded. All data entries were double-checked to prevent errors. Descriptive statistics were utilized in data analysis. The characteristics of the participants were summarized using either means and standard deviations or frequencies and percentages, and were presented using descriptive analysis (means, standard deviations, and percentages). Chi-square tests were employed for comparisons when appropriate. The statistical tests included a two-sided test. Statistical significance was considered at $p<0.05$. Logistic regression was performed to examine the factors that affect undergraduate poor sleep quality. We included variables that have a p -value <0.05 in the bivariate analysis with "poor sleep quality" as the dependent variable in the regression model with backward elimination to retain those factors that were still significant. The independent variable "The only child" was recorded into 2 categories: 1="Yes" and 0="No" due to zero cell size in one of the responses for selection.

“Type of University school” was recorded into 5 categories: 1=Comprehensive University, 2=Medical University, 3=University of foreign languages, 4=Technological University, 5=Normal University; WeChat was recorded into 2 categories: 1=“Yes” and 0=“No”; SNS website was recorded into 2 categories: 1=“Yes” and 0=“No”. “The average time of social media use before bedtime” was recorded into 4 categories: 1=Less than 0.5 hours, 2=0.5 hours to 1 hour, 3=1 hour to 2 hours, and 4=More than 2 hours. “The average time of social media use per day” was recorded into 3 categories: 1=Less than 2 hours, 2=2 hours to 4 hours, 3=More than 4 hours. “The frequency of social media use in the recent week” was recorded into 5 categories: 1=0 day, 2=Almost every day, 3=4 days to 5 days, 4=2 days to 3 days, 5=1 day. The threshold for statistical significance was established at the 0.05 level in the logistic regression.

(72.97%) females. The mean age of participants assessed was 20.27 (SD: 1.26) years, while 1,311 (66.25%) were reported to have poor sleep quality. Significant association were found in the only child (OR=1.262, 95%CI: 1.047 - 1.522), normal university (OR=0.716, 95%CI: 0.542 - 0.947), and university of foreign languages (OR=1.454, 95%CI: 1.051 - 2.013). Our results found 11.77% respondents had sleep onset latency of more than 30 minutes per night. 17.89% respondents had multiple arousals during sleep. 29.21% respondents had difficulty waking up in the morning. 31.63% respondents had poor memory. 34.51% respondents had depressed mood. 58.41% respondents felt fatigue at work. 77.61% respondents felt upset (Table 1).

Results

Characteristics of study participants

Table 1 displays descriptive statistics for undergraduate students. A total of 1,979 students comprised 535 (27.03%) males and 1,444

Demographic	OR,95%CI	(Mean±SD/%)
Gender		
Male	1(Reference)	535(27.03)
Female	1.138 (0.925, 1.401)	1444 (72.97)
AgeYear,Mean+SD Grade	-----	20.27±1.26
Freshman	1(Reference)	693(35.02)
Sophomore	1.191 (0.952, 1.488)	708(35.78)
Junior	0.930 (0.737, 1.174)	557(28.15)
Senior	1.705 (0.617, 4.711)	21(1.06)
The only child		
Yes	1.262 (1.047, 1.522)*	893(45.12)
No	1(Reference)	1086(54.88)
Monthly living expense		
Less than 500 Yuan	1(Reference)	51(2.58)
500 Yuan to 800 Yuan	1.519 (0.861, 2.683)	1075(54.32)
800 Yuan to 1,000 Yuan	1.673 (0.932, 3.001)	516(26.07)
More than 1,000 Yuan	1.254 (0.691, 2.277)	337(17.03)
Type of University school		
Comprehensive University	1(Reference)	392(19.81)
Medical University	1.141 (0.853, 1.527)	425(21.48)
University of Foreign Languages	0.716 (0.542, 0.947)*	458(23.14)
Technological University	1.225 (0.907, 1.653)	390(19.71)
Normal University	1.454 (1.051, 2.013)*	314(15.87)

Sleep quality		
Good	-	668(33.75)
Poor	-	1311(66.25)

Table 1: The influence factors of poor sleep by selected demographic characteristics, Chongqing, China, 2014 (n=1979), Note:* There was statistically significant (P<0.05).

