

# Epidemiology of Smartphone Addiction among University Students

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## Abstract

Smartphone dependence can be measured through questionnaires that evaluate time of use, feelings associated with the absence of the device, and habits related to the use of this technology. Unlike gambling addiction, smartphone addiction has not yet been classified as a disease within the areas of medical knowledge, but several studies show harm to individuals who develop this addiction, such as sleep, mood, and impulsive disorders. **Purpose:** We aim to find out the prevalence of smartphone addiction and determine its epidemiology among university students in the city of Maceió. **Methods:** The smartphone dependency scale was applied among undergraduates, validated by the author Julia Khoury, from the SPAI (Smartphone Addiction Inventory) questionnaire, using the cutoff point of 9 positive answers out of 26 questions. **Results:** In this research, a prevalence of dependence of 31.85% was found, without gender difference, with higher incidence among individuals under 40 years old. **Conclusions:** Given the high proportion of smartphone addicts and the consequences of this addiction, it is appropriate to discuss strategies to promote health and assist those affected.

## Keywords

Epidemiology, Smartphone, Addiction Medicine

## 1. Introduction

Currently more than 4 billion people are internet users worldwide, 90% of which

use smartphones instead of computers and this is an increasing number every year [1]. The term that designates addiction to smartphone is nomophobia. It refers to the anxiety, discomfort, or distress caused by not having a smartphone or computer.

Smartphone addiction, and consequently internet addiction, is mediated by low self-control, high stress levels, and impulsivity, as indicated by Nunes *et al.* [2].

In several studies smartphone addiction, neuroticism, and depression have shown a positive and significant correlation [3]-[5]. A significant correlation has also been seen between addiction and poor sleep quality and anxiety [6] [7]. In addition, excessive smartphone use can result in musculoskeletal symptoms in the hands, forearms, and neck [8].

A meta-analysis was conducted with information from 31 countries to assess the correlation between internet addiction and quality of life, which showed that the prevalence of addiction was 6% and it is inversely associated with pollution, quality and also dissatisfaction with life in general especially in countries where people spend a lot of time commuting [9].

Another study observed the main causes of smartphone addiction such as, entertainment like games and social networks which were positive predictors of smartphone dependence, which clearly showed that the incidence of dependence was higher for those who used the smartphone to access social networks than to play games [10].

Due to the high prevalence of smartphone addiction found in several studies and the consequences it generates in individuals, this study aimed not only to investigate it but also its epidemiology.

## 2. Materials and Methods

This was an observational and cross-sectional study. The sample size consisted of 415 undergraduates based on a Brazilian study conducted by Julia Khoury [11]. 10 of these 415 undergraduates were excluded from the research for not having answered all the questions in the questionnaire. The criteria for this research included individuals of both sexes, higher education students aged 18 to 50 years old and smartphone owners. Regarding the age range of the volunteers, it was divided into three groups with a difference of 10 years between the each group age. Data collection took place between February and December 2018 after approval by the Ethics and Research Committee of State University of Health Sciences of Alagoas (UNCISAL) with number CAAE: 79813417.8.0000.5011 on 12/12/2017.

To obtain social data, a self-administered sociodemographic questionnaire was applied. To assess smartphones use by the study volunteers, the Smartphone Dependency Scale (SPAI) was applied. This scale was developed and validated in Taiwan region in 2014 and translated and validated into Portuguese with the necessary cultural adaptations by Khoury in 2016 [11]. The dependence scale is a questionnaire which consists of 26 questions divided into four domains: the first

domain consists of questions related to “compulsive behavior,” the second domain contains questions about “functional impairment,” the third domain contains questions related to “withdrawal syndrome,” and the fourth and last domain evaluates questions about “tolerance syndrome.” Participants’ responses were objective in a yes/no format. The scoring was based on the number of “yes” responses on the scale. The points were then tabulated for comparison with the scale’s reference results. For each question on the scale, participants were also given the option “I do not wish to answer.” Individuals who answered yes to 9 or more out of 26 questions on the smartphone addiction screening instrument, were classified as smartphone-dependent [11].

