

## Relationship between Smartphone Addiction and Sleep Quality among Faculty of Medicine Students, Suez Canal University, Egypt

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### Abstract:

**Background:** Smartphone addiction is an increasing problem among university students worldwide. Excessive smartphone use can lead to unfavorable outcomes such as social isolation and poor academic achievement. Assessing the utilization of smartphones among students at the university level is extremely necessary. **Objectives:** The study aim was to investigate the prevalence of smartphone addiction among medical students and to assess its relationship with sleep quality. **Methods:** A cross-sectional study was conducted on 150 medical students, Suez Canal University. A self-administered questionnaire was distributed to the students to collect the required data. Smartphone addiction was assessed with the Smartphone Addiction Scale Short Version (SAS-SV) and the quality of sleep was assessed by the Pittsburgh Sleep Quality Index (PSQI). **Results:** The study shows that 74.7% were addicted to smartphone use and addiction was prevalent among male students. PSQI global score was statistically significantly higher among students with smartphone addiction ( $P = 0.010$ ). **Conclusion:** The present study showed high prevalence of smartphone addiction among medical students at Suez Canal University. The findings of this study indicate that screening and prevention of smartphone addiction should be considered.

**Keywords:** Addiction Scale, Medical Students, Prevalence, Quality of Sleep, Smartphone

### Introduction:

Smartphones give users with Network-based contact, business commercialism, education, entertainment media, and sometimes even medical applications with rich programs. Given their form of functions and simple use, the amount of estimated international users was one billion in early 2012, and it is increasing with nice speed.<sup>(1)</sup>


Excessive use of smartphone will interfere with faculty or work, decrease social interaction, decrease tutorial ability, cause relationship issues, and cause physical health-related issues together with blurred vision and pain within the wrists or the rear of the neck.<sup>(2, 3)</sup> Another scope of concern might be addiction to the smartphone. Intensive use is usually dependent on the smartphone, and problematic use has been of interest within the literature of

psychological aspects of smartphone use in adolescents. Like addiction to substances, behavioral addiction is recognized as a habitual drive or compulsion to repeat conduct despite its adverse effect on one's well-being.<sup>(4, 5)</sup>

With mobility of cell phones, teens trust heavily on their phones and are not forming applicable boundaries about usage. For example, the National Sleep Foundation Sleep in America 2011 Task Force found that fifty % of teenagers use their cell phones and the web one hour before sleep. Moreover, the excessive use of computers and mobile devices within the bedchamber delays bedtime and rise times.

Also Because of the short development and widespread use of mobile phones, and their great impact on communication and interactions in work and personal life, it is necessary to

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check likely potential health effects of the exposure.<sup>(6,7)</sup>

It is worth mentioning that Egypt is graded nineteenth globally in terms of possession of people with mobile phones. Consistent with the Ministry of Communications and Knowledge Technology (2012), the number of mobile subscriptions in Egypt reached 92.640.000 mobile users until July 2012. In another study conducted on smartphone users, it had been found that state anxiety, attribute anxiety, and depression was higher in the smartphone overuse group than in the normal use group.<sup>(8,9)</sup>

It is worth mentioning that Egypt is graded nineteenth globally in terms of possession of people with mobile phones. Consistent with the Ministry of Communications and Knowledge Technology (2012), the number of mobile subscriptions in Egypt reached 92.640.000 mobile users until July 2012. In another study conducted on smartphone users, it had been found that state anxiety, attribute anxiety, and depression was higher in the smartphone overuse group than in the normal use group.<sup>(10,11)</sup>

Poor sleep quality has emerged as a relevant public health issue in technologically advanced societies. Roberts, Yaya and Manolis discovered that learners spent almost 9 hours per day on their mobile phones. The scientists argue that, as cell phones use continues to grow, addiction to cell phones becomes an apparently inevitable piece of technology. As this is a

current and growing public health problem.<sup>(12,13)</sup>

The objectives of the current study was to investigate the prevalence of smartphone addiction among medical students and to assess its relationship with sleep quality

#### **Methods:**

**Setting:** The study was conducted in faculty of medicine of Suez Canal University in Ismailia city, Egypt. The college has been designated as a WHO Collaborating Center for health manpower development since 1978 and till now. It adopts a problem-based, community-oriented curriculum, emphasizing self-learning, continuing updating, mastering of skills, intersectorality and first and foremost moral integrity and sound ethical attitudes.