Influence of social media on sleep quality

Table 2 showed sleep quality among college students using different social media. Almost all college students used social media. Majority of the respondents used QQ (95%), Fection (82.57%), WeChat (66.7%), and microblogs (56.44%), while minority of them used SNS websites

(35.78%), Blog (28.15%), and Post bar (22.74%), and only a smaller group used Forums (6.97%). To note, significant association were found in the use of WeChat (OR=0.691, 95%CI: 0.564 - 0.847) and SNS websites (OR=1.220, 95%CI: 1.002 - 1.485).

Social media user	OR, 95%CI	n, %	Sleep quality	
			Good (%)	Poor (%)
QQ user(VS.Non-user)	1.128 (0.741, 1.718)	1880(95.00)	632(33.62)	1248(66.38)
Fetion user(VS. Non-user)	1.025 (0.802, 1.309)	1634(82.57)	550 (82.34)	1084 (82.68)
WeChat user(VS. Non-user)	0.691(0.564, 0.847)*	1320(66.70)	481(36.44)	839(63.56)
Microblog user(VS. Non-user)	1.637 (0.597, 4.489)	1117(56.44)	375(33.57)	742(66.43)
SNS website user(VS. Non-user)	1.220 (1.002, 1.485)*	708(35.78)	219 (32.78)	489 (37.30)
Blog user(VS. Non-user)c	0.847(0.690, 1.040)	557 (28.15)	203 (30.39)	354(27.00)
Post bar user(VS. Non-user)	0.826 (0.663, 1.028)	450(22.74)	167(37.11)	283(62.89)
Forum user(VS. Non-user)	0.706(0.496, 1.004)	138(6.97)	57(41.30)	81(58.70)

Table 2: Sleep quality among college students using different social media, Chongqing, China, 2014, Note: SNS website (such as RenRen, KaiXin) user

The time of Social media use and poor sleep

The association between the use time of social media and poor sleep quality were found in table 3. Significant differences were found in the average time of social media use before bedtime (0.5 hours to 1 hour (OR=1.486, 95%CI: 1.198 - 1.842) vs. 1 hours to 2 hour (OR=1.746, 95%CI: 1.322 - 2.306) vs. more than 2 hours (OR=1.826, 95%CI: 1.244 - 2.681)), the average time of social media use before bedtime (2 hours

to 4 hours (OR=1.581, 95%CI: 1.295 - 1.932) vs. more than 4 hours (OR=1.749, 95%CI: 1.288 - 2.374)), and the frequency of social media use in the recent week(almost every day (OR=2.920, 95%CI: 1.553 - 5.492) vs. 4 days to 5 days (OR=2.899, 95%CI: 1.484 - 5.664) vs. 2 days to 3 days(OR=2.493, 95%CI: 1.269 - 4.898) vs. 1 day (OR=2.279, 95%CI: 1.033 - 5.024)) (Table 3).

Variables	OR, 95%CI	(Mean ± SD/%)
The average time of social media use before bedtime		
Less than 0.5 hours [▲]	1 (Reference)	657(33.20)
0.5 hours to 1 hour	1.486 (1.198, 1.842)*	808 (40.83)
1 hour to 2 hours	1.746 (1.322, 2.306)*	357(18.04)
More than 2 hours	1.826 (1.244, 2.681)*	157 (7.93)
The average time of social media use per day		
Less than 2 hours [▲]	1 (Reference)	852 (43.05)
2 hours to 4 hours	1.581(1.295,1.932) [†]	869(43.91)

More than 4 hours	1.749(1.288, 2.374)*	258 (13.04)
The frequency of social media use in the recent week		
0 day▲	1 (Reference)	41 (2.07)
Almost every day	2.920 (1.553, 5.492)†	1354 (68.42)
4 days to 5 days	2.899(1.484, 5.664)*	278 (14.05)
2 days to 3 days	2.493 (1.269, 4.898)†	238 (12.03)
1 day	2.279 (1.033, 5.024)†	68 (3.44)

Table 3: The time of Social media use and poor sleep, Chongqing, China, 2014, Note: * There was statistically significant (P0.05).

