

Mobile telephony in students of physical education dependency or addiction

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ABSTRACT

In this initial study on the dependency or addiction to mobile telephony in the university students of the Faculty of Educational Sciences of the University of Granada, two fundamental objectives are intended. First, establish the technical adequacy (reliability and validity) of the instrument and second, determine the degree of addiction / dependence to the mobile device that presents the sample object of investigation at a merely descriptive level. We have used a descriptive methodology per survey, responding to a sample of 60 subjects. Some of the conclusions of the work are: With regard to validity, we can affirm that the instrument claims to measure the construct for which it has been developed through the adaptation of other instruments, that is, it is creditor of content validity. It has also revealed the presence of a remarkable concurrent criterial validity that shows that the items individually measure the same as the scale in its entirety. In the second block of conclusions we highlight the fact that, in a general way, levels of dependency / addiction to the mobile device have been moderately low. **Keywords:** Mobile telephony; Addictions; University students.

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INTRODUCTION

Contemporary society is immersed in an ongoing process of alteration, transformation and adaptation to New Technologies. In this context, mobile phones are no longer a business implement or a luxury item, but a personal device so widespread that it has become “an important space for the socialization process that influences behaviours and attitudes” (Castellana, Sánchez-Carbonell, Graner and Beranuy, 2007, p. 196). Further improvements in mobile technology have provided individuals with multi-purpose tools capable of more than facilitating communication with others at any time and place. Per Saldaña (2001), the design of this technology can potentially weaken one’s capacity for control and lead to the onset of addictive behaviour. As experienced users capable of acquiring proficiency over novel technologies faster than adults, adolescents are of particular interest to the study of addiction related to mobile phone use. Adolescents are native to the current technological era and exhibit a fascination with technological innovation (Chóliz et al. 2009) that can have potentially harmful effects in their daily lives. Specifically, mobile phones have become a staple accessory for teenagers, one that is utilized in every aspect of their social relationships and activities (Puyol Pérez, A. 2010), even if a gender disparity has been observed with regard to their use. As previously stated, mobile phones are used for more than facilitating interpersonal relationships; among their many functions, they are a medium for leisure and entertainment, activities in which “men and women exhibit differences that can explain the distinctly gendered patterns of mobile phone use” (Chóliz et al. 2009, p. 76).

Addiction to New Technologies has been widely discussed since Goldberg and Young raised the issue in 1995, but in Spain the issue gained media attention in 2002 with the publication of a number of empirical articles on addiction. Current data on NT use is scarce but several institutions and authors, having studied its effects on children and adolescents, have yielded some alarming figures. Among them, the 2002 study conducted by Protégeles for the Spanish Children’s Ombudsperson, titled “*Seguridad Infantil y Costumbres de los Menores en Internet*” [“Child Safety and Children’s Habits on the Internet”], shows that nearly half of the interviewed children used the internet daily and 11% of those admitted to feeling the need to use it habitually.

A review of previous studies

The 2002 study “*Jóvenes, Sociedad de la Información y Relaciones Familiares*” [“Youth, Information Society and Family Relationships”] conducted by the Spanish National Research Council showed that, even then, 81.4% of respondents owned a mobile phone. Of those, 23.7% used it frequently for calls and messaging and 92.4% used it sporadically for errands and short family calls. A study by Chóliz et al. (2009) showed that, among respondents aged 12 to 14, 92% owned a mobile phone; among respondents aged 17 to 18, phone ownership increased to 99%. The Spanish Ministry of Education, Culture and Sports conducted a statistical study titled “*La Sociedad de la Información y la Comunicación en los Centros Educativos no Universitarios*” [“Information Society and Communication in Non-University Educational Centers”] between the years 2014 and 2015, showing that 92.7% of regular classrooms featured an internet connection, connections to which came from laptop computers (45.2%) and touchscreen devices like tablets or mobiles (11.5%). The Spanish Statistical Office undertakes a yearly study on the state of implementation and use of Information Technologies in Spanish homes. The latest such study, in 2018, showed that 82.5% of people between 16 and 74 years of age were frequent internet users, up from 71.2% in 2014.

