

Smartphones, the New Addiction: Causes and Consequences for Elementary and High School Students According to Teachers and Experts

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Smartphones, the New Addiction: Causes and Consequences for Elementary and High School Students According to Teachers and Experts

A major concern is how to tackle student smartphone addiction (SSA). First, however, analysis of the definition, causes, and consequences of SSA is necessary. There is a lack of consensus in this regard, and scarce research considers its multidisciplinary nature. This paper first reviews the key literature across different disciplines. Based on this review, a conceptual model of SSA, its causes, and its consequences is proposed. Qualitative analysis is then used to explore this model empirically for the case of elementary and high school students. A total of 90 papers were reviewed. In addition, 33 in-depth interviews with experts and teachers from four European countries were conducted. The literature review shows the multifaceted nature of SSA. According to the literature, SSA is the result of biological, psychological, social, and technological factors and leads to health, performance, and social problems. The qualitative analysis identifies specific areas to develop this proposed conceptual model, based on the views of experts and teachers in relation to SSA.

Keywords: addictive behavior; causes; consequences; smartphones

Introduction

Mobile connections in Spain are above 100% (Kemp, 2021). In other words, there are people in Spain who own more than one mobile. It is therefore reasonable to imagine that smartphone addiction may be a concern. Smartphone usage statistics suggest that, on average, each person spends between three and five hours a day on their smartphone. Two out of ten smartphone users check their phones every few minutes. Half of them look at it a few times per hour (Armstrong, 2017; Milijic, 2019).

According to Spanish reports, the Spanish population is aware of the problems of improper smartphone use, with 41% of Spanish people stating that they seek

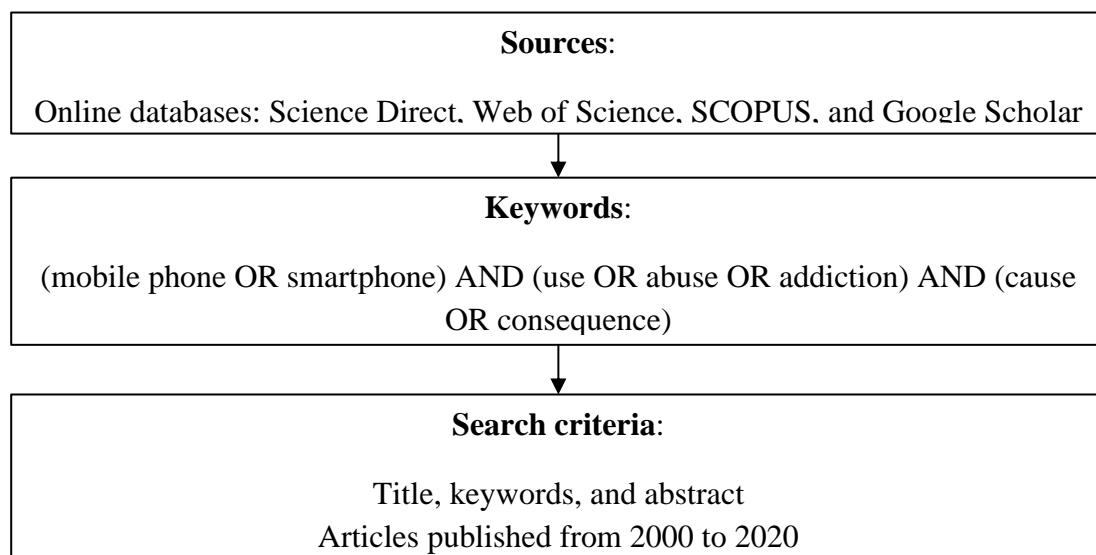
solutions such as switching it off at night or silencing notifications (Ditrendia, 2019). Among Spanish residents, 25.6% consider themselves smartphone addicts, and 77.3% affirm that they could not live without their smartphone (Rastreator, 2019). Young people are at a greater risk of smartphone addiction because these devices are more important in young people's lives (Polo del Río, Mendo Lázaro, León del Barco, & Felipe Castaño, 2017). The risk is also greater because young people use their smartphones to reduce psychological pressure from, for example, the interpersonal relationships and adaptation that they face during the early stages of personal and social maturation (Shi et al., 2022). Young students are also digital natives, so they have fully integrated the use of smartphones into their lives. This situation increases their risk of addiction (Caponnetto et al., 2021). As a result, this study focuses on elementary and high school student smartphone addiction (SSA). It is critical to tackle this problem at a young age to offer solutions. It is especially important considering that the excessive use of mobile devices is socially accepted yet could affect primary and high students' academic performance (Sunday, Adesope, & Maarhuis, 2021).

