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Original Research Article

Social Media Use and Sleep Disturbances among Medical Undergraduates in Southern Nigeria

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Abstract: This study sought to determine the average time spent on social media by medical undergraduates in University of Uyo, Akwa Ibom State, Nigeria and to determine the relationship between social media use and disturbances of sleep quality and quantity amongst medical undergraduates in University of Uyo. It was a cross sectional population based study among 208 medical students in University of Uyo, Southern Nigeria. They were randomly selected with a proportionate stratified random sampling method and data collection was done using a self-reporting anonymous questionnaire. Social media use was assessed using multiple items reflecting the frequency, volume, location and platform of social media use. The average time spent on social media by respondents was 1-3 hours. Proportionately, the most time was spent on Facebook. In models that adjusted for all covariates, participants who spent more time on social media per day had significantly greater odds of having disturbance of sleep quality. Compared with those who spent more than 3 hours per day on social media, those who spent 1-3 hours per day had an adjusted odds ratio of 4.59 (95%CI: 4.14-5.48, p value < 0.001) for sleep disturbance. A significant association was reported between volume of social media use and sleep disturbance. This has important clinical implications for the health of young adults. Future work would focus on the interactions on the various social media platforms that make their use significant to young adults.

Keywords: Sleep disturbances, social media, undergraduates, smart phone, sleep quality.

INTRODUCTION

Sleep has an important role in human life not only for general health but also for mental health and quality of life [1]. The Center for Disease Control and Prevention recommends eight hours of sleep a night for young adults [2]. However, achieving the desirable quantity and quality of sleep for proper physiological functioning among undergraduates has been set back by the meteoric rise in the use of social media [1]. The potential negative influence on health has implicated social media use as a public health problem [3-6]

Several hypotheses have been proposed regarding the mechanisms of association between social media use and sleep disturbances [7]. Social media use is a form of unstructured activity which usually lacks a clear beginning and end. It is likely to be extended, sacrificing sleep time, and thus shortening sleep duration.[3] This sedentary form of entertainment also may alter sleep architecture[8] and lead to poor quality of sleep [8,9].

Also, exposure to the bright light of the viewing screen before sleep may affect the sleep/wake cycle through suppression of the nocturnal salivary secretion of melatonin [10-12]. Studies have reported the effect of excessive nightly exposure to bright light, especially from mobile phone screens, and disturbances of the circadian rhythm. While some report that excessive nightly exposure to bright light from computer screens may suppress melatonin and consequently delay the circadian rhythm [13], others say that endogenous melatonin played only a very minor role in the mechanism by which light reduces sleepiness [14].

Social media usage is more common among those with a higher educational level compared to those with lower education, and students are the most frequent users [15,16] The most active users are 15–24-year-olds [16], with just about all of them (96%) using social networks such as Facebook and Twitter, but other age groups are also becoming increasingly active in social media.

However, the rapidly growing rate of social media use in recent years [17] raises concern that social media use may adversely affect sleep quality and may displace total amount of sleep[18]. Additionally, sleep deprivation has been negatively related to academic

performance. One study showed that sleep-deprived students performed worse on attention, memory, and problem-solving tasks and this adversely affected their academic performance [19].

96% of young adults in the 18–30 year-old range use some type of technology–such as cell phones (67%), computers (60%), and electronic music devices (43%)–before bed [20]. However, most research in this area has been in developed nations especially concerning adolescents. There is a dearth of research on the association between social media use, quantity and quality of sleep among undergraduates and young adults in developing countries, Nigeria inclusive. Hence this study sought to determine the association between social media use and sleep disturbances in Southern Nigeria.

Objectives

- To determine the average time spent on social media by medical undergraduates in University of Uyo, Akwa Ibom State, Nigeria
- To determine the relationship between social media use and disturbances of sleep quality and quantity among medical undergraduates in University of Uyo.

