



SYSTEMATIC REVIEW: TREATMENT MODALITIES APPLIED IN SMARTPHONE ADDICTION/ABUSE

REVISIÓN SISTEMÁTICA: MODALIDADES DE TRATAMIENTO APLICADAS A LA ADICCIÓN/ABUSO DEL TELÉFONO MÓVIL (SMARTPHONE)

Eduardo J. Pedrero-Pérez

Universidad Complutense University. Madrid. Spain

<https://orcid.org/0000-0002-3940-5609>

Gloria Rojo-Mota

Rey Juan Carlos University. Madrid. Spain

<https://orcid.org/0000-0003-0358-1181>

Elisabet Huertas-Hoyas

Rey Juan Carlos University. Madrid. Spain

<https://orcid.org/0000-0002-5840-541X>

Correspondence:

Elisabet Huertas Hoyas (Rehabilitation and Physical Medicine Department, Rey Juan Carlos University, Avenida de Atenas s/n. CP.28922, Alcorcón, Madrid, Spain)
ejpedrero@yahoo.es; elisabet.huertas@urjc.es

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Abstract

Introduction: There is a lack of consensus on the addictive or non-addictive nature of excessive mobile phone use, but we have a vast number of studies exploring its prevalence, which is usually very high in all current societies. This problem is associated with serious consequences, so it is to be expected that therapeutic approaches have been tried. *Methods:* This study is a systematic review of articles that have applied some type of treatment for smartphone addiction/abuse. The international databases PsycInfo, Academic Search Premier, CINAHL, MEDLINE and OpenDissertations were reviewed for articles in English using any type of treatment. *Results:* Only two articles met criteria. In both cases, they are very low-evidence studies, impossible to replicate, and had poor results. *Discussion:* There is no correspondence between the magnitude of the problem observed in scientific literature and the health-care response that such a problem should generate. This is an argument from those who consider it inappropriate to consider the excessive/abusive use of smartphones as an addictive behavior, since the consequences for individuals and society are in no way comparable. *Conclusions:* There is a need for studies that propose treatment alternatives for people who have lost control over their behavior and that will allow them to recover it.

Resumen

No existe consenso internacional sobre el carácter adictivo o no del uso excesivo del móvil, pero disponemos de un número ingente de estudios explorando su prevalencia, alta en todas las sociedades actuales. Este problema se asocia a graves consecuencias, por lo que es de esperar que se hayan ensayado modalidades de abordaje terapéutico. Este estudio es una revisión sistemática de los artículos que han aplicado algún tipo de tratamiento para la adicción/abuso del *smartphone*. Se revisaron las bases de datos internacionales buscando artículos en inglés que utilizaran algún tipo de tratamiento. Finalmente, sólo dos artículos cumplían criterios. En ambos casos, se trata de estudios de baja calidad, imposibles de replicar, sin grupo de control aleatorizado y con pobres resultados. No existe correspondencia entre la magnitud del problema que se observa en la literatura científica y la respuesta asistencial que tal problema debería generar. Este es un argumento de quienes estiman inadecuada la consideración del uso excesivo o abusivo del smartphone como una conducta adictiva, puesto que las consecuencias para la persona y la sociedad no son en modo alguno equiparables. Se requieren estudios que propongan modalidades de tratamiento para las personas que han de recuperar el control sobre su conducta.

Keywords

Behavioral addictions; Mobile phone abuse; Smartphone addiction; Systematic review; Treatment.

Palabras clave

Adicción al móvil; Abuso del móvil; Adicciones comportamentales; Tratamiento; Revisión sistemática.

Introduction

Smartphones burst into people's lives in the mid-2000s-2010, irreversibly changing many human habits and providing endless new options for communication, culture, information, entertainment, etc. However, the problems associated with the use of these devices soon began to be discussed. For example, the Blackberry, launched in 2003, was soon singled out for its excessive and compulsive use, associating these problems with those generated by the abuse of drugs. Thus, people began to talk about the *Crackberry*, attributing to these early smartphones the addictive power of substances such as crack (Chandler, 2007; Taylor, 2007).

A bibliometric study (Carbonell et al., 2009) explored the number of publications between 1996 and 2005, finding that the largest number of studies corresponded to the years 2004 (n = 42) and 2005 (n = 40), although at that time mobile phone addiction only represented 2.2% (n = 4) of the total articles found. A review in 2012 identified a good number of instruments used for mobile phone addiction diagnosis, finding prevalence rates ranging from 0 to 38% (Pedrero-Pérez et al., 2012). However, everything was going to change radically with the release of new applications such as WhatsApp, in 2009, and its wide popularization precisely in 2012.