The fascination of children and adolescents with mobile phones has impacted their demand, and subsequent studies have shown that possession and usage of the devices has increased steadily since their entrance in the market, to the point that “the information shared by adolescents on the net, along with its abundance of options and its promise of anonymity, have become an optimal breeding ground for the development of a

number of addictions” (Puyol Pérez, 2010). Compounding this issue, many parents have turned to smartphones as allies in controlling their children or keeping them distracted and ‘out from underfoot’. Simultaneously and paradoxically, young users perceive mobile phones to be a source of independence from their parents. The reality is that parents cannot fully control their children’s activities and children’s independence is beholden to their constant availability. Users are incentivized never to turn off their devices, not even at night. This ‘always on’ form of connectivity has impacted “not only the pattern of social communication, but the very concepts of availability and personal privacy” (Chóliz et al. 2009, p. 82).

METHODOLOGY

The research presented can be considered a pilot-survey study, given the size of the sample (N=60). As per Hernández, Fernández and Baptista (2005) as well as Palella and Martins (2003), it is worth restating that pilot studies are preliminary explorations of limited-scale samples from a context wherein a larger-scale study will later be conducted. Similarly, Malhotra (2008) defines a pilot-survey as the application of a survey to a small sample of respondents in order to identify and address possible obstacles in the design of a full-scale survey.

The goal of any pilot-survey study is to refine and improve the psychometric properties of the instrument to be administered; in other words, to evaluate how reliable and valid that instrument will be.

Research objectives

This pilot study is guided by two main objectives:

- a) To evaluate the technical adequacy (reliability and validity) of the instrument.
- b) To determine, at a merely descriptive level, the degree of addiction/dependency to mobile devices exhibited by the studied sample.

Research variables

Two types of variables have been considered for this study. Firstly, those identifying variables present in the data-gathering instrument which can be considered independent attributes. Due to the constraints of this pilot survey, only two of these variables were considered:

- a) Gender as a binary answer: male or female.
- b) Age.

Secondly, responses to each of the items in the data gathering instrument were considered dependent variables, along with any latent variables arising from the items’ thematic grouping.

Sampling characteristics and methodology

Due to the exploratory nature of this research, implementing a sampling typology was deemed unnecessary. Instead, the instrument was applied to a group of Physical Education students at the University of Granada. The sample size of this group was N=60 and their age and gender distributions were as shown in tables 1 and 2.

As shown in these tables, the studied sample was overwhelmingly female (95% versus a 5% of males) and predominantly 18 years old (43.33%) or 19 years old (16.67%). The mean age of the sample was 19.5 years old with a standard deviation of 2.05 years and minimum and maximum values of 17 and 27 years old respectively.

Table 1. Percent distribution of the sample by gender.

	Sex	Frequency	Porcentaje	Porcentaje acumulado
Valid	Man	3	5	5
	Woman	57	95	100
	Total	60	100	

Table 2. Percent distribution of the sample by gender.

	C	Frequency	Porcentaje	Porcentaje acumulado
Valid	17	2	3.3	3,3
	18	26	43.3	46.7
	19	10	16.7	63.3
	20	6	10	73.3
	21	6	10	83.3
	22	5	8.3	91.7
	23	1	1.7	93.3
	24	3	5	98.3
	27	1	1.7	100
	Total	60	100	

Data gathering instrument

For data gathering, a questionnaire was created *ad hoc* by selecting and adapting items from pre-existing standardized instruments. This questionnaire includes a number of identifying variables (gender, age, degree and university), but as previously stated only gender and age of the studied sample were considered for this initial pilot study.

The pilot study is concerned only with items related to the use/abuse of mobile devices, but the questionnaire includes items unrelated to the matter. Items in the questionnaire fall into two categories: items with non-exclusive categorical responses (4 items) and items with Likert-type scale responses (28 items) for a total of 32 items each with four response categories: *never*, *sometimes*, *often*, and *always*.

Quality parameters for the data gathering instrument

As established, the objective of a pilot study such as this is to determine the degree of reliability and validity of the instrument in order to remove or reformulate those items that fall below minimum acceptable standards.

To this end, reliability was assessed as internal consistency (given one single administration of the data gathering instrument) among items susceptible to that measure (that is, the 28 scale response items) utilizing a Cronbach's alpha procedure for a value of $\sigma = .92$. For a pilot study with a sample size of 60 students and 28 items, this is a very high value (Abad, Olea, Ponsoda and García, 2011) that indicates the scale possesses a high reliability as internal consistency.

Additionally, Cronbach's alpha values were calculated for the scale as a whole if each of its 28 items is individually deleted. These values are shown in the following table.

Table 3. Cronbach's alpha values if items are individually deleted.