METHODOLOGY

Study Location

University of Uyo is located in the state capital, Uyo. Akwa Ibom State is a state in Nigeria located on the southern part of the country lying between latitudes 4°32'N and 5°33'N, and longitudes 7°25'E and 8°25'E with a population of over 5 million people based on a projected population growth rate of 3.2% per annum of the 2006 National census.

Study Design

This was a cross sectional study conducted among medical students in University of Uyo, Akwa Ibom State between April 2016 and June 2016. Ethical approval was received from the Ethical Review Board of Akwa Ibom State Ministry of Health.

Sample

217 medical students were randomly selected using a proportionate stratified random sampling method. Formula for obtaining sample size was:

$$SS = \frac{Z^2 p(1-p)}{C^2}$$

$$New\ SS = \frac{SS}{1 + \left(\frac{SS-1}{Pop}\right)}$$

Where:
SS = Sample Size
Z = Given Z value
P = Percentage of population
C = Confidence level
Pop = Population

The medical school was divided into 7 classes: 1st year (100 level); 2nd year (200 level); 3rd year (300 level); 4th year (400 level); 5th year classes A and B (500 level); 6th year (600 level). The total number of students and percentage of students in each class was calculated and the sample size determined in proportion to the size of each class. Each student was selected into the study sample using simple random balloting. Medical students who were unwilling and/or unable to provide informed consent were excluded. Medical students under 18 years of age were also excluded. Students with a history of a psychiatric disorder or were receiving medications with known effects on sleep were also excluded.

Study Instrument

The questionnaire was developed after a thorough literature review and further evaluation by experts in public health to ensure quality and content validity. The reliability of the instrument was determined through a test-retest reliability method with medical students outside the study sample. The Pearson moment coefficient (r) was calculated and a coefficient of 0.81 was determined.

The medical students were interviewed using a self-reporting anonymous questionnaire after signing an informed written consent.

Measure

Participants completed study instrument assessing social media use (independent variable), sleep disturbance (dependent variable), and covariates (Gender, Coffee use, Alcohol use, Cigarette use, Nightmares, Night study, Smart phone ownership, Time spent on social media, Talking in sleep, Daytime sleep). Social media use was assessed using multiple items reflecting the frequency, volume, location and platform of social media use.

Analysis

The completed questionnaires were carefully examined for correctness and completeness, coded and analysed using the Statistical Package for Social Sciences (SPSS) version 23 for Windows. Quantitative data generated from the study was presented in the form of tables and analysed as descriptive frequencies and percentages.

Chi-square tests were used to determine whether participants in each sleep disturbance group (quantity and quality) differed significantly on level of social media use (volume and frequency) and covariates. Logistic regression was used to examine association between social media use and disturbances of sleep quality and quantity. Analysis was first conducted without covariates (using ordered logistic

regression), and later with covariates (using multinomial logistic regression). The decision to include all covariates in the models was made based on their possible impact on sleep disturbance[21]. Appropriate diagnostics to ensure that the data satisfied the proportional-odds assumption, necessary to conduct the ordered logistic regression, was done.

P-value of less than 0.05 was accepted to be statistically significant.

RESULTS

A). Socio-demographic Characteristics

Table-1: Socio-Demographic Characteristics of Respondents

Variable	Frequency (n)	Percentage (%)
Age		
18-21	76	36.5
22-25	80	38.5
26-29	47	22.6
30-32	5	2.4
Total	208	100
Gender		
Male	136	65.4
Female	72	34.6
Total	208	100
Level		
100	38	18.3
200	46	22.1
300	34	16.3
400	21	10.1
500	46	22.1
600	23	11.1
Total	208	100
Extra financial support		
Yes	146	70.2
No	62	29.8
Total	208	100

Table 1 above shows the socio-demographic and academic characteristics of the respondents. The most respondents (38.5%) were aged 22-25 years; also 34.6% of respondents were females. Equal proportions (22.1%) of respondents were 2nd and 5th year students. Interestingly, 70.2% of the respondents had an extra financial support besides their regular income.

Social Media Use

90.4% of the respondents had smart phones and 85.6% use social media. The average (mean, median and mode) time spent on social media per day was 1-3 hours.

