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How adolescents lose control over social networks: A process-based approach to problematic social network use

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ABSTRACT

Social networks (SNs) are immensely popular, especially among teenagers, yet our understanding of problematic SNs remains limited. Understanding motivations and patterns of use is crucial given the current prevalence of problematic SNs use. Perarles et al. (2020) distinguish two behavioral control modes: Model-Free Control, where actions are characterized by actions driven by immediate gratification without reflective consideration for long-term consequences, and Model-Based Control, enabling planned and goal-directed actions. Both control modes can lead to problematic social network use. This study aims to delve into problematic SNs use and the underlying motives behind adolescents' participation in SNs, drawing upon the theoretical proposal by Perales et al. (2020). We conducted four focus groups with adolescents aged 13–17 (50 % female; $M_{age} = 14.5$, $SD = 1.75$), comprising two public school and two Catholic private school groups. Thematic analysis using Atlas.ti software revealed three themes. The first uncovers characteristics of problematic SNs use, including withdrawal, increased usage time, impaired control, behavioral salience and attentional capture and cognitive hijacking. The second spotlights motives, emphasizing emotional regulation, finding out what is going on, and social interaction. The third theme explores consequences such as compromised academic performance and physical harm. In conclusion, addressing both motives and problematic behaviors present a more effective approach to confronting SNs use challenges and fostering healthier online experiences for adolescents.

1. Introduction

Social networks (SNs), including platforms like Facebook, Twitter, Instagram, and Snapchat, are widely used and offer various benefits (Kuss & Griffiths, 2017; Vanden Abeele et al., 2018). However, they also raise concerns about potential physical and mental health drawbacks (Elhai et al., 2017; Wacks & Weinstein, 2021).

Adolescence is a critical stage for examining the consequences of SNs due to adolescents' heightened susceptibility to technology use (Kuss & Griffiths, 2011; Valkenburg & Peter, 2011). Adolescents, with their heightened social orientation, impulsivity, emotional instability, and limited self-regulation, may face an elevated risk of excessive SN use, potentially leading to adverse outcomes (Dienlin & Johannes, 2022).

Why do adolescents use SNs? Recent studies have explored motivational factors. Throuvala et al. (2019) found motivations such as social interaction, control, emotional regulation, and peer comparison. Heravi et al. (2018) identified motives such as maintaining relationships, seeking information, entertainment, social pressure, and staying informed. In the same vein, Andrade (2021) showed that adolescents use SNs to make friends (58.1 %), to combat loneliness (44.3 %), for self-expression (33 %), and to gain acceptance (27.8 %). The literature shows that using SNs as a way to alleviate negative emotions or avoid

Abbreviations: SNs, Social Networks; PSNSU, Problematic Social Network Sites Use.

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boredom can lead to Problematic Social Network Sites Use (PSNSU) (Gioia et al., 2021; Stockdale & Coyne, 2020). This term refers to excessive use with detrimental consequences to the user's personal, professional, and/or social functioning (Cataldo et al., 2022). It has been described as behavioral addiction (following the Components model of addiction proposed by Griffiths, 2005; 2019) but also as a maladaptive coping strategy (Billieux et al., 2015).

Griffiths' addiction model (2005) identifies six core symptoms in all behavioral addictions: salience, mood modification, tolerance, withdrawal, conflict, and relapse. Studies comparing PSNSU to substance addiction symptoms, such as craving and negative emotions upon withdrawal, highlight the complexity of this phenomenon (Stieger & Lewetzs, 2018; Wilcockson et al., 2019). Billieux et al. (2015) ask for caution when labeling PSNSU as an addiction due to its emerging nature. Other researchers, such as Flayelle et al. (2017) and Perales and Muela (2023), warn that such comparisons might lead to confirmation bias. This could potentially hinder the understanding of the structure and characteristics of the disorder (Cornil et al., 2018). In fact, one of the few qualitative studies examining craving in behavioral addictions, conducted by King et al. (2016) and focusing on video games, found that during an 84-hour period, withdrawal symptoms manifested as boredom and a desire for mental engagement. These results do not align with the components model of addiction, which suggests that symptoms such as "extreme moodiness and irritability", along with other physiological symptoms (e.g., nausea, sweats), should be reported.

In recent years, behavioral addictions research has seen the emergence of several process-based approaches, offering valuable alternatives to symptom-based approaches (see Brand et al., 2016; 2019; Hamonniere & Billieux, 2023). In this study, the "learning to lose control" approach to behavioral addictions will be explored in the context of PSNSU (Perales et al., 2020).

1.1. Learning to lose control in behavioral addictions

According to Perales et al. (2020), addictive behaviors can be defined as "a transition between different modes of behavioral control". This paper proposes two distinct modes of control: model-free and model-based. Model-free control refers to decision-making based on experience and immediate outcomes of actions without the need to construct an internal model of the environment. This form of control is linked to automatic responses and associative learning, where actions are strongly linked to immediate gratification without reflective consideration of long-term consequences (Muela et al., 2023; Perales et al., 2020). In contrast, model-based control involves constructing an internal model of the environment, allowing individuals to simulate and evaluate potential future outcomes of actions before making decisions entailing the potential consequences and outcomes associated with the behavior (Perales et al., 2020).