Although the literature shows progress on this issue, Rozgonjuk, Rosenvald, Janno and Täht (2016) noted that the concept of smartphone addiction as a behavioral addiction remains unclear. Smartphone addiction covers not only Internet addiction but also other device-related behaviors such as gaming, social networking, and online shopping (Noë et al., 2019). The purpose of this paper is to offer a multidisciplinary conceptual framework of smartphone addiction, as well as its causes and consequences, in the case of primary and high school students.

A literature review is first presented (see Figure 1). Science Direct, Web of Science, SCOPUS, and Google Scholar online databases were used to search for relevant literature. The search strings included several combinations of terms, including

the plural forms of “mobile phone”, “smartphone”, “use”, “abuse”, and “addiction” to explore the definition and leading “causes” and “consequences” of smartphone use and misuse. The search was restricted to the title, keywords, and abstract of articles published between 2000 and 2020. Articles related to the topic of interest were then selected. This process returned a total of 90 papers. The results show that a consensus is needed in terms of not only the definition of smartphone addiction but also its causes and consequences.

Figure 1. Literature review procedure



Smartphone addiction: A topic of interest

The conceptualization of smartphone addiction

The World Health Organization (WHO) still does not recognize smartphone addiction as a condition. However, this issue has been raised as a public health concern (WHO, 2015). In contrast, in the research, smartphone addiction is defined as a specific behavioral addiction that involves person–machine (device) interaction. It is not a chemical addiction (Lin et al., 2015). It is a behavioral addiction, which means that it involves the loss of control over behavior with adverse consequences (Potenza, 2006) or

a failure in resistance to the impulse of doing a harmful act to oneself or others (Grant, Potenza, Weinstein, & Gorelick, 2010). With substance addiction, it is easier to observe changes in lifestyle. With behavioral addiction, it could be due to problematic behavior or individual personality.

As noted by Grant and Chamberlain (2016), there have been considerable efforts to understand the neurobiological basis of substance addiction. In contrast, the potentially “addictive” qualities of repetitive behaviors and the question of whether such behaviors constitute “behavioral addictions” have received virtually no attention. There is some agreement that smartphone addiction involves excessive or problematic smartphone use. Also, it is generally conceptualized as a behavioral addiction (Billieux, Van der Linden, & Rochat, 2008). It has seven common symptoms: salience, tolerance, mood modification, conflict, withdrawal, problems, and relapse (Grant et al., 2010; Mahapatra, 2019). Smartphones also have the potential to become a prevalent social problem because they embody several characteristics of addiction such as tolerance, withdrawal, difficulty performing daily activities, and control disorders (Kwon, Kim, Cho, & Yang, 2013).

Several authors have addressed the issue of smartphone addiction (Busch & McCarthy, 2020; Chen et al., 2016; Cho & Lee, 2017; Chung et al., 2018; Duke & Montag, 2017; Gökçearsan, Mumcu, Haşlaman, & Çevik, 2016). Others have discussed the idea of smartphone dependence (Bata, Pentina, Tarafdar, & Pullins, 2018; Seo, Park, Kim, & Park, 2016) or problematic smartphone use (Billieux et al., 2008; Elhai, Levine, Dvorak, & Hall, 2016). The most commonly used adjectives when defining smartphone addiction are “dependence on mobiles” and “nomophobia”, which is defined as the fear of not being able to use one’s phone (Tams, Legoux, & Léger, 2018, p. 1). Other authors refer to problematic mobile use, considering addiction a psychological

pathology (Loid, Täht, & Rozgonjuk, 2020; Rozgonjuk et al., 2016). Some authors affirm that humans are not addicted to smartphones per se. Rather, they argue that addiction stems from the applications or functions provided by smartphones (Sha et al., 2019).

The Diagnostic and Statistical Manual of Mental Disorders (DSM, 5th edition) suggests that addiction occurs when there is constant, repetitive, and frequent behavior. In certain situations, there may even be physical danger (e.g., using a smartphone while crossing the street), legal problems (e.g., being blacklisted for not paying mobile bills), or other issues due to ease of access to social media and the Internet, such as not doing homework due to excessive smartphone use (Grant & Chamberlain, 2016).