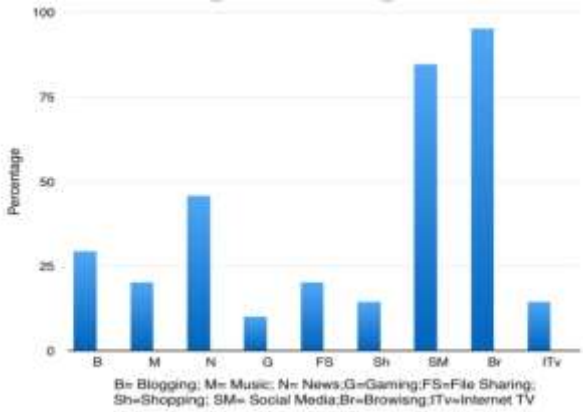

Fig-1: Bar Chart Showing Reasons for Internet Use among Respondents

Figure 1 above demonstrates a bar chart showing reasons for internet use among respondents. 95.2% of respondents used internet mostly for browsing, 84.6% used internet mostly for social media, while 45.7% and 29.3% used internet mostly for news and blogging respectively.

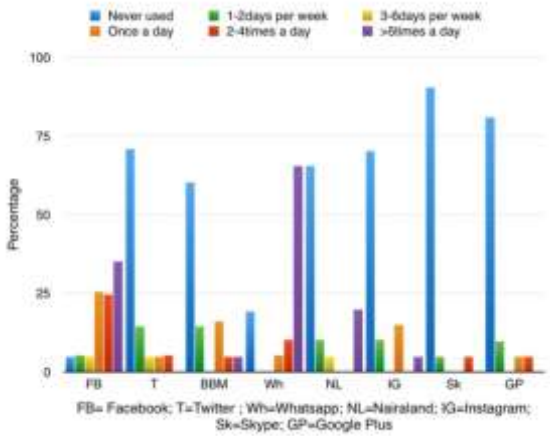

Figure 2: Histogram Showing Frequency of Use of Social Media Platforms among Respondents

Figure 2 above demonstrates a histogram showing frequency of use of social media platforms among respondents. WhatsApp was the SM with the most frequent visits per day (>5times/day), followed by Facebook; Nairaland, BBM and Instagram. Twitter, Skype, Google plus and Nairaland were the SM with the least frequent visits per day (never used >5 times/day). Skype was the SM "never used" by most respondents, followed by Google plus, Twitter, Instagram, Nairaland, BBM, Facebook and WhatsApp.

Table-2: Table Showing Frequency of Use of Social Media Platforms among Respondents

Frequency	Facebook (%)	WhatsApp (%)	BBM (%)	Twitter (%)	Nairaland (%)	Instagram (%)	Google Plus (%)	Skype (%)
Never used	4.8	19.2	60.1	70.7	65.4	70.2	80.8	90.4
Use								
1-2 days per week	5.3	-	14.4	14.4	10.1	10.1	9.6	4.8
3-6 days per week	4.8	-	-	4.8	4.8	-	-	4.8
Once a day	25.5	5.3	15.9	4.8	-	14.9	4.8	-
2-4 times a day	24.5	10.1	4.8	5.3	-	-	4.8	-
5 times a day	35.1	65.4	4.8	-	19.7	4.8	-	-
Use Total	95.2	80.8	39.9	29.3	34.6	29.8	19.2	9.6
Grand Total	100	100	100	100	100	100	100	100

Table 2 above demonstrates a table showing frequency of use of different social media (SM) platforms in the 4 weeks preceding the study among undergraduates. The table shows that 65.4% of WhatsApp users used it more than 5 times per day; compared to Facebook users, of which only 35.1% used it more than 5 times per day, even though amongst WhatsApp users none used it up to either "1-2 days per week" or "3-4 days per week" But the total number of Facebook users (95.2%) exceeds that of WhatsApp (80.8%). Skype (9.6%) was the least used SM, followed by Google plus (19.2), Twitter (29.3%), Instagram (29.8%) and Nairaland (34.6%). 90.4% of respondents "never used" Skype; 80.8% "never used" used Google Plus; and just 4.8% of respondents "never used" Facebook. It could be gleaned that only four SM platforms were used "3-6 days per week": Facebook, Twitter, Nairaland and Skype (even though Skype was the least used SM in terms of frequency of visits). The frequency of use was not determined by the highest number of the most used SM per time. Each SM platform is functionally distinct, and when grouped into those that do not use at all and those that use irrespective of how often per time, the picture changes and it is fair to all platforms irrespective of the purpose they serve.

