

FULL-LENGTH REPORT



# The good and the bad: A qualitative investigation of students' perspectives on their problematic smartphone use

SHUANG SU<sup>1,2\*</sup> , JANNA COUSIJN<sup>3†</sup> ,  
REINOUT W. WIERS<sup>2,4†</sup> , HAYLEY MURRAY<sup>5</sup> ,  
TIM M. SCHOENMAKERS<sup>6</sup> and HELLE LARSEN<sup>2</sup>

<sup>1</sup> UCD Centre for the Advancement of Wellbeing in Education, School of Education, University College Dublin, Dublin, Ireland

<sup>2</sup> Addiction Development and Psychopathology (ADAPT)-Lab, Department of Psychology, University of Amsterdam, Amsterdam, The Netherlands

<sup>3</sup> Neuroscience of Addiction Lab, Department of Psychology, Education & Child Studies, Erasmus University Rotterdam, Rotterdam, The Netherlands

<sup>4</sup> Centre for Urban Mental Health, University of Amsterdam, Amsterdam, The Netherlands

<sup>5</sup> Knowledge, Technology and Innovation group, Wageningen University, Wageningen, The Netherlands

<sup>6</sup> Department of Clinical Psychology, University of Amsterdam, Amsterdam, The Netherlands

Received: September 3, 2025 • Revised manuscript received: March 31, 2026; May 28, 2026 • Accepted: June 3, 2026  
Published online: June 30, 2026

## ABSTRACT

**Background and aims:** Problematic smartphone use (PSU) features remain debated. This study aimed to identify both parallels and distinctions between PSU and established addiction criteria (DSM-5 and ICD-11), to critically examine the appropriateness of applying these criteria to PSU, and to explore potential etiological factors. **Methods:** Semi-structured interviews were conducted with 28 university students from 17 European countries who scored above the established cut-off values for problematic smartphone use on the Smartphone Addiction Scale-Short Version (SAS-SV; >31 for males and >33 for females). Thematic analysis was applied to explore patterns of meaning across participants' accounts. **Results:** Participants reported addiction-like symptoms, including craving, salience and preoccupation, negative consequences, loss of control, coping, and tolerance- and withdrawal-like experiences. In addition, the smartphone's vital roles in daily life, habitual use, and its role as a disruptive distraction were highlighted. A substantial proportion of participants described experiences consistent with multiple DSM-5 or ICD-11 addiction criteria; however, all participants emphasized substantial positive consequences of smartphone use, often outweighing the negative. A central "trade-off process" between positive and negative consequences emerged, alongside motives and perceived social norms, as key elements in PSU etiology. **Discussion and conclusions:** Findings suggest that directly and uncritically applying existing DSM-5 or ICD-11 addiction criteria to PSU warrants careful empirical and conceptual scrutiny. Future research should move beyond existing addiction criteria to also address the dynamic balance between benefits and harms, and the roles of motives and social norms in shaping use patterns.

## KEYWORDS

problematic smartphone use, qualitative study, university students, addiction, thematic analysis

<sup>†</sup>Janna Cousijn and Reinout W. Wiers are shared second authors.

\*Corresponding author.  
E-mail: [shuang.su@ucd.ie](mailto:shuang.su@ucd.ie)

## INTRODUCTION

The ubiquitous nature of smartphones in daily life has facilitated communication, entertainment, and even health management (Kim, Wang, & Oh, 2016; Kuss et al., 2018;

Recio-Rodriguez et al., 2019), with the number of global smartphone users estimated to be 7.434 billion in 2025 (Taylor, 2024). However, excessive smartphone use has raised concerns regarding their potential psychological and physical consequences (e.g., AlAbdulwahab, Kachanathu, & AlMotairi, 2017; Clayton, Leshner, & Almond, 2015; Demirci, Akgönül, & Akpınar, 2015; Sun & Tang, 2025; Wang et al., 2025). The prevalence of problematic smartphone use (PSU) among children and youth was estimated to be between 10 and 30% (Sohn, Rees, Wildridge, Kalk, & Carter, 2019), with a global increase observed among youth aged 15–35 years (Olson et al., 2022).

Despite this growing concern, the classification of PSU as an addiction remains contentious (Lanette, Chua, Hayes, & Mazmanian, 2018; Montag, Wegmann, Sariyska, Demetrovics, & Brand, 2021). Several factors contribute to the skepticism around classifying PSU as a behavioral addiction. First, research on PSU often lacks concrete evidence of addiction-like symptoms (Billieux, Maurage, Lopez-Fernandez, Kuss, & Griffiths, 2015), such as significant functional impairment, severe physical consequences, tolerance, and withdrawal (Panova & Carbonell, 2018). This absence of clearcut addiction markers may make it challenging to establish concrete boundaries for PSU as an “addiction” (Gutiérrez, de Fonseca, & Rubio, 2016). Additionally, most studies rely on cross-sectional or correlational data (Panova & Carbonell, 2018). Another limitation is that the definition and measurement of PSU tend to be overly general, atheoretical, and confirmatory (Billieux, Maurage, et al., 2015; Panova & Carbonell, 2018). Moreover, some researchers argue that the focus should shift away from categorizing smartphones as inherently addictive and instead concentrate on identifying specific activities, like gaming or social networking, as the primary addictive behaviors associated with smartphone use (Körmendi, Czki, Végh, & Székely, 2016; Panova & Carbonell, 2018). This aligns with earlier debates on “internet addiction”, a broad category that remains contested in the literature (e.g., Musetti et al., 2016). The ongoing controversy regarding the classification of PSU as an “addiction” or “disorder” arises from the reliance on broad screening methods that often fail to demonstrate the presence of severe addiction-like symptoms as outlined in diagnostic manuals such as the DSM-5 or ICD-11 (American Psychiatric Association, 2013; Panova & Carbonell, 2018; World Health Organization, 2019). Although PSU has been proposed as a potential behavioral addiction (Haug et al., 2015; Lin et al., 2014), its definition varies significantly across studies and disciplines. Some researchers adhere to the DSM-5 framework, which includes six symptom criteria (e.g., withdrawal), four functional impairment criteria (e.g., physical problems), and one exclusion criterion (i.e., symptoms not caused by other disorders) (Lin et al., 2016). Other established PSU scales, however, emphasize dimensions such as daily-life disturbances, which contribute to higher prevalence rates based on these criteria (Akin, Altundağ, Turan, & Akin, 2014; Khalily, Saleem, Bhatti, Ahmad, & Hussain, 2019; Kwon, Kim, Cho, & Yang, 2013; Kwon, Lee, et al., 2013; Lopez-Fernandez, 2017; Luk et al., 2018; Olson et al., 2022).

Given these unresolved issues and inconsistencies in the literature, qualitative research has become increasingly important. Such approaches allow for a deeper exploration of the lived experiences of individuals affected by PSU, allowing for a more nuanced understanding of its psychological impacts and the behaviors associated with it (Harkin & Kuss, 2021; Kardefelt-Winther et al., 2017). Qualitative studies can enrich quantitative findings by uncovering the complex antecedents and consequences of PSU, thus providing a more comprehensive understanding of the phenomenon (Harkin & Kuss, 2021). For example, based on semi-structured interviews with undergraduate students, individuals identified as “addicts” or excessive users were distinguished from moderate or average users based on characteristics such as deep involvement and preoccupation with smartphone use (Dai, Tai, & Ni, 2021; Lapointe, Boudreau-Pinsonneault, & Vaghefi, 2013). Similarly, qualitative research with Indian university students and young Chinese workers has shown that problematic users often report symptoms such as withdrawal, salience, preoccupation, and conflict, which align with the existing addiction criteria (Jameel, Shahnawaz, & Griffiths, 2019; Li & Lin, 2019a). Additionally, phantom phone signals may be a potential unique symptom of PSU (Li & Lin, 2019a). Both problematic and non-problematic users have reported negative consequences of smartphone use on different aspects such as productivity, academic performance, social life, and physical and mental well-being (Alotaibi, Fox, Coman, Ratan, & Hosseinzadeh, 2022; Carter et al., 2024; Dai et al., 2021; Lapointe et al., 2013; Yang, Asbury, & Griffiths, 2019). These findings have emerged from various methodologies, including open-ended questions and semi-structured interviews with adolescents, undergraduate students, and university staff (Alotaibi et al., 2022; Carter et al., 2024; Dai et al., 2021; Lapointe et al., 2013; Yang et al., 2019). Simultaneously, the positive effects of smartphones on users’ everyday life have been reported alongside the negative aspects of PSU (Alotaibi et al., 2022; Carter et al., 2024). In terms of etiology, qualitative researchers have explored several antecedents of PSU, including factors like personality traits, poor self-regulation, social pressure, loneliness, and boredom (Alotaibi et al., 2022; Lapointe et al., 2013; Li & Lin, 2019b; Yang et al., 2019). Moreover, the characteristics of smartphones—such as reasonable price, portability, attractive applications, and functions—have also been reported to be the contributing factors of PSU (Alotaibi et al., 2022; Lapointe et al., 2013).

Despite these significant contributions, some important aspects of PSU symptoms have not yet been studied in depth with qualitative designs. Specifically, consequences that directly mirror DSM-5 substance use criteria, such as impaired cognitive functioning (e.g., Wilmer, Sherman, & Chein, 2017) and physical danger related to PSU (e.g., Gutiérrez et al., 2016), have not been thoroughly investigated. Without deeper exploration, it is unclear how these criteria are translated into and enacted in users’ everyday lives. Moreover, documenting the lived experience of these addiction-like symptoms is essential to evaluate the

conceptual appropriateness of “smartphone addiction”, a label that currently relies heavily on either quantitative scale scores (e.g., Kwon, Kim, et al., 2013) or direct translations of DSM-5 and ICD-11 frameworks (e.g., Lin et al., 2016). Beyond the DSM-5 and ICD-11 addiction criteria, the unique anthropomorphic characteristics of the smartphone (i.e., perceiving smartphones with human qualities and characteristics) require future investigations among individuals with PSU (Conroy, Chadwick, Fullwood, & Lloyd, 2023; Fullwood, Quinn, Kaye, & Redding, 2017; Harkin & Kuss, 2021). Establishing a clearer understanding of such clinical features grounded in the lived experiences of individuals with PSU is essential to prevent the overuse or misapplication of terms like “smartphone addiction” in mainstream discourse (Lanette et al., 2018).