**Study design and sampling:** The current research was a cross-sectional study undertaken during the academic year 2018–2019 among medical university students, Suez Canal University. A self-administered questionnaire was distributed to the students.

The sample size was calculated assuming that smartphone addiction was 39.8%.<sup>(14)</sup> Sample size was calculated according to the following formula.

$$N = [Z \alpha/2 / E]^2 * P (1-P)$$

Where N = sample size,  $Z \alpha/2 = 1.96$  (The critical value that divides the central 95% of the Z distribution from the 5% in the tail)

P = the prevalence of the outcome variable (Prevalence of high smartphone users) = 39.

E = the margin of error (=width of confidence interval) = 10%

The sample size calculated was 92 students and to overcome the non-response the sample size was increased to 150 students. Medical college students' names were listed in a numerical order and was arranged alphabetically. Study population was selected randomly from the numerical list by simple random sampling technique using simple random table. Every student had an equal chance to be included in the study. Any student from first to sixth grade was included in the study and those who refuse to participate was excluded.

**Tool of the study:** The study used a self-administered anonymous questionnaire. The questionnaire composed of three components. First component is socio-economic demographic characteristics as name, age, sex, residence, and marital status.

Second component of the questionnaire was to assess smartphone use and addiction. Smartphone use was assessed through 4 questions about the following: duration of smartphone use on a typical day, frequency of smartphone use on a typical day, duration of time until first smartphone use in the morning upon waking and the smartphone use with the greatest personal relevance. Smartphone addiction assessed using the Smart phone Addiction Scale Short Version (SAS-SV). This self-reporting tool of 10 items has been created and validated. The internal

consistency and concurrent validity of SAS were verified with a Cronbach's alpha of 0.911. Sensitivity was 86.7%, and Specificity was 89.3%. Items from the initial Smartphone Addiction Scale (SAS) were chosen from the measure. The SAS-SV addresses the following 5 content regions: (1) 'daily life disturbance,' (2) 'withdrawal,' (3) 'cyberspace-oriented connection,' (4) 'overuse,' and (5) 'tolerance.' The options on this scale range from 1 (definitely not), to 6 (absolutely yes). Higher scores indicate a higher risk of smartphone addiction. The total score on the scale can vary between 33 and 198.<sup>(3)</sup>

Third component of the questionnaire was The Pittsburgh Sleep Quality Index (PSQI); it is an effective instrument used to measure the quality and patterns of sleep in adults with sensitivity of 89.6% and specificity of 86.5% . The Cronbach's alpha was found to be 0.736. It distinguishes "poor" from "good" sleep quality by evaluating seven areas (components): subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month. PSQI  $\geq 5$  indicate poor sleep quality.<sup>(15)</sup>

**Outcome variables:** Smart Phone use addiction and the effect of smartphone addiction on quality of sleep.

**Data mangement:** The results was evaluated using the Social Sciences Statistical Package (SPSS 21). Categorical data were presented in form of frequencies and percentages while mean

± standard deviation or median (25th–75th percentile) to express numerical data. After testing data normality, non-parametric tests were performed, Mann Whitney was used for not normally distributed data. Qualitative categorical variables was compared using Chi-square test. Whenever the expected values in one or more of the cells was less than 5, Fisher exact test was used instead. Level of  $p < 0.05$  was considered statistically significant.

#### **Ethics Approval and Participation Consent:**

The present study was approved by the Local Committee of Bioethics (LCBE) at Suez Canal University, Egypt, with reference number #3701. The privacy of the participants was protected, and all data was coded and processed anonymously. The participants in the study signed written consent after clarifying the aim of the study.

#### **Results:**

Table 1 demonstrates the respondents' socio-demographic features. The mean age of the students was  $21.26 \pm 1.548$ . About 71% were female and nearly 83% were from an urban areas. The sample was distributed among all grades from first to sixth grade with the third grade presenting about 38.3% of the study sample.