As devices with more and more applications appeared, the functional dependence that humans developed on their mobile phone resulted in many people making seemingly abusive use of their device. The term smartphone (named for its Internet connection and the many uses it could develop) addiction was initially used in the general press, although by 2012 this new addictive behavior was openly discussed in the scientific press (Choi, Lee, & Ha, 2012), and soon after, addiction to some of the applications used on smartphones (Wu et al., 2013). By 2013, work had already been carried out to validate measuring instruments in order to quantify this new problem (Kwon, Kim, et al., 2013; Kwon, Lee, et al., 2013).

Many voices have been raised against this conceptualization of excessive mobile phone use that compares it to substance addiction. The absence of significant functional impairment and serious physical consequences, the absence of tolerance and abstinence and the lack of diagnostic stability have been proposed, among others, as crucial differences with substance addiction (Billieux et al., 2015; Panova, & Carbonell, 2018). Recent diagnostic classifications DSM-5 and ICD-11 have refused to include mobile phone addiction as a category, so the absence of diagnostic criteria, in addition to multiple conceptual and methodological inconsistencies reveal that we are far from being able of considering the addictive nature of smartphone abuse (Yu, & Sussman, 2020).

A recent meta-analysis has estimated that the average prevalence of problematic use in children and young people is 23.3% (Sohn et al., 2019). No work of the same level of evidence has been found that quantifies prevalence at other ages, predominated by the dispersion of measurement instruments, sampling methods, prevalences and methods of analysis. One study found that the prevalence of problematic smartphone use remains almost unchanged until age 45, then begins a progressive decline (Pedrero-Pérez et al., 2018).

With all this data on problematic or addictive use, it may be assumed that therapeutic strategies have been developed to solve the problems posed. The aim of this study is to carry out a systematic review that allows us to know the therapeutic interventions that have been developed in the world to respond to the growing problem of addiction/abuse/problematic use of smartphones.

Method

Data Sources

Following PRISMA standards (Moher et al., 2009), the following databases were searched in September 2020 for relevant articles published in English: PsycInfo, APA PsycArticles, Academic Search Premier, CINAHL, MEDLINE and OpenDissertations. All combinations of the terms "smartphone" OR "cellular phone" OR "mobile phone" AND "addiction" OR "abuse" OR "problematic use" AND "therapy" OR "treatment" OR "intervention" were used. This search

strategy identified a total of 322 articles. After removing the duplicates, the titles and summaries of the remaining records were reviewed. Once irrelevant articles were removed, the full texts of the remaining articles were reviewed to assess the eligibility of each study. Reference analyses and additional searches were performed manually (Scholar Google and references of the relevant articles found) to avoid overlooking eligible studies.

Study selection

The selection criteria were to find all studies that had applied some type of treatment to a group of people with problematic mobile phone use (whether considered addiction or not) and carried out outcome assessment at the end of the intervention and/or over the subsequent time. No limitations were predetermined regarding the treatment modality, the existence or not of a control group, the participants' age, or any other of the intervention's characteristics. Nor was the period of publication limited, on the understanding that they would all correspond, at most, to the last two decades. The main idea was to know the types of therapeutic approach developed on this issue. Figure 1 shows the search method flowchart.