In terms of the possible etiology of PSU, the emerging imbalance between positive (i.e., the multifunctionality of smartphone use) and negative (i.e., substantial impairments in daily-life functioning caused by PSU) consequences have been proposed as a salient factor (Conroy et al., 2023; Harkin & Kuss, 2021; Kardefelt-Winther et al., 2017; Panova & Carbonell, 2018; Yang et al., 2019), while the dynamic process has not been discussed yet. Additionally, the motives and perceived social norms for smartphone use also play an important role in PSU (Chotpitayasunondh & Douglas, 2016; Fullwood et al., 2017; Harkin & Kuss, 2021; Hong, Lin, Lin, & Huang, 2021; Mostyn Sullivan, George, & Rickwood, 2024; Stirnberg, Margraf, Precht, & Brailovskaia, 2024). Some users may turn to smartphones as a coping mechanism for negative emotions such as anxiety (Elhai, Levine, & Hall, 2019). According to the Compensatory Internet Use Theory, individuals may use digital technologies to compensate for unmet real-life needs (Kardefelt-Winther, 2014). Similarly, the Uses and Gratifications Theory (Blumler, 1979) and Motivational Theory (Brand, Young, Laier, Wölfling, & Potenza, 2016) suggest that individuals perhaps initially use their smartphones based on their unique needs and motives. However, there may be both intended (e.g., connecting with others on smartphone) and unintended (e.g., disruptions related to smartphone use when communicating with others) consequences for the users after their various needs are met with their smartphone use. Without a proper understanding of the multifaceted positive and negative nature of smartphone use as well as the motives and perceived social norms for smartphone use, the current labeling of individuals as having “problematic smartphone use” or even “smartphone addiction” may be premature (Billieux, Maurage, et al., 2015; Kardefelt-Winther et al., 2017), potentially resulting in over pathologizing or stigmatizing smartphone users (Billieux, Maurage, et al., 2015; Billieux, Schimmenti, Khazaal, Maurage, & Heeren, 2015; Kardefelt-Winther, 2015; Kardefelt-Winther et al., 2017).

Therefore, to advance our understanding of PSU, we investigated the perceived PSU-related experiences, antecedents, and consequences in European university students who reported their smartphone use as significantly problematic. Going beyond phenomena resembling

addiction, our goal was to systematically identify both commonalities and differences through deductive and inductive approaches in comparison to established addiction symptoms (i.e., DSM-5 and ICD-11). Based on these comparisons, we sought to determine the extent to which participants’ experiences align with existing addiction criteria to evaluate whether the widespread application of the addiction label to smartphone use is reasonable. Finally, central themes relating to PSU etiology were identified and evaluated.

## METHODS

### Participants and procedures

Thirty European students were recruited via an online research platform from the University of Amsterdam. Recruitment was conducted in multiple rounds to achieve a gender-balanced sample. Inclusion criteria were (1) age 18–25 years; (2) at least one European nationality; (3) a score higher than 31 for males or 33 for females on the English version of short version of smartphone addiction scale (SAS-SV) based on the proposed cut-off scores for PSU (Kwon, Kim, et al., 2013). During recruitment, participants completed a brief screening questionnaire to confirm eligibility. Eligible students who agreed to participate were then scheduled for semi-structured interviews. While the internal consistency for the current qualitative sub-sample ( $N = 28$ ) is limited by restriction of range, the reliability of this English version has been established within this specific university community population in another research: Cronbach’s  $\alpha = .83$ ; McDonald’s  $\omega = .86$  (Su et al., 2024).

Two participants withdrew for personal reasons resulting in a final sample of 28 ( $n = 14$  males;  $n = 26$  Bachelor students;  $n = 2$  Master students) aged between 18 and 24 years ( $M = 20.29$ ,  $SD = 1.61$ ). The average SAS-SV score of these participants was 46.82 ( $SD = 3.22$ ) and the average number of years that they had used their smartphones was 7.39 ( $SD = 1.47$ ). Participants were from 17 different European countries of which six had dual nationality. The demographic information including age, gender, nationality and their years for smartphone use by individual participants was presented in Table 1. Although participants represented 17 European nationalities, the distribution across countries was uneven, with many national backgrounds represented by a single participant. As such, the analysis did not attempt cross-national comparison, as this would risk over interpretation of individual cases. Instead, we focused on thematic patterns across the dataset.

A semi-structured interview protocol was developed, using the following sources: a protocol of a cross-cultural qualitative study on problematic internet use (Dreier et al., 2013); DSM-5 (American Psychiatric Association, 2013) and ICD-11 (World Health Organization, 2019); existing questionnaires and recent studies on PSU, problematic internet use, social media use and gaming (Cho & Lee, 2015; Fisher, Goddu, & Keil, 2015; Kwon, Lee, et al., 2013; Stavrinou,

Table 1. Demographic information per participant

| Participant Pseudonyms | Age | Gender | Nationality   | Duration of smartphone use |
|------------------------|-----|--------|---------------|----------------------------|
| S02                    | 22  | female | International | 6 years                    |
| S03                    | 19  | male   | International | 8 years                    |
| S04                    | 19  | female | Local Dutch   | 8 or 9 years               |
| S05                    | 19  | female | International | 5 years                    |
| S06                    | 20  | female | International | 6 or 7 years               |
| S07                    | 21  | female | Local Dutch   | 10 years                   |
| S08                    | 19  | female | International | 7 or 8 years               |
| S09                    | 22  | female | International | 10 years                   |
| S10                    | 21  | female | International | 8 years                    |
| S11                    | 19  | female | International | 7 years                    |
| S12                    | 23  | female | Local Dutch   | 8 years                    |
| S14                    | 21  | female | International | 7 years                    |
| S15                    | 20  | female | International | 7 years                    |
| S17                    | 19  | female | International | 5 or 6 years               |
| S18                    | 19  | female | International | 7 years                    |
| S19                    | 20  | male   | International | 10 years                   |
| S20                    | 19  | male   | International | 6 years                    |
| S21                    | 18  | male   | International | 7 years                    |
| S22                    | 24  | male   | International | 8 or 9 years               |
| S23                    | 19  | male   | International | 7 years                    |
| S24                    | 19  | male   | International | 7 years                    |
| S25                    | 20  | male   | Local Dutch   | 9 years                    |
| S26                    | 24  | male   | International | 5 years                    |
| S27                    | 21  | male   | International | 7 years                    |
| S28                    | 20  | male   | International | 10 years                   |
| S31                    | 22  | male   | International | 6 years                    |
| S32                    | 20  | male   | International | 7 or 8 years               |
| S33                    | 19  | male   | International | 6 years                    |

Pope, Shen, & Schwebel, 2018; Van Rooij, Schoenmakers, Vermulst, Van Den Eijnden, & Van De Mheen, 2011); pilot interviews with two co-authors, two colleagues, and two pilot participants. The final interview protocol started with questions about how the smartphone was used in daily life (e.g., frequency, duration, setting, social/non-social goals), followed by questions on the positive and negative consequences of use. The interview protocol was presented in [Supplementary S1](#). These were followed by questions about specific PSU symptoms proposed in previous studies, DSM-5 (American Psychiatric Association, 2013) and ICD-11 (World Health Organization, 2019), motives and perceived social norms for smartphone use, and potential changes in use. Open-ended questions were employed to encourage participants to provide detailed narratives. Follow-up prompts were used to facilitate further elaborations on those questions. The interviews were conducted in English, the second language of all interviewees and the interviewer, and minorly revised during the interview process based on weekly discussions within the research team.

At the university, participants first received the informed consent form and filled out the socio-demographic questionnaire. The interviewer (i.e., the first author, female) audio-recorded all interviews. The average duration of the interviews was 71.68 min ( $SD = 12.33$ ), and the transcripts contained an average of 10684.93 words ( $SD = 2531.49$ ).

Upon completion, participants were given the choice between receiving 10 euros or earning 1 research credit.

### Data analysis

After all interviews were transcribed verbatim, the data were coded with MAXQDA2022 (VERBI Software, 2021). Data analysis followed an iterative thematic approach informed by Braun and Clarke (2006). In the initial phase, the first author and a research assistant independently coded three transcripts to familiarize themselves with the data and generate initial codes. They then met to compare interpretations and assess inter-rater agreement (mean inter-rater agreement: 92.5%). Subsequently, they engaged in several rounds of discussion to resolve discrepancies and refine code definitions. This process informed the development of a flexible coding framework, which the first author applied and continuously refined while coding the remaining transcripts. Coding proceeded inductively, with close attention to participants' meanings, language, and contextual descriptions. Emerging themes were regularly discussed within the interdisciplinary research team to critically examine assumptions and explore alternative interpretations, treating themes as evolving patterns of meaning rather than fixed categories.

During theme development, the research team iteratively reviewed and refined the thematic structure to reduce conceptual overlap and ensure that each subtheme represented a distinct aspect of participants' experiences. Although some subthemes were conceptually related, they were retained when they captured analytically meaningful and non-redundant dimensions of PSU, thereby preserving the richness and nuance of the dataset. By the twenty-sixth interview, no substantially new thematic dimensions were identified, suggesting sufficient conceptual depth to address the research aims.

In a subsequent analytic step, the identified themes were examined in relation to addiction criteria in DSM-5 and ICD-11 to explore points of convergence and divergence between participants' experiences and established diagnostic frameworks. This deductive mapping did not constrain earlier inductive coding but served as a critical lens for evaluating the applicability of addiction criteria to PSU. Alongside this comparison, further inductive refinement identified distinctive experiential and etiological dimensions of PSU, including the vital role of smartphones in daily life, habitual smartphone use, smartphone as a disruptive distraction from daily life, motives for use and restriction, positive consequences, the trade-off process, and perceived social norms. Through iterative discussion and ongoing comparison across themes and cases, these insights coalesced into an explanatory model centered on a dynamic trade-off between perceived benefits and harms of smartphone use.

To enhance analytic transparency, we reported the frequency of codes and themes to illustrate patterns of occurrence and relative prominence across participants. These numerical descriptors were not intended to imply



statistical representativeness or generalizability but to provide contextual information about theme distribution within this sample and to complement thematic descriptions and illustrative quotations.

**Reflexivity and Research Team** At the start of the project, the first author was a 25-year-old PhD candidate under the supervision of the other co-authors. She holds a master's degree in developmental psychology and is a trained psychotherapist. As a Chinese woman who moved abroad for her studies, she shared a similar background with many participants who had also moved abroad for university. Her smartphone was her primary tool for maintaining connections with loved ones in China, especially during the COVID-19 pandemic. These personal experiences shaped her sensitivity to both the benefits and burdens of smartphone use, providing an insider perspective that facilitated rapport and understanding during the interviews. Having previously conducted quantitative research on PSU, including the development of a Chinese-language scale, she was acutely aware of the potential to interpret participants' accounts through an addiction or disease-model lens. To mitigate this, the research team engaged in ongoing reflective practices throughout the study.