According to the Expectancy-Value Theory (Atkinson, 1957), people perform behaviors based on the expectations of their outcome (Nicolai et al., 2018; Wu et al., 2013). It has been also proposed that humans not only compare a single behavior, but also select the optimal behavior from its behavioral repertoire (Borders et al., 2004). Human behavior selection involves assessing the relative utility of a behavior compared to alternatives for positive or negative reinforcement, potentially leading to negative consequences if an overestimated behavior outweighs others (e.g., dysregulation problems, Castro-Calvo et al., 2022a; Quaglieri et al., 2022; Perales et al., 2020).

Compulsivity, as defined by Yücel et al. (2019) and Luigjes et al. (2019), refers to the experience of feeling forced or compelled to act despite awareness of serious negative consequences. Thus, the behavior is detached from goals, becoming automatic and inflexible. This detachment can occur when outcomes no longer motivate actions, or when behaviors persist driven by strong short-term motives despite harmful long-term effects. In essence, compulsivity encompasses both stimulus-driven and goal-directed control (Muela et al., 2023). A recent systematic review by Muela et al. (2022) identified six key domains related to compulsive behavior, including craving, bingeing, insensitivity to punishment, inflexible rules, behavioral salience, and attentional capture and cognitive hijacking.

In the case of PSNSU, evidence from Perales and Muela (2023) suggests that model-free control may not be as relevant when seemingly compulsive use occurs. Nevertheless, it still becomes problematic. Thus, PSNSU becomes a pathway to obtain certain, both positive and negative, reinforcers but the value of these reinforcers depends on dysfunctional motives. PSNSU may arise when SNs are used as a coping mechanism or an escape from negative emotional states or when they provide access to socially valuable reinforcers that cannot be obtained through more adaptive activities (e.g., avoiding face-to-face interaction due to a lack of social skills) (Kardefelt-Winther, 2017; Luchman et al., 2014). Given that (1) compulsion is predominantly associated with substance addiction and gambling disorder and (2) not all compulsive characteristics are evident in PSNSU (Stieger & Lewetz, 2018), we have opted to use the term PSNSU.

In summary, engaging in SNs through either model-free or model-based control approaches may lead to negative consequences, such as social, academic, or physical problems (Kardefelt-Winther, 2014; Khang et al., 2013). This parallels Park's (2019) distinction in smartphone dependency, with both instrumental (model-based) and existential (model-free) use associated with negative outcomes, and model-free behavior having more severe consequences. Thus, both mechanisms can be present in an individual using SNs, albeit to varying degrees (Perales & Muela, 2023). Additionally, while Perales et al. (2020) lack direct quantitative validation, Aparicio-Martínez et al. (2020) found a significant correlation between SN addiction levels and the statement 'Social networks are a basic tool for staying connected.' The correlation coefficients were 0.65 for men and 0.61 for women.

Therefore, this study aims (1) to explore the components of problematic SN use and (2) to describe the utility outcomes of SNs in adolescents' lives. Qualitative research methods were employed as recommended by Flayelle et al. (2019).

2. Methods

2.1. Procedure

We initially contacted eight high schools in Valencia, Spain, with two agreeing to participate. We distributed questionnaires in four classrooms across a public school and a private Catholic school. To accommodate participants without internet access at the time, we administered the questionnaires using both Qualtrics and paper formats. All eligible participants were then invited to join a focus group.

Each focus group was conducted by two researchers. One researcher asked questions in a semi-structured format about PSNSU and reasons for using SNs, while the other observed and recorded nonverbal behavior without interference. The questions were selected based on popular scales for assessing problematic use of social media (e.g., Social Media Disorder Scale, Bergen Social Media Addiction Scale), as well as on the theoretical conceptualization of behavioral addictions between model-free and model-based control by Perales et al. (2020). All the questions can be found on the OSF link (e.g., Could you not use social networks if you wanted to? Are there things or goals that can only be achieved through social networks?). All participant contributions were systematically recorded with an audio recorder. Each focus group lasted an average of 56 min ($SD = 6.78$).

Finally, we re-presented the qualitative results obtained, receiving positive feedback regarding the themes and subthemes extracted from participants in the four classrooms. None of them identified any components that had not been considered.

2.2. Measures

In order to describe the characteristics of the sample, the use of SNs was assessed by four ad hoc questions adapted from previous works (Ellis et al., 2019; Flayelle et al., 2017). The first item assessed dependence on SNs ("I think I am overly dependent on social networks") and the second item, problematic use ("I think my use of social networks is problematic"), using a Likert scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"). Participants were also asked about their daily number of unlocks ("During the last month, how many times have you unlocked your cell phone on average each day?") and average daily usage time ("During the last month, how many minutes on average have you used your smartphone each day?").

In addition, we also administered The Social Media Disorder Scale (SMD-Scale; Boer et al., 2022) to evaluate the problematic use of social media. This scale is composed of nine self-administered questions and uses a dichotomous scale (Yes/No) ($\alpha = 0.82$). We selected this scale because it has been designed by experts as an adequate tool when targeting these behaviors (Fineberg et al., 2022). Due to the better psychometric properties of the SMD-Scale, we used its scores as a criterion to form the focus groups, using only ad hoc questions to describe the participants.