Sleep

Table 3 below demonstrates associations between social media use variables and sleep quality for unadjusted (bivariate) and adjusted models (multivariate). In the unadjusted bivariate association, social media use, more time spent on social media, ownership of a smart phone, studying at night, sleep talking and drinking coffee at night were significantly associated with disturbances of sleep quality.

In fully adjusted multivariate association, factors significantly associated with disturbances of sleep quality were 1-3 hours spent on social media (OR= 4.59; 95% CI: 4.14-5.48); ownership of a smart phone (OR= 3.32; 95% CI= 2.93-4.46); studying at night frequently (OR=1.63; 95% CI =1.48-1.80); daytime sleep (OR= 0.38; 95% CI: 0.26-0.45); and taking alcohol at night (OR= 2.32; 95% CI= 2.06-2.43). Social media use, sleep talking and taking coffee at night which were significant in the unadjusted models were no longer significant when the covariates were included.

Post-estimate tests demonstrated linearity of the overall association between each of the independent variables and the dependent variable in both unadjusted and adjusted models (all P value < 0.001).

Table-3: Bivariate and Multivariate Associations (At 95% Confidence Intervals) For Sleep Quality, Social Media Use and Covariates

Independent variable	Unadjusted odds ratio	Adjusted odds ratio
Social media use	**Disturbance of sleep quality**	**Disturbance of sleep quality**
Yes	**1.67 (0.88-2.14)**[a]	1.21 (0.71-1.48)
No	1.0 (reference)	
Time spent on social media		
<30 minutes	1.50 (1.33-1.61)	0.76 (0.54-1.31)
30-60 minutes	**5.21 (5.13-5.42)**[a]	1.02 (0.66-1.79)
1-3 hours	**5.30 (5.26-5.61)**[a]	**4.59 (4.14-5.48)**[b]
>3 hours	1.0 (reference)	
Gender		
Male	0.44 (0.28-0.77)	0.11 (0.06-0.39)
Female	1.0 (reference)	
Own a smart phone		
Yes	**6.16 (5.74-6.88)**[a]	**3.32 (2.93-4.46)**[d]
No	1.0 (reference)	
Study at night		
Frequently	**2.23 (2.03-2.76)**[d]	**1.63 (1.48-1.80)**[a]
Always	**1.0 (reference)**	
Talk in sleep		
Occasionally	**0.64 (0.43-0.87)**[c]	0.04 (0.02-0.07)
Never	1.0 (reference)	
Nightmares		
Occasionally	1.10 (0.46-2.55)	1.81 (1.35-2.89)
Never	1.0 (reference)	
Daytime sleep(nap)		
Occasionally	0.72 (0.26-1.59)	**0.38 (0.26-0.45)**[d]
Frequently	1.31 (0.44-1.81)	0.54 (0.38-0.76)
Never	1.0 (reference)	
Take alcohol at night		
Occasionally	2.12 (1.38-3.16)	**2.32 (2.06-2.43)**[a]
Never	1.0 (reference)	
Take coffee at night		
Occasionally	**3.21 (2.72-3.86)**[c]	2.35 (1.21-2.62)
Never	1.0 (reference)	

a= two tailed P value < 0.0001; b= two tailed p value < 0.001; c= two tailed p value < 0.01; d= two tailed p value < 0.05

DISCUSSION

Ownership of a smart phone has been shown to affect sleep quality in this study. This could be explained by the fact that each social media on smart phones uses notifications to keep users updated with latest information regarding user's own activity therein—especially when the user is offline. And almost all smart phones have at least 3 social media pre-installed, with some smart phone users using up to 8 social media platforms every day. This study assessed use of 12 different social media platforms (Reddit, Google Plus, Tumblr, Vine, Facebook, Twitter, BBM, WhatsApp, Nairaland, Snapchat, Instagram and Skype), out of which 4 (Reddit, Tumblr, Vine and Snapchat) were never used at all by undergraduates for the period under review. This study did not ascertain how many different SM platforms were used by each undergraduate per day.

