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Smart phone overuse among teen ager patients with sleep difficulties

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***Abstract*---**Background: Smart phone use is an emerging worldwide phenomena as a new electronic technology used in different issues as education and public communication especially in the country tendency to electronic numerical transformation. Many studies reported that smart phone overuse is a risk factor that interferes with the sleep quality causing sleep difficulties. Aim: This study aimed to determine smart phone overuse among teen ager patients with sleep difficulties. Design: exploratory research design used in the current study. Sample: purposeful sample of 485 participants recruited in this study divided into two groups; 285 patients in study group suffering sleeping difficulties and 200 patient in the control group treated from sleep difficulties and visit the sleeping clinic for follow up. Setting: the study conducted in the Psychiatry and Addiction Prevention Hospital - Cairo University Hospitals (in Sleep Clinic). Tools: Two tools were used for data collection; Socio-Demographic Data Sheet and Jenkins Sleep Scale (JSS). Results: (64.6%) of patients with sleep difficulties used smart phone more than 5hr. /day. (31.5%) of the study group use smart phone for 11-15 times / day, there was a statistically significant positive correlation between sleep difficulties and hours of smart phone use in; 3 > 5 hr. and ≥ 5hr. per day (p = 0.001& 0.001) respectively, there was a statistically significant difference between the two groups regarding the frequencies of smart phone use and bed time use (p = 0.02 and 0.0001) respectively. Conclusions: the study concluded that the smart phone overuse were estimated to be associated with sleeping difficulties.

***Keywords*---**smart phone overuse, teen agers, sleep difficulties.

Introduction

According to the United Nations and Central Agency for Public Mobilization and Statistics CAPMAS (2015) definitions of different age groups; teen ager people,

'adolescents' are those between 10 and 20 old and 'youth' includes everybody between 15 and 24 years old. Today's youth in Egypt constitute about 60% of the population. adolescents lifestyles encompassing daily routine school or college obligations and spare time activities, homework, and evening outings or priorities (e.g. watching TV, video gaming, and surfing the internet) (Magda, et al., 2018), in addition weekend social duties and, perhaps, a job, as well excess internet and social media usage and elongated time spent on smart devices like mobile phones and iPads, all of which are known and lead to sleep deprivation and sleep disorders (which constitute an abnormal quantity or quality of sleep) (Bentley et al 2015).

Sleep difficulties among youngers appear to have many of negative impacts on mental and physical functioning in a variety of dimensions, including school performance, emotional control, cognitive process and overall health and wellbeing. Short sleep onset latency “sleeping fewer than 6 hours per day” and an unwillingness to sleep were revealed to be significant independent predictors of severe depressive disorder or anxiety disorders which could be a major cause for inattention or even suicide (Busch P. and McCarthy S., 2020). The USA National Sleep Foundation (NSF, 2017) recommends that adolescents should sleep for no less than 9 hours a day. In the USA, 75% of those 15 to 20 years old report insufficient sleep, and young people in other developed countries have the same phenomenon especially in Egypt (Hanan et al., 2014).

Smart phone use is an emerging worldwide phenomena as a new electronic technology used in different issues as education and public communication especially in the country’ tendency to electronic numerical transformation. Previous study have found that sleep reduction appears to be aggravated by excessive use of technology devices such as TV viewing, internet use, video gaming (Weaver et al., 2010; Rehbein et al., 2010) and smart phone use (Munezawa et al., 2011). Smart phone overuse in teenagers has been a hot spot of research for decades. Moreover, the usage of smart phones in persons’ everyday lives have increased the concerns about the potential negative health effects of radiofrequency electromagnetic field (RF-EMF) exposure and the bright light from electronic gadgets disrupting human circadian cycles responsible for sleeping process resulting in physical and psychological health problems especially when used in bed at night causing poor sleep quality and sleep difficulties (Meo, S., et al., 2019; Pai R., and Alathur, S., 2019; Elhai, J., et al., 2017). Solidifying a link between technology use and poor sleep quality can serve as a point of intervention to correct sleep patterns and encourage effective development (Mei et al., 2018).