In sum, this study follows the approach of Gökçearsan et al. (2016), with smartphone addiction defined as the excessive use of smartphones in a way that is difficult to control and that has a negative influence that extends to other areas of life. Accordingly, heavy smartphone usage would be an antecedent of smartphone addiction. Besides conceptualizing SSA, another critical research question in this area relates to the causes and consequences of SSA. The following sections address this question.

Causes of smartphone addiction

The causes of smartphone addiction are multiple. The literature suggests numerous roots of smartphone addiction. The predictors of smartphone addiction mentioned in prior research are biological, such as gender, age, or physical inactivity (Chung et al., 2018; Kuss et al., 2018), psychological, such as self-control, depression, fear of missing out, or loneliness (Chotpitayasunondh & Douglas, 2016; Khang, Kim, & Kim, 2013; Lu et al., 2018; Mahapatra, 2019), social, such as family and social relationships (Khang et al., 2013; Lu et al., 2018); (Gao et al., 2020; Xie, Chen, Zhu, & He, 2019), and technological, such as time spent with smartphones and the use of social media or

smartphone applications (Khang et al., 2013; Kuss et al., 2018; Salehan & Negahban, 2013). Prior research likewise suggests that addictive behaviors are associated with unhealthy lifestyles and habits (Pourrazavi, Allahverdipour, Jafarabadi, & Matlabi, 2014). For example, some studies posit that other problematic or abusive practices could trigger smartphone addiction, such as Internet addiction (Chotpitayasunondh & Douglas, 2016), alcohol consumption (Chung et al., 2018), problematic use of smartphones (Kuss et al., 2018), and social media abuse (Salehan & Negahban, 2013; Sha et al., 2019).

The analysis is more complicated when considering children and adolescents. Few studies have examined samples of young people. Moreover, such studies have focused on causes related to the child's family and peers. Examples include parental neglect, relational maladjustment in school, neglect and psychological abuse, parent-child attachment, deviant peers, and parental phubbing, which refers to situations where parents ignore their children due to smartphone use (Chotpitayasunondh & Douglas, 2016; Gao et al., 2020; Xie et al., 2019). Studies have also examined how children deal with those situations through emotional intelligence and coping mechanisms (Sun, Liu, & Yu, 2019). This emphasis on the role of parents is predominantly supported by three theoretical frameworks: social cognitive theory, which is an extension of social learning theory (Bandura, 1986), informal social control theory (Sampson & Groves, 1989), and the broaden-and-build theory (Fredrickson, 2004).

The theoretical frameworks of social learning theory and social cognitive theory suggest that observational learning is the primary means by which children and adolescents learn (Bandura, 1971). Moreover, according to informal social control theory, a dysfunctional family atmosphere will amplify the deviant behaviors of children and adolescents (Mason & Windle, 2002). Likewise, the broaden-and-build

theory of positive emotions suggests that deprived parent–child relationships with low emotional warmth and supportive acceptance can lower children’s perceptions of quality of life. To alleviate negative emotions, children turn their to their smartphones. Thus, they may exhibit problematic smartphone use (Gao et al., 2020). Attachment theory states that insecure attachments mediate the links between interpersonal problems and maladjustment or compensatory responses, which can lead to behavioral addictions (Han, Kim, & Kim, 2017).

In studies of young adults, stress is one of the most frequently mentioned causes of smartphone addiction (Kuss et al., 2018; Van Deursen, Bolle, Hegner, & Kommers, 2015). General strain theory (Agnew & White, 1992) suggests that problematic behaviors mainly result from the negative experience of some kind of stress or strain (Jun & Choi, 2015). Perceived stress may decrease personal resources for self-control. Moreover, stress can induce anxiety, depression, and maladaptive cognition, which may also lead to addictive behaviors (Hong et al., 2019; Kuss et al., 2018).

Psychological problems such as depression and anxiety also seem to play a role in developing smartphone addiction (Han et al., 2017; Hong et al., 2019; Kuss et al., 2018). Self-determination theory poses three basic psychological needs (i.e., competence, autonomy, and relatedness) throughout people’s development (Deci & Ryan, 2000). Of these needs, satisfaction and thwarting associated with the need for relatedness are the most potent predictors of psychological health and problem behaviors such as smartphone addiction (Hong et al., 2019). Unsurprisingly, therefore, recent studies have included variables such as quality of life and well-being as antecedents of smartphone addiction (Gao et al., 2020; Volkmer & Lerner, 2019).

