Smartphone addiction among medical students in mansoura university

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Background
In the past few years, there has been a growing attention to smartphone addictions. Various studies conducted within the past decade have analyzed the harmful effects of smartphone overuse on university students including medical students.
Objective
This cross-sectional study on 780 students estimated the prevalence of smartphone addiction and its associated factors in medical students of Mansoura University, Egypt.
Patients and methods
A self-administered questionnaire was completed to gather data about Problematic Use of Mobile Phones scale, sociodemographic characteristics, Depression Anxiety Stress Scale 21, Insomnia Severity Index, and feeling of loneliness (UCLA) questionnaire.
Results
The overall prevalence of smartphone addiction was 53.6%. The significant independent predictors of smartphone addiction are studying less than or equal to 4 h [adjusted odds ratio (AOR)=1.6], mild/moderate and severe/extreme severe depression (AOR=2.5 and 3.4, respectively), and severe/extreme severe stress (AOR=2.1).
Conclusion
Smartphone addiction is common among medical students and closely related to psychological problems.

Keywords:
addiction, anxiety, depression, Egypt, insomnia, loneliness, Mansoura, medical students, smartphone, stress

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Background

According to Oxford Dictionaries (2016), smartphone is defined as a mobile phone that performs many of a computer's tasks. It usually has a touchscreen interface, internet access, and an operating system that can run downloaded applications.

They have become an increasingly important component of the daily life because of their many advantages (Alosaimi *et al.*, 2016). Smartphone is helpful for medical students to search for data about a specific disease or drug from the bedside of the patient, communicate to organize a learning session, view images, listen to podcasts, and download textbooks. Most of them used applications related to medicine that assisted them in clinical environment (Robinson *et al.*, 2013).

The idea of smartphones addiction is not proposed in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders as nonsubstance-related disorder. Smartphone addiction involves four main criterions: incontrollable mobile use; behaviors like frequent checking for various applications; tolerance; and withdrawal and impairment either academic or functional or social (Lin *et al.*, 2016).

There were some suggestions that smartphone misuse is linked to several psychological and behavioral problems such as depression, anxiety, sleep disturbance, headaches, decreased concentration, memory loss, hearing loss, and fatigue (Khan, 2008; Thomee *et al.*, 2011; Machell *et al.*, 2015).

Smartphones are becoming increasingly indispensable in everyday life for most undergraduates with increasing the problem of addiction during adolescence and early adulthood. Despite this, there

is a dearth of knowledge about smartphone addiction among medical students in Egypt.

Aim

The current study aims to estimate the prevalence of smartphone addiction and its associated factors among the undergraduate medical students in Faculty of Medicine, Mansoura University, Egypt.

Patients and methods

Study design and setting

This is a cross-sectional observational study directed during year 2018 in Faculty of Medicine of Mansoura University, Egypt. The medical schools in Egypt offer a 6-year-long degree program divided into three academic years followed by three clinical years.

This study was approved by the IRB of Faculty of Medicine, Mansoura University (Code Number: 17.12.68). A written informed consent was obtained from participants prior to the admission after explaining the purpose of the study.

Target population is Egyptian medical students in all educational years with no history of psychiatric diseases. Sample size was calculated using the following formula: $n=Z_{1-\alpha}{}^2 p\,(1-p)/d^2$, where p is the expected prevalence of smartphone addiction, which among Lebanese students was 44.6%, $Z_{1-\alpha/2}=1.96$, and d=precision (margin of error)=0.05 (Lwanga and Lemeshow, 1991; Hawi and Samaha, 2016). The sample size of 380 was multiplied by 2 to compensate for the design defect for cluster sampling method, and the total sample size is 760. The questionnaire was distributed to 842 students, and 780 (92.6% response rate) returned completed forms. Those who did not complete the questionnaires refused to participate in the study. Three clusters were selected from each educational year by systematic random samples from the list of sections or rounds. The questionnaire was distributed and collected during the class times.

Tools

An Arabic self-administered questionnaire was used to collect the sociodemographic data, for example, age, sex, residence during the academic year, special habits (excess caffeine drinks and cigarette smoking), substance use, physical exercise, marital status, working while studying, number of studying hours/day, the year of study, and the academic achievement.

Smartphone addiction was assessed by Problematic Use of Mobile Phones (PUMP) scale (Merlo *et al.*, 2013). It includes 20 items that evaluate mobile phone use built on the Diagnostic and Statistical Manual of Mental Disorders-criteria for substance use disorder such as tolerance, withdrawal, craving, social problems, facts about physical risk due to the usage of mobile phones, physical and psychological problems, using for longer time than planned, great deal of time spent, activities given up or reduced, and failure of fulfilling role duties. The respondents responded each PUMP scale question on a Likert-type scale, where strongly disagree corresponds to one and strongly agree corresponds to 5. The total score ranges from 20 (lowest score) to 100 (highest score). The Arabic version used in this research was translated by Alosaimi *et al.* (2016). There is no operational characteristic to identify the cutoff point of the PUMP scale. In our study, smartphone addiction is defined by having PUMP score more than or equal to mean PUMP score of studied students (67.9).

