Dirasat: Human and Social Sciences, Volume 52, No. 1, 2025

Deanship of Scientific Research

Psychometric Properties of the Smartphone Addiction Scale (SAS) Among Students at Jeddah University, KSA

Sayed Ahmed Elwakeel*[*1], Hatim Mohammed Nadreen[2], Arzak Mohammed Ewees[3]

[1] Department of Psychology, Faculty of Arts, Fayoum University, Egypt; Department of Psychology, University of Science and Technology of Fujairah, UAE.

[2] Department of Psychology, Faculty of Social Sciences, Jeddah University, KSA.

[3] Department of Medical Surgical Nursing, Faculty of Nursing, Ain Shams University, Egypt.

Received: 8/11/2023
Revised: 13/12/2023
Accepted: 18/1/2024
Published online: 14/11/2024

* *Corresponding author:*
sae11@fayoum.edu.eg

Citation: Elwakeel, S. A., Nadreen, H. M., & Ewees, A. M. (2024). Psychometric Properties of the Smartphone Addiction Scale (SAS) Among Students at Jeddah University, KSA. *Dirasat: Human and Social Sciences*, *52*(1), 65–77. https://doi.org/10.35516/hum.v52i1.6117

© 2025 DSR Publishers/ The University of Jordan.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY-NC) license https://creativecommons.org/licenses/by-nc/4.0/

Abstract

Objectives: The current study examines the psychometric properties (validity and reliability) of the Smartphone Addiction Scale (SAS) to verify its adequacy for the Saudi environment. The study identifies gender differences in smartphone addiction at Jeddah University and highlights a variety of smartphone-based activities.

Methods: The sample consists of (272) male and female students at Jeddah University, and it is divided into (152) female students and (120) male students, respectively representing 55.9% and 44.1%. Their ages range from 19 to 23 years old with an average age of 21.66 and a standard deviation of 1.732. The tools include a basic data collection form and the Smartphone Addiction Scale (SAS) by Kwon et al., 2013a.

Results: The study shows that the Smartphone Addiction Scale (SAS) has good psychometric properties, reflecting its validity and reliability in the Saudi environment. Moreover, the study reveals that there are significant differences between male and female university students in smartphone addiction at 0.001, favoring male students. That is, male students suffer more from smartphone addiction than female students. In addition, the study shows that there are diverse smartphone-based activities among students.

Conclusion: Based on the results, the study recommends offering counseling programs, lectures, and seminars to raise awareness of the negative effects of using smartphones and to help university students (especially males) to get rid of this behavioral addiction.

Keywords: psychometric properties, smartphone addiction, university students

الكفاءة السيكومترية لمقياس إدمان الهاتف الذكي لدى طلاب وطالبات جامعة جدة في المملكة العربية السعودية

سيد أحمد الوكيل*[*1]، حاتم محمد ناضرين[2]، أرزاق محمد عويس[3]

[1] قسم علم النفس. كلية الآداب. جامعة الفيوم، مصر؛ وقسم علم النفس، كلية الإنسانيات والعلوم. جامعة العلوم والتقنية في الفجيرة.

[2] قسم علم النفس- كلية العلوم الإجتماعية . جامعة جدة، السعودية.

[3] قسم تمريض الجراحي الباطني. كلية التمريض. جامعة عين شمس، مصر.

ملخّص

الأهداف: هدفت الدراسة الحالية إلى التحقق من الكفاءة السيكومترية لمقياس إدمان الهاتف الذكي في البيئة السعودية من خلال الحصول على صدقه وثباته، والتعرف إلى الفروق في إدمان الهاتف الذكي بين عينة الدراسة من طلاب وطالبات جامعة جدة بالمملكة العربية السعودية، وأخيراً استهدفت الدراسة الحالية التعرف إلى طبيعة الأنشطة المُرتبطة باستخدام الهاتف الذكي لدى عينة الدراسة.

المنهجية: تكونت العينة من 272 طالباً وطالبة من جامعة جدة بالمملكة العربية السعودية، بواقع (152) طالبة بنسبة 55,9% من العينة الكلية، (120) طالباً بواقع 49,1% من العينة الكلية، تراوحت أعمارهم ما بين 19 و23 عاماً بمتوسط عمري قدره 21,66 عاما، وانحراف معياري 1,732 عاما، وتضمنت الأدوات استمارة جمع البيانات الأساسية، ومقياس إدمان الهاتف الذكي إعداد (كوون وآخرون، 2013).

النتائج: أشارت النتائج إلى أن مقياس إدمان الهاتف الذكي يتمتع بكفاءة سيكومترية جيدة في البيئة السعودية من خلال ما كشفت عنه المؤشرات المُعبرة عن ارتفاع صدقه وثباته، كما تبين من النتائج وجود فروق دالة إحصائياً بين الطلاب والطالبات في إدمان الهاتف الذكي عند مستوى 0,001 في اتجاه الطلاب مما يُعبر عن مُعاناة عينة الطلاب من إدمان الهاتف الذكي وأعراضه أكثر من الطالبات، وأخيراً أوضحت النتائج أن هناك العديد من الأنشطة المُرتبطة باستخدام الهاتف الذكي من قبل أفراد العينة من طلاب وطالبات جامعة جدة.

الخُلاصة: يتمتع مقياس إدمان الهاتف الذكي بخصائص قياسية جيدة تعكس صدقه وثباته في البيئة السعودية؛ وقد كان طلاب الجامعة أكثر إدماناً على الهواتف الذكية من الطالبات، وهذا يتطلب برامج إرشادية ومحاضرات وندوات توعوية لزيادة الوعي بالآثار السلبية المُرتبطة بالإفراط في استخدام الهواتف الذكية، ومساعدة طلبة الجامعات على التخلص من هذا الإدمان السلوكي.

الكلمات الدالة: الخصائص السيكومترية، إدمان الهاتف الذكي، طلاب الجامعة.

Introduction

Smartphones become more effective for performing various tasks that ensure a sense of pleasure, comfort, happiness, and well-being, in our daily lives. Hence smartphones achieved great popularity globally and the number of their users increased day by day, due to their ease of connection and accessibility, especially in the low-and middle-income countries (Li et al., 2020a; Andrade et al., 2023).

According to (Turner, 2020; Zhang & Wu, 2020), the number of smartphone users reached 4.78 billion in 2020, and this was representing 61.63% of the world's population, this highlights the growing use of these phones around the world.