Consequences of smartphone addiction

The consequences of smartphone addiction remain largely undefined (Lanette, Chua,

Hayes, & Mazmanian, 2018). However, recent studies have advanced in this sense. The present literature review offers an overview of the different ways in which smartphone addiction can affect the lives of current and future students.

Health problems appear to be prevalent consequences of excessive smartphone use. The literature reports both psychological problems such as negative emotions and mental disorders (Hartanto & Yang, 2016; Liu et al., 2019) and physical afflictions such as aches, sleep disturbance, and hypertension (Toh et al., 2020; Vacaru, Shepherd, & Sheridan, 2014; Zou et al., 2019) as negative outcomes of young users' smartphone addiction.

Psychological disorders such as depression, rumination, and stress are more likely to affect people with smartphone addiction (Seo et al., 2016; Tams et al., 2018). According to coping style theory (Folkman & Lazarus, 1984), mental disorders may increase when individuals cope with their problems passively. As a result, if smartphones are used to escape from daily problems, students who constantly use them should be expected to experience these types of psychological outcomes (Wang et al., 2019).

Excessive smartphone use also has physical consequences. Examples include musculoskeletal problems (Toh et al., 2020; Vacaru et al., 2014), cardiovascular disease (Zou et al., 2019), and sleep problems (Panda & Jain, 2018; Rosen et al., 2016; Vacaru et al., 2014). These sleep-related problems are emphasized in the literature as one of the main consequences of SSA in young students. For instance, (Liu et al., 2019) confirmed that excessive smartphone use contributes to various sleep disturbances. Insomnia, excessive daytime sleepiness, short weekday sleep duration, long weekend sleep compensation, and a preference for eveningness (i.e., being more active and alert in the evening) are some examples. Moreover, they observed a bidirectional relationship,

implying that smartphone addiction and sleep problems create a vicious circle. This link between impaired sleep and smartphone use is particularly serious in the case of elementary and high school children and adolescents because the amount of sleep needed for the optimal health of such students is higher than for adults (Paruthi et al., 2016).

Health issues are the most commonly highlighted consequences of SSA. However, problematic smartphone use also affects other aspects of people's lives, such as work or academic performance (Soror, Steelman, & Limayem, 2012). For example, young students and adolescents have high rates of smartphone use, which often disturbs their academic routine. Excessive smartphone use reduces cognitive capacity for information processing and results directly in poor academic performance (Mahapatra, 2019). It also increases procrastination (Wang et al., 2019) and harms attention in class. For instance, it increases distractions and the capacity to wait before answering. It also prevents participation in activities that require mental effort and leads to the loss of information necessary to complete activities (Seo et al., 2016). Similarly, a recent meta-analysis indicates that addictive smartphone use has a predominantly negative impact on academic achievement. It also negatively affects the skills and cognitive abilities that students need for academic success and learning (Sunday et al., 2021), particularly in elementary school education (Abbasi, Jagaveeran, Goh, & Tariq, 2021).

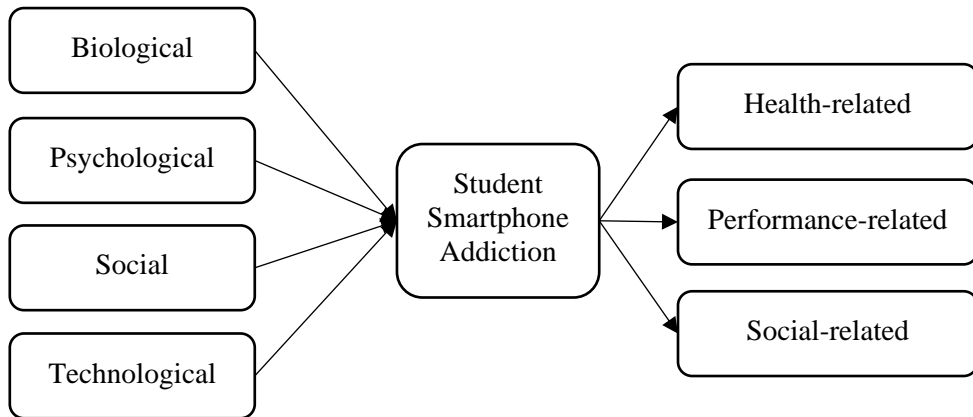
However, these negative consequences of SSA could also affect students in the future because they persist in adult life. Using smartphones usually entails multitasking (Rosen et al., 2016), which leads to repeated interruptions. In the context of work, Duke and Montag (2017) found that the daily smartphone interruptions predicted by smartphone addiction contribute to the negative effect of smartphone use on work productivity. This excessive smartphone use also affects other work activities. Bata et

