Addiction toward Smartphone on College Students, during the Contingency Derived from COVID-19

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Abstract
The purpose of the study focuses on determining the level of addiction to the Smartphone in university students, as well as evaluating the perception between men and women, in relation to the elements that determine the addiction to the Smartphone. Through a non-probabilistic sample by self-determination, the groups were invited to participate in order to capture the largest possible number of cases. It was established as an inclusion criterion that they were students enrolled in a school cycle, belonging to a public university. To obtain data, the scale designed by Kwon, Kim, Cho & Yang (2013) called Smartphone Addiction Scale (SAS) was used, which consists of 10 indicators with a Likert-type response option, as well as questions related to the profile of participants. The main findings were: in relation to women, the level of addiction (64 %) corresponds to scores between 10 and 22, classified as the lowest level, with scores greater than 33 considered as addicted people. 27 % of the women surveyed present high risk levels. In relation to men, 64 % correspond to scores between 10 and 21, which reflects that the level of addiction to the smartphone in men is low, although a considerable percentage (29 %) presented a high level of risk. In relation to the perception between men and women, in relation to the elements that are considered determinants of the addition to the smartphone, the AFE was used. 63 % of the variance is explained by three factors, whose items with the greatest weight in each component are: resistance (.798), in the second component the item with the greatest weight is people (.797) and the third groups four items and the one with the greatest weight is responsibility. In women, the variables are grouped into 2 components, in component one the item with the greatest weight is resistance (.825), in the second factor the item with the greatest weight is muscle (.756), together they provide a variance of 56.07 %.

Keywords: Internet addiction, smartphone, COVID-19.

1. Introduction

We are currently experiencing a complicated moment derived from the health contingency caused by COVID-19, which has generated substantial changes in all human activity. The effort made by science in the field of virology, as a discipline in charge of studying viruses and those less complex genomic agents called subvirals, to seek the necessary cure for this disease, is advancing slowly and at the same time variants of this strain continue to emerge malignant. However, economic activity has not stopped completely, on the contrary, various protocols have been

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implemented to be able to combine both things, on the one hand, coping with this virus and, on the other, the activity of the human being.

Communication between people, whether within family, social, business life and in all types of organization or space, has had the need to innovate with the appearance of social networks and the internet, but an important element that has facilitated this communication, have been portable telephones, called Smartphones.

This tool has already caught the attention of scholars on the subject, since a phenomenon has been presented which has been called Smartphone addiction (Darcin et al., 2017; Lee et al., 2018; Alkhunzain, 2019; Saad, 2020; García-Santillán et al., 2021; García-Santillán, Espinosa-Ramos, 2021).

The phenomenon of addiction that occurs in mobile phone users leads us to ask if: Does the smartphone generate addiction? Specifically, in a population that is vulnerable due to the type of social activity they carry out and that has also become a fashion, referring to youth, therefore another question is established: Do students present a high level of addiction to the smartphone? In addition, does the perception differ between men and women, in relation to the determining elements of addiction the smartphone?

Objectives: to evaluate the level of addiction to the smartphone presented by the students, as well as to evaluate the perception between men and women, in relation to the determining elements of the addiction to the smartphone.

Hypothesis

Ho1: In men, the level of addition to the smartphone is not high

Ha1: In men, the level of smartphone addiction is high

Ho2: In women, the level of addition to the smartphone is not high

Ha2: In women, the level of smartphone addiction is high

For the development of the empirical study, the theoretical foundation that explains the level of addiction to the Smartphone is now analyzed and discussed.

2. Literature review

Various arguments have been put forward regarding the use of the Smartphone. At the beginning, a couple of decades ago, the cell phone was applied more frequently for work (Ling, 2002), even the use was focused more on men than women. In its evolution, it was used as a symbol of identity for young people who wanted to be part of a social group (Mante, Piris, 2002; Protegeles, 2005).

The literature provides evidence that indicates that the levels of addiction to the Smartphone have been present in various populations that have been studied. In addition, the reported findings indicate that these levels have differed by gender, as demonstrated by the study by Demirci et al., (2014) and Alkhunzain (2019). Although the subject of study focuses on the smartphone or mobile phone, it is important to recognize that to a great extent the excessive use that has generated addictions is also supported by the birth of the Internet, as pointed out in the work of Yehuda et al., (2016) who refer that Smartphone addiction is highly correlated to internet addiction. This is due to the easy access and the possibility of having the information at hand when needed, which leads to an excessive use of both technologies.