Smart phone overuse is a dependence syndrome seen among certain smart phone users who exhibit problematic behaviors after daily use which did not applied on use for purpose of work or study characterized by preoccupation with mobile communication, excessive money or time spent on smart phone, and use it in socially or physically inappropriate situations such as driving an automobile. Furthermore, increased use can also lead to increased time on smart phone communication and anxiety if separate from it or insufficient signal (Sarkar T., et al., 2019) and (Ding D. and Jiang L., 2017). Over the last 4 years, smart phone broadband has increased 45% annually in Egypt and it has been predicted that this percent will increase further in the coming few years (Islam M., 2020). As

such, people who have psychological and emotional disorders including sleeping disorders and distraction easily get addicted to any type of technology such as smart phone and the place where internet accesses. In addition to, other important factors helping in overuse among Youngers as the degree of time use, peer relationships and parenting types (AlBarashdi HS, 2016).

Significance of the study

Smart phone overuse is global issue and in turn, it became prevalent and significant in our society. The Ministry of Egyptian Communications and Information Technology (2020) revealed the increase in the percentage of Egyptian families that have smart phone to about (98.8%) and the percentage of Egyptian family members that use the Internet to send information and messages is about (93.9%). The evolution of technology in the world have encouraged continuous dependence on smart phone among new generation (Dikeç & Kebapçı, 2018).

A multidisciplinary approach is crucial in the prevention and management of smart phone overuse, and nurses play a decisive part and awareness role in this approach. Thus, psychiatric nurses should be aware of all aspects related to the physical and mental consequences of overuse and the basic principles for treatment (Dikeç & Kebapçı, 2018). Psychiatric nurses should apply the protective measures for the prevention and assess the effects of smart phone overuse not only in the clinic but also in schools, universities and facilities wherever they can access them, taking into account the evidence from future studies concerning psychiatric nurses, health team members, and help to raise awareness concerning the behavioral consequences (Kim, 2013).

In the past few years, there has been a growing attention to smart phone addictions and its link to a range of mental health concerns as sleeping disorders (Sam, 2020).The association between smart phone overuse and poor sleep outcomes among teen ager patients with sleep difficulties has been represent a gap in recent studies. This necessitates the importance of the role of the psychiatric nurse in the intervention of smart phone overuse on the three level of prevention to limits its effect on mental health of Egyptian teen agers.

Aim of the study

The current study aimed to determine smart phone overuse among teen ager patients with sleep difficulties.

Research Questions

1. Is there smart phone overuse among teen ager patients with sleep difficulties?
2. Is there correlation between sleep difficulties and smart phones overuse among teen agers?

Materials and Methods

Study Design

Exploratory research design was adopted in this study as an attempt to discover the smart phones overuse among teen ager patients with sleep difficulties.

Sample

Purposeful sample of 485 participants recruited in this study divided into two groups. 285 patients with sleeping difficulties in the study group and 200 patients treated from sleep difficulties and visit the sleeping clinic for follow up in the control group during 3 months from Sept. to Dec. 2020. The inclusion criteria: both genders, age group from 10 to 20 years, using smart phone and can read and write. The exclusion criteria: patients with psychiatric and medical disorders, mental retardation as mentioned in their hospital files and patients don't have smart phone.

Setting

The study was carried out in Psychiatry and Addiction Prevention Hospital- Cairo University Hospitals (sleeping clinic). It works for two days per week. The number of patients attends the clinic daily around 15 patients per day.

Measurements

The tools used in this study were including 1) Socio-demographic data tool, and 2) the Jenkins Sleep Scale (JSS).

Socio-demographic data

It included the gender, age, school year, total hours of smart phone use (hours/day), the answers were: < 1 hr., 1 > 3hr, 3 > 5 hr., and ≥ 5 hr., causes , frequency, and bedtime use.

The Jenkins Sleep Scale (JSS)

The JSS is a four-item questionnaire that evaluate sleep problems over the preceding four weeks. Each item is rated on a five-point Likert scale (not at all = 0, 1–3 days = 1, 4–7 days = 2, 8–14 days = 3, 15–21 days = 4. difficulty falling asleep, waking up at night, difficulty staying asleep, and non-restorative sleep (waking up exhausted and worn-out after the typical amount of sleep). the total score is a straight forward sum of the values for all four criteria, and it goes from 0 (no sleep difficulties) to 20 (sleep disorders) (most sleep problems). A score of 11 is a cut-off point; a score of 12 indicates a low frequency of sleep disturbance, while a score of >11 indicates a high frequency of sleep disturbances. Tool reliability: Spearman correlation coefficient was used, $P < 0.05$ was accepted as significant (Unal-Ulutatar and Ozsoy-Unubol, 2020).