Servidio et al. (2022); indicated that there were high rates of using smartphones among American university students, as this percentage increased from 35% in 2011 to 95%, and adolescent ownership of a smartphone reached 97% for the ages of 18 to 29 years and ownership of a smartphone didn't represent a problem itself, but the primary concern is the excessive using.

Ayandele's study (2020) indicated that the average daily use of smartphones reached 150 times; many of its users spend approximately 6 hours or more browsing its applications, in such a way that they can't give up. Also, the penetration rate in developing countries will reach more than 90% by the end of 2023, especially among adults.

In Europe, smartphone users' deal with their phones more than 48 times daily, and 65% of them check their phones from the moment they wake up and 15 minutes after waking up; it is expected that teenagers interact with their smartphones more than 65 times a day in 2023, which represents 20% increase compared to 2019. Such statistics reflect the excessive use of smartphones and their negative effects on human psychology (Arpaci, 2019).

Although Smartphones facilitate the tasks of our daily lives; they cause a lot of disorders such as anxiety, stress, and tension due to excessive use and suffering from addiction (Regan et al, 2020). Hence, the marked increase in smartphones led to increased research on the negative psychological and social effects of smartphones (Hale et al., 2020).

The fifth edition of Diagnostic and Statistical Manual of Psychological and Mental Disorders (DSM5) didn't list smartphone addiction as a recognized mental disorder; however, we are in front of a clear behavioral addiction because it includes many symptoms associated with addiction to psychoactive substances such as; cognitive dominance, loss of control, changing of mood, Tolerance dependence and withdrawal, conflict and relapse (de Freitas, et al. 2023); ***cognitive dominance*** refers to the emotional control of the smartphone over an individual's life, ***mood changing*** refers to the preoccupation or reluctance to use the smartphone to make the user feels calm and being one of the coping mechanisms of avoidance, ***dependence tolerance*** refers to the urgent need to increase the frequency and duration of using the smartphone to access the same psychological effects, ***withdrawal refers*** to negative physiological symptoms that occur when the activity stopped or the conflicts resulting from using Smartphones, which can be internal or external (for example, conflict with family members and/or professional/educational activities due smartphones). Finally, ***relapse*** refers to the rapid repetition of previous patterns of smartphone use after a period of abstinence of the same intensity or even higher than before (Szabo & Demetrovics, 2022; Vujić et al, 2023).

Recent studies showed that university students are more prone to smartphone addiction, as they spend a lot of time interacting with smartphones, added to the negative effects caused by excessive use (Busch &McCarthy, 2021*;* Vaterlaus et al., 2021; Arpaci & Unver, 2020; Elkholy et al., 2020; Erdem & Uzun, 2020; Lei et al., 2020).

Epidemiological statistics on the prevalence rates of this phenomenon among university students indicated that 80% of students use smartphones for 5 to 7 hours daily (Dikeca & Kebapci, 2018).

Accordingly, university students are now living in the Digital Era, and they are growing and developing with smartphones and digital products; therefore, these phones become an important part of their daily lives (Li et al., 2018).

Maladaptive behavior associated with smartphone use is a growing phenomenon associated with a lower quality of life (Bradish, et al, 2023), so the excessive use of smartphones accompanied by psychological disorders such as sleep disturbances, lack of concentration, poor social skills, poor emotional intelligence, involvement in traffic accidents, emotional sensitivity, memory difficulties, fatigue, anxiety, depression, poor sleep quality, and frequent physical complaints. (Lemola et al, 2015; Kim et al., 2015; Chen et al., 2017; Soni et al., 2017; Alhassan et al., 2018; Thomee, 2018; Kumar et al. 2019; Sohn et al.,

2019; Al Battshi et al., 2020; Ayandele et al., 2020; Cevik et al., 2020; Desouky & Abuzaid, 2020; Hale et al., 2020; Harris et al, 2020 ; Hong et al., 2020; Mohamed & Mostafa; 2020; Panova et al., 2020; Zhang et al., 2020b; Alshwi et al., 2021; El-Wakeel, 2021; Fortes et al., 2021; Jin et al., 2021; Hidalgo-Fuentes, 2023; de Freitas et al, 2023).

World Health Organization (WHO) included smartphone addiction in the eleventh International Classification (ICD-11) based on the excessive use of smartphones combined with many negative psychological effects (Zhang et al., 2020b), so psychologists in many countries developed a diagnostic tool to measure smartphone addiction and its negative effects; and they developed more than 70 scales however, a lot of these tools are without psychometric properties (Harris et al, 2020).

As a result of this, the psychometrics movement became active in the 21st Century, and the researchers focused on the preparation of a diagnostic tool for this type of behavioral addiction, and these efforts have resulted in Kwon et al (2013a) to prepare a diagnostic tool for smartphone addiction and its efficiency in many societies and cultures all over the world.

Based on the factor analysis conducted by Kwon et al (2013b) of the smartphone addiction scale, it was found that this scale has good psychometric properties in the South Korean environment, and its items distributed on six essential dimensions they are: (daily life disturbance, positive expectation, withdrawal, cyberspace, overuse & resilience).

Smartphone Addiction Scale (SAS) used in different societies and translated into different languages and cultures, such as Korean, Turkish, Persian, Romanian, English, Chinese, Italian, Spanish, Malaysian, French, Indonesian, Pakistani, Brazilian, American, Mexican, and Serbian. The psychometric properties of this scale have been verified among university students in these societies, the results showed that this scale has high indicators of validity and reliability, which expresses that this scale is considered one of the best diagnostic tools for identifying negative symptoms associated with excessive use of smartphone, in addition to its use in many cross-cultural comparisons (Kumar et al., 2019; Cheung et al., 2019; Fallahtafti et al, 2020; Nikolic et al., 2022.)

Kumar et al., (2019) conducted a study aimed at verifying the psychometric properties of the smartphone addiction scale in Chinese. The sample consisted of 3211 whose ages ranged between 11 and 47 years. The results of the confirmatory factor analysis showed that the scale has high validity rates in Chinese society. All items were well saturated on their sub-dimensions, and the results showed high goodness of model fit indicators resulting from confirmatory factor analysis.

Harris et al., (2020) in their study in the USA indicated that the indicators of validity and reliability of the scale were high; with an alpha value was 0.93; also; the results of confirmatory factor analysis indicated high goodness of model fit indicators, which expresses the validity of the scale.