al. (2018) observed that maladaptive behavior in the use of smartphones influences team participation and work in groups because people's communication and socialization skills are reduced. This reduction in team participation results in lower task completion, which reduces work productivity.

Besides these intrapersonal problems related to smartphone use, the literature reveals a link between SSA and students' interpersonal skills. Research has shown that relations with others (including family, friends, and acquaintances) deteriorate as a consequence of SSA (Chen et al., 2016). Displacement theory (Kraut et al., 1998) suggests that when individuals use devices compulsively, their social communications and circles decrease, which leads to further interpersonal problems. These problems refer not only to social, friend, and family relationships (Panda & Jain, 2018; Seo et al., 2016) but also to maladjustment to socialization, a lack of willingness to address these problems (Cho & Lee, 2017), and phubbing (Chotpitayasunondh & Douglas, 2016).

The ease of internet access through digital devices, particularly smartphones, has facilitated social communications and increased the number of victims of bullying (Gül et al., 2019). The literature confirms that bullying via smartphones is highly likely and mainly affects teenagers (Vacaru et al., 2014). In addition, Gül et al. (2019) observed that students with problematic smartphone use are more likely than other adolescents to be involved in cyberbullying. Figure 2 illustrates a conceptual proposal of the general causes and consequences of SSA.

Figure 2. Proposed conceptual model of student smartphone addiction



Method

Qualitative analysis was conducted to explore the proposed model empirically.

Qualitative semi-structured in-depth interviews were performed with relevant actors to extend knowledge of SSA in K-12 education students.¹ Thirty-three 20-to-30-minute interviews were conducted between February and July 2020. The sample consisted of 13 experts in youth addiction with experience in psychology, sociology, or technology and 20 elementary and high school teachers. Sample details are provided in Table 1. Respondents were from four European countries: Italy, Portugal, Slovenia, and Spain. The interview was divided into three areas: (1) definition of SSA, (2) causes of SSA, and (3) consequences of SSA (see Appendix).

Table 1 Sample characteristics

Expert characteristics (frequency)	Teacher characteristics (frequency)
Gender 76.92% Male (10) 23.08% Female (3)	Gender 45% Male (9) 55% Female (11)
Expert participation by country 23.08% Portugal (3) 23.08% Slovenia (3) 23.08% Spain (3) 30.77% Italy (4)	Teachers per country 25% Portugal (5) 25% Slovenia (5) 25% Spain (5) 25% Italy (5)
Area of expertise 22.22% Psychology and psychotherapy (3) 5.56% Gambling and Internet addiction (1)*	All the teachers were recruited from elementary and high schools

¹ From elementary to high school.

22.22% Sociology and social work with minors (3)
50% Experience working with kids and adolescents & technologies and media (7)

*This expert is also expert on psychology and psychotherapy.

The interviews were translated into English by bilingual experts. Then, hybrid thematic analysis, as described by Fereday and Muir-Cochrane (2006), was followed for coding. This approach combines data-driven inductive coding with theory-based deductive coding. The first round of analysis consisted of the development of an *a priori* code template based on the definition, causes, and consequences of SSA detected in the literature review. ATLAS.TI qualitative software was then used to codify the interviews. Two researchers analyzed the transcripts and codified them independently. They subsequently compared their findings. Any disagreements were resolved by discussion.

The next section discusses the results of the content analysis. The perspectives of the experts and teachers regarding the conceptualization of SSA, its causes, and its consequences for students are described in that order.

