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The Association between Smartphone Addiction, Depression and Anxiety among Medical Students in Jordan

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Abstract

Introduction: Awareness of psychological disorders such as smartphone addiction, anxiety, and depression is a trending research area in the scientific community that has further escalated with the impact of COVID-19. In this regard, young adults and medical students are already considered to be under a high level of stress academically and culturally. This study aimed to investigate the relationship between depression, anxiety, and smartphone addiction among medical students in Jordan.

Methods: A cross-sectional study was conducted using an online structured questionnaire. The survey was completed by 164 male and female medical students stratified by years one to three in the basic medical sciences. The survey consisted of items from the Generalized Anxiety Disorder (GAD-7), Patient Health Questionnaire (PHQ-9), and Smartphone Addiction Scale-Short Version (SAS-SV), in addition to two questions concerning the impact of the COVID-19 pandemic on smartphone addiction.

Results: Among the students who participated, the mean age was 18.9, with almost half (47.2%) being first-year students. The results showed no significant difference in stress, anxiety or cell phone addiction based on gender or academic year. The logistic regression model was not statistically significant regarding the covariates, except for GAD, which had an OR=1.15 (CI: 1.06 -1.25). Furthermore, SAS-SV was positively correlated with GAD-7 and PHQ-9 scores (r=0.42, r=0.2, $p<$ 0.000, p=0.029, respectively).

Conclusions: The results of the study showed a statistically significant positive correlation between smartphone addiction, depression, and anxiety. These variables were not statistically different among medical students in terms of gender and academic year.

Keywords: Cross-sectional study, anxiety, depression, GAD-7, PHQ-9, SAS-SV, smartphone addiction, medical students.

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Introduction

Smartphone use has been growing at an annual rate of eight percent, with an average of more than one million new smartphones coming into use every day [1]. In 2020, there were 3.5 billion smartphone users worldwide [2]. Moreover, their multifunctionality is so powerful and versatile that users often feel they are an essential component of daily life. This need has created considerable changes in diverse aspects of modern society [3]. For example, in Jordan, while neither internet nor smartphone addiction prevalence was previously reported, the data show that mobile connections increased by +1.7% between January 2019 and January 2020, equivalent to 81% of the total population [2]. However, research examining the patterns and practices of smartphone usage among university students in

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Jordan revealed that 33.6% reported spending between three to five hours on their smartphones every day [4].

On the other hand, advancements in digital technologies have resulted in various positive applications, but they have also appeared as independent positive predictors of smartphone addiction, as recently shown in a cross-sectional study among Lebanese university students [5]. Moreover, smartphones have been linked to subjective distress and psychopathological symptoms [6], decreased academic performance [7] musculoskeletal disorders [8–9], levels of loneliness, poor bonding, and bridging social capital [10–1], as well as sleep disturbance [12]. Following the outbreak of the COVID-19 pandemic [13], data from a worldwide survey conducted in March 2020 showed that 70% of responding international internet users were using their smartphones or mobile phones more as a direct result of the extended 'stay at home orders' during COVID-19 pandemic, although this varied significantly by country [14]. Therefore, the correlation between the excessive use of smartphones, depression, and anxiety is a matter of ongoing discussion. To the best of our knowledge, no previous studies have assessed the relationship between smartphone addiction, depression, and anxiety among medical students in Jordan. Consequently, the current study investigates these variables in a cross-sectional design.

Materials and Methods

Study design

A cross-sectional study was conducted online between September 2020 and January 2021 among students belonging to years one through three in the basic medical sciences at the Hashemite University, Jordan. The sample was randomized according to student university numbers, using an online random sample generator. From this, 197 smartphone users agreed to participate and were contacted through their Microsoft Teams private inbox/messages. Three questionnaires were used to assess smartphone addiction, depression, and anxiety among the medical students, along with two additional questions to see if these patterns were affected by the COVID-19 context.