The broader interdisciplinary research team, comprising of experts in developmental psychology, neurobiology, clinical psychology, and ethnography, brought diverse perspectives that both enriched and challenged the analysis. This multicultural and interdisciplinary composition allowed the team to critically examine their own disciplinary assumptions, including tendencies to interpret behaviors through clinical or quantitative framework. The team therefore approached the analysis with deliberate reflexive awareness of this potential bias, foregrounding participants' accounts as situated, meaningful practices and avoiding the use of pathologizing or clinical language in interpreting smartphone use.

To support methodological rigor, multiple reflexive strategies were employed. During interviews, the first author drew on therapeutic skills such as active listening and nonjudgmental engagement, which may have influenced the openness and emotional tone of participants' disclosures. Although the interview guide included prompts related to emotional states and smartphone use, these were used as guiding topics rather than fixed questions. The first author primarily asked open-ended questions, and adapted follow-up prompts to participants' responses, encouraging participant-led insights and reducing the risk of confirmatory or overly deductive responses. Furthermore, she maintained a reflexive journal throughout the entire research process. During the data analysis phase, the research team held regular reflexive discussions to critically examine their assumptions (such as the expectation that frequent smartphone use reflects addiction, that participants lack self-control, or that behaviors should align with clinical criteria) and purposely sought out disconfirming cases that fell outside standard addiction criteria. This iterative and reflexive process supported the identification of the "trade-off process", highlighting both the perceived benefits and

harms of smartphone use and the broader motives and social norms shaping participants' experiences. The research team also reflected on alternative ways of organizing themes and discussed potential consolidation, ensuring that the final structure balanced conceptual clarity with the richness of participants' accounts.

## Ethics

All participants received an information letter and provided informed consent prior to the interviews. The study protocol was approved by the Ethical Review Board (ERB ID # 2018-DP-9789) of the University of Amsterdam.

## RESULTS

To provide a comprehensive overview of the findings, a thematic mapping was developed to illustrate the core themes and subthemes identified across the participant accounts (see [Table 2](#)). The table documents the presence of each theme within the dataset to enhance transparency regarding patterns observed in this qualitative sample. The complete codebook is available in [Supplementary S2](#). A detailed exploration of these themes, supported by illustrative quotations, is presented in the following sections.

### Themes of PSU symptoms in the light of DSM-5 and ICD-11 addiction criteria

Our analyses revealed several themes that, when examined deductively, showed conceptual overlap with addiction-related criteria described in DSM-5 and ICD-11. These experiences included craving, salience and preoccupation, negative effects of smartphone use, loss of control, coping, tolerance-like, and withdrawal-like symptoms.

**Urges to be always on one's smartphone: craving.** Participants described a strong and persistent pull toward smartphone use. Even during periods of non-use, they reported thinking about checking messages, browsing content, or engaging other smartphone-related activities. They referred to recurring urges to check their smartphones and stay connected. This intense craving was characterized by a subjective sensation of desiring or longing for smartphone use ([Tiffany & Wray, 2012](#)). Many participants described how this craving manifested in everyday situations, particularly when access to the smartphone was restricted or interrupted. As S09, a 22-years-old female international student explained: *"If my phone dies, and then I want to listen to music, then the entire time I'm thinking about it. And sometimes, I think of something that I want to message someone and then I don't have internet and then I'm thinking about my phone like: Oh, I can't wait until I get internet."* This account illustrated how the absence of smartphone access triggered craving.

**Salience and preoccupation.** Participants also exhibited significant preoccupation with their smartphones,

Table 2. Overview of themes and subthemes identified across the sample

| Theme                                                 | Subtheme                                                                                         | Definition                                                                                                                                                                                | <i>n</i> | Frequency (%) |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------|
| Urges to be always on one's smartphone: craving       | Think about things on smartphone when not using                                                  | –                                                                                                                                                                                         | 22       | 78.6          |
|                                                       | Want to use smartphones when not using                                                           | –                                                                                                                                                                                         | 26       | 92.9          |
| Salience and preoccupation                            | Illusions of new messages or notifications on smartphone                                         | –                                                                                                                                                                                         | 25       | 89.3          |
|                                                       | Ignore the regulations that one is not allowed to use smartphones under some specific situations | The situations include conferences, driving a car, cycling, and so on                                                                                                                     | 27       | 96.4          |
|                                                       | Get immersed when using smartphones                                                              | –                                                                                                                                                                                         | 24       | 85.7          |
|                                                       | Living in the virtual world on smartphone instead of the real world                              | Participants feel they have paid more attention to the virtual world on smartphone                                                                                                        | 5        | 17.9          |
|                                                       | Dreams about smartphones                                                                         | Having dreams about smartphones or activities related to smartphone                                                                                                                       | 8        | 28.6          |
| Negative consequences of smartphone use on daily life | Negative effects on real-life relationships                                                      | –                                                                                                                                                                                         | 23       | 82.1          |
|                                                       | Negative effects on cognitive process                                                            | The negative effects of smartphone use on participants' attention span, problem-solving abilities, memory, and general thinking abilities                                                 | 23       | 82.1          |
|                                                       | Negative effects on study                                                                        | The negative effects of smartphone use on lectures, study efficiency (e.g., less time for study, less concentration during study, procrastination, etc.), academic performance, and so on | 28       | 100           |
|                                                       | Mental health risks                                                                              | The negative feelings and pressure related to smartphone use                                                                                                                              | 23       | 82.1          |
|                                                       | Physical health risks                                                                            | The physical health risks include physical complaints, traffic accidents, and bad eating and sleeping habits                                                                              | 28       | 100           |
|                                                       | Negative effects on hobbies                                                                      | Spend less or no time on hobbies because of smartphone use                                                                                                                                | 14       | 50.0          |
|                                                       | Use smartphones longer than intended                                                             | –                                                                                                                                                                                         | 27       | 96.4          |
|                                                       | Failures of control                                                                              | Participants feel they could not control their smartphone use                                                                                                                             | 4        | 14.3          |
| Coping                                                | Reduce the negative feelings with smartphones                                                    | To actively make themselves feel better by using smartphone functions (e.g., watching videos, listening to music, etc.)                                                                   | 27       | 96.4          |
|                                                       | Get distracted/escape with smartphones when having negative feelings                             | Get distracted or escape hard situations or negative feelings by using smartphones                                                                                                        | 12       | 42.9          |
|                                                       | Seek social connections or support via smartphone when having negative feelings                  | To make themselves feel better by contacting their family or friends                                                                                                                      | 10       | 35.7          |
|                                                       | Can't get bored anymore with the smartphone                                                      | –                                                                                                                                                                                         | 1        | 3.6           |
| Tolerance-like symptoms                               | Get bored easily since one has used the smartphone a lot                                         | –                                                                                                                                                                                         | 2        | 7.1           |
|                                                       | No excitement about smartphone use                                                               | Feeling empty or neutral after spending much time on their smartphones                                                                                                                    | 21       | 75.0          |
|                                                       | Use smartphones more than before                                                                 | –                                                                                                                                                                                         | 19       | 67.9          |
|                                                       | Withdrawal-like feelings when one cannot get access to smartphones                               | –                                                                                                                                                                                         | 28       | 100           |

(continued)

Table 2. Continued

| Theme                                                 | Subtheme                                                             | Definition                                                                                                                                                                                                            | <i>n</i> | Frequency (%) |
|-------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------|
| Vital roles of the smartphone in daily life           | Attempts to avoid/fix the problem when one cannot access smartphones | –                                                                                                                                                                                                                     | 28       | 100           |
|                                                       | Positive feelings when getting smartphones back                      | –                                                                                                                                                                                                                     | 27       | 96.4          |
|                                                       | Excessive use when getting smartphones back                          | –                                                                                                                                                                                                                     | 5        | 17.9          |
|                                                       | Important role                                                       | Stress the importance of smartphones                                                                                                                                                                                  | 28       | 100           |
| Habitual smartphone use                               | Emotional attachment role                                            | Emotional attachment to smartphones                                                                                                                                                                                   | 9        | 32.1          |
|                                                       | Self-extension role                                                  | Smartphone as a part or an extension of the user                                                                                                                                                                      | 16       | 57.1          |
|                                                       | Functional role                                                      | Stress the multiple and versatile functions that can make life easier                                                                                                                                                 | 19       | 67.9          |
|                                                       | Habitual smartphone use                                              | Get smartphones automatically/subconsciously                                                                                                                                                                          | 27       | 96.4          |
| Disruptive distractions from daily life               | Habitual App use                                                     | Open smartphone Apps automatically/subconsciously                                                                                                                                                                     | 27       | 96.4          |
|                                                       | Control issues related to such habitual use                          | Inability to control such habitual behaviors                                                                                                                                                                          | 2        | 7.1           |
|                                                       | General distractions from everyday life                              | Smartphone as a general distractor                                                                                                                                                                                    | 16       | 57.1          |
|                                                       | Distractions from social settings                                    | Smartphone as a distractor when communicating/interacting with others offline                                                                                                                                         | 6        | 21.4          |
| Motives for smartphone use and restrictive motives    | Distractions from study                                              | Smartphone as a distractor during study                                                                                                                                                                               | 28       | 100           |
|                                                       | Social motives                                                       | Connect and communicate with the participant's family and friends                                                                                                                                                     | 28       | 100           |
|                                                       | Informational motives                                                | Easy access to information for everyday life                                                                                                                                                                          | 28       | 100           |
|                                                       | Emotional motives                                                    | Entertainment (mainly listening to music), coping with negative feelings (e.g., boredom, sadness, stress, etc.), sharing their life with others online (e.g., social media), enhancing positive and negative feelings | 28       | 100           |
| Positive consequences of smartphone use on daily life | Restrictive motives                                                  | Want to restrict one's smartphone use when realizing the negative consequences of smartphone use on communication/relationships, study/work, cognition, hobbies, physical and mental health                           | 20       | 71.4          |
|                                                       | Positive effects on communication/relationships                      | The benefits their smartphone could bring to participants' communication and relationships                                                                                                                            | 28       | 100           |
|                                                       | Positive effects on cognitive processes                              | The positive effects of smartphone use on participants' memory, problem-solving, and general thinking                                                                                                                 | 26       | 92.9          |
|                                                       | Positive effects on study                                            | The benefits and facilities smartphone use could bring to participants' study                                                                                                                                         | 25       | 89.3          |
|                                                       | Positive effects on mental health                                    | The positive effects of smartphone use on participants' perceived mental health                                                                                                                                       | 15       | 53.6          |

(continued)