Results and discussion

The experts reported that SSA is a behavioral problem that is conceptually related to the problematic use of technology. In this case, technology refers to smartphones. This problematic use of technology is characterized by constant, abusive use. Specifically, the experts cited “the increasing difficulty to avoid constantly using one’s smartphone and turn it off,” “using it [the smartphone] for more than what is actually necessary,” and situations “where an individual excessively uses a smartphone in everyday life.” Such use leads to losing control over other aspects of life. According to the interviewed experts, SSA occurs “when they [students] are not able to control certain choices, but those choices are conditioned by the smartphone and what’s on it.”

According to the interviewed experts, the main causes of SSA are social and psychological factors. Among the social aspects causing SSA, the family was reported as the main factor. The sampled experts reported that SSA is the result of “educational poverty due to family background,” “a lack of support, care, and esteem from family or deeper family problems,” “a family background lacking valid social gatherings,” and “a lack of rules imposed by parents.” Here, educational poverty refers to “a lack of formal qualifications which severely restricts participation in a number of areas of social life” (Glaesser, 2022, p. 2818). Similarly, social isolation is cited as another social cause of SSA. The experts referred to “the difficulty for adolescents to socialize,” explaining that “because they do not socialize, they do not learn to interact with each other correctly.” Likewise, psychological problems were repeatedly highlighted as causes of SSA. For instance, the experts reported that SSA is caused by “difficulties in emotional control” (i.e., not knowing how to recognize and manage negative emotions), “low self-image and self-esteem,” “psychological problems,” and “impulsiveness.” Finally, albeit to a lesser extent, the “passion for technologies,” “early availability of mobile phones,” and “frequency of use” were highlighted as technological causes of addiction.

Regarding the consequences of SSA, the experts emphasized the three types proposed in the model (i.e., social, health, and performance-related consequences). As social consequences, the experts frequently cited both social problems and interpersonal relationships. They described social problems such as “damage to personal (online and offline) reputation,” “loss of social life and real friends,” “social isolation,” and other problematic behaviors such as “drug use” and “overspending on purchases or gambling.” Examples of interpersonal relational consequences mentioned by the experts included those related to the “deterioration of family relationships,” “loss of interpersonal relationships,” and “a growing number of virtual friends who have no

realistic impact on real life.” Health problems were cited as another consequence of SSA. The most frequently mentioned physical consequences were “sleep problems” and “musculoskeletal problems.” The psychological consequences that were repeatedly cited by the experts were “manipulation,” “becoming incapable of dealing with one’s own personality (...) and less and less aware of one’s real surroundings,” “building an identity on a fake virtual basis that has false importance for daily reality,” “difficulties in respecting waiting times,” “a loss of freedom of decision (resulting from the need to overuse the smartphone), an increase in negative emotions (e.g., anxiety, sadness, and irritability), and a rise in negative cognitions (e.g., poor self-concept),” and “increased vulnerability to other addictions.” Likewise, SSA was also reported to affect academic performance, with the experts highlighting “problems with school attainment” and “school failure.” Addiction was also reported to detract from other tasks such as “memorizing, calculating, planning... (because they become too dependent on the functions offered by smartphones),” “home obligations,” and future “professional opportunities.”

The views of the teachers overlapped somewhat with those of the experts but also differed in certain aspects. The interviewed teachers reported that addiction can be conceptualized as dependence on the use of smartphones. They affirmed that “there is dependence when use takes away family time and direct contact among peers,” that “from the moment a young person ceases to relate to others and starts to socialize through smartphones, we have a case of serious dependence,” and that “young people today depend a lot on smartphones because most of the time they serve as a crutch for social integration or simply to let themselves be in their own world. It is a dependence that provides comfort with no questions asked.” Besides dependence, SSA was conceptualized by teachers as abuse or excessive use (“excessive time of use without

being aware of it,” “being on the smartphone all day,” and “dedicating all their free time to using the smartphone”) and as a persistent behavior (“constant desire for a mobile device” and “constantly reaching for the smartphone and checking the status on various social media”).

Concerning the causes of SSA, the teachers mainly highlighted social factors. Explicitly, they cited the family and context as critical factors: “family environments that allow smartphone overuse due to a lack of parental presence or control,” “a lack of control (and rules) and permissiveness over time and use by parents,” and “affective/emotional problems in their closest circles (friends and family).” Moreover, the teachers reported that SSA could be the result of “social inhibition (difficulties in talking to others and the reduction in embarrassment that comes with expressing oneself through a smartphone)” and “isolation from society that leads youngsters not to speak or interact with peers.” Less frequently, the teachers also suggested technological reasons for SSA. They referred to “its immediacy and cheapness as a form of entertainment,” “games and playful interfaces,” and “the use of social media.” They also cited psychological factors such as “shyness” and “self-confidence.”