Measurements and Instruments

Age, gender, and academic year demographic data were collected and the Generalized Anxiety Disorder 7-item (GAD-7) test was used to measure self-reported anxiety on a 4-point Likert scale, with 0 indicating 'not at all' and 3 being 'nearly every day'. The GAD has a Cronbach's alpha of 0.89, sensitivity = 0.97, and specificity = 0.67, with a summative score of 8 being the threshold between the presence and absence of anxiety [15]. The following nine items were the Patient Health Questionnaire (PHQ-9) for depression, again with a 4-point Likert scale, with a score of 0–4 indicating no depressive symptoms, to more than 15 indicating severe depressive symptoms. It has good reliability, having a Cronbach's alpha of = 0.89 [16]. Lastly, we used the Smartphone Addiction Scale—Short Version (SAS-SV), which consists of ten items measuring problematic smartphone use severity on a 7-point Likert with 1 = strongly disagree to 6 = strongly agree [17] (Cronbach's alpha 0.91 [18]). Issues with cell phone addiction were considered positive if a female scored 33 or higher, and for males, a score of 31 and up [19]. Two additional questions were asked about phone usage during COVID; these questions focused on the frequency and duration of smartphone use since the COVID-19 pandemic began compared with before, by providing dichotomous responses of yes or no.

Ethics

The Institutional Review Board approved the ethical consideration of this study of the Hashemite University. In addition, participants' informed consent was obtained before they were given access to the online survey, and completed surveys were labeled with numbers instead of names to protect confidentiality. Data were secured and stored in electronic form without personal identifiers, with only research members allowed access to the data.

Statistical Analysis

We calculated descriptive statistics for the demographic characteristic variables as well as the GAD-7, PHQ-9, and SAS-SV scores,

including mean, standard deviation (SD) and percentages (%), accordingly. Additionally, a non-parametric Chi-square test was used to examine the percentages for the questionnaire scores as well as the responses to the COVID-19-related questions. Furthermore, Bivariate Spearman's correlation was conducted to examine the strength of the relationship between GAD-7, PHQ-9, and SAS-SV scores after we checked for variables having an abnormal distribution. Finally, a binary regression model was established to see if the SAS-SV scores were predicted by variables such as age, gender, anxiety, and depression. A *p*-value of <0.05 indicated statistical significance, and analysis was conducted using SPSS v25.

Results

A total of 164 students completed the online survey with a mean age of 18.99 (SD=1.22). Among the participants, 36.6% were male, and 62.8% were female. The majority were first-year students, comprising 47.6% (n=93), while 36.6% (n=60), 15.9% (n=26) were second and third years, respectively.

The participants' scores are represented with mean and SD regarding gender and academic year. The females' SAS-SV score [39] for cellphone addiction was higher than the males' mean score of 38. However, males had a higher PHQ-9 depression scale score than females. To determine if there was a difference in smartphone addiction, depression and anxiety based on gender, *t*-tests were conducted. No significant difference was found for any of the three questionnaires (p=0.808, 0.753, 0.667, respectively). An ANOVA test was conducted to compare the students. Also, here there was no significant difference between any of the three questionnaires. Although the first years had the highest scores, no statistically significant differences were present (p= 0.986, 0.863, 0.525, respectively), as shown in Table 1.

Furthermore, the number of students who reported that they used their smartphones more during the COVID-19 pandemic was significantly higher than those who had decreased their smartphone use. Students were considered high risk for anxiety and depression if they scored more than 7 for GAD-7 (being high), and more than 9 was considered high for PHQ-9. Additionally, it was observed that the prevalence of anxious and smartphone-addicted students was higher than non-anxious and non-addicted ones (p>0.000). On the other hand, there was no significant difference among medical students in terms of depression, as shown in Table 2.

The prevalence of depressive, anxious, and addicted males and females plus academic years regarding each scale is shown in Table 3. Students considered at high risk for anxiety and depression scored more than 7 for GAD-7 and more than 9 for PHQ-9. The highest prevalence of depression, anxiety, and smartphone addiction was recorded among females and first-year medical students. However, there was no significant difference between gender and each academic year regarding the proportion of these psychological problems.

According to Spearman's correlation, the SAS-SV was positively correlated with GAD-7 and PHQ-9 scores (r=0.42, r=0.2, p< 0.000, p=0.029, respectively). Furthermore, a binary logistic regression was performed to predict the effect of age, gender, PHQ-9 scores, and GAD-7 scores on the likelihood that participants are addicted to smartphone use. The logistic model was not statistically significant regarding the covariates, except for GAD-7, which has an OR=1.15 (CI: 1.06–1.25), indicating a slight increase in anxiety for those who self-reported having a smartphone addiction.