Depression Anxiety Stress Scale 21 (Lovibond and Lovibond, 1995) was used to evaluate symptoms of anxiety, stress and depression, which is a summarized 21-item version of the full Depression Anxiety Stress Scale, which primarily consisted of 42 items. The three scales contain seven items that assess the dimensions of depression, anxiety, and stress. The severity ratings are grounded on percentile scores, with 0–78 classified as normal, 78–87 as mild, 87–95 as moderate, 95–98 as severe, and 98–100 as extremely severe. The Arabic version of the scale was used in the current study (Moussa *et al.*, 2001).

Insomnia was assessed by Insomnia Severity Index (Morin *et al.*, 2011). It is a seven-item self-reported questionnaire determining the nature, severity, and effect of insomnia over one month. The dimensions estimated include sleep onset, sleep maintenance, early morning awakening problems, sleep dissatisfaction, interference of sleep difficulties with daytime functioning, noticeability of sleep problems by others, and distress caused by the sleep difficulties. A five-point Likert scale is used to rate each item, yielding a total score ranging from 0 to 28. The total score is interpreted as follows: absence of insomnia (0–7); subthreshold insomnia (8–14); moderate insomnia (15–21); and severe insomnia (22–28). The Arabic Version of the scale was used in the present study (Suleiman and Yates, 2011).

Feeling of loneliness was assessed by UCLA Loneliness Scale (Rusell, 1996). It is a 20-item Likert-type scale in which responses ranged from 1 (never) to 4 (always).

The scale includes nine positively worded items (1, 5, 6, 9, 10, 15, 16, 19, and 20) and 11 negatively worded items (2, 3, 4, 7, 8, 11, 12, 13, 14, 17, and 18) randomly disturbed throughout the scale. The degree of loneliness was categorized as mild (20–39), moderate (40–59), and severe (60–80). The Arabic version used for this study was translated by Daswqee (1998).

Statistical analysis

Data are coded, processed, and analyzed using SPSS software package, version 16 (SPSS Inc., Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.). Categorical data were presented as number and percentage. Non-normally distributed continuous data were described as median and minimum and maximum. χ^2 Fisher's exact test was used to test significance of categorical data as appropriate. Crude odds ratios (COR) with their 95% confidence intervals were calculated. Variables significantly associated with smartphone addiction in bivariate analysis were entered in stepwise logistic regression analysis using Forward Wald method. Adjusted odds ratios (AOR) with 95% confidence interval were calculated. Statistical significance was defined as *P* value less than or equal to 0.05.

Results

Table 1 shows that the overall prevalence of smartphone addiction is 53.6%. The factors associated with mobile phone addiction are physical exercise (COR=1.8), studying for 4 h or less (COR=1.8), mild/moderate and severe/extreme severe depression (COR=3.0 and 6.1, respectively), mild/moderate and severe/extreme severe anxiety (COR=2.0 and 5.2, respectively), mild/moderate and severe/extreme severe stress (COR=2.4 and 4.6, respectively), mild/moderate and severe/extreme severe insomnia (COR=2.6 and 4.8, respectively), and severe/extreme severe loneliness (COR=1.6).

The significant independent predictors of smartphone addiction are studying less than or equal to 4 h (AOR=1.6), mild/moderate and severe/extreme severe depression (AOR=2.5 and 3.4, respectively), and severe/extreme severe stress (AOR=2.1) (Table 2).

Table 3 shows that 81.8% of students used smartphone for more than 3 years, 6.8% spent less than 8 h using smartphone, and 57.8% uses less than four applications. Smartphone was mainly used for social interacting purposes (66.8%), watching news (43.7%), academic tasks (39.2%), games (28.5%), education (22.4%), and scientific purposes (21).