In the descriptive analysis, the data were stored in Microsoft Excel. Quantitative data were presented as mean and standard deviation. Qualitative data were presented in the form of frequency tables while in the inferential analysis, to compare the interference of smartphone use on the performance of the scales and the demographic form—considering each response to the questionnaire and the final score of the volunteers’ the Chi-square test ( $\chi^2$ ) scale was applied. Statistical analysis was performed using BIOESTAT software, version 5.0, considering results statistically significant when  $P \leq 0.05$ .

### 3. Results

This was a sample of 405 university students, of whom 215 were female and 190 were male. Age ranged from 18 to 50 years old, with a mean of 25.34 years and a standard deviation of 6.98 years. Smartphone dependence was found in 31.85% of the participants who were classified as smartphone-dependent according to the smartphone dependence scale if there were a minimum score of 9 “yes” responses out of the 26 questions. No statistically significant difference was found between sexes regarding smartphone dependence. With respect to age group, a higher smartphone dependence was observed among individuals under 40 years of age ( $P < 0.05$ ). Among individuals aged 18 to 28 years the dependence rate was 33.55% ( $n = 99$ ), whereas among those over 40 years of age it was 17.39% ( $n = 4$ ). Participants who answered “I do not wish to answer” on the questionnaire were not included in the analyses, as it was a personal matter and was not related to the research objectives as well, as shown in **Table 1**.

**Table 1.** Sociodemographic profile of university students. Maceió (AL, Brazil), 2018.

Variable	N	Dependent (%)	Non-dependent (%)	<i>P</i>
<b>Gender</b>				
Male	190	54 (28.42)	136 (71.57)	0.44
Female	215	75 (34.88)	140 (65.11)	
<b>Age range</b>				
18 - 28	295	99 (33.55)	196 (66.44)	0.02
29 - 39	80	25 (31.25)	55 (68.75)	
40 - 50	23	4 (17.39)	19 (82.60)	

## Continued

<b>Marital status</b>				
Married	73	16 (21.91)	57 (78.08)	0.04
Single	313	106 (33.86)	207 (66.13)	
Divorced	11	4 (36.36)	7 (63.63)	
<b>Employment</b>				
Working	194	57 (29.38)	137 (70.61)	0.64
Not working	202	68 (33.66)	134 (66.33)	
<b>Extracurricular activities</b>				
Have activities	48	17 (35.41)	31 (64.58)	0.65
Have no activities	354	112 (31.63)	241 (68.07)	
<b>Residence</b>				
Local residents	316	96 (30.37)	220 (69.62)	0.36
Non-local residents	89	33 (37.07)	56 (62.92)	
<b>Academic year</b>				
1 <sup>st</sup>	178	64 (35.95)	114 (64.04)	0.36
2 <sup>nd</sup>	54	18 (33.33)	36 (66.66)	
3 <sup>rd</sup>	39	11 (28.20)	28 (71.79)	
4 <sup>th</sup>	59	14 (23.72)	45 (76.27)	
5 <sup>th</sup>	58	19 (32.75)	39 (67.24)	
<b>Reason for replacing the cellphone</b>				
Replacement due to technological advancement	122	37 (30.32)	85 (69.67)	0.20
Malfunction or loss	116	33 (28.44)	83 (71.55)	
Theft or robbery	28	11 (39.28)	17 (60.71)	

Regarding marital status, a higher prevalence of smartphone dependence was found among single or separated individuals compared to married individuals ( $P < 0.05$ ), as shown in **Table 1**.

There was no statistically significant difference in dependence between individuals who were employed and those who were not, nor with regard to performing or not performing any extracurricular activity other than the college/work ones. Furthermore, there was no statistically significant difference concerning the reasons for previous smartphone replacements (**Table 1**).