2.3. Participants

Initially, 98 students completed the screening questionnaire. Following the removal of 11 participants due to various reasons (e.g., missing values, random responses), the final screening sample comprised 87 participants. A total of 26 participants for four focus groups were selected from this initial sample (six to eight participants per group), in accordance with recommendations (Krueger, 2014). Participant characteristics are presented in Table 1.

We aimed to balance gender representation and SMD-Scale scores in each focus group. Consequently, a minimum of two boys and two girls were intentionally chosen for every focus group. Additionally, we ensured the inclusion of a minimum of two participants in each group whose SMD-Scale scores exceeded 5, with a preference for prioritizing individuals with higher scores whenever feasible. Inclusion criteria for the study were:

(a) Being between 13 and 17 years old and attending from the 2nd to 4th year of Compulsory Secondary Education.
(b) Owning a smartphone for at least 2 years.
(c) Using their smartphone for at least 30 min a day.

Table 1
Participant characteristics.

	n (%) or *M (SD)* and *Mdn* (*Range*)
Demographics	
Gender	
Male	11 (42.3 %)
Female	13 (50 %)
Prefer not to answer	2 (7.7 %)
Age (from 13 to 17 years old)	14.5 (1.75)
High school	
Public school	13 (50 %)
Private Catholic school	13 (50 %)
School year	
2nd Year of Compulsory Secondary Education	12 (46.2 %)
3rd Year of Compulsory Secondary Education	6 (23.1 %)
4th Year of Compulsory Secondary Education	8 (30.8 %)
Ad hoc questions	
Average daily hours of use in the last month	3.82 (1.99); 4 (1–8)
Average daily unblocks in the last month	56.29 (35.76); 50 (13–130)
I think I am overly dependent on social networks	2.88 (1.78); 3 (1–5)
I think my use of social networks is problematic	2.62 (1.13); 3 (1–5)
Social Media Disorder Scale	4.31 (2.31); 4 (1–8)

Note. *M* = Mean; *SD* = Standard deviation; *Mdn* = Median.

2.4. Data analysis

R 4.1.3 and R Studio were used for calculating ordinal alpha and creating the spider plot. We chose reflexive thematic analysis (RTA) as the method for analyzing our qualitative data. RTA, a flexible approach to data analysis, is outlined by Braun and Clarke (2006; 2019) in a six-phase procedure. These phases include familiarizing oneself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and finally, producing the report, as proposed by Braun and Clarke (2006). This method is data-driven and does not rely on pre-existing models, obviating the need for a codebook (Braun & Clarke, 2019). A second researcher provided additional insights, enriching data interpretation, in accordance with the original authors' proposal. Consensus was achieved through debate after thoroughly reviewing the audios and the transcriptions, considering both verbal and non-verbal interactions. All focus group audio interactions were reviewed by the second researcher. In cases where the interviewer influenced participant responses, either by providing cues or suggesting possible answers, it was deemed necessary to discard those responses. They lasted an average of 56 min ($SD = 6.78$). We used an identification system, such as 'FG4M1′ to label participants, indicating the focus group number, gender (Female, Male, or Prefer not to say), and participant number within the group. The study was pre-registered (https://doi.org/10.17605/OSF.IO/SDV6Y) and data are public (https://osf.io/wc4ev/). Qualitative analyses were performed using the Atlas.ti program.

2.5. Ethics

This study complies with the Helsinki Ethical Declarations and was approved by the Ethics Committee of the University of Valencia (Procedure number: 2675827). According to the Spanish regulation, all participants and their legal guardians, in the case of minors under 16 years of age, signed informed consent.

3. Results

Three themes were identified (i.e., problematic use, the utility of the expected outcome, and negative consequences of SNs). In addition, each theme is composed of different subthemes. A full table with themes and subthemes accompanied by examples of the participants' interventions is shown in Table 2.

Furthermore, Fig. 1 allows us to observe the contributions of each focus group in each of the themes. The maximum for each theme is the highest score of the most mentioned subtheme within each theme.

3.1. Theme 1: Problematic use of social networks

3.1.1. Withdrawal

The removal of access to SNs can trigger emotional reactions such as boredom or diffuse psychological discomfort among participants. Several participants reported situations such as "If my parents take away my smartphone, it's like I feel terrible all day, it's like I'm missing something…" (FG2F4), indicating a strong need to use SNs. Participants mentioned phrases like: "Stress, it's like I want to know what people have uploaded to Instagram, see new WhatsApp messages, it's horrible" (FG4M7) or during Instagram and WhatsApp crashes "I was bored. But well, I had TikTok" (FG1F4).

Moreover, the most extreme cases of PSNSU not only produced

Table 2
Results of the qualitative study using thematic analysis.