Figure 1 explains the prevalence of smartphone addiction among students. According to the smartphone addiction scale, 25.3% of the students scored normal for smartphone addiction and 74.7% of the students were addicted to smartphone use.

Table 2 showed a statistically significant relationship between smartphone addiction and gender as addiction was prevalent among male students ( $P = 0.010$ ). The prevalence of smartphone addiction was significantly higher among students in first grade ( $P = 0.034$ ). However, there were no significant differences between smartphone addiction and residence.

Table 3 shows the relationship between smartphone addiction and the smartphone usage patterns among students. There was a statistically significant association between smartphone addiction and smartphone use duration on a typical day as smartphone addiction was significantly higher among those with longer duration of use ( $P = 0.007$ ). Internet addiction among students with more frequency of smartphone use was also significantly greater, as the dominant frequency was 51-100 times/day and more than 100 ( $P = 0.033$ ) and also a statistically significant relationship with the Time until first smartphone use in the morning (within 5 minutes). Regarding the Most personally relevant smartphone function, Emailing followed by social network with a statistically significant difference.

Table 4 presents a significant relationship between quality of sleep (sleep latency and sleep efficiency) which are components of the PSQI and smartphone addiction; scores were higher among students with smartphone addiction ( $P = 0.010$ ,  $P = 0.016$ , respectively). The prevalence of poor sleep quality among students using the PSQI score was 58.7% and PSQI global score

was statistically significantly higher among students having smartphone addiction ( $P = 0.011$ ).

### Discussion:

Smartphones have become increasingly vital in our lives and offer much kind of applications for information, communication, education, and amusement functions. The popularity of mobile Internet technologies, which smartphones are categorized under, is noticeably increasing among university students.<sup>(16)</sup>

Given this ever-increasing range of operations that can be done via cell phone, we must know that such actions increase the likelihood of being linked to smartphone addiction.<sup>(17)</sup>

The present study showed that smartphone addiction is reported in 74.7% of medical students where the remaining 25.3% of the students considered not addicted. The higher level of smartphone addiction shown in this research was explained by a research done by Demirci et al, which revealed that 39.8% of their study sample was high smartphone users. Around 60 per cent of United Kingdom adolescents confess of being extremely addicted to their smartphones.<sup>(14, 18)</sup>

In Malaysia, a significantly higher percentage (70.8%) of Malaysian students reported the use of the internet having a smartphone as the most commonly used device.<sup>(19)</sup>

Abdelsalam et al, 2019 considered the observed variations in the incidence of Internet

addiction and, in fact, smartphone addiction in the aforementioned research to be ascribed to the implementation of multiple evaluation tools, and cultural and social context differences.<sup>(20)</sup>

This study indicates that smartphone addiction was higher in males than females while another study found that SAS scores were significantly is higher in females than males. And in a study by Thomee et al. 2011; he indicated that there is no difference between both males and females with high mobile using. This can be explained by the revolution in the applications of the smartphone in entertainment and education as well, smartphones have become an important part of everyone's life.<sup>(17, 21)</sup>

In discussing the association between addiction to smartphones and quality of sleep; this research evaluated smartphone use and smartphone addiction and showed that a longer duration of smartphone use, increased frequency of using and shorter period time until first smartphone use in the morning, were positively associated with smartphone addiction. In addition, this study indicates that Emailing followed by social networking was considered, as the smartphone feature that was most personally important and positively associated with smartphone addiction and these findings were consistent with the previous study in Switzerland.<sup>(22)</sup>

The internet has altered the way we communicate with each other and people might only need to make a minimal effort to

communicate with their friends. Now, social interactions tend to take place directly on the internet and the need to speak with friends in the real world could be minimized. Younger generations who have grown up with the internet could prefer communicating online with each other than engaging in real-world social communication.<sup>(23)</sup>

Prior studies on the relationship between the use of electronic media and sleep have concentrated mainly on teenagers. It has been noted that sleep problems, including subjective insomnia and bad sleep quality, are associated with harmful Internet use.<sup>(24)</sup>