Ítems	Alfa de Cronbach if the element has been deleted
4.5. Are you feeling bad when for some reason you can't use your mobile phone?	.915
4.6. Are you thinking from hours before using the mobile?	.915
4.7. Do you have discussions with your friends for the time you spend using the mobile?	.917
4.8. Do you lie to your family or friends about the hours you spend on mobile?	.916
4.9. Have you ever tried to stop using your mobile and you have not succeeded?	.915
4.10. Do you relax using your mobile?	.916
4.11. Do you feel nervous if it has been a long time since you last used your mobile?	.913
4.12. Do you check your cell phone in case someone has called or written to you?	.915
11. Have you reduced your mobile phone use because you thought you were hooked?	.915
12. Do you lose track of time when you are talking on the mobile?	.913
13. Have you felt bad about spending too much time with your mobile?	.914
14. Have you ever tried not to use your mobile and have not been able to do so?	.910
15. Have you ever hidden from your parents the money you invest in mobile?	.918
16. How many times have you ever used the mobile in class?	.918
17. How many times by inertia do you look at the mobile per day? (have you been written or not).	.914
18. Is it easier for me to convey feelings and emotions through emoticons than in front of the person I want to express it to?	.914
19. The first thing I pick up in the morning after getting up is the cell phone.	.918
20. I return home while I go to class if I have left the phone at home.	.922
21. I often use my mobile when I'm bored.	.915
22. I have simulated receiving a call to avoid a compromised situation.	.917
23. I spend more and more time with the mobile.	.911
24. I spend more time on my mobile than I should.	.912
25. I have anxiety or become irritable if my mobile phone is not in sight.	.913
26. I panic when I think I lost my cell phone.	.915
27. I have discussed with my partner, friends or family about the use of mobile phones.	.916
28. I use my mobile when I'm driving.	.919
29. I tried to stop using my phone so much, but the intention has not lasted long.	.913
30. I need to reduce my use of mobile phones, but I fear that I cannot do it.	.913

As shown, Cronbach's alpha coefficient values of the scale not only do not improve but fall markedly (to $\alpha < .92$ values) when each of the scale-response items is deleted from the instrument. Consequently, each of the items under consideration can be said to be necessary and should remain in the instrument, as their deletion would decrease the level of consistency of the scale.

Along with reliability, two types of validity were estimated: content validity and concurrent criterion validity. Content validity seeks to guarantee that the items present in the instrument measure the construct for which

they were designed; in other words, that the instrument measures what it is supposed to. In order to certify content validity, a scale based on three previously standardized instruments was constructed. Specifically, 12 items were adapted from Labrador and Villadangos (2010), 8 from Ordóñez, Urbano and Esparrell (2013), and 12 from Bolaños (2015) for a total of 32 items. Of these, the 28 items with scale responses were considered for content validity measurement.

Table 4. Corrected item-total correlation values.

Ítems	Total correlation of the elements corrected
4.5. Are you feeling bad when for some reason you can't use your mobile phone?	.542
4.6. Are you thinking from hours before using the mobile?	.539
4.7. Do you have discussions with your friends for the time you spend using the mobile?	.364
4.8. Do you lie to your family or friends about the hours you spend on mobile?	.515
4.9. Have you ever tried to stop using your mobile and you have not succeeded?	.534
4.10. Do you relax using your mobile?	.473
4.11. Do you feel nervous if it has been a long time since you last used your mobile?	.640
4.12. Do you check your cell phone in case someone has called or written to you?	.503
11. Have you reduced your mobile phone use because you thought you were hooked?	.496
12. Do you lose track of time when you are talking on the mobile?	.658
13. Have you felt bad about spending too much time with your mobile?	.583
14. Have you ever tried not to use your mobile and have not been able to do so?	.799
15. Have you ever hidden from your parents the money you invest in mobile?	.351
16. How many times have you ever used the mobile in class?	.346
17. How many times by inertia do you look at the mobile per day? (have you been written or not).	.574
18. Is it easier for me to convey feelings and emotions through emoticons than in front of the person I want to express it to?	.567
19. The first thing I pick up in the morning after getting up is the cell phone.	.300
20. I return home while I go to class if I have left the phone at home.	.253
21. I often use my mobile when I'm bored.	.509
22. I have simulated receiving a call to avoid a compromised situation.	.451
23. I spend more and more time with the mobile.	.754
24. I spend more time on my mobile than I should.	.701
25. I have anxiety or become irritable if my mobile phone is not in sight.	.680
26. I panic when I think I lost my cell phone.	.495
27. I have discussed with my partner, friends or family about the use of mobile phones.	.437
28. I use my mobile when I'm driving.	.196
29. I tried to stop using my phone so much, but the intention has not lasted long.	.647
30. I need to reduce my use of mobile phones, but I fear that I cannot do it.	.627

The goal of assessing concurrent criterion validity is to determine the degree of correlation between each individual item of the scale and the scale itself. To this end, a corrected item-total correlation coefficient was implemented, the results of which are shown in Table 4.