Fallahtafti et al (2020) conducted a study to verify the psychometric efficiency of the smartphone addiction scale in the Iranian environment, the scale was translated into Persian and applied to a sample of 398 male and female students in the Iranian university; results showed high indicators of confirmatory factor validity, as the RMSEA value was 0.07 and the CFI value was 0.95, which confirms the validity of the scale, and alpha value was 0.82, which it expresses the reliability of the scale in the Iranian environment.

Elwakeel, (2021) conducted a study in the Egyptian environment among two hundred male and female university students. The results showed that the smartphone addiction scale has a high goodness of model fit indicators resulting from confirmatory factor analysis, the RMSEA value reached 0.049 and the CFI value was 0.931, these values indicated the construct validity. The alpha value reached 0.939 and for the sub-dimensions, it ranged between 0.749 and 0.881. These are high values that express the reliability of the scale in the Egyptian environment.

In Brazil, Andrade et al. (2023) verified the psychometric efficiency of the smartphone addiction scale using confirmatory factor validity and criterion validity for multiple sets of scales. The sample consisted of 392 adolescents; their average age was 12.76 years and a standard deviation of 1.1 years. Tools included: the short form of the Smartphone Addiction Scale (SAS-SV) and the Internet Addiction Test (IAT). The confirmatory factor validity (CFA) showed adequate matching quality indicators for the smartphone addiction scale, and the correlation coefficient between the smartphone addiction scale and the Internet addiction scale was high, which expresses the scale's validity, the Cronbach's alpha criteria reached 0.722 and the McDonald Omega criteria reached (0.725) that values express the scale's reliability.

Bradish, et al (2023) conducted a study aimed at verifying the psychometric efficiency of the smartphone addiction

scale, the sample consisted of 221 participants, 31 males and 179 females, and the results of the factor analysis of the scale showed that the items of the scale were saturated on its sub-dimensions in a way that expresses the sincerity of the scale.

In Malaysia, Tan, et al (2023) conducted a study to verify the psychometric properties of the smartphone addiction scale (short version) among 308 university students, and the results showed that the smartphone addiction scale has good psychometric efficiency among Malaysian adults, and this was shown by the high indicators of validity and reliability of this scale.

In Serbia, Vujić, et al., (2023) conducted a study aimed at verifying the psychometric properties of the Serbian version of the Smartphone Addiction Scale (SABAS). The sample consisted of 599 Serbian participants; results indicated that the scale had a good internal consistency (**α**=.81) the value of the reliability coefficient by the test-retest method was 0.795, and the sale has good indicators of confirmatory factor validity.

Based on the results of the previous studies; we can find that the smartphone addiction scale has good psychometric properties in diverse cultures; and it's important to verify its psychometric properties among university students in the Saudi environment. Therefore, for the current study, we assumed that the smartphone addiction scale has good psychometric properties among university students in Saudi Arabia.

Research Questions:

The current study tries to answer the following questions:

1-Does the smartphone addiction scale have good psychometric properties that reflect its validity and reliability in the Saudi environment?

2-Are there any statistically significant differences in smartphone addiction between male and female students at Jeddah University?

3-What are the activities associated with using smartphones among students at Jeddah University in Saudi Arabia?

Objectives &Significance:

This study acquires its Objectives and significance through the following points:

1-To highlight one of the most dangerous and widespread types of behavioral addiction among adolescents, which is smartphone addiction, and try to identify its psychological consequences.

2-Verifying the psychometric properties of the smartphone addiction scale in the Saudi environment by obtaining its validity and reliability.

3-Identifying the differences between male and female students at Jeddah University in smartphone addiction.

4-Identifying the activities associated with using smartphones among students at Jeddah University in Saudi Arabia.

5- Develop a set of recommendations based on the research findings to reduce the negative consequences associated with excessive use of smartphones

Methods

Population:

The current study community included students of the Faculty of Social Sciences at Jeddah University in the Kingdom of Saudi Arabia, and the number of its students reached 1706 students from its various scientific departments, namely the Departments of Geographic Information Systems(GIS), the number of its students reached (425), and the Department of Social Sciences, number of its students reached (223) students, the Department of History and antiquities, the number of its students reached (598) students, the Department of Psychology, the number of its students reached (460). A sample of this community was randomly selected to verify the objectives of the study and answer its questions.

Participants:

The sample consisted of 272 male and female students from the College of Social Sciences at Jeddah University in

Saudi Arabia from various scientific and academic specializations; the sample was divided into)152)female students, representing 55.9%, and (120)male students, representing 44.1%. Their ages ranged between 19 to 23 years, their mean age was 21.66 years with 1.732 years as the standard deviation. The following table shows the sample demographic characteristics:

Table (1) ***The Sample Demographic Characteristics N=272***

Characteristics		**N**	**%**	**Characteristics**		**N**	**%**
Gender	***Males***	***152***	***55.9***	***Marital Status***	***Bachelor***	***169***	***62.1***
	Females	***120***	***44.1***		***Married***	***103***	***37.9***
Academic Majors	***Psychology***	***126***	***46.3***	***Employment Status***	***Casher***	***2***	***0.7***
	Social Work	***83***	***30.5***		***Unemployment***	***254***	***93.4***
	History	***35***	***12.9***		***Employee***	***7***	***2.6***
	Geographic Systems	***28***	***10.3***		***Businessman***	***5***	***1.8***
					Manager	***4***	***1.5***

From the previous table, we can notice the diversity of academic specializations among the sample, such as psychology as its percentage was 46.3%, then social work was 30.5%, then history was 12.9%; these results express the diversity of academic specializations among the sample. Regarding marital status; most of the sample were unmarried their percentage was 62.1% regarding employment; the majority of the sample didn't work, as their percentage was 93.4%.

Regarding **smartphone use hours**, the following table shows frequencies and percentages of using smartphones daily:

Table (2) ***Frequencies and percentages the smartphones using hours daily among the sample N= 272***

Number of Hours	***F***	***%***
From 2 to 4 hours	***20***	***7.4***
More than 4 hours to 7 hours	***80***	***29.4***
More than 7 hours	***172***	***63.2***

The previous table shows the high rates of daily smartphone use among the sample, as 63.2% of the total sample uses their smartphone for more than 7 hours daily, this is a large period and wasted time in their lives and reflects the high rates of smartphone addiction among the sample.