Sleep latency, sleep efficiency as a component of PSQI and PSQI global scores were significantly higher in the smartphone-addicted students than in the non-addicted. The current study findings are compatible with Demirci et al research; which showed that daytime dysfunction, a component of sleep quality, was greater in the smartphone great usage group than in the smartphone low usage group.<sup>(14)</sup>

Canan et al. study discovered a link between addiction to the Internet and debilitated sleep. The scientists proposed that both Internet use and Internet use motive are associated with troubled length of sleep. And this also was consistent with Fossum et al study; they found that there is a positive relationship between the use of a mobile phone for playing, surfing, and texting in bed and the severity of insomnia.<sup>(25,26)</sup>

Adolescents are susceptible to addiction to smartphones, comparable to addiction to substances and other forms of behavioral addiction. Excessive use of smartphones was specifically connected with multiple mental health disorders and adolescent behavioral issues.<sup>(27,28)</sup>

**Limitations:** This study is cross sectional, where causal relationship cannot be established. Data collected was based on self-reported questionnaire that can be biased. The level of smartphone addiction and quality of sleep was calculated upon self-reported answers.

**Conclusion and Recommendations:** The present study showed high prevalence of smartphone addiction among medical students at Suez Canal University. The study verified a substantial and particular association between smartphone addiction and poor quality of sleep among the study participants. The findings of this research indicate that screening and prevention of smartphone addiction should be considered. It is suggested that further research identify the effect of smartphone use on students' distinct health dimensions.

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**Conflict of Interest:** There was no conflict of interest.

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**Table 1: Sociodemographic Features among Students at Faculty of Medicine, Suez Canal University, Egypt, 2019 (N=150)**

	Number	Percent
<b>Age</b>	(x ± SD) 21.26 ± 1.54	
<b>Gender</b>		
▪ Male	43	28.7%
▪ Female	107	71.3%
<b>Residence</b>		
▪ Urban	125	83.3%
▪ Rural	25	16.7%
<b>Grade</b>		
▪ First	8	5.3%
▪ Second	18	12%
▪ Third	58	38.7%
▪ Fourth	24	16%
▪ fifth	16	10.7%
▪ Sixth	26	17.3%

**Table 2: Relationship between Smartphone Addiction and Sociodemographic Features among Students at Faculty of Medicine, Suez Canal University, Egypt, 2019 (N=150)**

	Smartphone addiction according to the SAS-SV $\downarrow$		X <sup>2</sup>	P value
	Addicted (n=112)	Not addicted (n=38)		
<b>Age (x <math>\pm</math> SD)</b>	21.17 $\pm$ 1.47	21.52 $\pm$ 1.75		0.233
<b>Gender</b>				
▪ Male	38 (88.4%)	5 (11.6%)	5.986	0.014*
▪ Female	74 (69.2%)	33 (30.8%)		
<b>Residence</b>				
▪ Urban	93 (74.4%)	32 (25.6%)	0.028	0.867
▪ Rural	19 (76%)	6 (24%)		
<b>Grade</b>				
▪ First	7 (87.5%)	1 (12.5%)	15.993	0.032*
▪ Second	11 (61.1%)	7 (38.9%)		
▪ Third	51 (87.9%)	7 (12.1%)		
▪ Fourth	17 (70.8%)	7 (43.8%)		
▪ Fifth	9 (56.3%)	7 (43.8%)		
▪ Sixth	17 (65.4%)	9 (34.6%)		

P value was calculated using the Chi-square test; the fisher exact test was used when cell is less than 5.

\*Significant at  $p < 0.05$ .  $\downarrow$  Smart phone Addiction Scale Short Version.