Table 1. Mean Scores of Medical Students on the Stress, Anxiety and Cellphone Inventories

	SAS (cell phone) [a]	*p*-value	GAD-7 (anxiety)[a]	*p*-value	PHQ-9 (depression)[a]	*p*-value
Males	37.9 (11.9)	0.808	8.2 (6.3)	0.667	*11.2 (6.7)*	0.653
Females	39.1 (10.6)		8.6 (4.7)		10.7 (6.22)	
1st Year	39.6 (11.1)	0.986	8.5 (5.9)	0.863	11.3 (6.5)	0.525
2nd Year	38.2 (11.1)		8.4 (5.1)		10.5 (6.8)	
3rd Year	36.5 (8.6)		8.3 (4.0)		10.6 (5.0)	
[a] **Mean (SD)**						

Table 2. Scores' percentages of medical students on the stress, anxiety and cellphone inventories

		N (%)	*p*-value
PHQ-9	High	86 (53)	0.44
	Low	77 (47)	
GAD-7	High	59 (36)	0.000
	Low	105 (64)	
SAS-SV	Addicted	125	0.000
	Not	(76.2)	
How would you describe your smartphone time-use during the COVID-19 pandemic compared to before?	Addicted	39 (23.8)	0.000
	Increased	129	
	Decreased	(78.7)	
During the COVID-19 pandemic, how often do you check your phone per day, compared to before?		35 (21.3)	0.000
	Increased		
	Decreased	132	
		(80.5)	
		32 (19.5)	

Table 3. Prevalence of depressive, anxious, and smartphone-addicted medical students

		SAS-SV			GAD-7			PHQ-9		
		Not Addicted[a]	Addicted[a]	*p*-value	Low	High	*p*-value	Low	High	*p*-value
Gender	Male	15 (9.2%)	45 (27.6%)	0.806	37 (22.7%)	23 (14.1%)	0.665	27 (16 %)	33 (20.2%)	0.751
	Female	24 (14.7%)	79 (48.5%)		67 (41.1%)	36 (22.1%)		49 (30.1%)	54 (33.1%)	
Academic Year	1st Year	19 (11.6%)	59 (36.0%)	0.986	49 (29.9%)	29 (17.7%)	0.860	36 (22.0%)	42 (25.6%)	0.520
	2nd Year	14 (8.5%)	46 (28.0%)		40 (24.4%)	20 (12.2%)		31 (18.9%)	29 (17.7%)	
	3rd Year	6 (3.7%)	20 (12.2%)		16 (9.8%)	10 (6.1%)		10 (6.1%)	16 (9.8%)	
[a] **N (%)**										

Discussion

Our findings show that the percentage of students with an addiction to their smartphone was greater than those who were not addicted (76.2% vs 23.8%). Furthermore, there was a positive correlation between smartphone addiction, depression, and anxiety among medical students. However, these variables were not statistically different among these students in terms of gender or academic year.

Similar results have been reported in previous studies. A study conducted by Alhassan et al. revealed that the percentage of participants with smartphone addiction was

higher than those with no addiction (81% vs. 19%, respectively) [19], which aligns with the current study. This may be explained by the fact that some online games and apps facilitate social contact. Moreover, e-learning and teaching have increasingly relied on the Internet, especially during the COVID-19 pandemic. A cross-sectional study by Demirtaş et al. reported no significant difference between problematic and normal internet use groups in terms of gender [20]. Another example is a 688-university student sample [5].

However, Alkhateeb and colleagues reported a significant difference between males and females in terms of smartphone addiction [21]. This disagreement with our findings may result from the large sample recruited in their study, revealing this subtle difference. Also, cultural and traditional beliefs and behaviors have a significant role, especially those related to women.