In the question regarding which application university students used most on their smartphones, among the 366 individuals who responded, the most frequent answers were: games, WhatsApp, Instagram, and Facebook. It was observed that the application most related to smartphone addiction was Instagram, with 38.88% of individuals who gave this answer presenting smartphone dependence ( $P < 0.0006$ ), as shown in **Table 2**.

**Table 2.** Most frequently used smartphone application. Maceió (AL, Brazil), 2018.

Variable	N	Dependent (%)	Non-dependent (%)	P
Instagram	54	21 (38.88)	33 (61.11)	0.0006
Facebook	7	1 (14.28)	6 (85.71)	
WhatsApp	272	92 (33.82)	180 (66.17)	
Games	3	1 (33.33)	2 (66.66)	

Unadjusted bivariate analysis

#### 4. Discussion

In the present study, a smartphone dependence rate of 31.85% was found in the sample. Similar to our findings, a study evaluating medical students in Jeddah reported a prevalence of smartphone dependence of 36.5%, showing a directly proportional relationship with the number of hours spent using the device [12]. Other study conducted in Brazil showed a prevalence of problematic smartphone use of 37.5% [13], while another study carried out in China found a rate of 29.8% [6]. Conversely, the study by Hidalgo-Fuentes *et al.* found dependence in only 19.97% of participants [14], and 21.3% was reported in the study by Long *et al.* [15]. These differences in findings may be due to different methods used to assess smartphone dependence, as well as cultural characteristics of each studied population.

Regarding marital status, this study showed a higher prevalence of dependence among single or separated individuals. However, in the study by Aker *et al.*, no difference was found in this aspect [16]. This may be due to differences in the questionnaire applied, associated with sociodemographic and cultural differences, since the sample age range was from 19 to 21 years old, unlike the present study, which included individuals aged 18 to 50 years old.

No gender difference in dependence was identified in this study, which is consistent with other research conducted in Jeddah [12], France [4], Lebanon [7], and China [15]. On the other hand, some studies showed a significant association between smartphone dependence and women [17] [18]. This divergence in results may be due to different assessment methods and population age ranges, since both studies used samples of young individuals, with a maximum age of 26 years old.

A significant association between smartphone dependence and younger age groups (under 40 years) was observed, in agreement with studies by Barrault *et al.* [4], Alhassan *et al.* [5] and Hidalgo-Cajo *et al.* [19]. Most studies included in the literature review did not include individuals over 30 years of age, which prevented a large-scale comparison regarding age groups [6].

The prevalence of social networking and communication app use was high among participants who responded to our study (97.13%), and among these 34.21% presented smartphone dependence. This finding agrees with a study conducted in South Korea, in which a significant percentage of smartphone-addicted users (36.04%) used their devices for entertainment compared to normal users (28.24%) [17]. Among the most commonly used smartphone applications, Insta-

gram showed the highest prevalence of smartphone dependence (38.88%), which may be correlated with the brain reward mechanism triggered by “likes” on the application [20].

## 5. The Study Limitations

The fact that the study was conducted with a sample from a single educational institution made it difficult to generalize the results found, as well as the lack of an objective instrument for data collection, consequently requiring it to be based on self-reporting, which limited the generalization of the conclusions.

## 6. Conclusions

This study demonstrated a high proportion of university students with smartphone dependence. No statistically significant difference was found regarding gender; however, there was a difference related to age group, with greater relevance among younger individuals. This may be attributed to the fact that these technologies have emerged within the last 20 years and have been part of the lives of many young people since birth.

It is known that smartphone dependence has not yet been included in the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders); however, given the high incidence of dependence and the possible modifiable causes, such as anxiety and mood disorders, this topic has become particularly important.

The causes that trigger addiction are amplified due to dependence, as it generates further psychosocial disorders. Therefore, the development of new studies on this topic is essential, whether through quantitative or qualitative research. Guidance, psychological support, and psychiatric care—when necessary—are also considered essential for individuals predisposed to depression, self-control reduction, and smartphone dependence, as well as to the technologies related to it.

## Conflicts of Interest

The authors report there are no competing interests to declare.

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