This technology brought with it the appearance of social networks and with it, the excessive use of users of these applications to be in communication with their loved ones and with the rest of the world. So we could think that Internet addiction goes hand in hand with Smartphone addiction. Authorities have already spoken about the phenomenon of internet addiction, one of them is Dr. Kimberly Young, who is considered a leader in the field of internet addictions.

In 1996, Dr. Kimberly Young presented research on the existence of Internet addiction at the 104th annual meeting of the American Psychological Association in Toronto, Canada. This research presents the problems caused by a potential misuse of this technology. Similarly, Dr. Young has published on support and treatment measures to address this addictive disorder generated by the Internet (Young, 1998).

Although the internet is the medium or conduit through which we can access the different platforms and social networks, it is the addiction to the Smartphone, the central theme addressed in this work. Therefore, with this consideration, in the literature review analysis, several works are identified which reported evidence on Smartphone addiction in different populations and contexts (Kim et al., 2014; Choi et al., 2015; Kahyaoglu et al., 2016; Gökçearslan et al., 2016; Yehuda et al., 2016; Arefin et al., 2017; Lee et al., 2018; Alkhunzain, 2019; Saad, 2020; García-Santillán et al., 2021; García-Santillán, Espinosa-Ramos, 2021).

However, the great difference between pathological behavior and excessive or frequent use has also been noted, since, as pointed out by Billieux et al. (2015) frequent use is not a pathological behavior, unless it is accompanied by addictive disorders.

The differences by gender recently reported in relation to addiction to the Smartphone suggest that, between men and women, it is not a high risk, although they do differ among themselves, which results in students not planning their work (García-Santillán, Escalera-Chávez, 2021). For their part, Lee & Kim, (2018) carried out a study on students who are in the risk group for behaviors on Smartphone addiction in South Korea. In their report they point out that the behavior between men and women was not significantly different (15.18 % men and 13.39 % women). In their study they evaluate indicators related to: the time of use of the smartphone, the use given to games and videos, even for music. Another important indicator that they point out is the poor communication with parents, motivated by the use of smartphones. In their conclusion, they point out that it is necessary to develop behavior prevention programs on Smartphone addiction.

Another study carried out by Cerro, Rojo, González, Madruga and Prieto (2020) on a sample of 271 participants who were in summer camps in the Extremadura region, reported interesting findings regarding the levels of dependency and addiction towards the Smartphone, in the order of 53.1 % and 23.6% respectively, which makes evident in the first case, a significant percentage that should be paid attention to. They also reported findings in relation to the difference between gender, since men showed a higher level of addiction versus women (30.3 % and 18.1 % respectively), they even report another finding regarding the economic expenditure they make where in the same way men invest more than women, although these economic expenses could be paid by the parents, since the study was carried out in people between 16 and 18 years of age. In this idea, considering these theoretical arguments previously exposed, an empirical study is now developed to be able to determine the level of addiction towards smartphones that students present and with it, determine if that addiction is different between men and women.

3. Methods

This study is developed from a cross-sectional, descriptive and exploratory quantitative approach whose participants are undergraduate students from a public institution located in the Port of Veracruz. The type of sample is non-probabilistic by self-determination, since all groups are invited to participate, in order to obtain the largest possible number of cases. The inclusion criterion is that they are current regular students, enrolled in a school year. The instrument used is the scale of Kwon, Kim Cho & Yang, (2013) called The Smartphone Addiction Scale (SAS), which consists of 10 indicators with a Likert-type response option, as well as questions related to the profile of the participants.

Data collection and statistical analysis.

The data collected was analyzed using the IBM Statistic SPSS 25 version for descriptive and exploratory analysis using factor analysis with component extraction, as well as the t-test to determine the level of addiction in men and women. The reliability of the instrument on a Likert scale is evaluated using Cronbach's alpha, based on the following expression:

$$\alpha = \frac{K}{K-1}\left[1 - \frac{\Sigma Vi}{Vt}\right] \qquad (1)$$

Where: α=Cronbach's Alpha; K= Number of items; Vi= Variance of each item and Vt= Total variance.