Only for two of the items (20 and 28) does $r < .30$. Per Martínez-Arias, Hernández-Lloreda and Hernández-Lloreda (2006) as well as Muñiz (2010), these results substantiate that these items measure the same construct as the scale in its entirety and, since the correlation is positive in every case, that they measure it in the same direction. In light of this, the scale can be said to possess concurrent criterion validity.

Data analysis

The data obtained was analysed using SPSS v.24 statistical analysis software. Different descriptive statistical methods were used (frequencies, percentages, arithmetic averages, standard deviations) given the lack of sufficient independent attribute variables for the application of correlations that could indicate differential effects.

Of particular note are the locations where students use their mobile devices. A near totality of the sample (57 students, a 95% of respondents) professed to use their phones in their bedrooms. This was the most popular location, followed by their educational centres (high-school or university campus) with 61.7% (37 respondents), their places of reunion with friends (36.7%, 22 respondents) and other locations (13.3%, 8 respondents).

Among these other locations, respondents favoured: while walking on the street, while waiting for someone, at home, etc. As far as who bears the cost of the phone bill, a majority (86.7%, 52 respondents) claimed to have it paid by their parents. Only 11.7% (7 respondents) foot their phone bill with their own money, while one single respondent (1.7% of cases) claimed it was their partner who paid for their phone expenses.

Another revealing aspect of the survey codified the amount of time respondents spend on their phones each day and each week. The results are reflected in Figure 1 and Figure 2.

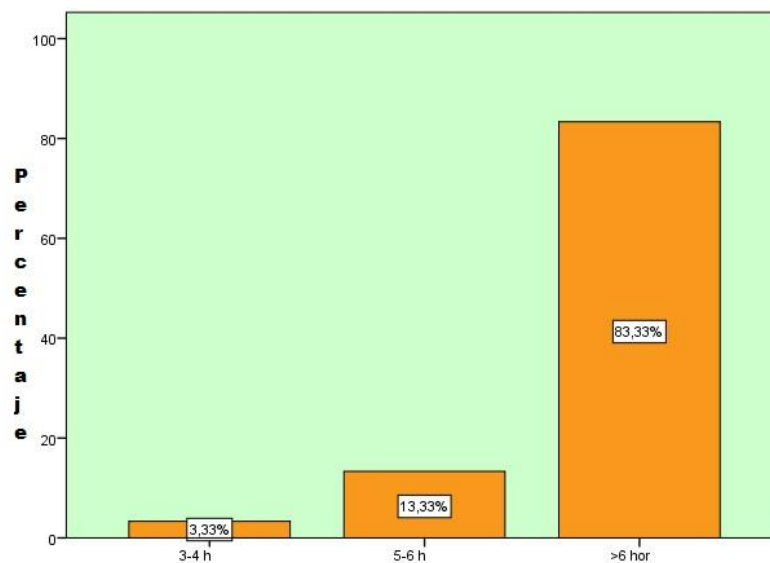


Figure 1. Percent distribution of number of hours spent using a mobile device in a week.

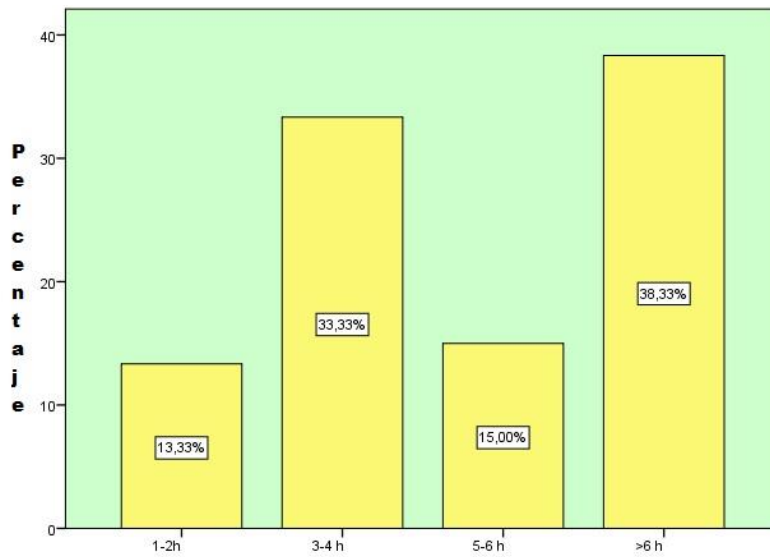


Figure 2. Percent distribution of number of hours spent using a mobile device in a day.