Procedure

The purpose of the study was explained to the participants and an oral agreement was taken for participation in the study. Participants were informed to answer questionnaires on basis of sleep difficulties they experienced during the last four weeks and met inclusion criteria. After checked the patient's files. The researcher interview the participants to complete the sheets that lasted 15-25 minutes for each participant. The researchers collected data over a period of 3 months from Sept. to Dec. 2020. The semi structured interview of 485 participants in the two days of the clinic per week.

Ethical considerations

Written agreement for data collection from the patients in sleeping clinics was taken from the director of the hospital. The purpose of the study was explained to participants before interview. Participants were informed that participation in the study was voluntary, and the data will be used only for research purpose. The confidentiality would be protected through coding the sheets. Oral agreements were obtained from all participants (study and control group) prior to the interview, if the participant less than 18 years, agreements were taken from their parents. Anonymity were granted to the participants.

Statistical Analysis

All statistical analyses were performed using SPSS 20 for Windows. For the correlational analyses, continuous variables were represented by means ± SD, whereas categorical variables were represented by frequencies and percentages. Pearson's correlation analysis was conducted to determine the correlation between total number of hours of smart phone use per day, and sleeping difficulties among study and control group. Correlation between smart phone overuse and sleep difficulties were examined using multiple logistic regression analyses. An odds ratio (OR) was calculated from the logistic regression. P-values < 0.05 were considered statistically significant.

Results

Table (1) shows that the male were (53.3%) in the study group but (55.5%) in the control group, (53%) were age group from 16-20 in the study group but (52.5%) in the control group. (40%) were at college in the study group but (44%) in the control group.

Table 1: Frequency distribution of participants according to demographic characteristics of the study and control group (n= 285) (n=200)

	Study group		Control group	
Variables	No.	(%)	No.	(%)
Age10 >16 years	134	47	95	47.5
16-20 years	151	**53**	105	52.5
Gender Male	152	**53.3**	111	55.5
Female	133	46.6	89	44.5

School Year Preparatory	67	23.5	35	17.5
Secondary	104	36.5	77	38.5
College	114	40	88	44

Table (2) reveals that (75%) of the study group had trouble falling asleep respectively, (69.1%) of the study group had sleeping problem of waking up feeling tired respectively.

Table 2: Frequency distribution of participants according to the JSS Items (n= 285)

The Item	Study group	
	No.	(%)
Trouble falling asleep	214	75
Waking up but no trouble falling asleep again	158	55.4
Waking up and trouble falling asleep again	157	55
Waking up feeling tired	197	69.1

*Responses not mutually exclusive

Figure (1) reveals that (64.6 %) of the study group used smart phone ≥ 5 hr. but (11%) only in control group used ≥ 5., (1 %) of the study group used smart phone < 1 h but (39.50%) in control group.

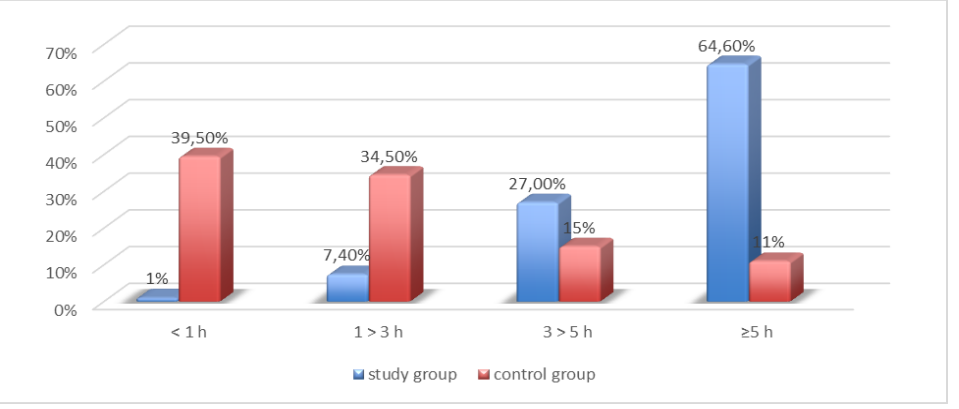

Figure 1: Frequency distribution according to the hours of smart phone use / day Study and Control group (n= 285) (n=200).