**Table 3: Relationship between Smartphone Addiction and The Patterns of Smartphone Use among Students at Faculty of Medicine, Suez Canal University, Egypt, 2019 (N=150)**

The patterns of smartphone use	Smartphone addiction according to the SAS-SV $\downarrow$		X <sup>2</sup>	P value
	Addicted (n=112 )	Not addicted (n=38 )		
<b>Duration of smartphone use on a typical day</b>				
▪ Less than 10 minutes	2 (33.3%)	4 (66.7%)	15.421	0.006*
▪ 11–60 minutes	4 (66.7%)	2 (33.3%)		
▪ 1–2 hours	8 (50%)	8 (50%)		
▪ 3–4 hours	34(79.1%)	9 (20.9%)		
▪ 5-6 hours	21 (70%)	9 (30%)		
▪ More than 6 hours	43 (78.8%)	6 (12.2%)		
<b>Frequency of smartphone use on a typical day</b>				
▪ Less than 5 times/day	24 (60%)	16 (40%)	11.789	0.031*
▪ 6-10 times/day	28 (71.8%)	11 (28%)		
▪ 11-20 times/day	17 (70.8%)	7 (29.2%)		
▪ 21-50 times/day	16 (94.1%)	1 (5.9%)		
▪ 51-100 times/day	2 (100%)	0 (0%)		
▪ More than 100 times/day	25(89.3%)	3 (10.7%)		
<b>Time until first smartphone use in the morning</b>				
▪ Within 5 minutes	57 (81.4%)	13 (18.6%)	10.200	0.016*
▪ Within 6-30 minutes	40 (78.4%)	11 (21.6%)		
▪ Within 31-60 minutes	8 (50.0%)	8 (50.0%)		
▪ After more than 60 minutes	7 (53.8%)	6 (46.2%)		
<b>Most personally relevant smartphone function</b>				
▪ Social network	59 (83.1%)	12 (16.9%)	19.910	0.004*
▪ Phone calls	4 (33.3%)	8 (66.7%)		
▪ Gaming	1 (50.0%)	1 (50.0%)		
▪ Text messaging	17(70.8%)	7 (29.2%)		
▪ E mailing	6 (100%)	0 (0%)		
▪ Watching videos	22 (75.9%)	7 (24.1%)		
▪ Listening to music	3 (60.0%)	2 (40.0%)		
▪ Reading news	0 (0%)	1 (100%)		

P value was calculated using Chi-square test and Fisher exact test when needed.

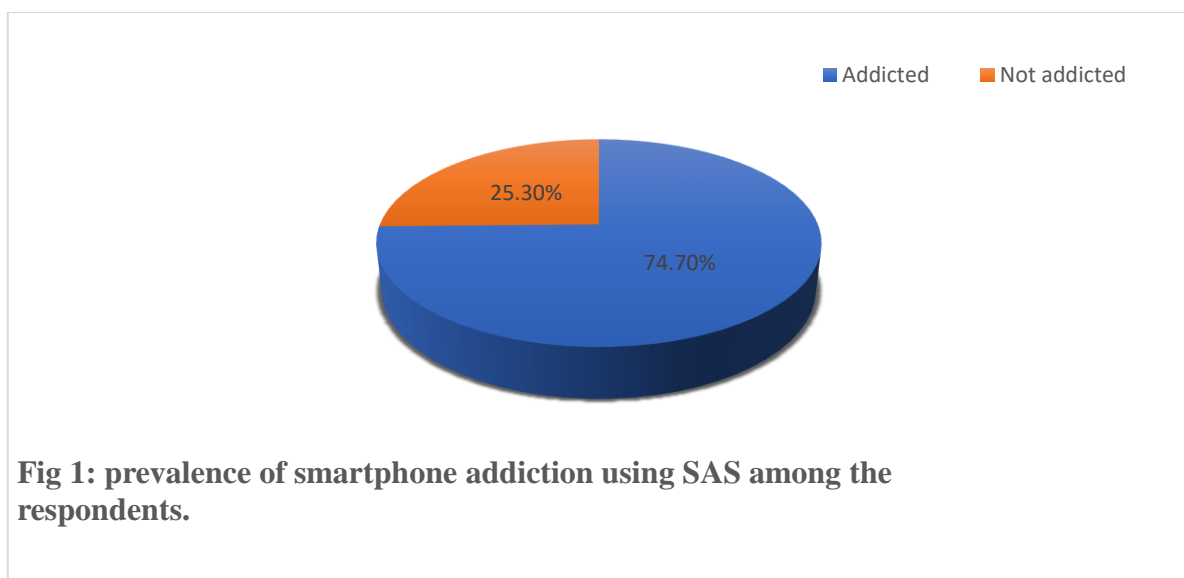
\*Significant at  $p < 0.05$ .