A majority of respondents (N=50, 83.3%) claimed to use their phone for more than 6 hours in a normal week; 8 respondents (12.3%) estimated their weekly usage between 5 and 6 hours and only 2 respondents (3.3%) estimated it between 3 and 4 hours.

In a regular day, 23 respondents (38.3%) estimated their usage to be above 6 hours, 20 (33.3%) estimated it to be between 3 and 4 hours, 9 respondents (15%) use their phones between 5 and 6 hours and, finally, 8 respondents (13.3%) limit their phone usage to 3-4 hours a day.

Items with strictly scale-based responses are shown on table 5 along with their response percentages and averages.

Table 5. Valid percentages per response category and average responses for scale-based items.

ITEMS	Valid percentages of the response and average categories obtained				
	Never	Sometimes	Usually	Always	\bar{X}
4.5. Are you feeling bad when for some reason you can't use your mobile phone?	46.7	36.7	11.7	5	1.75
4.6. Are you thinking from hours before using the mobile?	61.7	26.7	5	6.7	1.57
4.7. Do you have discussions with your friends for the time you spend using the mobile?	80.0	18.3	1.7	-	1.22
4.8. Do you lie to your family or friends about the hours you spend on mobile?	90	6.7	3.3	-	1.13
4.9. Have you ever tried to stop using your mobile and you have not succeeded?	56.7	31.7	10.0	1.7	1.57
4.10. Do you relax using your mobile?	25	48.3	16.7	10	2.12
4.11. Do you feel nervous if it has been a long time since you last used your mobile?	66.7	18.3	11.7	3.3	1.52

ITEMS	Valid percentages of the response and average categories obtained				
	Never	Sometimes	Usually	Always	\bar{X}
4.12. Do you check your cell phone in case someone has called or written to you?	5	25	33.3	36.7	3.02
11. Have you reduced your mobile phone use because you thought you were hooked?	36.7	45	11.7	6.7	1.88
12. Do you lose track of time when you are talking on the mobile?	33.3	31.7	11.7	23.3	2.25
13. Have you felt bad about spending too much time with your mobile?	20.0	46.7	21.7	11.7	2.25
14. Have you ever tried not to use your mobile and have not been able to do so?	63.3	23.3	8.3	5	1.55
15. Have you ever hidden from your parents the money you invest in mobile?	96.7	1.7	1.7	-	1.05
16. How many times have you ever used the mobile in class?	8.3	43.3	28.3	20	2.60
17. How many times by inertia do you look at the mobile per day? (have you been written or not).	5	11.7	36.7	46.7	3.25
18. Is it easier for me to convey feelings and emotions through emoticons than in front of the person I want to express it to?	51.7	40	3.3	5	1.62
19. The first thing I pick up in the morning after getting up is the cell phone.	1.7	13.3	23.3	61.7	3.45
20. I return home while I go to class if I have left the phone at home.	45	21.7	8.3	25	2.13
21. I use the mobile phone when I am bored.	-	15	38.3	46.7	3.32
22. I have simulated receiving a call to avoid a compromised situation.	26.7	38.3	15.0	20	2.28
23. I spend more and more time with the mobile.	35	33.3	21.7	10	2.07
24.- I spend more time using my cell phone than I should	16.7	36.7	18.3	28.3	2.58
25. I have anxiety or become irritable if my mobile phone is not in sight.	73.3	16.7	8.3	1.7	1.38
26. I panic when I think I lost my cell phone.	6.7	21.7	38.3	33.3	2.98
27. I have discussed with my partner, friends or family about the use of mobile phones.	78.3	15	5	1.7	1.30
28. I use my mobile when I'm driving.	88.3	8.3	3.3	-	1.15
29. I tried to stop using my phone so much, but the intention has not lasted long.	58.3	26.7	13.3	1.7	1.58
30. I need to reduce my use of mobile phones, but I fear that I cannot do it.	61	25.4	6.8	6.8	1.59

As Table 5 reflects, the studied sample does not display high levels of overall mobile phone addiction. However, certain items which show troublingly high levels of dependency have been highlighted in orange.