Discussion

Smartphone use is nearly universal among college students, especially medical ones. Extreme use of smartphones has departed up to a degree, classified as addictive behaviors. The topic has shown the consideration of many researchers.In this study, the prevalence of smartphone addiction was 53.6%, which is higher than rates reported in previous studies: 36.5 and 27.2% in Saudi Arabia (Alhazmi, 2018; Albursan *et al.*, 2019), 44.6% in Lebanon (Hawi and Samaha, 2016), 31.7% in Tunis (Khan, 2008), 9.3% in Iran (Yahyazadeh *et al.*, 2017), 10% in Belarus (Szpakow *et al.*, 2011), 24.8% in South Korea (Kwon *et al.*, 2013), 12.8% (Spain), 21.5% Belgium (Lopez-Fernandez *et al.*, 2017), 16.9% in Switzerland (Haug *et al.*, 2015), 29.8% in China (Chen *et al.*, 2017), 31.3% in India (Nikhita *et al.*, 2015), 17.3% in Sudan, and 8.6% in Yemen (Albursan *et al.*, 2019). However, much higher rates were reported in India (85.40%) (Sethuraman *et al.*, 2018) and Jordan (59.8%) (Albursan *et al.*, 2019).

The reason for high smartphone usage in the present study could be owing to the lack of other sources of outdoor entertainment among medical students owing to preoccupation with studying and academic activities and finding smartphones as their only spring of entertainment and a way to relieve stress and anxiety. Adding to that, there is a constant obsession among young population about taking selfie and posting them on social media, which is easily available on smartphone, besides various applications of chatting, gaming, and social interaction (Sethuraman *et al.*, 2018). The wide variation of smartphone addiction between different studies could be attributed to different sample sizes, different population characteristics (age, sex, level of education, and culture), the extent of 4 G Wi-Fi coverage, and use of different tools for assessing levels of smartphone addiction. Another outlook may be universal variation in addiction liability, something which can be related to universal differences in average personality shape (Meisenberg, 2015).

By logistic regression, studying for less than or equal to 4 h is an independent significant risk factor for smartphone addiction. Smartphone addiction and preoccupation with the smartphone result in the neglect of other assignments and tasks (Walsh *et al.*, 2007). Many studies correlated smartphone usage with the decrease in academic achievement (Kubey *et al.*, 2001). Some studies emphasized the positive role of smartphones in proceeding students' learning (Markett *et al.*, 2006; Cheon *et al.*, 2012).

Table 1 Smartphone addiction and its associated factors

	Total	Smartphone addict [*n* (%)]	*P*	COR (95% CI)
Overall	780	418 (53.6)	–	
Age				
<20	245	136 (55.5)		1 (r)
20 and more	535	282 (52.7)	0.5	0.9 (0.7–1.2)
Sex				
Male	379	208 (54.9)		1 (r)
Female	401	210 (52.4)	0.5	0.9 (0.7–1.2)
Marital status				
Single	760	408 (53.7)		1 (r)
Married	20	10 (50)	0.7	0.8 (0.4–2.1)
Smoking				
Yes	31	15 (48.4)		1 (r)
No	749	403 (53.8)	0.6	1.2 (0.6–2.5)
Substance abuse				
Yes	4	4 (100)		
No	776	414 (53.4)	0.1	Undefined
Caffeine intake				
≤6	637	335 (52.6)		1 (r)
>6	143	83 (58)	0.2	1.2 (0.9–1.8)
Physical exercise				
Yes	146	61 (41.8)		1 (r)
No	634	357 (56.3)	0.002	1.8 (1.2–2.6)
Work during studying				
No	643	347 (54.0)		1 (r)
Yes	137	83 (60.6)	0.2	1.3 (0.9–1.9)
Educational stage				
Preclinical	390	204 (52.3)		1 (r)
Clinical	390	214 (54.9)	0.96	0.99 (0.7–1.3)
Studying hours				
≤4	545	316 (58)	≤0.001	1.8 (1.3–2.5)
>4	235	102 (43.4)		1 (r)
Depression				
No	167	43 (25.7)		1 (r)
Mild/moderate	237	120 (50.6)	≤0.001	3.0 (1.9–4.5)
Severe/extreme severe	376	255 (67.8)	≤0.001	6.1 (4.0–9.1)
Anxiety				
No	191	63 (33.3)		1 (r)
Mild/moderate	204	102 (50.0)	≤0.001	2.0 (1.7–3.1)
Severe/extreme severe	385	253 (65.7)	≤0.001	5.2 (3.5–7.6)
Stress				
No	254	85 (33.5)		1 (r)
Mild/moderate	220	120 (54.5)	≤0.001	2.4 (1.6–3.5)
Severe/extreme severe	306	213 (69.6)	≤0.001	4.6 (3.2–6.5)
Insomnia				
No	92	29 (31.5)		1 (r)
Mild/moderate	601	329 (54.7)	≤0.001	2.6 (1.6–4.2)
Severe	87	60 (69.0)	≤0.001	4.8 (2.6–9.1)
Loneliness				
Moderate	624	319 (51.1)		1 (r)
Severe/extreme severe	156	99 (63.5)	0.006	1.6 (1.2–2.4)

CI, confidence interval; COR, crude odds ratio; r, reference category.