	Frequency (%)	Examples
Theme 1: Compulsive use of social networks		
Withdrawal	68 (35.23 %)	"Once I ran out of battery, I was traveling, and I couldn't use my smartphone for 2 h, and let's see, I didn't feel bad or anything, but I didn't like the feeling of not being able to open Instagram at all… it was like, I don't know, that I needed to enter because I hadn't opened it for 2 h." (FG1F6) "Sometimes when, I don't have my smartphone in my hand, it's not that I'm nervous, but it's like I feel naked without my smartphone in my hand. If I go out of the house, I can forget everything except my smartphone, I always carry it in my hand. I can leave it and such, but in the street, I prefer to carry it in my hand rather than in my pocket, I feel more comfortable." (FG1F4)
Increased usage Time	38 (19.68 %)	"We are already used to it, it is already a habit. For example, during the quarantine I increased my use and it has stayed that way…" (FG2F4). "I could go days without looking at stories "[in Instagram]. But now I use it more and more. I like to see stories." (FG1F4)
Behavioral salience	34 (17.61 %)	"Look at my smartphone every 10 min, even if I don't have notifications, opening the applications just in case…" (FG1M7) "Because sometimes when you're not doing anything, you open it just to be on it and that's it." (FG1M7) "…when I'm not doing anything or whatever, I go straight to my smartphone…" (FG1F4)
Impaired control	28 (14.5 %)	"I failed miserably, I've tried several times, but in all of them, I ended up failing. But in quarantine and everything I tried, and using the computer instead of the smartphone, but in the end, I don't know what happened, but I always ended up using it." (FG4F5) "You want to get in for a little while and you end up spending 2 h there, and then you can't stop." (FG4F5)
Attentional capture and cognitive hijacking	25 (12.95 %)	"When you get a notification, instead of saying, I don't care, I have to look at it. To see what's going on." (FG2F6) "…I arrived and he was sitting on the couch with her smartphone, and he didn't say hello or anything, his mother said hello and I said hello and he continued and he was on TikTok all the time and he kept scrolling down…" (FG4F5)
Theme 2: Utility outcome of social networks		
Emotional regulation	132 (42.17 %)	
Pleasurable emotions	31	"…on Instagram, watching what people upload because it's entertaining. There are a lot of things to see…" (FG1F4)
Boredom	45	"…I usually use my smartphone when I'm bored." (FG1M1) "…if I'm not bored and I have something else to do, then I might not use my smartphone. But if I'm at home and I have nothing to do it's more complicated." (FG2M5)
Anxiety and stress	12	"I, for example, do have anxiety […], that's why my escape route is my smartphone." (FG1F5)
Sadness	23	"When I'm sad, I look at my smartphone. To forget about everything." (FG2M5)
Anger	4	"Well, if you're angry, you watch funny videos." (FG4F2)
Shame	24	"Often, you pick up your smartphone because you feel uncomfortable, if they are looking at you in the street, you pick it up…" (FG2F3)
Social interaction	73 (23.32 %)	"…to communicate, to talk to my friends. I use it to talk to my friends when school is out." (FG2F3)
Find out what is going on	47 (23.32 %)	"…I go down to the street and when half an hour goes by it's like: oops, let's see if someone has uploaded something and I missed it." (FG4F2) "[To find out about the news] …it's not just on social networks, in class, you end up finding out." (FG2M1)
Social identity	27 (15.01 %)	"Being known. Uploading photos so that people follow you and you have more followers." (FG2M5)
Social acceptance	21 (6.71 %)	"To feel normal. If you say you don't have Instagram people look at you like what a weirdo or freak." (FG2F4)
Developing skills	13 (4.15 %)	"Learning from some videos, no longer just about classroom things, but videos on TikTok to learn how to do something, English vocabulary…" (FG4F2)
Theme 3: Negative consequences of social networks		
Social problems 40 (43.01 %)		
Family	22	"Well, my parents sometimes get angry because I don't pay attention to them and I'm on my smartphone more." (FG3F2) "It happens to me that, for example, the other day I was talking to my mom and it's not that I didn't want to talk to my mom or anything, but she had been talking for a long time and I wanted the conversation to end. Not because I didn't want to talk to her, but because I felt like looking at Instagram. I wanted her to end the conversation so I could look at Instagram. Even if I don't have notifications or I haven't used it at all recently, I still want to upload a story." (FG1F6)
Friends	18	"The smartphone thing makes me very angry, because, for example, there are times when I'm with friends and there are times when we're in a park or having dinner or somewhere and you always see one or two people with their smartphones or watching videos. If you're meeting up, be with your friends and then when you are alone at home you get on your smartphone." (FG2M1)"If the guy you like talks to you,

(*continued on next page*)

Table 2 (*continued*)

	Frequency (%)	Examples
		even if you're talking to your friend, it's like it ends since I want to answer him already." (FG1F4) "If they're talking to me, even if I'm looking at my smartphone, I still listen. I tell them, 'You talk to me, I'm still listening", because I'm still listening to the conversation because I understand everything they tell me and then I answer them. But still, I do answer the notifications." (FG1F6)
Academic performance	21 (22.58 %)	"…when you're on TikTok and you have an exam and it's like: well, one more or until a certain time, and that in the end makes you have less study time." (FG1F4) "because of your smartphone, sometimes you don't study and you don't do well." (FG3F2)
Physical problems	16 (17.2 %)	
Headache and dizziness	4	"Headache." (FG1F5)
Vision problems	8	"…I had to be fitted with close-up glasses because they said that the use of the smartphone had also affected my vision." (FG4F5)
Nervous tics	2	"…sometimes I would close my eyes very tightly and then open them. They are like tics in my eyes, or my nose because of the smartphone." (FG1F4)
Physical integrity	2	"People on Instagram taking selfies in dangerous places to get more likes, which can even lead to death." (FG3M5)
Sleeping alterations	7 (7.52 %)	"For being on your smartphone and in the end you go to bed at 00:00 and end up getting rough sleep, because you get up at 7:00." (FG1M7)
Spare time activities displacement	6 (6.45 %)	"My spare time is being on my smartphone…" (FG1F5).
Psychological distress	3 (3.25 %)	"It can cause depression, mental damage" (FG3M5)