The presence of some particularly personal and sensitive items, such as items 15, 27 and 28, for which an 'honest' response might contravene political correctness and even the law of the land, could potentially represent a source of bias against complete candour. Even so, as previously mentioned a number of items (4.12, 16, 17, 19, 24 and 26) show a significant level of mobile phone dependency among respondents. The cut-off point for these particularly alarming items was an average of 2.5, the Archimedean point for all values in the scale (1, 2, 3, 4).

Item 4.12 (*"Do you check your phone to see if someone called or texted you?"*) is the first of the items that merit a closer inspection. The sum of the response categories *often* and *always* is 70% with $\bar{X}=3.02$, signifying that a large percentage of respondents check their phones regularly for missed calls or messages. The rate of dependency increases even further when students are queried about checking their phone as a purely mechanical action (item 17), to which nearly 84% of respondents admit to doing *often* or *always* ($\bar{X}=3.25$). No less alarming is the admission among 85% of respondents ($\bar{X}=3.45$) that *often* or *always* the first thing they do in the morning is reach for their phones (item 19), or that they grab for their devices whenever they feel bored (item 21), which 85% ($\bar{X}=3.32$) admit to doing *often* or *always*.

Indicating a lower intensity of dependency, but still above the 2.5 Archimedean point, are items 16 (*"Did you ever use your phone in class?"*) with a response rate of *often* or *always* of nearly 50% ($\bar{X}=2.60$), 24 (*"I spend more time on my phone than I should."*) with a rate nearing 47% of higher-frequency categories ($\bar{X}=2.58$), and 26 (*"I panic when I think I might have lost my phone."*) with *often* or *always* responses at nearly 72% ($\bar{X}=2.98$)

CONCLUSIONS OF THE PRELIMINARY STUDY

Two distinct clusters of conclusions arise from this pilot study. On the one hand are those findings related to the technical criteria for measuring the quality of the data gathering instrument, that is, its validity and reliability. On the other hand, are those findings related to the exploratory descriptive survey conducted on the pilot sample.

Most saliently, the scale has demonstrated considerably high values of internal consistency or stability. The instrument is composed of items taken or adapted from other known devices, and yet those items have been shown to have more in common than not in common. This is further verified by the presence of reliability values nearing 1 both for the instrument as a whole and for the instrument without each of its individual items.

With respect to validity, it can be said that the instrument measures the construct for which it was designed through the adaptation of other instruments. In other words, the instrument has been shown to have content validity. Notable levels of concurrent criterion validity also demonstrate that the individual items measure the same construct as the scale as a whole.

In the second cluster of conclusions, the most noteworthy point is the moderately low level of generalized addiction/dependency to mobile devices found among the sample. This may clash with our own everyday impressions and the prosaic commentary about the sampled demographic, that is, young students, who are seen as increasingly dependent on new technologies.

Nevertheless, the responses to some items do reflect a prevalence of certain behaviours tied to mobile phone addiction among the studied sample. Of particular note are those students who acknowledge their own dependency on their mobile device when they admit to checking their phone first thing in the morning and

automatically, mindlessly throughout the day, as well as resorting to it whenever they are idle, bored, waiting or taking a break. As our increasingly complex mobile devices gain in resources and features, this tendency is unlikely to decrease. This must be a source of reflection and a point of inflection lest we risk falling prey to a new form of technological subjugation, a pervading fear of being separated from our personal screens even temporarily. This problematic source of anxiety has already been labelled 'nomophobia', the fear of having "no mobile phone".

AUTHOR CONTRIBUTIONS

Daniel Álvarez-Ferrándiz: During the realization of the article, he has collaborated in review tasks of the different questionnaires that we have used in the study. As well as, functions of elaboration of the matrix, data collection and emptying of the same. He then uploaded the article to the magazine's platform and supervised its follow-up. Laura Contreras-Machado: Her functions are framed in the elaboration of the theoretical foundation, search of bibliographic sources and preparation of the conclusions. José Álvarez-Rodríguez: Coordinator of the study, developing tasks of analysis, discussion and interpretation of the data and review of the final document.

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No potential conflict of interest was reported by the authors.

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