**Table 4: Relationship between Quality of Sleep and Smartphone Addiction among Students at Faculty of Medicine, Suez Canal University, Egypt, 2019 (N=150)**

▪ <b>Quality and patterns of sleep</b>	Smartphone addiction according to the SAS-SV $\downarrow$		U	P value
	Addicted (n=112 ) Median (IQR) $\ddagger$	Not addicted(n=38 ) Median (IQR) $\ddagger$		
▪ <b>Duration of sleep</b>	1.00 (0.00-1.00)	0.00 (0.00-1.00)	178	0.110
▪ <b>Sleep disturbances</b>	1.00 (1.00-2.00)	1.00 (1.00-1.00)	194	0.359
▪ <b>Sleep latency</b>	1.50 (1.00-2.00)	1.00 (2.00-0.00)	155	0.010*
▪ <b>Day dysfunction due to sleepiness</b>	1.00 (0.25-2.00)	1.00 (0.00-2.00)	193	0.371
▪ <b>Sleep efficiency</b>	1.00 (0.00-2.00)	0.00 (0.00-1.00)	162	0.016*
▪ <b>Use of sleep medication</b>	0.00 (0.00-0.00)	0.00 (0.00-1.00)	190	0.183
▪ <b>subjective sleep quality</b>	1.00 (1.00-2.00)	1.00 (0.00-1.25)	185	0.187
▪ <b>PSQI global score<math>^{\circ}</math></b>	6.50 (5.00-9.00)	5.50 (4.00-7.00)	154	0.011*

$\downarrow$  Smart phone Addiction Scale Short Version. P value was calculated using the Mann Whitney test.

\*Significant at  $p < 0.05$ .  $\downarrow$  Smart phone Addiction Scale Short Version.  $^{\circ}$  The Pittsburgh Sleep Quality Index (PSQI). Interquartile Range.



**Fig 1: prevalence of smartphone addiction using SAS among the respondents.**

### الملخص العربي

#### العلاقة بين إدمان الهواتف الذكية وجودة النوم بين طلبة كلية الطب جامعة قناة السويس ، مصر

رحاب علي محمد – هبه احمد مصطفى

**الخلفية:** إدمان الهواتف الذكية مشكلة متزايدة بين طلاب الجامعات في جميع أنحاء العالم. يمكن أن يؤدي الاستخدام المفرط للهواتف الذكية إلى نتائج غير مواتية مثل العزلة الاجتماعية وضعف التحصيل الأكاديمي. تقييم استخدام الهواتف الذكية بين الطلاب على المستوى الجامعي أمر ضروري للغاية. **الأهداف:** كان الهدف من الدراسة هو التحقق من انتشار إدمان الهواتف الذكية بين طلاب الطب وتقييم علاقته بجودة النوم. **طرق البحث:** تم عمل دراسة مقطعية مستعرضة على 150 من طلبة الطب بجامعة قناة السويس. تم توزيع استبيان ذاتي الإدارة على الطلاب لجمع البيانات المطلوبة. تم تقييم إدمان الهواتف الذكية باستخدام الإصدار القصير من مقياس إدمان الهواتف الذكية (SAS-SV) وتم تقييم جودة النوم من خلال مؤشر جودة النوم في بيتسبرغ (PSQI). **النتائج:** أظهرت الدراسة أن 74.7% مدمنين على استخدام الهواتف الذكية وأن الإدمان منتشر بين الطلاب الذكور. كانت درجة PSQI العالمية أعلى إحصائياً بشكل ملحوظ بين الطلاب الذين يعانون من إدمان الهواتف الذكية. **الخلاصة و التوصيات:** أوضحت الدراسة الحالية انتشار إدمان الهواتف الذكية بين طلاب الطب بجامعة قناة السويس. تشير نتائج هذه الدراسة إلى أنه ينبغي النظر في الفحص والوقاية من إدمان الهواتف الذكية.