Logistic regression model to indicate factors affect poor sleep quality

Several factors were considered in modeling the factors that affect poor sleep quality. These factors included the only child, type of university, WeChat user, SNS website user, the average time of social media use before bedtime, the average time of social media use per day. Table 4 showed the data of the logistic regression model, which were used to indicate the factors that influenced poor, sleep quality. Table 4 showed that “the only child” had no significant association with sleep quality. However, compared with students who did not study in the university of foreign languages, those who studied in universities of foreign language (OR=0.662, 95%CI: 0.498 - 0.880) were less likely to have poor sleep quality. Compared with students who did not use WeChat, those who used this site (OR=0.674, 95% CI: 0.547 - 0.829) were less likely to have poor sleep quality. Compared with students who spent less than 0.5 hours on social media before bedtime, those who spent 0.5 to 1 hour (OR=1.370, 95% CI: 1.094 - 1.717) or 1 to 2 hours (OR=1.551, 95% CI: 1.152 - 2.088) were more likely to have poor sleep quality. Compared with students who spent less than 2 hours on social media per day, those who spent 2 hours to 4 hours (OR=1.476, 95%CI: 1.190 - 1.831) or more than 4 hours (OR=1.523, 95%CI: 1.089 - 2.130) were more likely to have poor sleep quality (Table 4).

Variables	Estimate	ORa, 95%CIa	p-value
Intercept	0.5194	----	0.0002
Type of University			
Comprehensive University	-	1 (Reference)	-
Medical University	0.0617	1.064(0.791, 1.431)	0.6833
University of foreign languages	-0.412	0.662 (0.498, 0.880)	0.0046*
Technological University	0.1123	1.119 (0.824, 1.519)	0.4716
Normal University	0.2689	1.309 (0.940, 1.821)	0.1107
WeChat user			
No▲	-	1 (Reference)	-
Yes	-0.3951	0.674(0.547, 0.829)	0.0002*

The average time of social media use before bedtime			
Less than 0.5 hours	-	1 (Reference)	
0.5 hours to 1 hour	0.3151	1.370 (1.094, 1.717)	0.0061*
1 hour to 2 hours	0.439	1.551 (1.152, 2.088)	0.0038*
More than 2 hours	0.3689	1.446 (0.953, 2.195)	0.083
The average time of social media use per day			
Less than 2 hours	-	1 (Reference)	
2 hours to 4 hours	0.3894	1.476 (1.190, 1.831)	0.0004*
More than 4 hours	0.4207	1.523(1.089 2.130)	0.0140*

Table 4: Logistic regression model to predict the influence factors of poor sleep, Chongqing, China, 2014 (n=1979), Note1* There was statistically significant (P0.05) 2) a Logistic regression model was adjusted for The only child, Type of University school, WeChat, SNS website, The average time of use of social media before bedtime, The average time of use of social media per day, How often did you use the social media in a recent week

Discussion

Our findings show that more than half (66.25%) of undergraduate students have poor sleep quality. The current results are similar with previous studies among undergraduate students [15-18]. The present study showed the actual situation of college students regarding the frequency of use of social media. More than half of undergraduates who use social media (SNS websites, microblogs, QQ, Fetion, WeChat, post bars, forums, and blogs) have poor sleep quality. A study in Peru also indicated 69.4% students of Facebook dependence have poor sleep quality [6]. The results are also similar with prior research, which examined the association between using social media and sleep quality among college students [19,20].

The influences of using social media before bedtime on sleep quality in many aspects. Most of the potential impact of social media use on sleep quality seems to be during daytime. The current study shows that a minority of people experience multiple arousals during sleep, poor memory and depression. More than half of the respondents experience fatigue at work and upset. The respondents reported experiencing

sleep onset latencies of more than 30 minutes per night and difficulty of waking in the morning, which are associated with sleeping disorders [21]. Our study found that the most common adverse consequences of sleep caused by using social media are “experiencing fatigue at work” and feelings of “upset”. These will affect the students’ learning efficiency and the academic performance. Chronic fatigue and upset feelings can cause the occurrence of some diseases and reduce the students’ physical quality of life.