Table 2. Continued

| Theme                                                                            | Subtheme                                                                    | Definition                                                                          | <i>n</i> | Frequency (%) |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------|---------------|
| The trade-off process for smartphone use                                         | Positive effects on physical health                                         | The positive effects of smartphone use on participants' perceived physical health   | 18       | 64.3          |
|                                                                                  | Positive effects on hobbies                                                 | Smartphones could facilitate the execution and development of participants' hobbies | 8        | 28.6          |
|                                                                                  | I can control my smartphone use when I realize its negative effects         | –                                                                                   | 8        | 28.6          |
|                                                                                  | I don't restrict my smartphone use though I'm aware of its negative effects | –                                                                                   | 5        | 17.9          |
|                                                                                  | I don't think my smartphone has negative effects on me                      | –                                                                                   | 4        | 14.3          |
|                                                                                  | I can't give up my smartphone completely                                    | –                                                                                   | 21       | 75.0          |
|                                                                                  | My smartphone is generally positive                                         | –                                                                                   | 16       | 57.1          |
| The role of perceived social norms: others' evaluations of one's smartphone use  | My smartphone has more positive than negative effects                       | –                                                                                   | 11       | 39.3          |
|                                                                                  | Others said I'm "addicted" to my smartphone                                 | –                                                                                   | 21       | 75.0          |
|                                                                                  | Others think I use my smartphone too much                                   | –                                                                                   | 27       | 96.4          |
|                                                                                  | Others, mainly my friends think my smartphone use is okay                   | –                                                                                   | 20       | 71.4          |
| The role of perceived social norms: one's own evaluation of their smartphone use | I don't use my smartphone more than the average                             | –                                                                                   | 10       | 35.7          |
|                                                                                  | I use my smartphone as much as the average                                  | –                                                                                   | 12       | 42.9          |
|                                                                                  | I use my smartphone more than the average                                   | –                                                                                   | 10       | 35.7          |
|                                                                                  | I use my smartphone less than the average                                   | –                                                                                   | 4        | 14.3          |

Note. *n* refers to the number of participants who mentioned each theme, and frequency represents the proportion of the total sample ( $n/N$ ;  $N = 28$ ).

particularly demonstrating constant alertness for incoming notifications, which had been described as perceptual illusions (e.g., sound, light, and vibration, etc.) of new notifications. These perceptual experiences indicated that smartphones occupied a central role in participants' attentional processes. For instance, S20, a 19-year-old male international student, described: "Sometimes I think that it vibrated, but it didn't, it is in silence mode most of the time and I feel like it's vibrating." This example demonstrated how participants' expectations of notifications could generate perceptual illusions, reflecting an internalized alertness toward smartphone signals, and the perceived vibrations did not correspond to actual notifications or device settings, which were called phantom phone signals in previous studies (e.g., Li & Lin, 2019a).

Participants further acknowledged widely using their smartphones in prohibited or socially inappropriate settings, such as during conferences, cycling, and driving. Notably, smartphone use during cycling and driving is illegal in the Netherlands. However, many participants reported continuing to use their smartphones in such situations

despite being aware of potential legal restrictions. As S24, a 19-year-old male international student explained: "I heard that they might be implementing laws here to make people stop using their phones on their bike. But if I have a conversation, it's hard to stop it. It's hard to say that like, oh, let's talk later when I can just like kind of continue the conversation while I'm biking." This example suggested that ongoing smartphone engagement often overrode situational norms and safety considerations, making it difficult for participants to disengage even in potentially risky or restricted contexts.

Many participants also described becoming quickly immersed in smartphone use, which sometimes resulted in reduced environmental awareness and adverse consequences in everyday situations, particularly while moving (e.g., walking, cycling, or using public transportation). As S17, a 19-year-old female international student reported: "I am walking somewhere and I'm on my phone and I don't notice where someone is going, so I have like confrontation, and we follow each other. Or I get lost because I was looking at my phone or when we were going somewhere, I forgot to leave the



tram because I was on my phone.” This account highlighted how smartphone preoccupation interfered with situational awareness and everyday functioning, increasing the likelihood of minor accidents, navigation problems, or missed important information.

In addition, many participants noted that they constantly paid attention to their smartphones even when not actively using them. For example, S20, a 19-year-old male international student stated: “When I’m trying to answer the question, I’m always looking at my phone. So, I’m focusing on the question, but part of my attention is on my phone. And when I’m doing something else, it’s the same. Or maybe I, if I’m talking to person and I will hold it most of the time. Like, I’m always ready to look at it.” Similar experiences were frequently reported by other participants, suggesting that smartphones remained a persistent attentional focus in participants’ daily life. Several participants further described smartphones as their default choice when having nothing to do and some even engaging in the virtual world via smartphones rather than the real world. As S10, a 19-year-old male international student reflected: “[...] It kind of shows me like it’s weird, because I know I never met those people in real life. And they’re my phone friends. It’s kind of weird in a way. It just shows like, I’m really addicted to my phone and bound because that’s like a virtual world, not the real world. So those are signs that show me, and if I really care about showing what I’m drinking right now more about drinking it, then living the moment. Like if I don’t care about the view but taking a photo of the view. And, like, forget not caring about the people having a conversation with the other person. And just looking at my phone, that means I am really paying more attention. I’m really missing out from real life.” This account illustrates how smartphone engagement could shift attention away from real-world interactions and experiences. The participant demonstrated a strong awareness that smartphone engagement had begun to reshape how he experienced and prioritized everyday life. The contrast he drew between the “virtual world” and “real life” further indicated a perceived disconnection from face-to-face relationships and present-moment experiences, alongside concern that smartphone use was diminishing his attentional and emotional engagement with his immediate social environment. From the perspective of salience and preoccupation, this narrative suggested that smartphone-related thoughts, behaviors, and priorities had become sufficiently dominant to interfere with participants’ engagement in ongoing real-life experiences and social interactions.

Finally, a few participants even reported dreams involving smartphone-related content, indicating a deep cognitive integration of smartphone use into their daily lives. This was reflected in the following account by S04, a 19-year-old male international student: “Yeah, I do (have dreams about my smartphone). I often have because I text certain people a lot, like my boyfriend had to go away for a while, so I could only text him and only contact him through texts, so I was dreaming about texting him and instead of having a conversation with him, which is very sad. And other than that, I think I have some like where I’m texting my

father. Because also he had to, like move away for his work. So, if it’s people that weren’t physically close to me, then I dream about texting them because I just talk to them more often that way.” This example suggested that smartphone-related thoughts and interactions extended beyond waking experiences and became cognitively embedded in participants’ mental processes.

Together, these findings suggest that smartphone salience operates at perceptual, behavioral, and cognitive levels, influencing participants’ attention, daily functioning, and engagement with both virtual and real-world environments.

### **Negative consequences of smartphone use on daily life.**

Participants reported a wide range of negative consequences of smartphone use on various aspects of participants’ daily lives, including interpersonal relationships, academic functioning, cognitive processes, mental and physical health.

Many participants described how their smartphone use interfered with relationships with their family and friends, often leading to conflicts, concealment, and dishonesty regarding their smartphone use. As S24, a 19-year-old male international student shared, when asked if he ever hid his smartphone use: “For my mom, definitely, it’s something that whenever I can hide it then I will like, [...] my attitude is that I’m not really going to use my phone less because of my mom. But if it makes her feel better, she doesn’t see me use it. Then I will not want to make her see it.” This example suggested that the participant was not attempting to reduce his actual smartphone use, but rather to conceal it to avoid potential frustration, criticism, or conflict with close ones such as his mother.

Furthermore, participants highlighted the detrimental effects of their smartphones on their study efficiency and academic performance. This is illustrated in the following excerpt from a participant regarding the impact of their smartphone use on their academic performance: “Probably lowers what I could do. I think I could score higher. I think I could manage better grades like, like, I could be better because it takes away my attention. So, I get less knowledge, I get less study hours, so I perform less on exams.” (S10, a 21-year-old female international student). Participants also disclosed cognitive problems with attention, memory, and problem-solving abilities related to smartphone use, as S27, a 21-year-old male international student stated, he felt his smartphone use killed his creativity when solving problems: “I think it kills creativity. Cuz if you just search for the solution. You don’t really try to solve it. You’re on your own. You tried to find an easy way to solve it.” As he reflected, he tended to find easy solutions to problems rather than developing using creative approaches.

Concerning mental health risks, participants mentioned suffering from stress and pressure related to instant messaging, negative feelings stemming from their smartphone use, and a sense of detachment from the real world. As S10, a 22-year-old female international student explained in responding to the open-ended question: ‘how does it negatively influence your health?’ “I get impatient with

myself. I get mad at myself for not getting things done. And I get stressed. Stressing causes me to now feel physical problems from stress like stomach ulcers, stress out, stress eating, binge eating, just like drinking caffeine, over caffeine, anything serious. I get aggressive with other people for nothing because I couldn't do some stuff." This account illustrated how participants' smartphone use contributed to emotional distress and self-criticism, which in turn led to both psychological (e.g., stress) and physical health problems (e.g., stomach ulcers), highlighting the interconnected nature of mental and physical health risks.

Physical health risks associated with smartphone use were also widely reported. Participants frequently described discomfort in their hands, back, neck, and eyes. Moreover, smartphone use had negative effects on participants' eating, sleeping, and physical activity. As S20, a 19-year-old male international student reported: "Maybe late at night when I'm checking some things and I just don't feel sleepy. I don't want to go to bed because I'm too focused on what I'm doing. So, procrastination is like 5 a.m. And I'm like, what is happening?" This example demonstrated how participants' smartphone use disrupted sleep patterns and contributed to delayed sleep and possible fatigue in daily life.

In addition, several participants have (almost) encountered traffic accidents, attributing these incidents to their habit of using their smartphones while walking, cycling, and driving. Participants regarded this behavior as "pervasive" and were cognizant of the associated risks. Here is an example described by S07, a 21-year-old female international student: "Everybody was using it. And because in the Netherlands we bike a lot. So, it's really dangerous to bike and use your phone at the same time. And one time I did hit the car. But I was using my phone a lot. So that's why I bumped into a car." Similarly, S20, a 19-year-old male international student, reported: "When I'm driving, I tend to use it sometimes. Maybe to check this, to change the song or something. And once I almost crashed very badly. So yeah, it is dangerous." These accounts suggest that participants' smartphone-related functional impairment extended beyond psychological and physical health to safety risks in everyday mobility, reinforcing the pervasive impact on daily functioning.

**Loss of control.** Participants predominantly described two primary categories of loss of control regarding their smartphone use: exceeding self-imposed limits and failing to control their smartphone use. Many participants reported setting personal limits on smartphone use but failing to adhere to them, which reduced time available for studying, sleeping, or other daily activities. As S31, a 22-year-old male international student explained: "Although you're setting your conscious to reminding yourself that you want to stop, want to end it after a certain point. You are already so in-depth into the task on smartphone that you feel that you cannot stop now. You have to first finish it, and then go to, then move on to the other things that you have to do. Then at the end, you are getting continuous stops and not concentrate enough to see stuff." Similar experiences were reported by

S10, 21-year-old female international student: "I want to stop myself from checking it. That's the thing. I can't stop myself from checking my smartphone." These accounts reflect the difficulty participants experienced in regulating their smartphone use even when they were consciously aware of the need to stop.