Figure (2) demonstrates that (81.7%) of the study group used smart phones for games and watching videos, tic-tucks and groups but (72.5%) in control group.

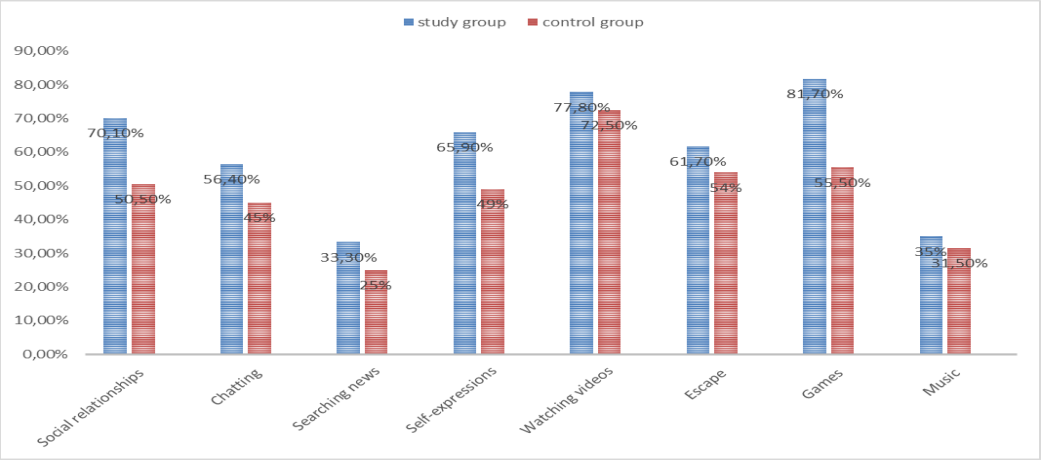

Figure 2: Frequency distribution of participants according to the causes of smart phone overuse for study and control group (n= 285) (n=200)

Figure (3) demonstrates that (31.5%) of the study group used smart phone (11-15 times per day) and (32%) from the same group used it for (16-20 times) but (7.5%) only in control group used smart phone (11-15 times per day), regarding to bed time use (74.7%) of the study group used smart phone at bed time but 30 % only in control group.

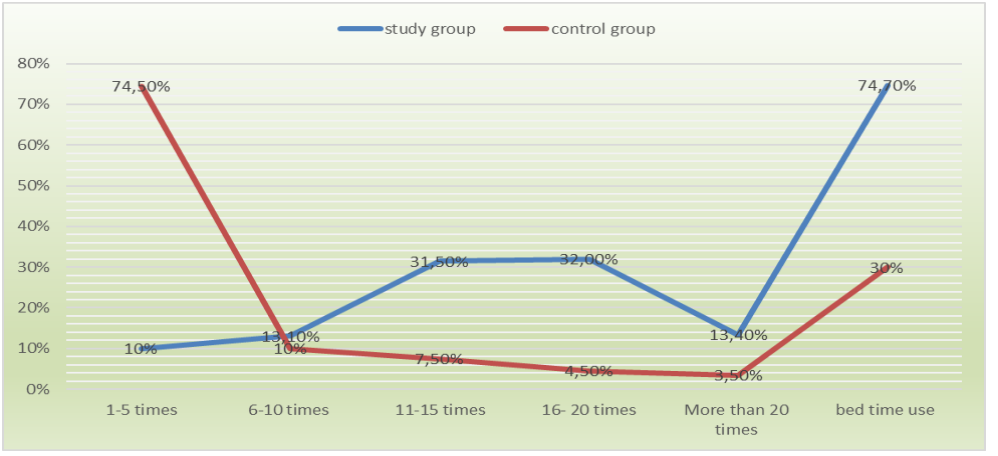

Figure 3: Frequency distribution according to the times of smart phone use per day in study and control group (n= 285) (n=200).

Table (3) demonstrates that there was a statistically significant positive correlation between sleep difficulties and hours of smartphone use; 3 > 5 hr. and ≥ 5hr. (r = 0.512 & 0.421 at p = 0.001& 0.001) respectively. There was a statistically significant positive correlation between gender and hours of smartphone use; >1hr. 1>3hr. 3 >5hr. and ≥ 5hr. (r = 0.363, 0.363, 0.461 & 0.431 at p = 0.001, 0.001, 0.002 & 0.001) respectively.