This study reported that the respondents spent an average of 1-3 hours on social media per day. Spending 1-3 hours per day on social media was associated with disturbances of sleep quality in this study. This is consistent with similar study by Jessica C et al, who reported a median of 61 minutes of social media use per day, and other prior research [21, 22]. Another similar study from Turkey, Tahiroglu *et al*. [23] also found that 7.6% of their cohort, which consisted of 3,975 undergraduate students, used the internet more than 12 hours weekly. Another study by the same group, which investigated the characteristics of problematic internet use in adolescents with and without psychiatric disorders, reported that frequency of using the internet more than 8 hours weekly was 23% and 10% in psychopathology and normal control groups, respectively [24].

Facebook was the most frequently used platform, followed by Blackberry Messenger (BBM), WhatsApp, Instagram and Twitter, with regard to frequency of visits. This is because Facebook, BBM and WhatsApp are instant messaging SM platforms. Hence it is expected that users will visit these platforms more than others per day. Facebook was also the most popularly used social media in this study (95.2%); followed by WhatsApp (80.8%); BBM (39.9%); Nairaland (34.6%); Instagram (29.8%); Twitter (29.3%); Google Plus (19.2%); and Skype (9.6%). A number of studies have demonstrated the same pattern. A previous study by Lenhart et al. in 2010 found that Facebook was a most popular form of social media platform [25]. Similarly, another study demonstrated a relationship between Facebook dependence and poor quality of sleep [26]. Facebook dependent participants were reported to have 1.3 times greater prevalence of poor sleep quality.

We realized that the volume of use of social media per day was significantly associated with disturbances of sleep quality than the mere use of social media in the fully adjusted multivariate model (P value < 0.0001**)**. This may mean that the frequency of use of social media is a better index to predict sleep disturbance than the mere use of social media. A similar study by Jessica C *et al*. [22] reported that frequency of social media visits was a better predictor of sleep disturbances than the time spent on them. This study took the frequency social media use into consideration but only focused on the frequency of use of selected social media platforms.

Factors like frequent study at night, daytime sleep and night time alcohol use were not explored as they were used to adjust the influence of social media use on sleep quality. It is worthy to mention that in this study, these factors were shown to have the potential to cause sleep disturbance.

Like previous cross sectional studies on this subject, the present study was unable to specify the direction of social media use – whether disturbances of sleep quality leads to increased time spent on social media or vice versa [24]. However, some possible explanations have been postulated as likely mechanisms. Firstly, social media use may directly displace sleep [23]. For example, if an individual stays up late posting pictures on Instagram, his or her sleep time may be reduced [22]. Secondly, social media notifications encourage frequent visits by users, especially when offline. These notifications may stimulate more frequent use of social media at rest, especially for individuals who are busy during the day. Sounds from these notifications may disturb sleep, as they contributed to the addictive nature of social media use among smart phone users. Use of multiple social media platform means more notifications, which require time to check and respond appropriately and sometimes urgently. This is especially applicable to instant messaging platforms like BBM, WhatsApp and Skype. Thirdly, SM use may promote emotional, cognitive, and/or physiological arousal. For example, watching a provoking video on YouTube or engaging in a contentious discussion on Facebook just before going to bed may contribute to disturbed sleep [25]. Fourthly, bright light emitted by SM devices may delay circadian rhythms [26]. In each of these cases, sleep may be disturbed as a result of the stimulating and rewarding nature of social media.