Regarding the consequences of SSA, the teachers reported that students’ health was most at risk. They suggested psychological harm such as “paranoia, fear based on games, schizophrenia, and confusion between reality and games,” “mood instability (because of awareness of who is texting and calling them),” “difficulty in dealing with frustration,” “agitation, aggression, impatience, and ‘zombie’ life (not listening or paying attention to those around them),” “nervousness and hyperactivity,” “lower self-esteem,” and “an unrealistic self-image.” They also mentioned physical problems “associated with sedentarism and the abuse of mental and visual arousal leading to muscle pain, obesity, insomnia, and vision problems” and “fewer manual skills and less

coordination.” In addition, social problems were reported as major consequences of SSA. For instance, the teachers expressed concern about “social isolation (lack of attention to family members, disinterest, loss of social relations, and not wanting to leave the house because of a desire not to miss out on gaming)” and other problems such as “gambling” and “bullying.” Similarly, interpersonal relationships were also reported as being damaged by SSA. The teachers reported that SSA leads to “family discussions (bad relationships with the family and bad temper),” “greater difficulty in interacting inside and outside school,” and “the loss of true friends.” Finally, some teachers reported that SSA affects young people’s performance. This impaired performance occurs in school in the form of “school failure (loss of concentration for studying, underachievement, and dropout)” and “lower school performance,” as well as in general in terms of “language problems” and “a lack of critical thinking.”

These results provide some valuable findings. Regarding the definition of SSA, the results highlight its complexity. In terms of causes, social factors appear to be the main causes of SSA. In reference to the consequences of SSA, the three types reported in the previous literature (i.e., health, social, and performance) were also cited by the experts and teachers interviewed for this study. Comparing the opinions of the interviewees reveals that both experts and teachers share common views regarding the definition, causes, and consequences of SSA in elementary and high school students. However, perhaps because of their differing experience with this issue, some variations were also observed. For instance, both groups described SSA as a behavioral problem characterized by excessive smartphone use. Nevertheless, teachers’ conceptualization of SSA was more similar to dependence than that of experts, who emphasized abusive use and the loss of control.

In the case of causes and consequences, both groups concurred that SSA is not caused by biological factors, as suggested in the literature. However, teachers mainly proposed social factors as causes of SSA, whereas experts focused on psychological as well as social aspects. There was consensus regarding the consequences of SSA, with psychological and social outcomes being the main consequences reported by teachers and experts.

It is also of interest to further compare these two groups of respondents. Elementary and high school teachers suggested that health-related problems are the main consequences of SSA, followed by social issues. In contrast, experts mostly cited social consequences, followed by health-related consequences. These findings confirm the importance of the social consequences of SSA (e.g., Gül et al., 2019; Panda & Jain, 2018). They expand prior research by suggesting that students' social isolation is a major consequence of SSA. Previous studies have paid relatively little attention to this consequence (Jafari, Aghaei, & khatony, 2019). Although performance-related consequences were emphasized less than other consequences, this study adds to the literature (Sunday et al., 2021) by highlighting problems with language and limited critical thinking. Such problems due to SSA could affect elementary and high school students. Table 2 summarizes the key findings of the qualitative study.

Table 2. Revised conceptual model of SSA: Definition, causes, and consequences

SSA issue	Key findings
Definition	SSA is a behavioral addiction characterized by constant, abusive, excessive use and dependence that leads to loss of control over other aspects of life.
Causes	<p>Social: family (lack of control and rules; permissiveness over time and use), peers (difficulty for adolescents to socialize; affective/emotional problems in their close circles), and social isolation</p> <p>Psychological: emotional control, self-image, self-esteem, shyness, self-confidence, and psychological problems</p> <p>Technological: passion for technology, early availability of mobile phones, frequency of use, cheapness, games, and</p>

Consequences	<p>Health: <i>physical</i> (e.g., musculoskeletal problems, obesity, insomnia, and vision problems) and <i>psychological</i> (e.g., negative emotions and cognitions, vulnerability to other addictions, and incapacity to separate real and virtual worlds)</p> <p>Social: reputational damages, gambling, bullying, loss of interpersonal relationships, social isolation, family discussions, and greater difficulty in interacting</p> <p>Performance: school failure, language problems, lack of critical thinking, and distraction from other tasks and future professional opportunities</p>
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Conclusions

The goal of this study was to gain a better understanding of the definition, causes, and consequences of SSA in elementary and high school students. The literature from different disciplines was reviewed to develop a conceptual model. This model was then explored through a qualitative study. This study contributes to the literature in several ways.