**Coping.** Participants frequently described using their smartphones to cope with negative emotions. Many reported using specific smartphone functions, such as texting, social media, or entertainment, to distract themselves from stress, anxiety, or other unpleasant emotional states. They could escape or get distracted by using their smartphone instead of confronting such emotions, as S24, a 19-year-old male international student stated: "If I feel lonely or like if I feel sad, I might be looking for my phone for a way to get out of it." This avoidance-oriented coping allowed participants to temporarily escape from negative emotions rather than directly confronting them. At the same time, some participants reported using their smartphones to actively seek social support, which could represent a more adaptive coping strategy. As S04, a 19-year-old female local student described: "If I'm anxious, I text a lot of my friends to like, get rid of that anxiousness and tell them what I'm feeling. And then they can get like, give their opinion about that." These accounts suggest that smartphone use could serve both avoidant and supportive coping functions, depending on how individuals use their smartphones.

**Tolerance-like symptoms.** Participants did not explicitly mention an increased need for usage time. However, many acknowledged spending more time on their smartphones than before. As S09, a 22-year-old female international student reflected: "I'm just spending more like more than more time than I should on it." Another manifestation of tolerance-like symptoms was a sense of emotional neutrality or emptiness after prolonged smartphone use. As S26, a 24-year-old male international student reported: "I don't really think that it gives me something. It's something that I do every day without thinking about it. So that's a great feeling but sort of still neutral." In addition, a few participants described reduced patience for "boring" real-life situations, leading to highlighted susceptibility to boredom without their smartphones. As S33, a 19-year-old male international student described: "I don't devote enough time to something. Because if I don't get this immediately, then I usually get bored very easily. I think that's a result of my smartphone usage." These accounts suggest that tolerance-like symptoms were reflected not only in increased usage time but also in diminished sensitivity to stimulation and reduced tolerance for real-world engagement.

**Withdrawal-like symptoms.** Participants also described withdrawal-like symptoms when they were unable to use their smartphones due to battery loss, internet issues, or external interruptions. Many reported experiencing frustration, anger, and annoyance in such situations. When being interrupted, strong negative emotions were reflected by S10,

a 21-year-old female international student): “(I feel) annoyed that they interrupted me because I’m doing something and that they should mind their own business and not look at my private stuff. I would be irritated. I will be annoyed. I would be angry. And I would want them to go away.” This participant described experiencing anger and irritability when her smartphone use was interrupted. Her narrative suggested that smartphone engagement was perceived as a private and psychologically absorbing activity, making external interruptions feel intrusive and unwelcome. Notably, they actively tried to resolve these impediments, as S23, a 19-year-old male international student stated: “Like, if it’s not connected to the internet, then there’s some problem in the world, right? [...] Like it’s either broken or there is no Wi-Fi connection. Like there is a cause of it, right? Then I would definitely solve this problem. Yeah, it will be like a number one priority.” Participants also reported feelings of relief and happiness when access to their smartphones was restored. In some cases, this led to excessive use after deprivation. As S10, a 21-year-old female international student, when asked ‘How would you feel after being connected again?’ articulated “I would feel like I would need to spend a lot of time to be known to people again.” These findings suggest that withdrawal-like symptoms were characterized by negative emotional reactions during deprivation and compensatory overuse after regaining access.

In summary, themes of PSU symptoms in the light of DSM-5 and ICD-11 addiction criteria rarely appeared in isolation (see Table 2). Many narratives contained descriptions that paralleled several criteria outlined in the DSM-5 and ICD-11, including craving, diminished control, and salience. These features often co-occurred within individual accounts, suggesting a patterned convergence between participants’ experiences and established addiction constructs.

### Emerging themes related to PSU beyond DSM-5 and ICD-11 addiction criteria

In addition to themes that overlapped with addiction-related themes, the inductive analysis identified experiential dimensions that were not fully captured by DSM-5 and ICD-11. These included vital roles of smartphones, habitual smartphone use, and smartphones as disruptive distractions from everyday life.

**Vital roles of the smartphone in daily life.** Participants described smartphones as playing a central and meaningful role in their everyday lives. Many attributed anthropomorphic qualities to their smartphones, referring to them as “a best friend” or a constant companion, reflecting strong emotional attachment to their smartphones. Smartphones were also frequently described as an extension of the self, as illustrated by S20, a 19-year-old male international student: “It’s always in the pocket or somewhere or in my hand. It’s like part of me.”

In addition, participants emphasized the multi-functionality of smartphones and their practical value in

organizing and managing daily life. As S23, a 19-year-old male international student noted: “It’s a super, super useful tool. I can kind of physically imagine my life without it, but my life would be so much more complicated.” S32, a 19-year-old male international student presented more explanations: “I just have everything in one device. [...] you can send emails with it, you can watch things on it, you can communicate, you have your calendars, so you can see all the things, you can write down task.” Both participants reflected on the usefulness and convenience of smartphones, emphasizing how having multiple functions integrated into a single device made everyday life easier and more efficient.

These accounts suggest that smartphones were not only devices for entertainment or communication but also deeply integrated into participants’ identities and daily functioning. The perceived importance of smartphones was closely linked to participants’ motivations for smartphone use.

**Habitual smartphone use.** Participants frequently described their smartphone use as habitual and automatic, characterized by repeated checking behaviors that occurred with little or no conscious awareness. Many used terms such as “automatic”, “unconscious”, “reflexive”, “natural”, and “habitual”, indicating a lack of conscious deliberation during the process. As S33, a 19-year-old male international student stated: “Sometimes I don’t even realize that I’m checking my phone. It’s like, if you’re a smoker, sometimes it happens that you put a cigarette in your mouth, and you light it, but you don’t realize that you did it. It’s just instinct. You don’t even think about it anymore. It’s so habitual that you don’t even think about it.” Interestingly, the participant used cigarette smoking as an analogy to describe the habitual nature of smartphone use. This comparison suggested that checking smartphones had become highly automatic, instinctive, and smoothly integrated into everyday behavior, occurring with limited conscious awareness in a manner similar to habitual smoking.

Habitual smartphone use was often reported to occur in the absence of specific goals, as exemplified by participants who reported engaging with their smartphones under various situations, such as during studying, waiting or experiencing social awkwardness. In response to ‘In what kind of situations, will you automatically get out your smartphone without thinking about it?’ S26, a 20-year-old male international student replied, “Like both when I’m studying and I’m doing a project for a company.”

A few participants acknowledged their inability to exert control over these habitual behaviors, suggesting underlying control issues. As S27, a 21-year-old male international student stated: “Sometimes I just open it and look at it for a few seconds. And then I close it. I may do it again, like, five minutes later.” He described repeatedly checking his smartphone every five minutes in a habitual and seemingly subconscious manner, possibly reflecting a sense of diminished control over his smartphone use.

These findings suggest that participants frequently experienced smartphone use as habitual, automatic, and occurring with limited conscious awareness.

**Disruptive distractions from everyday life.** Participants consistently experienced distractions caused by their smartphones in various situations of daily life, such as during lectures, conversations, and engagement in hobbies. Particularly noteworthy was one's smartphone as a major distractor while studying. As S21, an 18-year-old male international student described: *"It's a massive distraction. So instead of focusing on studying, I focus on mostly social media (on my smartphone). Yes, that in the long run affects my academic performance."* He also reflected on how the distracting effects of smartphone use could accumulate over time and negatively affect his academic performance.

Participants also highlighted the role of endless and abundant smartphone content in sustaining these distractions. Continuous access to the various content on smartphone frequently led to unintended, uncontrolled and prolonged disengagement from daily life tasks. As the "rabbit hole" metaphor used by S09, a 22-year-old female international student: *"It's just like a rabbit hole. You're on your phone, and then you just get sucked into this world that you're not controlling because technology is tricky."* Consequently, this distraction was perceived as having detrimental effects of inducing procrastination and a perceived loss of ability to regulate their smartphone use, which would lead to the sense of wasting time. As S33, a 19-year-old male international student described: *"When I study, I feel this urge to check if somebody messaged me. And then if I check my phone, and if I get a notification, then I usually go on every single social media, I check WhatsApp, I check Facebook, I go on YouTube. [...] the problem is, as soon as I get a notification, I start to procrastinate a lot."* His description also provided further support for the "rabbit hole" metaphor proposed by S09. The participant described how a single notification could trigger a cascade of smartphone-related checking behaviors. This pattern illustrates how smartphone use could progressively draw participants into prolonged engagement and contribute to procrastination.

The sense of wasting time was presented by S07, a 21-year-old female local student described: *"On my free days when I have laid in bed too long. When I use my phone long, then I check the time. Oh, it's already 11 o'clock or 12 o'clock. That's when I noticed, I use my phone too much, I think it's a waste of my time."* These accounts suggest that smartphones functioned as pervasive distractions that interfered with daily routines, reduced productivity, and contributed to feelings of time waste and reduced self-regulation.

### Central emerging themes related to PSU etiology

Beyond the addiction-like themes related to PSU, the inductive analysis also pointed to potential PSU etiology themes, including motives for smartphone use and restrictive motives, positive consequences of smartphone use on daily life, the trade-off process for smartphone use, and the role of perceived social norms.

**Motives for smartphone use and restrictive motives.** Participants described three primary motives underlying their smartphone use: social, informational, and emotional.

For social motives, participants emphasized the importance of using their smartphones to connect with their family and friends, with communication emerging as the central benefit of smartphone use. As S32, a 20-year-old male international student stated: *"My smartphone makes a lot of things easier. I mean, communication is, in my opinion, the biggest one."* By emphasizing communication as the primary benefit of smartphone use, this participant's account suggested that social motives may have been particularly salient among the three primary motives.

For informational motives, participants highlighted the convenience of smartphones in providing easy access to information, which significantly contributed to their daily lives. As S27, a 21-year-old male international student reported: *"When and where I have to go just by checking, I use Google Maps, and I never get lost. I know where I have to be on time with the transportation. I know where my friends are and what they're doing. I have all my information, like documents on my phone, so whenever I feel like I could use some of it in, I have them on my phone. So, I know if I search for this, I'll be okay."* He described having easy access to all the information he needed through his smartphone, which appeared to foster feelings of certainty, reassurance, and psychological security in everyday life.

For emotional motives, participants mentioned smartphones were used for entertainment (mainly listening to music), coping with negative feelings (e.g., boredom, sadness, stress, etc.), sharing aspects of their lives with others online (e.g., social media), and so on. As S09, a 22-year-old female international student described: *"When I'm happy, like, I'll see a funny joke or something, I want to share it with someone."* Her description highlighted possible associations among the three primary motives, with emotional gratification appearing to naturally promote social engagement through sharing with others.