Conversely, there is some evidence that sleep problems predict longer duration of overall technology and media use [25]. Someone with a pre-existing sleep condition may use social media as a pleasurable way to pass the time while awake or to distract him/herself from the distress of not sleeping [27].

Some clinical implications of social media use and sleep disturbances have been documented. Healthcare providers should assess level of social media use in their young patients, especially when those

patients have difficulty sleeping. School- and clinic-based education programs to address healthy social media use, as has been done for other health behaviors such as obesity and safe driving, should be encouraged. Public health programming and SM education should be used to inform the public of the strong associations between SM use and difficulty sleeping, as well as to disseminate information about strategies for improving healthy social media use [22].

Strengths and Limitations

This study is unique in so many regards. Most research in this area has focused on the effect of media use on sleep among adolescents. This study distinctly specified social media, unlike previous studies. With the current paradigm shift in media utilization from the mainstream media to social media, this study is in line with current realities facing young adults within this age group.

Studying social media use and sleep behaviors of young adults may help us to understand whether SM use in young adulthood promotes SM use in later life, and whether these patterns predict the likelihood of having disturbed sleep as these individuals age [22].

Additionally, this study had the benefit of analyzing the time spent on social media use with regard to selected social media platforms. This might help to understand the peculiarities of each platform, isolate patterns of use and help in modifying these patterns as a means of eroding the ill-effects of their use, should they arise.

This study examined a broader set of covariates as independent variables which could possibly have an effect on the dependent variable. It was important seeing the occurrence of the variables in peculiar ways to this study population.

One important limitation of the cross-sectional nature of the data is that we could not determine the direction of association between social media use and sleep disturbance, nor could we attribute causality to any effect [22]. This study also did not assess the nature of social media interaction associated with disturbances of sleep quality. Another limitation of the study is that it did not attempt to assess how many different SM platforms were used per day by undergraduates who owned smart phones.

CONCLUSION

This study assessed the association between social media use and sleep disturbances among medical students in University of Uyo, Southern Nigeria. We reported a significant association between social media use and sleep disturbance. This has important clinical implications for the health of young adults and public health practice. Future work should focus on longitudinal studies that can determine the direction of association between social media use and sleep disturbance [22].

Conflicts of Interest

The authors declare no conflicts of interest.

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REFERENCES

1. Ozalp EKİNCİ, Tanju CELİK, Nazan SAVAŞ, Fevziye TOROS. Association between Internet Use and Sleep Problems in Adolescents. *Archives of Neuropsychiatry. 2014; 51: 122-128. Doi10.4274/npa.y6751*
2. Center for Disease Control and Prevention (2013). Sleep and sleep disorders. Retrieved from: http://www.cdc.gov/sleep/about_sleep/how_much_sleep.html
3. Van den Bulck J. Television viewing, computer game playing, and Internet use and self-reported time to bed and time out of bed in secondary-school children. *Sleep 2004; 27:101-4.*
4. Olds T, Ridley K, Dollman J. Screenieboppers and extreme screenies: the place of screen time in the time budgets of 10-13 year-old Australian children. *Aust N Z J Public Health 2006; 30: 137-42.*
5. Paavonen EJ, Pennonen M, Roine M, Valkonen S, Lahikainen AR.TV exposure associated with sleep disturbances in 5- to 6-year-oldchildren. *J Sleep Res 2006; 15: 154-61.*
6. Owens JA. The electronic sandman: the impact of the media on adolescent sleep. *Sleep 2004; 27:15-6*
7. Shenghui Li,; Xinming Jin, ; Shenghu Wu; Fan Jiang; Chonghuai Yan; Xiaoming Shen. The Impact of Media Use on Sleep Patterns and Sleep Disorders among School-Aged Children in China. *SLEEP, Vol. 30, No. 3, 2007.*
8. Higuchi S, Motohashi Y, Liu Y, Maeda A. Effects of playing a computer game using a bright display on presleep physiological variables, sleep latency, slow wave sleep and REM sleep. *J Sleep Res 2005;14:267-73*
9. Chen X, Sekine M, Hamanishi S, et al Lifestyles and health-related quality of life in