boredom and stress, but also intense psychological discomfort "I had a friend who was always using his smartphone, and once they took it away from him and it was locked up […]. He was very frustrated and didn't know what to do […] he tried to buy a smartphone from one of his friends" (FG4F5).

3.1.2. *Increased usage time*

Several participants also described a slight increase in the use of SNs (e.g., FG1M1: "it has increased, but not much"), but others showed a progressive increase in the use of SNs, as can be seen in Table 2. We especially observed this in certain apps (e.g., Instagram and TikTok), where its use "has changed a lot, especially for TikTok […]. I spend 4 or 5 h a day, half of it is on TikTok" (FG1M3).

3.1.3. *Behavioral salience*

The problematic use described by adolescents is also characterized by a high dependency on social media. For instance, several individuals stated that people with PSNSU tend to use SNs, regardless of not having notifications. As FG1F8 refers to people with PSNSU: "Someone who opens the smartphone every two to three minutes, even if they have no notifications" or FG1M7: "Looking at the smartphone every 10 min […] they open the applications just in case". Participants also stated that they pick up their smartphones directly, not realizing that they are doing so.

3.1.4. *Impaired control*

Certain participants also showed a poor capacity to control their use: "You […] end up [referring to using SNs] 2 h later, and then you can't stop" (FG4F5), which is often shown by the inability to stop at a previously established time. They also described an excessive dependency, for instance, participant FG2M1 reported: " I look at it for 5 min, then 20 min have passed and […] an hour goes by [referring to using TikTok]".

While a few participants have shown attempts to control the use of SNs they shared failing continually. When asked if they had tried to reduce the use of SNs, one participant answered "Yes, but I didn't succeed. I promised my parents, but the more spare time I have, the more hooked I am." (FG2F3).

When they were asked about how long they thought they could last without checking SNs they stated: "I could try for an hour, but I don't want to" (FG1F4), "An hour and a half, 2 h" (FG1M2) or directly "I couldn't" (FG1F6).

3.1.5. *Attentional capture and cognitive hijacking*

Several participants demonstrated a strong inclination to respond to conditioned stimuli associated with SNs (e.g., receiving notifications), expressing their urge to check their devices: "I want to look at it"

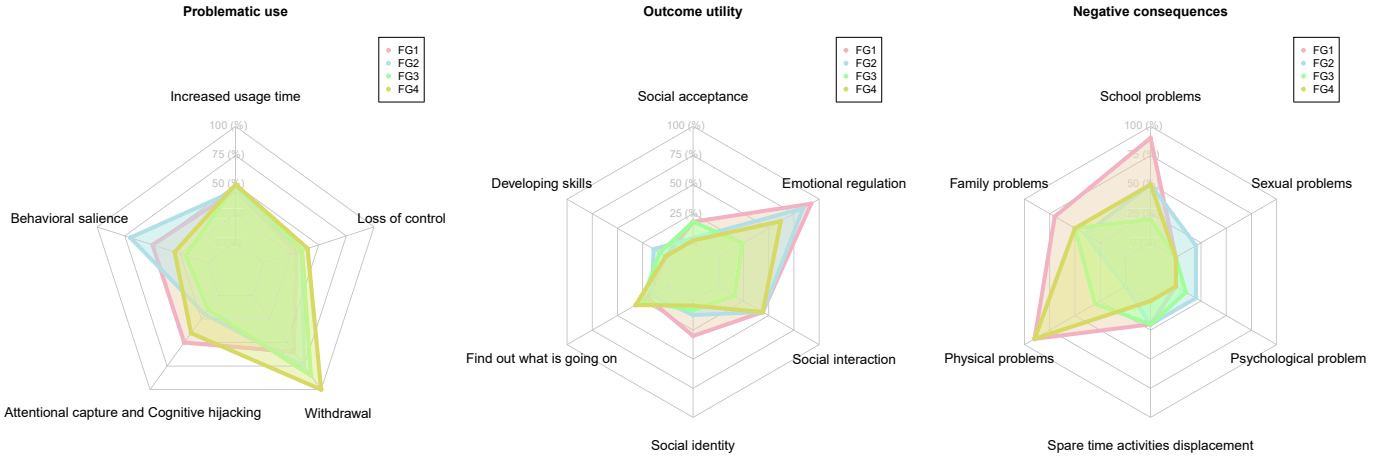

Fig. 1. The figure displays three radar charts, each highlighting a different theme. For each chart, the axes show various subthemes, and the plotted percentages indicate how often each subtheme was mentioned. These percentages are then compared to the most frequently mentioned subtheme, serving as a benchmark for relative comparison among the focus groups.