Poor sleep quality among undergraduates in China is influenced by numerous factors. Several possible explanations regarding the influence of using social media on sleep were found in our study. Use of WeChat is an example of factors that affect the sleep quality of undergraduates. This finding is shown in the result that indicates that WeChat users are less likely to experience poor sleep than non-WeChat users. WeChat users are less likely to experience poor sleep, it is worthy of further exploration. We guess that the WeChat has some health related knowledge, which make users have better sleep habits. WeChat is also likely to provide many people with a relaxed environment, which will help ease the pressure makes the user's sleep better. Further research needs to be confirmed that WeChat can be used for the health education among chinese people. The emergence of this phenomenon is worthy of further research.

Time usage of social media is likewise an important factor that affects undergraduates sleep quality. The study found the following effects of the average time of use of social media on sleep quality. Our results find that social media users who spend 0.5 to 2 hours on social media are more likely to experience poor sleep than those who spend less than 0.5 hours. A previous study showed that discontinuous light stimulation during the night is related to sleep quality [22], which has a potential effect on daytime functioning [23]. These consequences can cause students’ low learning efficiency, long-term fatigue likely to lead to the occurrence of some chronic diseases.

Second, users who spend above 2 hours on social media are more likely to experience poor sleep than those who spend less than 2 hours. Previous studies indicated that exposing to the Internet for 15 minutes is more likely to lead to feelings of depression and anxiety [24,25]. In this study, we found that students who spend more time on social media and use them more frequently are more likely to experience poor sleep quality. We also found that students at university of foreign languages are less likely to experience poor sleep quality. This phenomenon is worthy of attention. We are very surprise about this phenomenon, further research needed to explore this phenomenon. Thus, health policy makers should fully consider these factors in improving the sleep quality of undergraduates. Some authors indicated that delayed bedtime and shorter total sleep time are most consistently related to social media use [26].

This study has limitations, which must be addressed. First, cross-sectional survey data reduced the ability of the study to make direct causal inferences, explore whether or not unmeasured factors can better explain the observed relationships, and determine the direction of causality. Secondly, this study did not assess the concurrent validity of the questionnaire. This questionnaire was our own design. We did not assess the validity of the questionnaire with measures that did not themselves have established validity limits the validity of the findings. Finally, the study was based on self-reports which has its own limitations as the participants can be dishonest or not forthcoming with the correct responses. Notwithstanding the above limitations, this study also has certain strengths. This exploratory study provides a workable framework for further exploration of the association between

social media and sleeping problems. This approach helped solve the increasingly serious sleeping problems of college students in providing a theoretical foundation for this after intervention.

Conclusions

More than half of undergraduates who use social media experience poor sleep quality. Undergraduates at University of Foreign languages may be less likely to experience poor sleep quality. Using WeChat may be less likely to experience poor sleep quality.

Acknowledgements

This study was funded by Summer Social Practice Project of School of Public Health and Management, Chongqing Medical University. The study sponsor had no role in study design. Thanks Wenjing Zhou, Qian Zhang, Xiaofang Yang, Yizhou Long, Jia Wang, Long Qin, Wenqi Xiong, Xingyan Li, Haixiao Chen in Chongqing Medical University for their actively participation.

Competing interests

The authors declare that they have no competing interests.