Tools:

The current study relied on using the following tools:

1- ***A questionnaire for collecting main data (***prepared by researchers):

This questionnaire aimed to collect information about the sample, such as their ages, academic specialization, jobs, and social status, in addition to hours of using smartphones daily, and the activities or causes of using smartphones.

2-Smartphone Addiction Scale (SAS) prepared by (Kwon et al., 2013 a)

Translated into Arabic Language by Elwakeel (2021)

This scale is concerned with measuring smartphone addiction. This scale includes thirty-three self-report items including (6) six dimensions that answered according to the six-response Likert scale, ranging from (Strongly Disagree), which obtains one degree, and (Strongly Agree) that obtains 6 degrees, so the total score of the scale ranges between 33 to 198 degrees. This scale includes six dimensions they are:

1-Daily-life Disturbance (D): it includes six items; Start from one to five.

2-Positive anticipation (P): it includes eight items; from six to thirteen.

3-Withdrawal (W): it includes six items; from fourteen to nineteen.

4-Cyberspace-Oriented Relationship (C): it includes seven items; from twenty to twenty-six.

5-Overuse (O): it includes four items; from twenty-seven to thirty.

6-Tolerance (T): it includes three items; from thirty-one to thirty-three.

Kwon et al., (2013a) obtained the scale reliability through internal consistency using the Alpha Cronbach's Coefficient; the total score was 0.967, and the six sub-dimensions were 0.858, 0.913, 0.904.876, 0.825, 0.885, respectively, which showed high-reliability coefficients. The criterion validity was obtained by calculating correlations with a measure of susceptibility to smartphone addiction, the Smartphone Addiction Proneness Scale (SAPS), and the Korean image of SAS. For the Korean Self-Reporting Internet Addiction Scale, Kwon et al., (2013a) found that the value of the correlation coefficient between the smartphone addiction scale and spoken scales was significant at 0.01, which expresses its validity.

In the Egyptian environment, El-Wakeel (2021) verified its psychometric efficiency among a sample of male and female university students from Egyptian universities, consisting of 200 male and female students from the faculty of Arts at Fayoum University and the faculty of nursing at Ain Shams University their ages ranged between 18 to 25 years, with 19.10 years as mean age and a standard deviation of 1.11 years .Validity of the scale was obtained through confirmatory factor validity, which showed high indicators of the model fit goodness, which confirms the structural validity of the smartphone addiction scale and its sub-dimensions in the Egyptian environment. Also, the reliability was verified by using alpha reliability and the split-half method, there results showed high reliability.

Statistical analysis

The descriptive statistics: frequencies, percentage, mean, standard deviation, and T.test were conducted using SPSS. The Confirmatory Factor Analysis (CFA) by AMOS 24 To assess the model fit of the SAS scale, different fit indices were obtained These indices included the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA)values less than 0.08 indicate a good model fit, and values of CFI and TLI were > 0.90 indicate a good model fit.

Results

Results of the First Question:

Does the smartphone addiction scale have good psychometric properties that reflect its validity and reliability in the Saudi environment?

To answer this question; reliability and validity of the smartphone addiction scale were obtained among the sample; this can be explained as follows:

1-Reliability:

Researchers in the current study obtained the scale's reliability by calculating the MacDonald Omega reliability and split-half method with correction for the length using the Spearman-Brown and Gutman equations; this is shown in the following table:

Table (3) Reliability of the smartphone addiction scale using McDonald Omega and the split-half methods for the total sample of N=272

Scale	Number of items	McDonald Omega	Split Half method with scale length correction	Test length correction equation
Daily-life disturbance (D)	**5**	**0.838**	**0.850**	Gutman
Positive anticipation (P)	**8**	**0.846**	**0.724**	Spearman-Brown
Withdrawal (W)	**6**	**0.858**	**0.878**	Spearman-Brown
Cyberspace-oriented relationship (C)	**7**	**0.889**	**0.828**	Gutman
Overuse (O)	**4**	**0.847**	**0.832**	Spearman-Brown
Tolerance (T)	**3**	**0.723**	**0.711**	Gutman
Total degree	**33**	**0.956**	**0.891**	Gutman

It is clear from the previous table that the reliability coefficients of the smartphone addiction scale are high, either by the McDonald Omega method or by the split half method, after correcting the length of the test with the Spearman-Brown and Gutman equations, which expresses the scale's reliability.

2- Validity:

The confirmatory factor analysis (CFA) was obtained by applying it to the sample; before starting the confirmatory factor analysis.

The researchers designed the smartphone addiction scale model according to the theoretical framework of the scale; we can see that from the following figure:

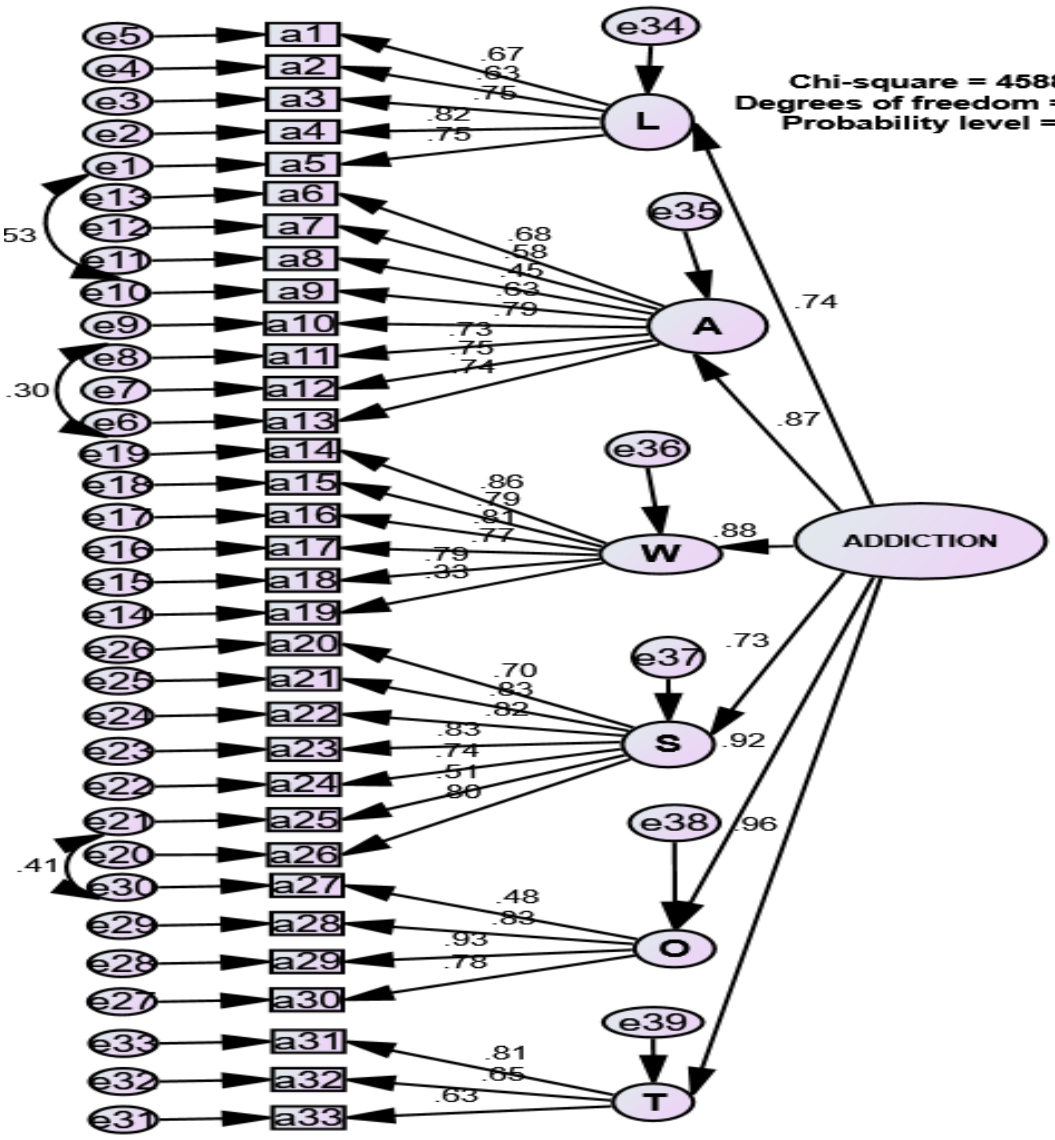

Figure (1)

Hypothesized model of smartphone addiction scale using Amos 24 software

The confirmatory factor analysis was conducted among the sample through AMOS 24, and it showed the goodness of the model fit indicators and achieved the confirmatory factor validity, this is shown in the following table:

Table (4) Indicators of the Smartphone Addiction Scale Model Fit among the Sample

X^2/df	GFI	AGFI	NFI	CFI	IFI	TLI	RMSEA
2.11	**0.971**	**0.957**	**0.954**	**0.967**	**0.967**	**0.962**	**0.061**

It is clear from the previous table that the supposed model of smartphone addiction scale confirms many Indicators of Model Fit among the Sample. Chi-square wasn't statistically significant, and the ratio between Chi- Square and degrees of freedom was (2.11) which is less than (5) and wasn't statistically significant; thus indicated acceptance of the model, in addition to the goodness of fit index (**GFI**), Adjusted Goodness of Fit Index **(AGFI),** Normal Fit Index (**NFI**), the comparative fit index **(CFI)**, the incremental fit index **(IFI),** and Tucker-Lewis Index (**TLI**), all of which have high values that reach the point of approaching the maximum of these indicators (one is correct). A high value in these indexes indicates a good model fit of the scale, and thus this indicates the quality of the model as in the results of the current model, in addition to the Root Mean Square Error of Approximation (**RMSEA**) indicator, which is one of the most important indicators of goodness of fit in confirmatory factor analysis, and its value reached (0.061). It is a good rate and indicates that the model completely matches the data, which confirms the structural validity of the smartphone addiction scale among the sample.

Results of the second question:

Are there any statistically significant differences in smartphone addiction between male and female students at Jeddah University?

To answer this question, the researchers obtained the significance between male and female university students using T.test, this is shown in the following table:

Table (5) Differences between male and female students in smartphone addiction N=272

Sex	Mean	Std. Deviation	T	Sig
Males (N)=152	87.39	24.66		
Females (N)=120	70.49	25.17	4.562	0.000

It is clear from the previous table that there were significant differences between male and female university students at 0.001 toward male students; it means that male students suffer from smartphone addiction more than females.

Results of the third question:

What are the activities associated with using smartphones among students at Jeddah University in Saudi Arabia?

To answer this question, the frequencies, and percentages of motives for using a smartphone were obtained, as indicated in the following table:

Table (6) ***Activities associated with using the smartphone among the study sample, n = 272***

Activities	*Frequencies*	*%*
Browsing Websites	271	99.63
Communicate with my friends through social networking sites	265	97.40
Play digital games	227	83.46
Browsing e-mail	220	80.88
listening to music	210	77.21
Watching movies and matches	205	75.40

The previous table shows the diversity of activities associated with using smartphones among the sample; **Browsing Websites** came in the first level with 99.63**%; communicating with friends through social networks** came in second

level with 97.4%.; **playing digital games** came in the third level with 83.46%, **browsing e-mail** came in the fourth level with 80.88%, **listening to music** came in the fifth level with 77.21%, finally **watching movies** came in the sixth level with 75.8%. Such activities confirm the diversity of using of smartphones among the sample.

Discussion:

Regarding the Psychometric properties, the results showed that the current scale has good psychometric properties. These results were consistent with the results of the previous studies that attempted to verify the psychometric efficiency of the smartphone addiction scale, such as Kumar et al., (2018) that aimed to verify the Psychometrics of the smartphone addiction scale on Chinese adolescents. The results of the confirmatory factor analysis showed that the scale has high validity rates in Chinese society. All items were well saturated on their sub-dimensions, and the results showed high indicators of goodness model fit that resulted from the confirmatory factor analysis.

The results of the current study agreed with Harris et al., (2020) study; that aimed to verify the psychometric efficiency of the smartphone addiction scale among university students in the USA. The results indicated high indicators of goodness model fit, which reflects the scale, 's validity.

Accordingly, the results of Fallahtafti et al (2020), showed high indicators of the model goodness which was revealed by confirmatory factor validity, as the RMSEA value reached 0.07 and the CFI value was 0.95, which confirms the scale's validity. The alpha value reached 0.82, which expresses its reliability in the Iranian environment.