(FG3F2). The prevalence of thoughts and concerns related to SNs was evident in the sample. Moreover, certain users reported being significantly absorbed by SNs, with friends prioritizing virtual interactions over face-to-face conversations. One participant (FG1M7) shared an example, stating "I met someone, and instead of talking to each other, they were looking at their smartphone". Despite this, some instances of appropriate use were also identified. (e.g., FG2M1: "I'm not thinking about notifications all the time… if someone sends me a WhatsApp message, it doesn't motivate me to check it").

3.2. Theme 2: Utility outcome of social networks

This second theme refers to the planned use of SNs, which seeks to achieve a specific goal (model-based control). These questions allowed us to establish a series of motivations that SNs fulfill in adolescents.

3.2.1. Emotional regulation

An important utility outcome is the use of SNs to regulate emotions, encompassing both pleasant and unpleasant feelings. Concerning pleasant emotions, two situations emerged. Firstly, some participants use SNs to amplify their cheerful or happy mood (e.g., FG1F4: "If it's a day when I look very pretty, I use my smartphone more to upload content to TikTok"). Secondly, others in a neutral mood use SNs as entertainment to increase enjoyment (e.g., FG1F4: "Instagram, seeing what people upload, I am entertained"). However, most participants reported using SNs to regulate negative emotions. Examples included using SNs to cope with sadness (e.g., FG2M5: "When I'm sad, I look at my smartphone to forget about everything") and anxiety (e.g., FG1NA5: "To disconnect from your life or if you have a problem"). Finally, the main reason for using SNs to regulate emotions was to alleviate boredom, as some participants pointed out (e.g., FG1M1: "I usually use my smartphone when I am bored"). Hence, boredom appears to function as an antecedent that motivates SN usage (e.g., FG1M1: "I usually use my phone when I'm bored"). However, it can also be a consequence of withdrawal from SNs (e.g., FG2M1: "Last year, my phone broke, and I was without a phone for a week. It felt quite long, to be honest. You're out of touch, and you get bored quickly").

3.2.2. Social interaction

Most of the adolescents stated that they use SNs to communicate (e.g., FG2F3: "talk to my friends"), flirt (e.g., FG1F6: "if you don't have Instagram you don't flirt"), share content (e.g., FG4F5: "to upload your content"), or to organize meetings (e.g., FG4M3: "your friends usually meet via WhatsApp"). Social interaction along with emotional regulation are the most prevalent functions of SNs.

3.2.3. Find out what is going on

Several participants exhibited a high level of Fear of Missing Out (FOMO) on current events. They reported using their SNs more frequently to stay updated (e.g., FG2F4: "It's like a need when you think about groups of friends, they'll be saying, I need to have someone to tell things to"). Participants emphasized the importance of knowing what their friends or idols are currently doing.

3.2.4. Social identity

Several adolescents stated that notoriety (e.g., FG2M5: "Being known. Uploading photos so that people follow you and you have more followers", "To reach a top number of followers") and sharing media content with their peers is important for them. Additionally, participants mentioned that they could develop their social identity online by discovering affinity groups (e.g., FG2F6: "Finding things that you like, that you feel like you identify with. Just finding people with the same music tastes as you").

Referring to online use, some participants argued that SNs are part of real life, FG3F3: "It's real life but through a screen". Furthermore, some participants reported neglecting their offline identity and attempting to develop a deeply ingrained online social identity through SNs (e.g., FG1M3: "There are people who think that an SN is the most important thing, and they must always be on it so that they can try to be the best and be well thought of. They think, 'if you don't upload anything, you are nobody'").

3.2.5. Social acceptance

Participants also recognized experiencing social pressure to use SNs (e.g., FG1F4: "If you don't have social networks, you are different, if someone doesn't have Instagram, you can like them very much, but you don't have the same relationship anymore, you see them as different from you"). Consequently, participants discussed seeking social acceptance through their engagement with SNs (e.g., FG1M1: "[They seek] to make it look like their life is better than it is, just uploading a picture to their stories, editing it so that it comes out perfect").

3.2.6. Seeking information

Several adolescents indicated using SNs to practice different languages, learn new school concepts, or look for cooking recipes. Although it was mentioned during the focus groups, it is not that to which they dedicate most of their time.

3.3. Theme 3: Negative consequences of social networks

Participants also provided negative consequences of PSNSU., including social, personal, physical, academic, and psychological problems.

3.3.1. Social problems

(a) Family

The use of SNs can be a source of conflict in families, especially at bedtime and during meals. Sometimes, using SNs allowed the participants to escape from uncomfortable situations (e.g., FG2F3: "When I argue with my parents, which is kind of uncomfortable, I pick up my smartphone, and that way I have the peace of mind of not having to look at them in the face"). Nevertheless, participants' phubbing generated interpersonal conflicts with friends and family members.

(b) Friends

Participants complained about their friends because they do not pay attention when they meet up, but they admit doing it too (e.g., FG1F6: "If someone is talking to me, even if I'm looking at my smartphone, I still listen […] I'm still listening to the conversation because I understand everything … But I can still answer the notifications").