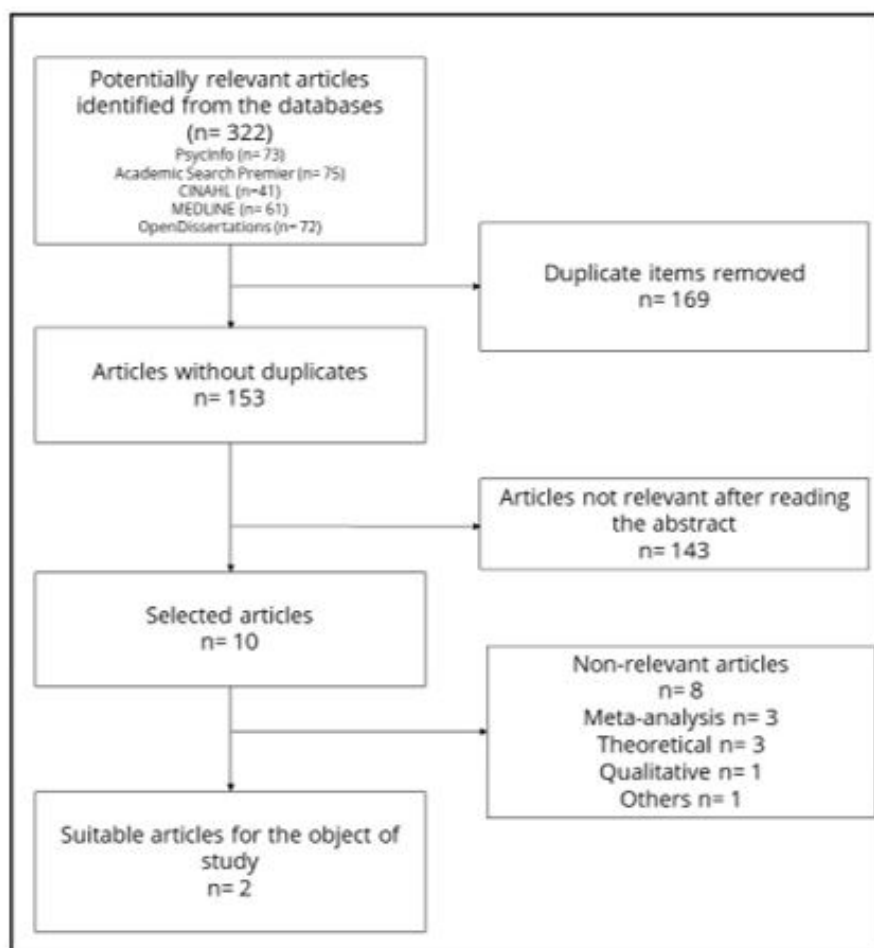


Figure 1. Flowchart of the search method.

Study quality criteria

The application of the Critical Appraisal Skills Programme Español (CASPe, 2020; Cabello-López, 2015) was determined in order to establish the quality level of the selected studies.

Results

Finally, only 2 articles focused on the subject matter. Table 1 summarizes its characteristics.

Table 1. Detailed description of the articles reviewed.

Author/year	Sample size	Age	Participants	Type of intervention	Control condition	Number of sessions/length	Diagnostic tools	Outcome measures	Study quality
Lee et al., 2016	n= 335	M= 13,3	Students	Home-based Daily Journal Writing (HDJ-S)	No	Two weeks during the holidays. Daily fulfilment of HDJ-S	Scale of Korean Youth Proneness to Smartphone Addiction. Motivation Scale for Smartphone Regulation. Scale of Parents' Concerns for Children's Smartphone Activities.	The same questionnaires	1/11
Lan et al., 2018	n= 70; Experimental group n= 41 (treatment completed n= 27); Control group n= 29 (ending n= 27)	Experimental group M= 21,1; Control group M= 21,2	Students	Manual for the Group Mindfulness-based Cognitive-behavioral Intervention (GMCI)	Yes (those who did not feel able to complete the program)	Eight sessions once a week. One hour length.	Mobile Phone Internet Addiction Scale (MPIAS)	The same questionnaire	2/11

The first of these is a Korean study (Lee et al., 2016) that used the HDJ-S (Home-based Daily Journal of Smartphone Use; An et al., 2007), a sort of daily self-registration developed at the Catholic University of Daegu in Korea. The subjects completed the HDJ-S for two weeks during the high school summer vacation in metropolitan Daegu. The HDJ-S recorded “time per day using the smartphone”, “content of smartphone use”, “places where the smartphone was used” and a “reflective self-assessment”. They were required to discuss their problem with their parents and to communicate with each other about issues such as their feelings around using the smartphone and their desire to play. Finally, they were asked to modify their behavior themselves after discussing it with their parents. The study involved 335 subjects (155 males and 180 females), high school students with an average age of 13.2 years. They were assessed using the Korean Smartphone Addiction Proneness Scale (Kim et al., 2014), which allowed for the extraction of a subsample of n= 46 subjects who were classified as “high risk”, on whom the procedure was applied. No control group was used. After the intervention, the same scale was used again, and significant differences were found between the pre and post-test ($p < 0.001$; the authors do not report the effect size, but it is easy to estimate that it was $d = 0.74$, which can be interpreted as low to moderate). The authors also conducted a parenting assessment (*Scale of Parents' Concerns for Children's Smartphone Activities*, published in an internal document, not found, of the Ministry of Gender Equality & Family Republic of Korea; Korea Youth Counseling & Welfare Institute, 2013), noting a significant increase in parental involvement ($p < 0.05$), although in this case the effect size would be very small if it had been calculated ($d = 0.24$). The authors conclude that HDJ-S is a useful intervention to reduce mobile phone addiction.