Table 3: Correlational matrix between study variables for study group (n=285)

Variables	JSS scale	Gender	Age	Phone use: <1 h	Phone use: 1 > 3h	Phone use: 3 > 5 h	Phone use: ≥ 5
JSS scale	1	0.067 (0.214)	0.087 (0.364)	0.047 (0.622)	0.075 (0.301)	0.512 (0.001)	0.421** (0.001)
Gender		1		0.363** (0.001)	0.363** (0.001)	0.461** (0.002)	0.431** (0.001)
Age			1	0.051 (0.203)	0.052 (0.132)	0.142 (0.232)	0.054 (0.114)
Phone use: <1 h				1	0.183 (0.161)	0.183 (0.161)	0.283 (0.204)
Phone use: 1 > 3h					1	0.174 (0.135)	0.341 (0.182)
Phone use: 3 > 5 h						1	0.197 (0.201)
Phone use: ≥ 5							1

*Significant level < 0.05
**highly significant level < 0.005

Table (4) demonstrates that there was a statistically significant difference between causes of smart phone overuse for study and control group. (p = 0.0001) respectively. There was a statistically significant difference between frequencies of smart phone overuse (16- 20 times) and bed time use for study and control group (p = 0.0001) respectively. There was also, a statistically significant difference between total hours of smart phone use (hours/day) for study and control group (p = 0.0001) respectively.

Table 4: The statistical difference between the study and control group (n= 285) (n= 200) regarding to causes, frequency of use and total hours of smart phone use/ day

Causes of smart phone use	Chi-square	p-value
Social relationships (Face book and Instegram)	32.56	0.0001*
Chatting	20.08	0.0001*
Searching news	13.97	0.0001*
Self-expressions	27.60	0.0001*
Watching videos, tic-tucks and groups	16.16	0.0001*
Escape from academic pressure and insomnia	16.28	0.001*

Games	43.27	0.0001*
Music	8.40	0.0001*
Frequency of use (times per day)		
1-5 times	41.09	0.0001*
6-10 times	6.38	0.01*
11-15 times	76.05	0.0001*
16- 20 times	50.45	0.0001*
More than 20 times	5.44	0.02*
Bed time use	12.25	0.0001*
Total hours of smart phone use/ day	Chi-square	p-value
< 1 h	11.64	0.0001*
1 > 3 h	77.76	0.0001*
3 > 5 h	20.64	0.0001*
≥5 h	127.40	0.0001*

*Significant level < 0.05
**highly significant level < 0.005

Discussion

The purpose of this study was to determine the smart phone overuse among teen ager patients with sleep difficulties. The findings of this study showed that around 65% of the patients with sleep difficulties spent more than 5 hours on their smart phone per day contrary to patients in control group (figure 1), there was a statistically significant positive correlation between sleep difficulties and hours of smartphone use; 3 > 5 hr. and ≥ 5hr. (r = 0.512 & 0.421 at p = 0.001& 0.001) respectively (table 3). These findings may be as a result to sleeping difficulties in the study group makes the patient need to get rid of their insomnia and boredom in bed by using the interesting technology that is constantly updated, especially that the age group predetermined in the study tends to be informed and eager. This findings were in agreement with; Winskel et al., (2019) who reported that the average smart phone use was about 6 hours among Australian students and study of Mari et al., (2015) who reported that the total daytime screen for electronic media use after school of more than 4 h was positively related to sleep deficit.

Moreover, Mohamed and Moustafa, (2020) mentioned that 74.7% of their participants of medical students at Suez Canal University were addicts to their smart phone and particular association between smartphone addiction and poor quality of sleep among the study participants. On the other hand, the current results were not in agreement with Islam et al. (2020), who reports that there was no correlation between sleeping disorders and hours of smartphone use. This could be attributed to the difference in the attitudes of students in South Korea such as the interest towards the academic career. Also, Chokshi et al. (2020) reported that there was no strong correlation between the excessive use of smart phone and sleep quality among college students of Seurat and India, which is inconsistent with the current study.
Regarding to the frequency of smart phone use and bed time use, the findings of the current study showed that about third of the study group used 11-15 times as compared with control group (7.5%) only (figure 3). This result agreed with the study of Olson et al., (2014) who explored whether nighttime cell phone use had

an impact on sleep quality of adolescents 12 to 20 years of age. Their study found that 62% of patients took their phones to bed with them, 37% texted after “lights out,” and 1 out of 12 adolescents were woken by a text in the middle of the night at least 2 or more times each week.