In addition, since the instrument is a Likert format scale, and in the absence of normality, it is suggested to use the EFA with polychoric correlation matrix (PCC) (Ogasawara, 2011; Timmerman, Lorenzo-Seva, 2011).

4. Results and discussion

After the data analysis, the result obtained from the hypothesis test is now exposed, with which the research questions and the achievement of the study objectives are answered. Firstly, the reliability of the test is good (> 0.75) and the data, presents an absence of normality, therefore the EFA was performed with polychoric matrices (Ogasawara, 2011; Timmerman, Lorenzo-Seva, 2011).

In other sense, because the scale differs between men and women, the following parameters or scores should be considered: for men they are considered addicted if they score more than 31 points, while between 22 and 31 a high risk is inferred. For their part, women are considered addicted for scores above 33 and high risk between 22 and 33.

Table 1 shows the highest percentage (64 %) which corresponds to scores between 10 and 21, which reflects that the level of addiction to the smartphone in men is low. Although there is a considerable percentage (29 %) with a high level of risk. To corroborate the statistical significance, the t-test was applied. The table shows that the p-value (0.137) is greater than the selected significance level (0.05), therefore the null hypothesis is not rejected and it is concluded that the addition to the smartphone is not high.

Table 1. Addiction level men

Scores	%	Level
10- 21	64	low
22-31	29	High risk
> 31	7	Addicts
Total	100%	
Variable	*t*	*df*	*Sig*
Addiction toward smartphone	1.496	156	.137
Cronbach's alpha (>0.75)			

Source: own

In relation to women, Table 2 shows the level of addiction in women, in which we can observe that the highest percentage (64%) corresponds to scores between 10 and 22, classified as the lowest level according to the scores considered by De Pasquale, Sciacca, Hichy (2017) who points out that scores greater than 33 are already considered as addicted people. In addition, we observe in Table 2 that 27 % of the women surveyed have high risk levels.

To verify statistical significance, the t-test was applied. Table 2 shows that the value of p (.360) is greater than the level of significance selected (0.05), which indicates that the null hypothesis is not rejected and it is concluded that the addition to the smartphone is low.

Table 2. Addiction level women

Scores	%	Level
10-22	64	low
23-32	27	High risk
> 31	9	Addicts
Total	100 %	
Variable	*t*	*df*	*Sig.*
Addiction toward Smartphone	.919	150	.360

Source: own

Hypothesis 3: Ho: There is no difference between men and women perception, in relation to the elements considered determinants of the smartphone addition; Ha: There is a difference between men and women perception, in relation to the elements considered determinants of the smartphone addition

With the factorial analysis, the factors in each group were determined. Tables 3 and 4 show the results in relation to the group of men. Table 3 shows the correlations between the variables, all values tend to one and none is zero. In addition, the value of the Chi² statistic (478.548) with 45 *df* and the value of the determinant is significant (.043) which indicates that the variables are suitable for performing an EFA. In addition, the values of the Measure of Sampling Adequacy (MSA), all are greater than .50.

Table 3. Correlation matrix, KMO and significance in the group of men

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	MSA
X_1	1.000	.442	.334	.142	.293	.317	.162	.139	.319	.271	.801
X_2		1.000	.319	.241	.275	.265	.304	.199	.431	.268	.821
X_3			1.000	.152	.331	.397	.123	.244	.215	.171	.761
X_4				1.000	.528	.216	.563	.362	.366	.281	.844
X_5					1.000	.377	.537	.343	.286	.310	.798
X_6						1.000	.316	.260	.342	.207	.853
X_7							1.000	.441	.491	.301	.807
X_8								1.000	.545	.493	.827
X_9									1.000	.520	.804
X_{10}									.	1.000	.833
KMO		.815									
Chi-square (45df)		478.548		Significance		.000					
Determinant		.043									

Source: own

Table 4 shows that the variables are grouped into 3 components; component one includes three items, the item with the greatest weight is resistance (.798), the second includes three elements, the item with the greatest weight is people (.797) and the third groups four items and the one with the greatest weight is responsibility (.745). Also in this table, it is observed that the three components together provide a total variance of 63 %.