Results of Elwakeel's study (2021), showed that the smartphone addiction scale has high validity indicators among university students in the Egyptian environment. This was supported by the high indicators of the quality of matching the confirmatory factorial validity model, as the RMSEA value reached 0.049 and the CFI value was 0.931; the alpha value for the total score was 0.939 and for the sub-dimensions ranged between 0.749 and 0.881; that express the scale's reliability.

These results also agreed with Andrade et al (2023) study, as confirmatory factor validity (CFA) showed appropriate goodness-of-model fit indicators for the smartphone addiction scale.

It also agreed with Vujić, et al (2023) results, as they showed that the Serbian version of the smartphone addiction scale has good psychometric efficiency, which expresses that it has good indicators of confirmatory factor validity.

Results of the current question agreed with (Bradish, et al, 2023; Tan, et al, 2023) studies that aimed to verify the psychometric efficiency of the smartphone addiction scale, and the results showed that the smartphone addiction scale has good psychometric efficiency among university students.

Results of the current study showed that male students suffer from smartphone addiction more than female university students. These results agreed with the results of the Kunt et al., (2020) study, as it showed that there were differences between male and female students in smartphone addiction toward male students. While these results differed from the results of (Dikec & Kebapci, 2018; Mitchell & Hussain, 2018; Kumar et al., 2019; Randjelovic et al., 2021) their studies showed that there weren't statistically significant differences between male and female university students in smartphone addiction. The results of the current study also differed from the results of Chen et al., (2017) as it showed that females are higher than males in smartphone addiction.

There was adversity of activities associated with using smartphones among the sample; results also revealed high indicators of confirmatory factor validity in the Saudi environment. This was demonstrated by the indicators of goodness of the model fit revealed by the assumed model. The results also revealed the high-reliability coefficients for the total score of the sub-dimensions, whether using McDonald Omega or the split-half method, which indicates that the scale has good psychometric properties in the Saudi environment.

Conclusion and recommendations:

The smartphone addiction scale has good psychometric properties that reflect its validity and reliability in the Saudi environment. Male university students are more addicted to smartphones than female students, this requires counseling programs, lectures, and awareness seminars to raise awareness of the negative effects of using smartphones and help

university students get rid of this behavioral addiction.

Data Availability

The data sets generated and analyzed during the current study are available in the corresponding author throw his email (sae11@fayoum.edu.eg).

Conflicts of Interest

The authors declare no conflict of interest.

Funding

This research didn't receive external funding.

REFERENCES

Alhassan, A. A., Alqadhib, E. M., Taha, N. W., Alahmari, R. A., Salam, M., & Almutairi, A. F. (2018). The relationship between addiction to smartphone usage and depression among adults: a cross sectional study. *BMC Psychiatry* 18, (148)1-18 https://doi.org/10.1186/ s12888-018-1745-4

Al Shawi, A. F., Hameed, A. K., Shalal, A. I., Abd Kareem, S. S., Majeed, M. A., & Humidy, S. T.(2021) Internet Addiction and Its Relationship to Gender, Depression and Anxiety Among Medical Students in Anbar Governorate-West of Iraq. *International Quarterly of Community Health Education*, 0272684X 2098 57 08.https://doi.org/ 10.1177% 2F02726 84X2098 57 08

Andrade, A. L. M., Spritzer, D. T., Scatena, A., de Oliveira Pinheiro, B., da Silva, G. T., Kim, H. S., & De Micheli, D. (2023). Psychometric properties of the Smartphone Addiction Inventory-Short Form (SPAI-SF) in Brazilian adolescents. *Psychiatry Research*, 319, 115001. https://doi.org/10.1016/j.psychres.2022.115001

Andrade, A. L. M., Kim, D. J., Scatena, A., Enes, C. C., Enumo, S. R. F., & De Micheli, D. (2021). Validity and reliability of the Brazilian version of the Smartphone Addiction Scale-Long Version (SAS-LV). *Trends in Psychology*, *29*(2), 302-319.https://doi.org/ 10.1007/s43076-020-00046-y

Arpaci, I., & Unver, T.K.(2020). Moderating role of gender in the relationship between big five personality traits and smartphone addiction. *Psychiatric Quarterly*, 91, 577–585.https://doi. org/10.1007/s11126-020-09718-5

Ayandele, O., Popoola, O. A., & Oladiji, T. O. (2020). Addictive use of smartphone, depression and anxiety among female undergraduates in Nigeria: across-sectional study. *Journal of Health Research.*34(5), 443-453 https://www.emerald. Com/insight / 2586-940X.htm

Bradish, T., Locker, L., Ryan, R. G., & Wilson, J. H. (2023). The Smartphone Addiction Measure (SAM): Subscales, Validity, and Reliability. *Psychological Reports*, *0*(0)1-19. https://doi.org/10.1177/00332941231 219791

Busch, P. A., & McCarthy, S. (2021). Antecedents and consequences of problematic smartphone use: A systematic literature review of an emerging research area. *Computers in Human Behavior*, 106414. https://doi.org/10. 1016/j.chb.2020.106414.

Çevik, C., Ciğerci, Y., Kılıç, İ., & Uyar, S. (2020). Relationship between smartphone addiction and meaning and purpose of life in students of health sciences. *Perspectives in Psychiatric Care*, 56(3), 705-711. https://doi.org/10.1111/ppc.12485

Chen, H., Wang, L., Qiao, N., Cao, Y., & Zhang, Y. (2017). Development of the smartphone addiction scale for Chinese adults. *Chinese Journal of Clinical Psychology*, 25(4),645–649.

Cheung, T., Lee, R. L., Tse, A. C., Do, C. W., So, B. C., Szeto, G. P., & Lee, P. H. (2019). Psychometric properties and demographic correlates of the smartphone addiction scale-short version among Chinese children and adolescents in Hong Kong. *Cyber psychology, Behavior, and Social Networking*, *22*(11), 714-723. https://doi.org/10.1089/cyber.2019.0325

Ching, S. M., Yee, A., Ramachandran, V., Lim, S. M. S., Sulaiman, W. A. W., Foo, Y. L. (2015). Validation of a Malay version

of the Smartphone Addiction Scale among medical students in Malaysia. *PloS One*, *10(10*). e0139337 https://doi.org/10.1371/ journal. Pone. 0139337

de Freitas, B. H. B. M., Gaíva, M. A. M., Bernardino, F. B. S., & Diogo, P. M. J. (2023). Adolescents' Perception about the Relationship between Self-Reported Smartphone Addiction and Emotional and Behavioral Problems during the COVID-19 Pandemic. *Journal of Adolescent Research*, 07435584231194869 .https://doi.org/10.1177/ 07435584231194869

Demirci, K., Orhan, H., Demirdas, A., Akpinar, A., & Sert, H. (2014). Validity and reliability of the Turkish version of the smartphone addiction scale in a younger population. *Klinik Psikofarmakoloji Bülteni/Bulletin of Clinical Psychopharmacology*, 24(3), 226–234. https://doi-org.srv-proxy1.library.tamu.edu/10.5455/bcp.20 1407 10040 824.