In addition to the motives for smartphone use, participants have also expressed motives to restrict their smartphone use. These motives arose when participants recognized the negative consequences related to smartphone use on communication/relationships, study/work, cognition, hobbies, and physical and mental health. As S18, a 19-year-old female international student mentioned: *"I think that I wanted to get things done quicker. I wanted to get more sleep and I wanted to fight this urge to check on it all the time and I knew I'm not doing anything meaningful, productive at this time and I wanted to change that."* The participant's account reflected a strong desire to reduce smartphone use in favor of more meaningful and productive activities.

**Positive consequences of smartphone use on daily life.** Participants acknowledged the positive consequences of smartphone use, particularly in fulfilling their social, emotional, and informational needs. As S05, a 19-year-old female international student described: *"I can keep in touch with my family and I can keep in touch, like my best friend lives in another country. I can call her every day. We talk every day on like, FaceTime. So, I couldn't do that without my smartphone."* She emphasized the necessity of her

smartphone for maintaining remote connections with family and friends, highlighting its perceived positive impact on social connectedness.

Participants also highlighted their smartphone's instrumental role in facilitating communication, memory, and problem-solving processes, as well as new hobby development. As S22, a 24-year-old male international student explained: *"Especially when you work in a new group or have to communicate with more than one person. [...] When you want to share the last presentation as a group, and you just do that or to open any Google presentation, so everyone works at the same time on it. That's awesome."* This account illustrated how smartphone use enhanced perceived ease and convenience in academic tasks, including real-time synchronization of Google slides and collaborative group work.

Despite the descriptions of one's smartphone as a major distractor, participants acknowledged the benefits and necessity of smartphones for their study. As S11, a 19-year-old female international student described: *"If I need to look up something, and I am not on my laptop, I can do that quickly. For example, if I don't know a place, or I don't know the definition, I can look that up quickly. And I always get notifications from an online student portal, for example. So, I'm always up to date on that. Same with emails."* This example highlighted how smartphones supported participants' study processes by enabling convenient access to information and facilitating the use of online learning platforms and student portals.

These accounts indicate that smartphones were perceived not only as problematic but also as highly beneficial and indispensable tools in daily life, reinforcing continued smartphone use.

### The trade-off process for smartphone use

In addition to the identified themes, we also found a dynamic trade-off between the pros and cons of smartphone use. Despite acknowledging the negative impact of smartphones on their daily life, participants were unwilling to give up their smartphones. They identified their smartphone as predominantly positive and useful, perceiving that the advantages outweighed the disadvantages. This was expressed by S25, a 20-year-old male local student: *"I think that overall positive influences are way more than negative influences. And as I said, I don't really think that besides health, and the emotions on WhatsApp or whatever. It has negative influences on my life. And the problems that I do have, for example, with the eyes getting tired or not understanding what people are trying to say, why they are ignoring me. And for those problems I already kind of solved it."*

This account suggests that participants actively and continuously evaluated the perceived benefits and costs of their smartphone use rather than viewing it as entirely harmful or uncontrollable. Although the participant acknowledged certain negative consequences, such as physical discomfort and interpersonal misunderstandings, these issues were framed as manageable and already

resolved. This perception of control appeared to reduce the perceived severity of smartphone-related problems and reinforced the belief that the overall benefits of smartphone use outweighed its disadvantages. Notably, the context played an important role in this trade-off process, as participants reported both positive and negative effects of their smartphones within the same daily activities (e.g., study, communication, etc.).

Furthermore, despite being aware of the negative consequences of their smartphones, some participants chose not to restrict their use. They attributed this decision to the positive effects they experienced, making it more challenging to change their smartphone use. As S23, a 19-year-old male international student described: *"I'm aware of all the negative sides of it. It's like the advantages that I gained from it still outweigh its disadvantages. So, I think I wouldn't be able to give up my smartphone use."*

These findings suggest that PSU may be maintained through a continuous evaluation process in which the perceived benefits of smartphone use outweigh the perceived harms.

**The role of perceived social norms.** Others' evaluations of one's smartphone use. Based on participants' descriptions, many of them had received feedback from their family, partner, and friends indicating concerns about their smartphone use, often characterized as "you are addicted to your smartphone" and "you use your smartphone too much". However, it is worth noting that some participants mentioned receiving feedback from others that their smartphone use was acceptable, primarily based on opinions from their friends. Interestingly, participants' friends were generally to be more tolerant of their smartphone use, often because participants and their friends engaged in similar smartphone use patterns. As S19, a 20-year-old male international student illustrated: *"My parents think that I'm using it way too much. But my friends don't think that because they also use it as much as me. So, they think, they don't think that it's too much."*

**One's own evaluation of their smartphone use.** In contrast to others' evaluations, many participants perceived their smartphone use time as either as average or even lower than that of their peers. Comparisons were often made with people of the same age group, leading participants to view their smartphone use as normal. As S08, a 19-year-old female international student conveyed: *"I think like, among my friends, I'm not using it super, like I'm not the one using their smartphone most often, like there are people that are worse than I am."* Only a few participants perceived their smartphone use to exceed the average use time, especially when using the older generation as reference. As S308 added: *"I don't think I spend more time than other people my age. Maybe I spend more time than people (who are) older than me."*

These findings suggest that participants often evaluated their smartphone use within the context of perceived peer norms, with frequent smartphone use commonly described as socially normative and widely accepted.



## DISCUSSION

Based on iterative discussion and continuous ongoing comparison across themes and cases, we have proposed a preliminary theoretical model for the etiology of PSU. Figure 1 summarizes the primary experiences, antecedents, and consequences of PSU, as well as the intricate interconnections elucidated in this study. Participants' smartphone use was driven by social, informational, and emotional motives, resulting in different types of smartphone use. Consequently, participants' smartphone use manifested both positive and negative consequences in their daily lives, a dynamic process within the context of a trade-off framework. As the negative consequences began to outweigh the positive consequences, participants exhibited addiction-like symptoms, which manifested into significant functional impairments. To mitigate the negative consequences, participants may restrict their smartphone use. Conversely, when the positive consequences outweigh the negative consequences, participants will be more inclined to use smartphones or not to change their use. Throughout this whole process, the perceived social norms emerged as a prominent factor, exerting a notable impact on each stage.

The primary novel insight of this study is that problematic smartphone use may be understood as a trade-off process between the negative consequences of smartphone use that outweigh the perceived positive consequences. This highlights the limitation of relying on scores solely gauging addiction-like symptoms for understanding problematic smartphone use. A substantial proportion of participants reported experience aligning with DSM-5 or ICD-11 addiction criteria, which is reflected in our results. However, participants simultaneously reported substantial positive consequences, functional management of daily life, and context-dependent trade-offs that challenge a

straightforward addiction label. Thus, the presence of addiction-like features does not necessarily imply pathological addiction; rather, these features exist within a nuanced, context-sensitive process. We now explicitly frame PSU as a “trade-off process”, emphasizing that both addiction-like symptoms and adaptive functional aspects coexist, which necessitates careful empirical and conceptual scrutiny before applying DSM-5 or ICD-11 labels. In addition, although previous qualitative research has explored both positive and negative aspects of smartphone use (Alotaibi et al., 2022; Carter et al., 2024), the dynamic process of weighing the good and bad aspects of smartphone use has received limited attention. The trade-off process should therefore be interpreted as a preliminary conceptual model of participants' experiences rather than an empirically validated explanatory model. Our findings resonate with a qualitative study of adolescents hospitalized for suicidal behavior, in which participants reported both positive and negative experiences with social technologies. Despite appreciating the temporary relief from technology during hospitalization, they still viewed these tools as essential for social reintegration (Weinstein et al., 2021).

Our exploration of PSU etiology extends beyond the trade-off process, encompassing two important factors: “motives for smartphone use” and “perceived social norms”. We have expanded the scope of the motives for smartphone use by highlighting informational motives, which have received less attention in previous research (Chen et al., 2017; Haug et al., 2015). In line with previous studies, the multifunctionality and self-extension roles of smartphones suggest that the diverse functions offered by smartphones may contribute to PSU (Alotaibi et al., 2022; Fullwood et al., 2017; Harkin & Kuss, 2021; Lapointe et al., 2013). Additionally, the social and emotional motives, along with the anthropomorphic roles of smartphones, align with previous findings on emotional attachment to smartphones and using

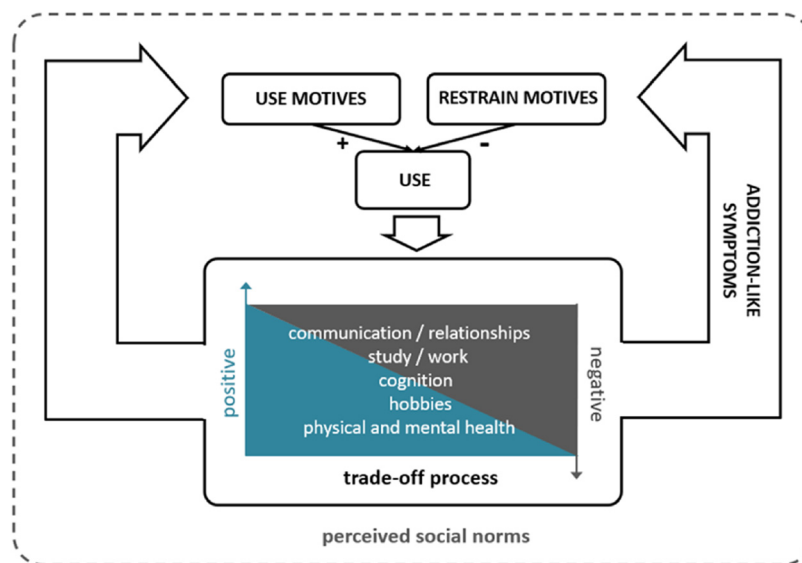


Fig. 1. A preliminary theoretical model for the etiology of Problematic Smartphone Use based on the findings from this study

smartphones to cope with discomfort (Mostyn Sullivan et al., 2024; Trub & Barbot, 2016). These results align with the established theories like Rational Addiction Theory (Becker & Murphy, 1988), Uses and Gratifications Theory (Blumler, 1979), Compensatory Internet Use Theory (Kardefelt-Winther, 2014), and Motivational Theory (Brand et al., 2016; Cooper, Frone, Russell, & Mudar, 1995; Köpetz, Lejuez, Wiers, & Kruglanski, 2013; Kuss, Louws, & Wiers, 2012). In accordance with the Rational Addiction Theory, smartphone users seek to maximize the utility of smartphones to attain positive consequences (Becker & Murphy, 1988; Köpetz et al., 2013). They use their smartphone to satisfy diverse needs and motives, in line with the Uses and Gratifications Theory (Blumler, 1979), Compensatory Internet Use Theory (Kardefelt-Winther, 2014), and Motivational Theory (Brand et al., 2016; Cooper et al., 1995; Köpetz et al., 2013; Kuss et al., 2012). This underscores the importance of considering specific motives for smartphone use and goal-directed behaviors when identifying individuals with severe smartphone use problems (Hogarth, 2020). In line with Hogarth's model, our findings demonstrated that excessive smartphone use may result in conflicts with other goals (e.g. academic achievement, work), yet this behavior persists due to the continued pursuit of the positive consequences associated with smartphone use (Hogarth, 2020). Additionally, the contrast between subjective and external evaluations of smartphone use highlights discrepancies between individual perceptions and perceived social norms (Parry et al., 2021). When excessive smartphone use is perceived as normal within peer groups, individuals may be less likely to recognize their own behavior as problematic, which may reduce motivation for behavioral change and reinforce continued use. This pattern is congruent with the previous studies on social norms within PSU (Hong et al., 2021; McAlaney, Almourad, Powell, & Ali, 2020). This phenomenon parallels the function of social norms observed in various substance use scenarios like alcohol consumption (Mostyn Sullivan et al., 2024; Vallentin-Holbech, Rasmussen, & Stock, 2017; Wood, Brown, & Maltby, 2012).