The second study is a pilot, carried out in China (Lan et al., 2018), which consists of the implementation of a cognitive-behavioral therapy program based on mindfulness. The study was conducted on an initial sample of 1,044 questionnaires completed by volunteer university students. The possible addiction to smartphones was estimated using the Mobile Phone Internet Addiction Scale (MPIAS; Hu et al., 2017). Among those who obtained scores suggesting mobile phone addiction, according to the pre-established scales for that questionnaire, two groups of volunteers were established: the experimental group ($n = 41$) and the control group ($n = 29$), with a similar average age in both groups, around 21 years old. The allocation criteria were not randomized, but those who did not feel capable of completing the treatment were included in the control group. Both groups were provided with educational literature on mobile phone addiction. The mindfulness program was manualized and applied in 8 sessions, once a week, of one hour length, in addition to proposing homework. Follow-ups were made from the baseline, in the first week, to the second, eighth, fourteenth and twentieth weeks. Twenty-seven subjects in each group started treatment and completed it. The subjects in the experimental group showed a decrease in the time of use of the smartphone and lower scores in the addiction questionnaire at all follow-up stages, although they also reported the same at the initial assessment. The authors report on the statistical significance, but not the effect size of the differences found, although the estimate would lead to a $d=0.77$ at best, which is a low to moderate effect. In the last follow-up, a rise in the time of use of the smartphone was observed, although with a low effect ($d= 0.31$). The authors conclude that *"the pilot study demonstrated the effectiveness of the mindfulness group on smartphone addiction"*.

As can be noted, the only two studies found lack even the slightest evidence criteria, estimated using the CASPe protocol. In both cases, volunteers are the samples. Only in the second study is a control group used, although the criteria applied for its configuration ensures bias and disqualifies subsequent comparisons. The samples in both cases are very small and were set up from two questionnaire scores. The authors of both studies omit to report the effect size of the differences, but this does not prevent them from stating categorically that the methods studied are useful and effective.

These are the only studies found that explore the application of therapeutic methods to reduce the severity of smartphone addiction. In a previous meta-analysis, which attempted to find studies of treatment for Internet and smartphone addiction (Malinauskas, & Malinauskiene, 2019), four treatment studies for Internet addiction, one for online gaming addiction and one for smartphone addiction were found. The latter (Shin, & Jang, 2016) has not even been considered worthy of mention: no information is given on the sampling method, nor on the criteria for assigning the control group, nor is any neutral task applied for the controls, a "therapeutic technique" (*sandplay games*) is used without citing any scientific work that has used it previously, inadequate statistical methods are used for the interpretation of the data, there is no temporal follow-up of the achievements "due to lack of time", in spite of which the authors claim for some conclusions: *"the effectiveness of the program was clearly verified by adopting the pre-test/post test control group design and also controlling for the pre-test effect through ANCOVA"*.

Several studies have been found that suggest the effectiveness of physical exercise as a useful approach to reducing smartphone addiction. One of them (Liu et al., 2019) is a meta-analysis that only found studies written in Chinese and were obtained from the Wanfang Data Base, so they have not been included in the present study. The meta-analysis concludes that there is evidence of the effectiveness of physical exercise in reducing the severity of smartphone addiction in subjects between 18 and 22 years old. Other studies only raise the possible usefulness of physical exercise without providing any evidence for it (Kim, 2013).

A Korean study (Lee et al., 2014) uses an application, called the Smartphone Addiction Management System (SAMS), which allows for the monitoring and supervision of user activity, as well as GPS location and Internet access location. It then sends the data to a central server that stores the usage data and performs key statistical data analysis and usage intervention according to the doctors' decision. They intervene the data and can block the device if the pre-set rules are not followed. This system was applied to a sample of 14 subjects aged between 19 and 51, recruited as volunteers who downloaded the application ($n= 120$) and used it for more than one week ($n= 14$, 7 men and 7 women). They were first assessed through the Korean Smartphone Addiction Scale (K-SAS; Hu et al., 2017). No results of the application are reported, since, as the authors say, that is not the intention of the study, but simply to present the application. This is not the only paper proposing applications for the prevention and treatment of mobile phone addiction (Rapeepisarn et al., 2016).