Desouky, D. E. S., & Abu-Zaid, H. (2020). Mobile phone use pattern and addiction in relation to depression and anxiety. *Eastern Mediterranean Health Journal*, 26(6), 692-699.

De Pasquale, C., Sciacca, F., & Hichy, Z. (2017). Italian validation of smartphone addiction scale short version for adolescents and young adults (SAS-SV). *Psychology*, 8, 1513–1518. https://doi.org/10.4236/psych.2017.810 100

Dikec, G., & Kebapci, A. (2018). Smartphone Addiction Level among a group of University Students. *Bağımlılık Dergisi Journal of Dependence*, 19 (1), 1-9. https://dergipark.org.tr/en/pub/bagimli/issue/35809/407360# article cite

Elkholy, H., Elhabiby, M., & Ibrahim, I. (2020). Rates of Alexithymia and Its Association with Smartphone Addiction among a Sample of University Students in Egypt. *Frontiers in Psychiatry*, 11, 304. https://doi.org/10.3389/fpsyt.2020.00304

El-Wakeel, S.A (2021) Mindfulness as a Moderator variable for the relationship between smartphone addiction, anxiety, depression, and sleep quality, *Fayoum University Journal of Educational and Psychological Sciences.* 15 (6) 677-758 https://jfust.journals.ekb.eg/ article176459.html

Erdem, C., & Uzun, A. M. (2020). Smartphone Addiction among Undergraduates: Roles of Personality Traits and Demographic Factors. *Technology, Knowledge and Learning*, *27*, *579–597*.https://doi.org/10.1007/s10758-020-09467-1

Fallahtafti, S., Ghanbaripirkashani, N., Alizadeh, S. S., & Rovoshi, R. S. (2020). Psychometric properties of the Smartphone Addiction Scale–Short Version (SAS-SV) in a sample of Iranian adolescents. *International Journal of Developmental Science*, *14*(1-2), 19-26. DOI: 10.3233/DEV-200002

Fortes, A. B., Broilo, P. L., & Lisboa, C. S. D. M. (2021). Smartphone use and psychological well-being: the moderating role of emotion regulation. *Trends in Psychology*, *29*, 189-203. https://doi.org/10.1177/074355 84231194869

Hale, K. U. L. A., Ayhan, C., Soyer, F., & Kaçay, Z. (2020). The relationship between smartphone addiction and life satisfaction: faculty of sport sciences students. *International Journal of Psychology and Educational Studies*, 7(1), 86-95. Retrieved from https:// dergipark.org.tr/en/pub/pes/issue/57204/807780

Harris, B., McCredie, M., & Fields, S. (2020). Examining the psychometric properties of the smartphone addiction scale and its short version for use with emerging adults in the US. *Computers in Human Behavior Reports*, *1*, 100011. https://doi.org/10.1016 /j.chbr. 2020.100011

Hidalgo-Fuentes, S. (2023). Smartphone Application-Based Addiction Scale: un meta-análisis de generalization de la fiabilidad. *European Journal of Education and Psychology*, *16*(1), 1-20. https://revistas.uautonoma. cl/ index. php/ ejep/article/view/1954/1490

Hong, Y.P., Yeom, Y.O., & Lim, M.H. (2020). The Relationships between Smartphone Addiction of Middle School Students and Smartphone Usage Types, Depression, ADHD, Stress, Interpersonal Problems, and Parenting Attitude.. https://doi.org/10.20944/preprints202009.0149.v1

Jin, L., Hao, Z., Huang, J., Akram, H. R., Saeed, M. F., & Ma, H. (2021). Depression and anxiety symptoms are associated with problematic smartphone use under the COVID-19 epidemic: The mediation models. *Children and Youth Services Review*, 121, 105875 https://doi.org/ 10.1016/j.childyouth.2020.105875

Kim, J. H., Seo, M., & David, P. (2015). Alleviating depression only to become problematic mobile phone users: Can face-to-face communication be the antidote? *Computers in Human Behavior*, 51, 440-447. https://doi.org/10.1016/j.chb.2015.05.030

Kumar, V. A., Chandrasekaran, V., & Brahadeeswari, H. (2019). Prevalence of smartphone addiction and its effects on sleep quality: A cross-sectional study among medical students. *Industrial Psychiatry Journal*, 28(1), 82-85 doi:

10.4103/ipj.ipj_56_19. Epub 2019 Dec 11. PMID: 31879452; PMCID: PMC6929238.

Kunt, M., Demir, L. S., Tuncez, İ. H., & Şahin, T. K.(2020). Smartphone Addiction and Its Relationship with Depression in University Students: A Cross-Sectional Study. *Euras J Fam Med;*9(1):15-26. Doi:10.33880/ ejfm. 2020 090103

Kwon, M., Kim, D., Cho, H., & Yang, S. (2013a). The smartphone addiction scale: Development and validation of a short version for adolescents. *PloS One*, 8(12), e83558. https://doi.org/10.1371/journal.pone.0083558.

Kwon, M., Lee, J. Y., Won, W. Y., Park, J. W., Min, J. A., Hahn, C., et al. (2013b). Development and validation of a smartphone addiction scale (SAS). *PloS One*, 8(2), e56936. https://doi.org/10.1371/journal.pone.0056936.