In the context of the described trade-off process in problematic smartphone use, while considering motives and perceived social norms for smartphone use, we have identified “addiction-like” symptoms. These include craving, salience and preoccupation, negative consequences of smartphone use, loss of control, and coping, as well as tolerance-like and withdrawal-like symptoms. These symptoms align with the criteria outlined in DSM-5 and ICD-11 as well as the previous questionnaires and criteria on PSU (American Psychiatric Association, 2013; Kwon, Lee, et al., 2013; Lin et al., 2014, 2016; World Health Organization, 2019). Simultaneously, they extend traditional addiction frameworks, as defined in the DSM-5 and ICD-11 for substance use and gambling disorders. For example, craving was not only directed toward the smartphone as a device but also toward the diverse activities and functions it provides, reflecting the functional and socially embedded role of smartphones in daily life. Salience and preoccupation were closely linked to unique smartphone features such as portability and constant connectivity,

including experiences such as perceived notification signals, smartphone use in restricted contexts, and smartphone-related dreams. Negative consequences were reported across multiple life domains, including relationships, cognition, academic functioning, and mental and physical health, yet these were often accompanied by acknowledged benefits, reinforcing the trade-off between harms and advantages. Loss of control largely aligned with existing addiction criteria, particularly difficulties in self-regulation and behavioral control. However, explicit failures to control smartphone use were relatively infrequent among participants, which may suggest that loss of control in PSU is more context dependent. Coping was also interpreted more broadly, as smartphones were used not only to escape negative emotions but also to seek social support and maintain connections. Tolerance was conceptualized in two ways, including diminished excitement after long smartphone use and reduced tolerance for boredom without smartphones, highlighting a shift from substance-related adaptation to everyday behavioral dependence. Similarly, withdrawal-like experiences were often triggered by situational disruptions such as battery loss or internet problems and were characterized by attempts to restore access except for severe psychological distress. Overall, these findings suggest that addiction criteria capture important aspects of PSU but require theoretical refinement to account for the functional, social, and context-dependent nature of smartphone use.

Furthermore, our study has identified unique symptoms of PSU that went beyond the DSM-5 and ICD-11 addiction criteria. These include the themes of “vital roles of the smartphone”, “habitual smartphone use” and “disruptive distractions from everyday life”. These findings are consistent with previous investigations into smartphone use, highlighting the attachment to smartphones (Fullwood et al., 2017; Trub & Barbot, 2016), smartphones as an extension of oneself (Harkin & Kuss, 2021), habitual smartphone use (Van Deursen, Bolle, Hegner, & Kommers, 2015; Wilmer et al., 2017), and smartphones as major distractions (Mendoza, Pody, Lee, Kim, & McDonough, 2018; Roberts & David, 2016). However, whether those symptoms should be formally incorporated into the criteria for diagnosing PSU warrants further investigation. It is also noteworthy that our participants' portrayal of “habitual smartphone use” was presented descriptively, reflecting the frequency and relatively automatic nature of such behaviors, rather than being laden with technical explanations (De Houwer, 2019).

Expanding on our current findings, we aimed to formulate a preliminary framework illustrating the connections between the identified themes, providing a foundational step toward understanding PSU etiology. The outlined theoretical framework including the trade-off process underscores intervention potential to address PSU by increasing the awareness of adverse PSU outcomes (Carlson & Larkin, 2009), aiding in reducing problematic smartphone use. Interventions should avoid advocating the elimination of smartphones, recognizing their integral role in achieving “digital well-being” (Pedrero-Pérez et al., 2019; Vanden Abeele, 2020; Weinstein et al., 2021). Moreover,

interventions targeting perceived social norms may offer a promising strategy to help problematic users.

This study has not only demonstrated the multifactorial nature of PSU but also sheds light on unexplored facets. However, it is important to acknowledge the limitations of this study. First, the generalizability of our findings is limited by the sample's specific demographic profile. The study primarily consisted of university students from 17 European countries, with many nationalities represented by only a single participant. Furthermore, the small sample size per country prevented a systematic analysis of cultural variability, limiting our ability to apply these findings to broader populations. Future research should address these limitations by recruiting larger, more diverse samples with balanced representation across genders, ages, and nationalities to examine cross-cultural differences in PSU. To this end, the present study is part of a broader research project that includes parallel qualitative interviews with Chinese university students using the same protocol. Such designs will enable more rigorous cross-cultural comparisons and help disentangle the shared versus culturally specific dimensions of PSU.

Second, although the sample was intentionally gender-balanced, participants were purposively recruited based on elevated scores on SAS-SV. This strategy was consistent with the exploratory qualitative aim of examining the lived experiences of individuals reporting significant difficulties with smartphone use. However, it does not permit comparison with non-problematic users. Future research incorporating broader usage patterns, including clinical samples (Körmendi et al., 2016), may help clarify distinctions between normative, high-frequency, and problematic smartphone use, as well as clinically significant PSU cases. Across the identified smartphone use populations, further research is encouraged to differentiate trade-off processes. In addition, the possible co-occurrence with other mental health problems should also be considered when investigating the trade-off process (Hogarth, 2020). Moreover, since the trade-off process is a preliminary conceptual model proposed in this study, future research is needed to examine its predictive utility and explore potential moderators.

Third, the data relied on self-reports, which may be influenced by social desirability and recall bias, despite the use of nonjudgmental interviewing strategies. In addition, the organization of subthemes reflects interpretive decisions inherent in qualitative analysis, and alternative thematic structures may also be possible. Moreover, the cross-sectional design captures participants' experiences at a single point in time, precluding conclusions about developmental trajectories or causal relationships in PSU. Future research could address these limitations by employing longitudinal designs to examine the evolution and causal mechanisms of PSU over time and by combining self-reported experiences with objective smartphone-use measures to provide a more comprehensive and less biased understanding of smartphone-related behaviors.

The present findings demonstrate meaningful overlap between participants' experiences of PSU and several addiction-related criteria described in the DSM-5 and ICD-11, while also revealing experiential nuances that complicate straightforward diagnostic translation. Although addiction

frameworks provide a useful interpretive lens, their direct application to emerging behavioral phenomena such as PSU requires careful empirical and conceptual scrutiny, particularly given the functional, socially embedded, and context-dependent nature of smartphone use. Moreover, the use of the term "smartphone addiction" warrants caution, as the casual use of "addiction" may contribute to stigma and misunderstandings about typical smartphone use (Kardefelt-Winther et al., 2017; Wiers & Verschure, 2021). A theoretically grounded and cautious use of addiction-related terminology is therefore necessary, ensuring that professional labels are applied only when supported by robust empirical evidence and sensitive to the broader social context of smartphone use.

## CONCLUSION

Our study underscores the significance of the trade-off process as well as the motives and perceived social norms for smartphone use in understanding problematic smartphone use, transcending a mere tallying of addiction criteria and reliance solely on psychometric measures. Future research should distinguish distinct patterns between non-problematic and problematic use within this proposed framework.

*Funding sources:* The first author is funded by China Scholarship Council (CSC) from the Ministry of Education of P.R. China.

*Authors' contributions:* SS: conceptualization, methodology, software, validation, formal analysis, investigation, data curation, writing - original draft, writing - review & editing, visualization, project administration; JC: conceptualization, methodology, formal analysis, writing - review & editing, visualization, supervision; RWW: conceptualization, methodology, formal analysis, writing - review & editing, visualization, supervision; HM: methodology, formal analysis, investigation, writing - review & editing; TMS: methodology, investigation, writing - review & editing; HL: conceptualization, methodology, formal analysis, writing - review & editing, visualization, supervision.

*Conflict of interest:* Authors declare that they have no conflicts of interest.

*Data and analysis code availability:* Due to the qualitative and sensitive nature of the interview data, transcripts cannot be publicly shared to protect participant confidentiality. De-identified materials and the coding framework are available from the corresponding author upon reasonable request and subject to ethical approval.

*Acknowledgements:* We would like to express our heartfelt gratitude to all the participants who generously shared their valuable experiences. We also want to thank Stella Ivana Kiss, Suzanne Stigter, Karla Westenberg and Roos Band in the process of transcript and coding. We thank the School of Education, University College Dublin (UCD), for covering the publication fees.



## SUPPLEMENTARY MATERIAL

Supplementary data to this article can be found online at <https://doi.org/10.1556/2006.2025.00380>.