Smartphone addiction and depression were statistically associated among undergraduate students in Australia and Lebanon [5, 22]. There was a significant difference between low and high levels of smartphone use in terms of depression [23]. Harwood et al. conducted another study and found that depression and anxiety were positively correlated with smartphone addiction [24]. Another study conducted by Zhang and Bian showed that different maladaptive concerns are associated with pathological internet usage (PIU) and are becoming more prevalent among the younger generations [25]. As an important predictor of PIU, anxiety has been discovered, with the neural base underlying the relationship between these two mediation models indicating that people with higher anxiety may be more likely to use the Internet. The probable rational illustration for these results may be as follows: medical students are trying to escape high academic stress by using their smartphones and are willing to be immersed in a virtual world that is compatible with their desires, but this tends to make them depressed.

Strengths and Limitations of the Study

To the best of our knowledge, this is the first study investigating the relationship between smartphone addiction, depression, and anxiety among medical students in Jordan, thus seeing if similar patterns could be noted in a traditional MENA region context. Moreover, the sample was selected from the target population by stratified randomization to escape bias and reach generalizable findings.

However, it also has a few limitations, including the sample being obtained from a limited range: only medical students from one large government university. Thus, the transferability may be reduced to a similar setting and may not apply to other types of university students or those from smaller private institutions. Additionally, the cross-sectional study design cannot establish a causative relation between examined independent and dependent variables; thus, future studies should try to establish a longitudinal study to reveal the temporal sequence.

Conclusion

In conclusion, our results revealed a positive correlation between smartphone addiction, depression, and anxiety among students in medical sciences at the Hashemite University, Jordan. However, in terms of gender and academic year variables, the findings were not statistically different for these students. At the same time, the percentage of students with smartphone addiction was greater than non-addicted ones (73.6% vs. 26.4%). Therefore, we recommend further studies in different institutions in Jordan with a large sample size.

Conflict of interest

None to declare

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الرابط بين الإدمان على الهواتف الذكية والاكتئاب والقلق بين طلاب الطب في الأردن

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الملخص

المقدمة: أصبحت الاضطرابات النفسية ، بما في ذلك إدمان الهواتف الذكية والقلق والاكتئاب ، مشكلة شائعة بين المجتمع. حيث أظهرت دراسات محدودة تأثير هذه الاضطرابات النفسية على الشباب وخاصة طلاب الطب في الأردن. لذلك ، هدفت هذه الدراسة إلى البحث في العلاقة بين الاكتئاب والقلق وإدمان الهواتف الذكية بين طلاب الطب في الأردن.

الطرق والأدوات: أجريت دراسة استطلاعية باستخدام استبيان عبر الإنترنت. تمت تعبئة الاستبيان من قبل 164 طالب وطالبة طب مقسمين حسب السنوات الأولى إلى الثالثة في العلوم الطبية الأساسية. حيث احتوت الأسألة على استبيان اضطراب القلق العام (GAD-7) ، واستبيان صحة المريض (PHQ-9) ، و الإصدار القصير لمقياس إدمان الهواتف الذكية (SAS-SV) ، بالإضافة إلى سؤالين يتعلقان بتأثيرات إدمان الهاتف الذكي أثناء جائحة كورونا.

النتائج: من بين الطلاب المشاركين ، كان متوسط العمر 18.9 (SD = 1.22) ، وكان نصفهم تقريبًا (47.2٪) من طلاب السنة الأولى. أظهرت النتائج عدم وجود فرق كبير في التوتر أو القلق أو إدمان الهاتف الخلوي على أساس الجنس أو العام الدراسي. لم يكن نموذج الانحدار اللوجستي ذو دلالة إحصائية فيما يتعلق بالمتغيرات المشتركة باستثنا ء استبيان اضطراب القلق العام. علاوة على ذلك ، كان SAS-SV مرتبطًا بشكل إيجابي بنتائج استبيان اضطراب القلق العام واستبيان صحة المريض.

الاستنتاجات: كشفت نتائجنا عن وجود علاقة إيجابية بين إدمان الهواتف الذكية والاكتئاب والقلق بين طلاب العلوم الطبية في الجامعة الهاشمية ، الأردن. لذلك ، نوصي بإجراء مزيد من الدراسات في مؤسسات مختلفة في الأردن بحجم عينة كبير.

الكلمات الدالة: دراسة استطلاعية ، قلق ، اكتئاب ، إدمان الهواتف الذكية ، طلاب الطب.