Lei, L. Y. C., Ismail, M. A. A., Mohammad, J. A. M., & Yusoff, M. S. B. (2020). The relationship of smartphone addiction with psychological distress and neuroticism among university medical students. *BMC psychology*, 8(1), 1-9 . https://doi.org/10.1186/s40359-020-00466-6

Lemola, S., Perkinson-Gloor, N., Brand, S., Dewald-Kaufmann, J. F., & Grob, A. (2015). Adolescents' electronic media use at night, sleep disturbance, and depressive symptoms in the smartphone age. *Journal of youth and adolescence*, 44(2), 405-418.https://doi.org/ 10.1007/s10964-014-0176-x

Li, Y., Li, G., Liu, L., & Wu, H. (2020). Correlations between mobile phone addiction and anxiety, depression, impulsivity, and poor sleep quality among college students: A systematic review and meta-analysis. *Journal of behavioral addictions*, 9(3), 551-571. https://doi.org/10.1556/2006.2020.00057

Matar Boumosleh, J., & Jaalouk, D. (2017). Depression, anxiety, and smartphone addiction in university students-A cross sectional study. *PLoS one*, 12(8), e0182239, 1-14. https://doi.org/ 10.1371/ journal . pone.0182239

Mitchell, L., & Hussain, Z. (2018). Predictors of problematic smartphone use: an examination of the integrative pathways model and the role of age, gender, impulsiveness, excessive reassurance seeking, extraversion and depression. *Behavioral Sciences*, 8(8), 74. 1-13 https://doi.org/10.3390/bs808 0074

Mohamed, S. M., & Mostafa, M. H. (2020). Impact of smartphone addiction on depression and self-esteem among nursing students. *Nursing Open*, 7(5), 1346-1353. https://doi.org/10.1002 /nop2.506

Nikolic, A., Bukurov, B., Kocic, I., Soldatovic, I., Mihajlovic, S., Nesic, D., Vukovic, M., Ladjevic, N., & Grujicic, S. S. (2022). The validity and reliability of the Serbian Version of the Smartphone Addiction Scale-Short Version. *International Journal of Environmental Research and Public Health*, 19(3), 1245.https://doi.org/10. 3390/ijerph19031245

Panova, T., Carbonell, X., Chamarro, A., & Puerta-Cortés, D. X. (2020). Specific smartphone uses and how they relate to anxiety and depression in university students: a cross-cultural perspective. *Behavior & Information Technology*, 39 (9), 944-956. https://doi.org/10.1080/ 0144929X.2019.1633405

Pew Research Center. (2021). Demographics of mobile device ownership and adoption in the United States. Pew research center: Internet and technology. https://www.pewresearch.org/ internet/fact-sheet/ mobile/

Randjelovic, P., Stojiljkovic, N., Radulovic, N., Stojanovic, N., & Ilic, I. (2021). Problematic smartphone use, screen time and chronotype correlations in university students. *European Addiction Research*, 27(1), 67-74. https://doi.org/10.1159/ 0005 067 38

Regan, T., Harris, B., Van Loon, M., Nanavaty, N., Schueler, J., Engler, S., & Fields, S. A. (2020). Does mindfulness reduce the effects of risk factors for problematic smartphone use? Comparing frequency of use versus self-reported addiction. *Addictive behaviors*, 108, 106435. https://doi.org/10.1016/j.addbeh.2020.1064 35

Scott, D. A., Valley, B., & Simecka, B. A. (2017). Mental health concerns in the digital age. *International Journal of Mental Health and Addiction*, *15*, 604-613. DOI: 10.1007/s11469-016-9684-0

Servidio, R., Griffiths, M. D., Di Nuovo, S., Sinatra, M., & Monacis, L. (2022). Further exploration of the psychometric properties of the revised version of the Italian smartphone addiction scale–short version (SAS-SV). *Current Psychology*, 1-14.https://doi.org/10.1007/ s12144-022-03852-y

Sohn, S. Y., Rees, P., Wildridge, B., Kalk, N. J., & Carter, B. (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: a systematic review, meta-analysis and GRADE of the evidence. *BMC psychiatry*, 19(1), 1-10. https://doi.org/10.1186/s12888-019-2350-x

Soni, R., Upadhyay, R., & Jain, M. (2017). Prevalence of smart phone addiction, sleep quality and associated behavior problems in adolescents. *International Journal of Research in Medical Sciences*, 5(2), 515-519. DOI: http://dx.doi.org/10.18203/2320-6012.ijrms201701 42

Szabo, A., & Demetrovics, Z. (2022). *Passion and addiction in sports and exercise*. Routledge. https://doi.org/10. 4324/ 97810 03173 595

Tan, C. S., Tee, X. Y., Rahim, N. A. B. A., Siah, Y. H., & Siah, P. C. (2023). Assessing the psychometric properties of the Smartphone Addiction Inventory and development of a new short-form among young adults in Malaysia. *International Journal of Mental Health and Addiction*, 21, 2274–2284 https://doi.org/10.10 07/s11469-021-00721-w

Thomée, S. (2018). Mobile phone use and mental health. A review of the research that takes a psychological perspective on exposure. *International Journal of Environmental Research and Public Health*, 15(12), 2692. https://doi.org/10.3390/ijerph15122692

Turner, A. (2020). How many smartphones are in the world? Published online at Bankmycell.com

Vaterlaus, J. M., Aylward, A., Tarabochia, D., & Martin, J. D. (2021). "A smartphone made my life easier": An exploratory study on age of adolescent smartphone acquisition and well-being. *Computers in Human Behavior*, 114, 106563. https://doi.org/10.1016/j.chb. 2020.106563

Vujić, A., Volarov, M., Latas, M., Griffiths, M. D., & Szabo, A. (2023). Psychometric properties of the Serbian Smartphone Application-Based Addiction Scale (SABAS) and validation of the English Version among non-native English speakers. *International Journal of Mental Health and Addiction*, 1-24. https://doi.org/10.1007/s11469-023-01013-1

Zencirci, S. A., Aygar, H., Göktaş, S., Önsüz, M. F., Alaiye, M., & Metintaş, S. (2018). Evaluation of smartphone addiction and related factors among university students. *International Journal of Research in Medical Sciences*, 6(7):2210-2216.DOI: http://dx.doi.org/ 10. 182 03/ 2320-6012. ijrms 20182805

Zhang, M. X., & Wu, A. M. (2020 a). Effects of smartphone addiction on sleep quality among Chinese university students: The mediating role of self-regulation and bedtime procrastination. *Addictive Behaviors*, 111, 106552. doi: https://doi.org/10. 1016/j.addbeh.2020.106552

Zhang, Y., Lv, S., Li, C., Xiong, Y., Zhou, C., Li, X., & Ye, M. (2020 b). Smartphone use disorder and future time perspective of college students: the mediating role of depression and moderating role of mindfulness. *Child & adolescent psychiatry and mental health*, 14(1), 1-11. https://doi.org/10.1186/s13034-020-0309-9