In the present study, mild/moderate and severe/extreme severe depression (AOR=2.5 and 3.4, respectively) and severe/extreme severe stress (AOR=2.1) are significant independent predictors of smartphone addiction. There was a strong positive relationship between smartphone addiction and depression (Yen *et al.*, 2009; Alhassan, 2015; Matar and Jaalouk, 2017). Previous studies reported that students who used their smartphones more frequently had higher depression and anxiety scores

Table 2 Logistic regression analysis of significant independent predictors of smartphone addiction

Parameters	*B*	*P* value	AOR (95% CI)
Studying hours			
≤4	–		1.6 (1.2–2.3)
>4	0.48	0.004	1 (r)
Depression			
No	–	≤0.001	1 (r)
Mild/moderate	0.9	≤0.001	2.5 (1.6–4.0)
Severe/extreme severe	1.2		3.4 (2.0–5.9)
Stress			
No	–	0.2	1 (r)
Mild/moderate	0.3	0.003	1.4 (0.9–2.1)
Severe/extreme severe	0.8		2.1 (1.3–3.5)
Constant	–1.4		
% correctly predicted	85.9		

AOR, adjusted odds ratio; CI, confidence interval; r, reference category; *B*, regression coefficient.

Table 3 Distribution of variables related to smartphone use

Variables	*n* (%) (*N*=780)
Duration of smartphone use (years)	
<1	36 (4.6)
1–≤3	106 (13.6)
>3	638 (81.8)
Hours spent using smartphone	
<8	513 (65.8)
≥8	267 (34.2)
Number of used applications	
<4	451 (57.8)
≥4	329 (42.2)
Purpose of using the applications[a]	
Watching news	341 (43.7)
Social interacting	521 (66.8)
Academic tasks	306 (39.2)
Games	223 (28.5)
Athletic	120 (15.3)
Educational	175 (22.4)
Religious	147 (18.8)
Scientific	169 (21.6)
Others (e.g. calling, calculation)	159 (20.4)

[a]Multiple responses.

(Hwang *et al.*, 2012; Demirci *et al.*, 2015; Tamura *et al.*, 2017).

One of the influencing reasons of smartphone addiction is increased stress levels trailed by a decrease in restraint, which eventually leads to the over-practice of smartphones (Chen *et al.*, 2017). Two previous studies reported no association between having smartphone and symptoms of depression and concluded that addiction is linked to self-control rather than the possession of the phone itself (Lemola *et al.*, 2015; Choi *et al.*, 2015).

Smartphones may source anxiety and depression, and extreme use of them may alter the biological clock, root sleep disorders, and cognitive, emotional, and mental symptoms. Furthermore, adolescents often wake up owing to the announcements they accept, and failure to sleep at night reduces the synthesis of melatonin (Cain and Gradisar, 2010).

In the current study, 65.8% of participants spent less than 8 h/day using smartphone, and 66.8% of participants used smartphone for social interacting. These findings are in a close agreement with the pattern of smartphone use in other countries. In Saudi Arabia, 34.2% of participants spent more than 8 h daily (Alosaimi *et al.*, 2016) and 55.8% of students used smartphone more than 5 h daily (Alhazmi, 2018). In Malaysia, 65.9% of students use more than 3 h/day (Nikmat, 2018) and 30% used smartphones more than 3 h in India (Kurugodiyavar, 2018).

Javid *et al.* (2011) examined the consequences of mobile phone on the academic achievement of university students. Utmost of the students answered that they used mobile devices to chat with their instructors and colleagues to discuss materials related to their study. They also used the mobile devices to segment valuable information with their classmates and to check a dictionary for educational aims. Nevertheless, they settled that the mobile phone wastes their time and money.

More research should be done among all sectors of the society besides teaching programs, which may help the students understand the risk of smartphone addiction and how to manage their stress related to the burden of the study.

Strengths and limitations of the study

To the best of our knowledge, this is one of the few studies done that have evaluated the prevalence of smartphone addiction among medical students, and it detects various associated factors in the form of depression, anxiety, stress, loneliness, insomnia, and other sociodemographic factors in Egypt. This study has some limitations: (a) it was done in one medical college, so the results cannot be generalized to all medical students nationwide; (b) reporting and recall biases cannot be removed, as the students can manipulate the information; (c) there was no comparison group using the same forms or from nonmedical students; (d) the cross-sectional design did not determine whether depression–stress–anxiety–insomnia–feeling of loneliness were causes of smartphone addiction or whether smartphone dependence may be a coping strategy for students to get rid of these problems; and

(e) arbitrary cutoff point was taken to define smartphone addiction, as no validated cutoff point is available.

Conclusion

Smartphone addiction is prevalent among undergraduate medical students and closely related to psychological problems.

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Conflicts of interest

There are no conflicts of interest.

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