3.3.2. Physical problems

Participants described a series of physical problems such as vision problems (e.g., FG4F5: "After the 14th year I had to wear glasses because they said that the use of the smartphone had also affected my vision"), nervous tics (e.g., FG1F4: "They are like tics in my eyes or nose because of the smartphone "), lack of sleep (e.g., FG4F2: "I have trouble sleeping … and I get worse with my smartphone, with my smartphone it is much harder for me to sleep"), dizziness (e.g., FG4F5:" There was a time when I used my smartphone so much that I had dizziness") or dangers to physical integrity (e.g., FG3NA5: "People on Instagram who take selfies in dangerous places").

3.3.3. Academic performance

Participants stated that SNs interfere when they are studying at home (e.g., FG1M2: "I put my smartphone away because otherwise, I concentrate less"). However, there were other participants who, due to FOMO, needed to study with their smartphones nearby (e.g., FG1F6: "I need to have it next to me, I can't leave it in another room. I need to have

it next to me (…) I don't use it, but just in case").

3.3.4. Spare time activity displacement

Many participants experienced a decline in interest in previously enjoyable activities due to their engagement with SNs (FG3F1: "I used to read a lot […], but now with my smartphone […] I don't read anymore". Some also accused smartphones of wasting their free time (e.g., FG1M7: "I'm there for an hour and then I say, I could have done something else").

3.3.5. Psychological distress

Although in the minority, the presence of psychological problems was also revealed (e.g., FG3M6: "It racks your brain"), such as depression (e.g., FG3NA5: "It can cause depression") or problems related to eating behavior (e.g., FG4F6: "When you see videos and everyone is like very happy, thin, travelling a lot, and you compare yourself. And you can end up with problems… like eating disorders").

4. Discussion

This study aimed to apply the theoretical framework proposed by Perales et al. (2020) to the phenomenon of PSNSU to enhance our understanding of it. Specifically, the study employed a comprehensive qualitative analysis involving adolescents. The primary objectives were (1) to explore the components of problematic SN use and (2) to describe the utility outcomes of using SNs in adolescents' lives. Furthermore, an additional issue has been contemplated that was not originally included, namely the negative consequences of PSNSU. The analysis of the focus groups' scripts resulted in three prominent themes regarding SN use.

Firstly, various components of PNSU were identified, including increased usage time, withdrawal, impaired control, behavioral salience, and attentional capture and cognitive hijacking. These findings are consistent with prior research conducted by Cuadrado et al. (2020) and Muela et al. (2022). The external conditioned stimuli present in PSNSU might hold particular significance. Notifications received from platforms like TikTok or Instagram can act as triggers, leading to craving and PSNSU (Davis, 2001; Moretta et al., 2020). The intermittent reinforcement provided by smartphones, particularly through SN usage, may emerge as a crucial factor in generating PSNSU (Skinner, 1958; Weatherly & Bogenreif, 2013). Therefore, when combined with smartphone notifications (e.g., LED lights or vibrations triggered upon receiving a notification) or features like infinite scrolling on popular platforms such as TikTok or Instagram, these stimuli can have a substantial impact. These attributes encourage users to engage for prolonged periods or repeatedly return to the app (Davis, 2001; Flayelle et al., 2023). Furthermore, it is important to highlight that the withdrawal phenomenon observed shares more similarities with internet gaming disorder than with withdrawal experiences associated with substance abuse or gambling disorder (Blaszczynski et al., 2008; Griffiths, 2005; Fernandez et al., 2020). Essentially, individuals engaged in both video games and SNs commonly report feelings of boredom (King et al., 2016). When access to specific SNs is restricted, they tend to engage in compensatory activities (Castro-Calvo et al., 2018; King et al., 2016). Additionally, participants report feeling increased pressure to use SNs (Fernandez et al., 2020). This suggests that the withdrawal phenomenon is notably different from what the components model proposes. Regarding the increase in usage time, it appears to be a factor present among problematic users but holds limited significance in the context of PSNSU. This is particularly true considering that an increase in usage time could be a reasonable coping mechanism, especially in situations like the COVID-19 pandemic (Castro-Calvo et al., 2018; Zarco-Alpuente et al., 2021). It is important to note that we have not observed an increase in tolerance in the sense of needing higher doses for comparable effects (Blaszczynski et al., 2008). Instead, our observations indicate an increase in usage time without a clearly defined cause. Indeed, both diagnostic criteria, namely tolerance and withdrawal, have been identified as symptoms that lack the capacity to effectively distinguish between unproblematic involvement and problematic use in various behavioral addictions, such as internet gaming disorder, thus indicating low clinical utility (Castro-Calvo et al., 2021). Within the context of SNs, these two symptoms have encountered substantial criticism due to their limited predictive power concerning other psychological problems (Fournier et al., 2023; Peng & Liao, 2023).