Japanese school children: a cross-sectional study. *Prev Med 2005;40: 668-78.*

10. Kubota T, Uchiyama M, Suzuki H, et al. Effects of nocturnal bright light on saliva melatonin, core body temperature and sleep propensity rhythms in human subjects. *Neurosci Res. 2002 Feb; 42(2):115-22.*
11. Higuchi S, Motohashi Y, Liu Y, Ahara M, Kaneko Y. Effects of VDT tasks with a bright display at night on melatonin, core temperature, heart rate, and sleepiness. *J Appl Physiol 2003; 94:1773-6.*
12. Higuchi S, Motohashi Y, Maeda T, Ishibashi K. Relationship between individual difference in melatonin suppression by light and habitual bedtime. *J Physiol Anthropol Appl Human Sci 2005; 24:419-23,*
13. Cain N, Gradisar M. Electronic media use and sleep in school-aged children and adolescents: a review. *Sleep Med 2010; 11:735-742.*
14. Ruger M, Gordijn MC, Beersma DG, de Vries B, Daan S. Weak relationships between suppression of melatonin and suppression of sleepiness/fatigue in response to light exposure. *J Sleep Res 2005;14:221*
15. Statistics Sweden. (2011) Use of computers and the Internet by private persons in 2010 *[In Swedish and parts in English]*. 2011, www.scb.se.
16. Nordicom (2011). Internet barometer 2010 *[In Swedish]*. University of Gothenburg, Sweden. www.nordicom.gu.se.
17. Duggan, M., Ellison, N.B., Lampe, A., Lenhart, A., M., M., 2015. Social Media Update 2014. Pew Research Center (Ref Type: Report).
18. Zimmerman, F.J., 2008. Children's Media Use and Sleep Problems: Issues and Unanswered Questions. Kaiser Family Foundation (Ref Type: Report)
19. Curcio G, Ferrara M, Dennaro LD (2006). Sleep loss, learning capacity and academic performance. *Sleep Medicine, 10,* 323-337.
20. Gradisar, M., Wolfson, A.R., Harvey, A.G., Hale, L., Rosenberg, R. Czeisler, C.A., 2013. The sleep and technology use of Americans: Findings from the National Sleep Foundation's 2011 Sleep in America poll. *J. Clin. Sleep Med. 9, 1291–1299.*
21. Gradisar, M., Wolfson, A.R., Harvey, A.G., Hale, L., Rosenberg, R., Czeisler, C.A., 2013. The sleep and technology use of Americans: Findings from the National Sleep Foundation's 2011 Sleep in America poll. *J. Clin. Sleep Med. 9, 1291–1299.*
22. Jessica C. Levenson a, Ariel Shensa b,c, Jaime E. Sidani b,c, Jason B. Colditz b,c, Brian A. Primack b. The association between social media use and sleep disturbance among young adults. *Preventive Medicine 85 (2016) 36–41*
23. Tahiroglu AY, Celik GG, Uzel M, Ozcan N, Avci A. Internet use among Turkish adolescents. *Cyberpsychol Behav 2008; 11:537-543.*
24. Tahiroglu AY, Celik GG. Fettahoglu C, Yıldırım V, Toros F, Avcı A, Ozatalay E, Uzel M. Problematic internet use in the Psychiatric Sample Compared Community Sample. Archives *of Neuropsychiatry 2010; 47:241-246*.
25. Cain, N., Gradisar, M., 2010. Electronic media use and sleep in school-aged children and adolescents: A review. *Sleep Med. 11, 735–742*.
26. Chang, A.M., Aeschbach, D., Duffy, J.F., Czeisler, C.A., 2015. Evening use of light-emitting eReaders negatively affects sleep, circadian timing, and next-morning alertness. *Proc. Natl. Acad. Sci. U. S. A. 112, 1232–1237*
27. Tavernier, R., Willoughby, T., 2014. Sleep problems: Predictor or outcome of media use among emerging adults at university? *J. Sleep Res. 23, 389–396*.