Regarding to the gender of the study participant, the results of the current study suggested that there was a statistically significant positive correlation between gender and hours of smartphone use; >1hr. 1>3hr. 3 >5hr. and ≥ 5hr. (r = 0.363, 0.363, 0.461 & 0.431 at p = 0.001, 0.001, 0.002 & 0.001) respectively (table 3). This result is agreed with the study of Andone et al., (2017) who reported that females use smartphones for longer periods than males, with a daily mean of 166.78 minutes vs. 154.26 minutes and younger participants use their phones longer and usage is directed towards entertainment and social interactions through specialized apps. Older participants use it less and mainly forgetting information or using it as a classic phone, which also consistent with the age group selected for the current study.

Conclusions

The results of the current study provide evidence that the overuse of smart phone is linked with sleep difficulties and there was a statistically significant positive correlation between sleep difficulties and hours of smartphone use, there was a statistically significant difference between frequencies of smartphone use, causes of use, bed time use and hours of use among teen ager patients with sleeping difficulties (study group) and other did not suffering sleeping difficulties (control group).

Recommendations and Limitation

Teen agers should be educated for how to limit smart phone use and protect themselves from smart phone addiction and its consequences. Public health Professionals especially psychiatric nurses should educate population about the negative consequences of excessive online communication, thereby, preventing the mental hazards to social media overuse. The study recommended many studies on causes of sleep difficulties among users of smart phone as perceived by patients and possible causes from medical prospective. Follow-up studies after implementing good sleep hygiene are required to detect any variation in youth behavior and study the effect of these changes on their health and performance. Further research is required to clarify the effects of gender on sleep related difficulties. In particular, differences between childhood and adolescence should be investigated in more detail. The study limited to patients with sleeping difficulties who might be correlated with other causative and risk factors rather that smart phone overuse.

References

1. AlBarashdi HS, Bouazza A, Jabur NH, Al-Zubaidi AS (2016). Smartphone Addiction Reasons and Solutions from the Perspective of Sultan Qaboos University Undergraduates: A Qualitative Study. Int J Psychol Behav Anal 2: 113. Doi http://dx.doi.org/10.15344/2455-3867/2016/113.

2. Andone Ionut, Konrad Błaszkiewicz, Mark Eibes, Boris Trendafilov, Christian Montag and Alexander Markowetz (2017). How Age and Gender Affect Smartphone Usage, 12-16, 2016, Heidelberg, Germany ACM 978-1-4503-4462-3/16/09. http://dx.doi.org/10.1145/2968219.2971451.
3. Bentley F, Church K, Harrison B, Lyons K, Rafalow M. Three hours a day: understanding current teen practices of smartphone application use. 18 Oct 2015.
4. Busch, P. A., & McCarthy, S. (2020). Antecedents and consequences of problematic smartphone use: A systematic literature review of an emerging research area. Computers in human behavior, 114, 106414.
5. Central Agency for Public Mobilization and Statistics CAPMAS (2015), https://www.unicef.org/egypt/adolescent-development.
6. Choksi, S. T., & Patel, N. (2020). A study to find out the correlation of mobile phone addiction with anxiety, depression, stress and sleep quality in the college students of Surat city. *Int. J. Curr. Res. Rev*, *13*, 137-142.
7. Dikeç, G., & Kebapçı, A. (2018). Smartphone Addiction Level among a Group of University Students. Journal of Dependence, 19(1), 1–9.
8. Ding D, Li J (2017) Smartphone Overuse – A Growing Public Health Issue. Journal of Psychology and Psychotherapy 7: 289. doi:10.4172/2161-0487.1000289
9. Elhai, J. D., Dvorak, R. D., Levine, J. C., & Hall, B. J. (2017). Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. Journal of affective disorders, 207, 251-259.
10. Hanan Ez ElArab, Menan A.M. Rabie and Dalia H. Ali (2014). Sleep behavior and sleep problems among a medical student sample in relation to academic performance: a cross-sectional questionnaire-based study. Middle East Cur Psychiatry 21:72–80 & 2014 Institute of Psychiatry, Ain Shams University, 2090-5408, DOI: 10.1097/01.XME.0000444452.76469.05.
11. Islam, M. (2020, September). Link between Excessive Smartphone Use and Sleeping Disorders and Depression among South Korean University Students. In Healthcare (Vol. 9, No. 9, p. 1213). Multidisciplinary Digital Publishing Institute.
12. Kim, H. (2013). Exercise rehabilitation for smartphone addiction. Journal of Exercise Rehabilitation, 9, 500–505.
13. Magda A. Ahmed , Nevin F.W. Zaki , Nesreen E. Morsy , Nabil J. Awadallad , Muhammed A. Hammad , Nihal M. Saleh, Sarah A.E. Elhefnawi (2018). Survey of sleep practice and sleep-related problems among a sample of Egyptian youths, The Egyptian Journal of Chest Diseases and Tuberculosis 2018, 67:169–174, http://www.ejcdt.eg.net. On Thursday, October 20, 2022, IP: 102.184.131.217].
14. Mari Hysing, Ståle Pallesen, Kjell Morten Stormark, Reidar Jakobsen, Astri J Lundervold and Børge Sivertsen, (2015). Sleep and use of electronic devices in adolescence: results from a large population-based study: Correspondence to Dr Mari Hysing; mari.hysing@uni.no. http://dx.doi.org/10.1136/bmjopen-2014-006748
15. Mei et al., (2018). Sleep problems in excessive technology use among adolescent: a systemic review and meta-analysis, Sleep Science and Practice (2018) 2:9, https://doi.org/10.1186/s41606-018-0028-9.