Other studies simply list and reference the works and therapeutic approaches used in the treatment of addictions, without verifying empirical data on their application to the treatment of addiction/problematic use of smartphones (Kim, 2013).

Discussion

“A synthetic “drug” of global pandemic proportions has emerged as the potentially most addictive threat in the entire population demography. Easily accessible, completely legal, and designed for mass distribution through attractive packaging, the drug can be purchased without a prescription, and often parents hand it out to their children (...) The drug is called a smartphone, and though we may not realize it, we are all potential sycophants to its enslaving temptations” (Grant, 2015).

Phrases such as the above have been read many times over the last decade, although rarely from serious professional society platforms, as is the case. Therefore, it could be assumed that, if the problem has acquired such dimensions, a good number of therapeutic responses aimed at reducing its impact, controlling its expansion or lessening the consequences generated would have been articulated. The result of the present study is conclusive: hardly anything has been done. Only two studies have been found, both providing minimal scientific evidence.

That an allegedly devastating problem, which some studies with a high degree of scientific evidence estimate to impact more than 20% of our adolescents and young people (Sohn et al., 2019), has generated hardly any therapeutic response capable of being subjected to empirical contrast is a fact that is at the very least surprising. Some work that applies behavioral therapy and offers provisional results (Olson et al., 2021) has appeared since the preparation of this systematic review, although it still lacks peer review.

Public administrations and some non-governmental organizations are providing welfare responses to these problems. However, the therapies offered lack scientific references. Nor do we have data referring to the number of people who request treatment, nor the diagnoses that justify it, nor the results of the intervention, with the exception of sporadic appearances in the general press. The few times that data on consultants is reported, a surprising gap can be seen between the epidemiological data, the alleged magnitude of the problem and the volume of requests received (Madrid Salud, 2019).

Probably, according to what can be read in the pages that these services offer, what is being done is to apply to those who request treatment (either on their own or by decision of their parents or guardians) certain therapies that have shown their effectiveness in the field of substance addiction or pathological gambling. In other words, excessive or problematic smartphone use must be an addiction in order to benefit from proven therapeutic approaches. And yet, as already mentioned, the differences between the two behaviors are abysmal (Billieux, Philippot et al., 2015; Panova & Carbonell, 2018) and this is true in any cultural environment in which it is studied (Panova et al., 2019).

Some authors have denounced an overpathologization of daily life (Billieux, Schimmenti et al., 2015), which has led to the formulation of such surprising “disorders” as “tango addiction” (Targhetta et al., 2013), “study addiction” (Atroszko et al., 2015) or “salt addiction” (Tekol, 2006), among many others. It is a question, as Billieux et al. (Billieux, Schimmenti, et al., 2015) says, of “*creating new diagnoses based on old recipients*”, instead of exploring the excessive behaviors that are occurring in daily life from an idiographic perspective, trying to understand the function that they fulfill for each subject and the cognitive, emotional or behavioral problems with which they are linked. In this sense, new conceptualizations about the problematic use of smartphones have been proposed, which may lead to new research and more specific therapeutic approaches (Pivetta et al., 2019)

In conclusion, this systematic review finds a gap between the importance attributed to the excessive or problematic use of smartphones and the therapeutic response developed in the scientific field. Despite the fact that mobile phone addiction has been discussed for fifteen years, and at times with apocalyptic overtones, not a single reliable study has been found that offers a therapeutic response which can be empirically contrasted. This circumstance, possibly

unique in the field of psychology and psychiatry, is probably based on the lack of unified and universally accepted criteria for considering this behavior as a behavioral problem. The consideration that this is a new addiction is not sufficiently justified and, consequently, neither is applying therapies that have been useful in the treatment of addictions to a different problem. However, neither has the consideration that this is excessive, abusive or problematic behavior generated any therapeutic response capable of addressing a problem that is perceived by the general population and that shows cross-cultural consistency. There is an urgent need to design treatment projects that can be empirically tested and applied with scientific evidence criteria.

The authors declare that they have no conflict of interest.

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