References

1. Dizon DS, Graham D, Thompson MA, Johnson LJ, Johnston C, et al. (2012) Practical guidance: the use of social media in oncology practice. *J Oncol Pract* 8: e114-124.
2. Madden M, Zickuhr K. (2011) 65% of online adults use social networking sites. *Pew Internet & American Life Project* 1-14.
3. China Internet Watch (2014) Analysis on China’s Top Mobile Messenger Apps.
4. Van den Bulck J (2004) Television viewing, computer game playing, and Internet use and self-reported time to bed and time out of bed in secondary-school children. *Sleep* 27: 101-104.
5. Choi K, Son H, Park M, Han J, Kim K, et al. (2009) Internet overuse and excessive daytime sleepiness in adolescents. *Psychiatry Clin Neurosci* 63: 455-462.
6. Wolniczak I, Cáceres-DelAguila JA, Palma-Ardiles G, Arroyo KJ, Solís-Visscher R, et al. (2013) Association between Facebook dependence and poor sleep quality: a study in a sample of undergraduate students in Peru. *PLoS One* 8: e59087.
7. Young KS (1999) Internet addiction: symptoms, evaluation, and treatment. In: *Innovations in Clinical Practice* Van de Creek L, Jackson TL (eds.) FL: Professional Resource Press, Sarasota.
8. Mason MJ, Zaharakis N, Benotsch EG (2014) Social networks, substance use, and mental health in college students. *J Am Coll Health* 62: 470-477.
9. Gomes AA, Tavares J, de Azevedo MH (2011) Sleep and academic performance in undergraduates: a multi-measure, multi-predictor approach. *Chronobiol Int* 28: 786-801.
10. Tsai HF, Cheng SH, Yeh TL, Shih CC, Chen KC, et al. (2009) The risk factors of Internet addiction--a survey of university freshmen. *Psychiatry Res* 167: 294-299.
11. Tavernier R, Willoughby T (2014) Sleep problems: predictor or outcome of media use among emerging adults at university? *J Sleep Res* 23: 389-396.
12. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ (1989) The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 28: 193-213.
13. Escobar-Córdoba F, Eslava-Schmalbach J (2005) [Colombian validation of the Pittsburgh Sleep Quality Index]. *Rev Neurol* 40: 150-155.

14. Rosales E, Egoavil MT, La Cruz CC, Rey de Castro J (2008) Somnolence and sleep quality in medical students during hospital practices and holidays. *ActaMed Per* 25: 199-203.
15. Cheng SH, Shih CC, Lee IH, Hou YW, Chen KC, et al. (2012) A study on the sleep quality of incoming university students. *Psychiatry Res* 197: 270-274.
16. Rocha CR, Rossini S, Reimão R (2010) Sleep disorders in high school and pre-university students. *Arq Neuropsiquiatr* 68: 903-907.
17. Cheng SH, Shih CC, Lee IH, Hou YW, Chen KC, et al. (2012) A study on the sleep quality of incoming university students. *Psychiatry Res* 197: 270-274.
18. Afandi O (2013) "Sleep Quality Among University Students: Evaluating the Impact of Smoking, Social Media Use, and Energy Drink Consumption on Sleep Quality and Anxiety." *Student Pulse* 5: 738
19. Munezawa T, Kaneita Y, Osaki Y, Kanda H, Minowa M, et al. (2011) The association between use of mobile phones after lights out and sleep disturbances among Japanese adolescents: a nationwide cross-sectional survey. *Sleep* 34: 1013-20.
20. Mesquita G, Reimão R (2010) Quality of sleep among university students: effects of nighttime computer and television use. *Arq Neuropsiquiatr* 68: 720-725.
21. Chung KF, Cheung MM (2008) Sleep-wake patterns and sleep disturbance among Hong Kong Chinese adolescents. *Sleep* 31: 185-194.
22. Liu Z, Zhao Z (2014) Effects of light interruption on sleep and viability of *Drosophila melanogaster*. *PLoS One* 9: e105678.
23. Wolfson AR, Carskadon MA (1998) Sleep schedules and daytime functioning in adolescents. *Child Dev* 69: 875-887.
24. Romano M, Osborne LA, Truzoli R, Reed P (2013) Differential psychological impact of internet exposure on Internet addicts. *PLoS One* 8: e55162.
25. Pantic I, Damjanovic A, Todorovic J, Topalovic D, Bojovic-Jovic D, et al. (2012) Association between online social networking and depression in high school students: behavioral physiology viewpoint. *Psychiatr Danub* 24: 90-93.
26. Cain N, Gradisar M (2010) Electronic media use and sleep in school-aged children and adolescents: A review. *Sleep Med* 11: 735-742.