16. Meo, S. A., Almahmoud, M., Alsultan, Q., Alotaibi, N., Alnajashi, I., & Hajjar, W. M. (2019). Mobile phone base station tower settings adjacent to school buildings: impact on students' cognitive health. American journal of men's health, 13(1), 1557988318816914.
17. Mohamed R. and Moustafa H., (2020). Relationship between smartphone addiction and sleep quality among faculty of medicine students Suez Canal University, Egypt: Vol. 5(1), May 2021 http://efmj.journals.ekb.eg/. Publication at: https://www.researchgate.net/publication/352396042
18. Munezawa T, Kaneita Y, Osaki Y, Kanda H, Minowa M, Suzuki K, 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. 2011; 34:1013–20.
19. National Sleep Foundation. Sleep in America Poll (2017). Summary of findings. https://sleepfoundation.org/sites/default/files/2014-NSF-Sleep-in-Americapoll-summary-of-findings—FINAL-Updated-3-26-14-.pdf. Accessed 28 Sept 2016.
20. Olson AL, Adachi-Mejia AM, Edwards PM, Gilbert-Diamond D, Greenough GP, TXT me I'm only sleeping: adolescents with mobile phones in their bedroom. Fam Community Health. 2014; 37:252-257. [PubMed] [Google Scholar]
21. Pai, R. R., & Alathur, S. (2019). Assessing awareness and use of mobile phone technology for health and wellness: Insights from India. Health Policy and Technology, 8(3), 221-227.
22. Rehbein F, Kleimann M, Mossle T. Prevalence and risk factors of video game dependency in adolescence: results of a German nationwide survey. Cyberpsychol Behav Soc Netw. 2010; 13:269–77.
23. Sam Steers, (2020). How mobile phone usage can impact mental health: article at https://mobile-magazine.com/media-and-entertainment/how-mobile-phone-usage-can-impact-mental-health
24. Sarkar TK, Taneja N, Jana PK, Gupta S, Dalal R, Dasgupta R, et al. (2019). Effect of mobile phone overuse on health of medical students. Int J Med Sci Public Health 2019; 8(1):91-94. Article in International Journal of Medical Science and Public Health · January 2018: DOI: 10.5455/ijmsph.2019.0516506122018
25. Telecommunications Internet Union. (2020). the world in 2011: ICT facts and figures. Retrieved from http://www.itu.int/ITU-D/ict/facts/2011/material/ICTFactsFigures2011.pdf
26. Unal-Ulutatar and Ozsoy-Unubol Advances in Rheumatology (2020) 60:22 https://doi.org/10.1186/s42358-020-0123-3.
27. Weaver E, Gradisar M, Dohnt H, Lovato N, Douglas P. (2010). The effect of pre sleep videogame playing on adolescent sleep. J Clin Sleep Med.; 6:184–9.
28. Winskel, H., Kim, T. H., Kardash, L., & Belic, I. (2019). Smartphone use and study behavior: A Korean and Australian comparison. *Heliyon*, *5*(7), e02158.