First, a conceptual model of SSA, its causes, and its consequences in relation to elementary and high school students is proposed. Past studies suggest that the interaction between various factors foments smartphone addiction (Hawi, 2012; Khang et al., 2013). However, in-depth knowledge of these factors is limited. The problematic behavior of SSA can be explained by a wide range of causes and can be thought of as a multifaceted phenomenon. The present literature review suggests that SSA cannot be easily predicted without employing different theoretical frameworks and perspectives. To explain what causes SSA, a wide range of variables should be considered. This preliminary study helps provide an understanding of SSA by reviewing an extensive body of literature. The causes of SSA are thus classified into four categories: biological,

psychological, social, and technological. Moreover, the literature suggests that SSA may be related to other problematic uses of technology, especially the use of smartphone applications, the Internet, and social media. This study also advances knowledge by defining and classifying the consequences of SSA. In the proposed model, the main areas affected by SSA are outlined. To the best of the authors' knowledge, existing studies have focused on different consequences in isolation. This model offers a comprehensive understanding of the impact of SSA on the key areas of students' lives (i.e., social, health, and performance).

Second, this study contributes to academic knowledge by empirically exploring the proposed model. The qualitative study partially supports the main conclusions of the literature review. Specifically, the interviewed experts and teachers defined SSA as a behavioral addiction related to problematic or excessive use of smartphones, constant use, and dependence that leads to a loss of control. Other antecedents (i.e., technological, social, and psychological) were underlined as causes. Only biological causes were not mentioned by the interviewed experts and teachers. This omission may be because these variables are considered profile-related, so they may not have been the first causes that occurred to the respondents when asked. Regarding the consequences of SSA, the findings reveal their multifaceted nature, with the interviewees citing social, health-, and performance-related consequences.

Third, this paper brings to light the complexity of SSA, with multiple factors predicting SSA and different problems resulting from it. SSA's complexity is due not only to the variety of causes and consequences but also to the challenge of understanding the role of each variable in the model. After analyzing both causes and consequences, a lack of consensus can be observed regarding certain variables. Certain aspects are considered causes of SSA by some and consequences by others. For

instance, psychological problems, such as depression and anxiety, are proposed as both causes and consequences of SSA. Similarly, issues related to relationships with others can be considered both determinants and outcomes of SSA. Consequently, further exploration of these phenomena would be of interest to clarify their role in the model. Fourth, the study contributes to the literature by focusing on elementary and high school students, including adolescents, a population at high risk of addiction. Prior research has emphasized that smartphone addiction is more common and problematic among young people because of their status as digital natives and the profound integration of smartphones in their daily lives (Caponnetto et al., 2021). This study also covers four European countries. As a result, the findings offer an overview of this young group of individuals from multiple perspectives. Although smartphone addiction can affect all generations, the idiosyncrasies of each age group should be considered so that the problem can be addressed more effectively.

The research also has limitations. For instance, it is based on the views of experts and teachers. Future research could study the perspectives of families and students through qualitative and quantitative analyses. Moreover, although the study was international, the results were not compared across countries. Future research should expand the analysis by comparing possible cultural differences. Further research can build on this framework to offer potential solutions to this problem from different perspectives. A major difficulty is to understand how excessive or problematic smartphone use is. This issue should be addressed in future studies. Finally, the classification of causes and consequences provided in this study is not exhaustive. It should be revised and extended in the future.

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Appendix

Questions to experts and teachers:

1. Would you say that there is a smartphone addiction problem among primary and secondary school students nowadays?
2. How would you define smartphone addiction?
3. What do you consider to be suitable use of smartphones by students?
4. What do you think are the three student background variables that could lead to smartphone addiction in students?
5. What five variables do you think are crucial to foster good or bad use of smartphones by students?
6. What are the five main consequences of addictive use of smartphones?