Table 4. Components, communalities and variance in the group of men

Variables	Component			Communalities
	1	2	3	
Resistance	.798			.690
Impatience	.764			.714
Influence	.758			.708
People		.797		.669
Mobile		.777		.727
networks		.706		.626
Responsibility			.745	.606
Muscular			.736	.567
Concentration			.617	.507
Use			.608	.496
Eigenvalue	3.934	1.332	1.045	
% de Variance	21.37	20.959	20.767	
% Total variance	63.100			

Source: own

In relation to the group of women, Tables 5 and 6 show the results about perception to the smartphone. Table 5 shows the correlations between the variables. It can be seen that the values none are zero. Likewise, the value of the Chi² statistic (543.26) with 45 df, and the value of the determinant is significant (.000), which indicates that the variables are suitable for performing an exploratory factor analysis. Similarly, the values of the Measure of Sampling Adequacy (MSA), all are greater than .50.

Table 5. Correlation matrix. KMO and significance in the group of women

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	MSA
X_1	1.000	0.348	0.294	0.305	0.336	0.373	0.328	0.223	0.358	0.259	.901
X_2		1.000	0.270	0.373	0.364	0.374	0.350	0.248	0.365	0.336	.928
X_3			1.000	0.193	0.311	0.129	0.254	0.237	0.288	0.242	.809
X_4				1.000	0.595	0.493	0.714	0.484	0.515	0.464	.843

X_5		1.000	0.519	0.466	0.374	0.485	0.481	.869
X_6			1.000	0.477	0.313	0.459	0.424	.899
X_7				1.000	0.549	0.547	0.525	.847
X_8					1.000	0.493	0.425	.912
X_9						1.000	0.420	.931
X_{10}							1.000	.926
KMO	.885	Chi-square $_{(45df)}$ 543.26		Sig .000			

Source: own

Table 5 describes the variables involved, which are grouped into 2 components; component one includes seven items, the item with the greatest weight is resistance (.825), the second component integrates three elements and the item with the greatest weight is muscle (.756). Similarly, it is shown in the table that the two extracted components together provide a total variance of 56.07 %.

Table 6. Components, communalities and variance in the group of women

Variables	Components		Communalities
	1	2	
Resistance	.825		.704
Influence	.822		.705
networks	.708		.507
People	.672		.497
Mobile	.666		.556
Impatience	.645		.556
Use	.633		.482
Muscular		.756	.576
Responsibility		.713	.557
Concentration		.600	.468
Eigenvalue	4.578	1.030	
% Variance	45.780	10.296	
% total variance	56.076		

Source: own

The results obtained from each group provide evidence that suggests that the elements that measure the smartphone addition are not perceived in the same way: men classify into three components, however, component 3 of the men's group contains 3 of the items of component two of the women's group, but its weight in each group is different. Regarding this result, findings have already been reported that suggest a gender difference in relation to Smartphone addiction between men and women, although it is not high risk, if they differ from each other (García-Santillán, Escalera-Chávez, 2021).

Similarly, these findings are not consistent with what Lee and Kim (2018) reported, since although the population is younger, they did not find significant differences in this addictive behavior towards the Smartphone. For these purposes, it is important to note that, although the population is not homogeneous in terms of age, it is clear that an early age some attitudes and behaviors begin to be reflected, which are continued over time, passing through the youth and maturity, so the comparison makes sense, based on this argument.

In the study carried out by Cerro, Rojo, González, Madruga and Prieto (2020), they reported findings in relation to the difference between genders, since men have a higher level of addiction than women, in the same way they report findings relative to the monetary expenditure they make, being men who invest more than women.

5. Conclusion
According to the results we can say the following: Firstly, we were able to learn that the highest percentage of participants, both men and women, are in the range of 10-22 points, which

are considered low risk (64 %) and 29 and 27 %, respectively, in the high range. With these data we can say that most of the participants do not present levels of addiction that deserve immediate attention, at least not according to the theoretical criteria with which the scale used in this study was designed.

However, the important thing is to highlight the percentages of the high levels, since, although the percentage is lower in both men and women (29 and 27 % respectively), it is convenient to pay attention to this group of people who are in this addiction range. The big question is whether this addiction is due to the strenuous work that derives from academic activities such as homework from their respective courses in which they are enrolled, or beyond that, excessive use in their moments of leisure and recreation, when they are out of all academic activity.

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