Secondly, the utility outcomes of using SNs may also be a relevant mechanism contributing to PSNSU. According to the focus groups, these were social interaction, emotional regulation, social acceptance, seeking information, finding out what is going on, and social identity. These findings also align with previous studies (Whiting & Williams, 2013; Wen et al., 2022). Notably, social interaction was found as the main function of SNs (Andrade, 2021), which holds particular significance during adolescence when individuals actively seek social acceptance and develop their social identity (Valkenburg & Peter, 2011). However, it is important to note that relying solely on SNs for human interaction can be problematic, potentially leading to the avoidance of face-to-face interactions (Castro-Calvo et al., 2022b; Kardefelt-Winther, 2014). Moreover, individuals who seek social acceptance and exhibit PSNSU may face dire consequences, as evidenced by viral challenges on platforms like TikTok in recent years (e.g., "Blackout challenge"; Roth et al., 2021). Additionally, it has also been observed that individuals use SNs to regulate dysphoric states such as anxiety or boredom, which is consistent with previous findings (Verduyn et al., 2017). Research has also demonstrated that difficulties in emotional regulation contribute to the development of PSNSU, acting as negative reinforcers (Marino et al., 2019). Understanding social connections is a fundamental motivation satisfied by SNs, allowing individuals to stay informed about others' activities (Deci & Ryan, 2008). Promoting healthy SN use may require fostering flexibility, as PSNSU is linked to reduced cognitive flexibility (İnal & Serel Arslan, 2021). Encouraging users to adopt alternative behaviors to meet their utility outcomes could reduce negative consequences (Liu et al., 2019). While using SNs to achieve specific goals, such as learning a language through Instagram videos, is not inherently problematic, issues arise when individuals limit their behavior solely to SNs, neglecting other communication methods. To address these issues, interventions could focus on engaging in enjoyable activities aligned with their values, drawing from contextual therapies that emphasize value-driven behavior (Hayes et al., 2013). In summary, if PSNSU arises from an overestimation of its utility in alleviating unpleasant emotional states (e.g., boredom or stress), this does not imply that intermittent reinforcement mechanisms (e.g., infinite scrolling) may not be playing a relevant role in PSNSU (Perales & Muela, 2023).

PSNSU can result in various negative consequences across domains, including social deterioration, physical issues (e.g., tics, vision loss, headaches), displacement from important activities, academic challenges (e.g., procrastination, lower performance), sleep disturbances, and psychological problems (e.g., anxiety, stress). Similar functional impairments in work or school, social relationships, sleep patterns, and leisure activity displacement have been reported in other studies (Andrade, 2021; Moqbel & Kock, 2018). However, it is worth noting that if someone exhibits PSNSU traits without experiencing these negative outcomes, a different term, such as 'passion' (Deleuze et al., 2018), may be more appropriate than PSNSU.

These findings indicate a need for personalized therapeutic approaches, considering individuals' specific utility outcomes associated with SN use. For users with PSNSU stemming from challenges in evaluating utility outcomes and goal-directed behavior, practitioners could explore interventions like teaching social skills, providing emotional regulation techniques, or encouraging alternative leisure activities (Liu et al., 2019; Wen et al., 2022).

4.1. Limitations

Several limitations should be acknowledged. Firstly, the study's

limited sample size may hinder the generalizability of the findings. Secondly, the study exclusively employed qualitative methodology to examine SN use components and utility outcomes, lacking quantitative validation. Thirdly, participant discussions were audio-recorded in the presence of peers, which might have constrained emotional openness and information sharing. In addition, it should be noted that the number of focus groups conducted in a private Catholic institution is over-represented compared to the prevalence of such institutions in Spain. Lastly, results may have limited generalizability due to shifting app preferences (e.g., TikTok's rise since 2020, the growth of BeReal in 2022 and Threads in 2024) (Throuvala et al., 2019).

4.2. Future lines

Future studies should explore utility outcomes of PSNSU in larger and more diverse samples (e.g., elderly, clinical population). For instance, unique adverse outcomes may arise in older adults (e.g., poorer concentration performance, lower productivity at work, conflicts with partners, distractions when driving etc.). Additionally, exploring ancillary processes and identifying risk and protective factors associated with PSNSU is indeed crucial for a comprehensive understanding of its emergence and maintenance. Finally, developing a psychometric tool specifically designed to assess the utility outcomes of SN use could prove valuable in both research and clinical settings.

5. Conclusions

In conclusion, our study underscores the importance of comprehensive models that encompass the entire trajectory of problematic behaviors like PSNSU. Process-based approaches offer valuable insights beyond the limitations of symptom-based models, aiding our understanding of problem development.

Furthermore, we emphasize the critical significance of promoting protective factors and implementing psychological techniques across different levels. These encompass individual-level strategies, interventions by social agents (e.g., digital education by schools and families), and even measures within smartphone apps to limit intermittent reinforcement techniques. Addressing these diverse factors can refine interventions for effective PSNSU mitigation among adolescents.

While interventions targeting new technologies have shown initial promise (Malinauskas & Malinauskiene, 2019), there is room for further improvement. Incorporating adolescents' motivations for using SNs and tailoring interventions for each individual can enhance their effectiveness.

6. Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT 3.5 to enhance English grammar. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

CRediT authorship contribution statement

Víctor Ciudad-Fernández: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Alfredo Zarco-Alpuente:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Data curation. **Tamara Escrivá-Martínez:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Funding acquisition, Data curation, Conceptualization. **Rocío Herrero:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Funding acquisition, Data curation, Conceptualization. **Rosa María Baños:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

I have shared the link to my OSF page, my data is available

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Ethics approval.

The study was conducted following the Declaration of Helsinki and approved by the ethical committee of the University of Valencia (Spain) (Procedure number: 2675827).

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