## REFERENCES

- Akın, A., Altundağ, Y., Turan, M. E., & Akın, U. (2014). The validity and reliability of the Turkish version of the smart phone addiction scale-short form for adolescent. *Procedia - Social and Behavioral Sciences*, 152, 74–77. <https://doi.org/10.1016/j.sbspro.2014.09.157>
- AlAbdulwahab, S. S., Kachanathu, S. J., & AlMotairi, M. S. (2017). Smartphone use addiction can cause neck disability. *Musculo-skeletal Care*, 15(1), 10–12. <https://doi.org/10.1002/msc.1170>
- Alotaibi, M. S., Fox, M., Coman, R., Ratan, Z. A., & Hosseinzadeh, H. (2022). Perspectives and experiences of smartphone overuse among university students in Umm Al-Qura University (UQU), Saudi Arabia: A qualitative analysis. *International Journal of Environmental Research and Public Health*, 19(7), 4397. <https://doi.org/10.3390/ijerph19074397>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. American Psychological Association.
- Becker, G. S., & Murphy, K. M. (1988). A theory of rational addiction. *Journal of Political Economy*, 96(4), 675–700.
- Billieux, J., Maurage, P., Lopez-Fernandez, O., Kuss, D. J., & Griffiths, M. D. (2015). Can disordered Mobile phone use be considered a behavioral addiction? An update on current evidence and a comprehensive model for future research. *Current Addiction Reports*, 2(2), 156–162. <https://doi.org/10.1007/s40429-015-0054-y>
- Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, 4(3), 119–123. <https://doi.org/10.1556/2006.4.2015.009>
- Blumler, J. G. (1979). The role of theory in uses and gratifications studies. *Communication Research*, 6(1), 9–36. <https://doi.org/10.1177/009365027900600102>
- Brand, M., Young, K. S., Laier, C., Wölfling, K., & Potenza, M. N. (2016). Integrating psychological and neurobiological considerations regarding the development and maintenance of specific internet-use disorders: An interaction of person-affect-cognition-execution (I-PACE) model. *Neuroscience and Biobehavioral Reviews*, 71, 252–266. <https://doi.org/10.1016/j.neubiorev.2016.08.033>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–10. <https://doi.org/10.1057/978-1-137-35913-1>
- Carlson, B. E., & Larkin, H. (2009). Meditation as a coping intervention for treatment of addiction. *Journal of Religion and Spirituality in Social Work*, 28(4), 379–392. <https://doi.org/10.1080/15426430903263260>
- Carter, B., Ahmed, N., Cassidy, O., Pearson, O., Calcia, M., Mackie, C., & Kalk, N. J. (2024). ‘There’s more to life than staring at a small screen’: A mixed methods cohort study of problematic smartphone use and the relationship to anxiety, depression and sleep in students aged 13–16 years old in the UK. *BMJ Mental Health*, 27(1), e301115. <https://doi.org/10.1136/bmjment-2024-301115>
- Chen, C., Zhang, K. Z. K., Gong, X., Zhao, S. J., Lee, M. K. O., & Liang, L. (2017). Examining the effects of motives and gender differences on smartphone addiction. *Computers in Human Behavior*, 75, 891–902. <https://doi.org/10.1016/j.chb.2017.07.002>
- Cho, S., & Lee, E. (2015). Development of a brief instrument to measure smartphone addiction among nursing students. *CIN - Computers Informatics Nursing*, 33(5), 216–224. <https://doi.org/10.1097/CIN.0000000000000132>
- Chotpitayasunondh, V., & Douglas, K. M. (2016). How “phubbing” becomes the norm: The antecedents and consequences of snubbing via smartphone. *Computers in Human Behavior*, 63, 9–18. <https://doi.org/10.1016/j.chb.2016.05.018>
- Clayton, R. B., Leshner, G., & Almond, A. (2015). The extended iSelf: The impact of iPhone separation on cognition, emotion, and physiology. *Journal of Computer-Mediated Communication*, 20(2), 119–135. <https://doi.org/10.1111/jcc4.12109>
- Conroy, D., Chadwick, D., Fullwood, C., & Lloyd, J. (2023). “You have to know how to live with it without getting to the addiction part”: British young adult experiences of smartphone overreliance and disconnectivity. *Psychology of Popular Media*, 12(4), 471.
- Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions. *Journal of Personality and Social Psychology*, 69(5), 990–1005. <https://doi.org/10.1103/PhysRev.52.54>
- Dai, C., Tai, Z., & Ni, S. (2021). Smartphone use and psychological well-being among college students in China: A qualitative assessment. *Frontiers in Psychology*, 12, 708970. <https://doi.org/10.3389/fpsyg.2021.708970>
- De Houwer, J. (2019). On how definitions of habits can complicate habit research. *Frontiers in Psychology*, 10, 2642. <https://doi.org/10.3389/fpsyg.2019.02642>
- Demirci, K., Akgönül, M., & Akpınar, A. (2015). Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *Journal of Behavioral Addictions*, 4(2), 85–92. <https://doi.org/10.1556/2006.4.2015.010>
- Dreier, M., Tzavela, E., Wölfling, K., Mavromati, F., Duven, E., Karakitsou, C., ... Tsitsika, A. (2013). 1653 - The development of adaptive and maladaptive patterns of Internet use among European adolescents at risk for Internet addictive behaviors: A grounded theory inquiry. *European Psychiatry*, 28(S1), 28–E931. [https://doi.org/10.1016/S0924-9338\(13\)76643-4](https://doi.org/10.1016/S0924-9338(13)76643-4)
- Elhai, J. D., Levine, J. C., & Hall, B. J. (2019). The relationship between anxiety symptom severity and problematic smartphone use: A review of the literature and conceptual frameworks. *Journal of Anxiety Disorders*, 62(July 2018), 45–52. <https://doi.org/10.1016/j.janxdis.2018.11.005>
- Fisher, M., Goddu, M. K., & Keil, F. C. (2015). General searching for explanations: How the internet inflates estimates of internal knowledge searching for explanations: How the internet inflates estimates of internal knowledge. *Journal of Experimental Psychology*, 144(3), 674–687. <https://doi.org/10.1037/xge0000070>

- Fullwood, C., Quinn, S., Kaye, L. K., & Redding, C. (2017). My virtual friend: A qualitative analysis of the attitudes and experiences of smartphone users: Implications for smartphone attachment. *Computers in Human Behavior*, 75, 347–355. <https://doi.org/10.1016/j.chb.2017.05.029>
- Gutiérrez, J. D. S., de Fonseca, F. R., & Rubio, G. (2016). Cell-phone addiction: A review. *Frontiers in Psychiatry*, 7(OCT). <https://doi.org/10.3389/fpsy.2016.00175>
- Harkin, L. J., & Kuss, D. (2021). “My smartphone is an extension of myself”: A holistic qualitative exploration of the impact of using a smartphone. *Psychology of Popular Media*, 10(1), 28–38. <https://doi.org/10.1037/ppm0000278>
- Haug, S., Paz Castro, R., Kwon, M., Filler, A., Kowatsch, T., & Schaub, M. P. (2015). Smartphone use and smartphone addiction among young people in Switzerland. *Journal of Behavioral Addictions*, 4(4), 299–307. <https://doi.org/10.1556/2006.4.2015.037>
- Hogarth, L. (2020). Addiction is driven by excessive goal-directed drug choice under negative affect: Translational critique of habit and compulsion theory. *Neuropsychopharmacology*, 45(5), 720–735. <https://doi.org/10.1038/s41386-020-0600-8>
- Hong, F. Y., Lin, C. C., Lin, T. J., & Huang, D. H. (2021). The relationship among the social norms of college students, and their interpersonal relationships, smartphone use, and smartphone addiction. *Behaviour and Information Technology*, 40(4), 415–426. <https://doi.org/10.1080/0144929X.2019.1699959>
- Jameel, S., Shahnaawaz, M. G., & Griffiths, M. D. (2019). Smartphone addiction in students: A qualitative examination of the components model of addiction using face-to-face interviews. *Journal of Behavioral Addictions*, 8(4), 780–793. <https://doi.org/10.1556/2006.8.2019.57>
- Kardefelt-Winther, D. (2014). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior*, 31(1), 351–354. <https://doi.org/10.1016/j.chb.2013.10.059>
- Kardefelt-Winther, D. (2015). Commentary on: Are we over-pathologizing everyday life? A tenable blueprint for behavioral addiction research: Problems with atheoretical and confirmatory research approaches in the study of behavioral addictions. *Journal of Behavioral Addictions*, 4(3), 126–129. <https://doi.org/10.1556/2006.4.2015.019>
- Kardefelt-Winther, D., Heeren, A., Schimmenti, A., van Rooij, A., Maurage, P., Carras, M., ... Billieux, J. (2017). How can we conceptualize behavioural addiction without pathologizing common behaviours? *Addiction*, 112(10), 1709–1715. <https://doi.org/10.1111/add.13763>
- Khalily, M. T., Saleem, T., Bhatti, M. M., Ahmad, I., & Hussain, B. (2019). An urdu adaptation of smartphone addiction scale-short version (SAS-SV). *Journal of the Pakistan Medical Association*, 69(5), 700–704.
- Kim, Y., Wang, Y., & Oh, J. (2016). Digital media use and social engagement: How social media and smartphone use influence social activities of college students. *Cyberpsychology, Behavior, and Social Networking*, 19(4), 264–269. <https://doi.org/10.1089/cyber.2015.0408>
- Köpetz, C. E., Lejuez, C. W., Wiers, R. W., & Kruglanski, A. W. (2013). Motivation and self-regulation in addiction: A call for convergence. *Perspectives on Psychological Science*, 8(1), 3–24.
- Körmendi, A., Czki, Z. B., Végh, B. P., & Székely, R. (2016). Smartphone use can be addictive? A case report. *Journal of Behavioral Addictions*, 5(3), 548–552. <https://doi.org/10.1556/2006.5.2016.033>
- Kuss, D. J., Kanjo, E., Crook-Rumsey, M., Kibowski, F., Wang, G. Y., & Sumich, A. (2018). Problematic mobile phone use and addiction across generations: The roles of psychopathological symptoms and smartphone use. *Journal of Technology in Behavioral Science*, 141–149. <https://doi.org/10.1007/s41347-017-0041-3>
- Kuss, D. J., Louws, J., & Wiers, R. W. (2012). Online gaming addiction? Motives predict addictive play behavior in massively multiplayer online role-playing games. *Cyberpsychology, Behavior, and Social Networking*, 15(9), 480–485.
- Kwon, M., Kim, D. J., Cho, H., & Yang, S. (2013). The smartphone addiction scale: Development and validation of a short version for adolescents. *Plos One*, 8(12), 1–7. <https://doi.org/10.1371/journal.pone.0083558>
- Kwon, M., Lee, J. Y., Won, W. Y., Park, J. W., Min, J. A., Hahn, C., ... Kim, D. J. (2013). Development and validation of a smartphone addiction scale (SAS). *Plos One*, 8(2). <https://doi.org/10.1371/journal.pone.0056936>
- Lanette, S., Chua, P. K., Hayes, G., & Mazmanian, M. (2018). How much is “Too Much”? The Role of a Smartphone Addiction Narrative in Individuals’ experience of use. *Proceedings of the ACM on Human-Computer Interaction*, 2(CSCW), 1–22. <https://doi.org/10.1145/3274370>
- Lapointe, L., Boudreau-Pinsonneault, C., & Vaghefi, I. (2013). Is smartphone usage truly smart? A qualitative investigation of IT addictive behaviors. In *Proceedings of the annual Hawaii international conference on system sciences*, pp. 1063–1072. <https://doi.org/10.1109/HICSS.2013.367>
- Li, L., & Lin, T. T. C. (2019a). Over-connected? A qualitative exploration of smartphone addiction among working adults in China. *BMC Psychiatry*, 19(1), 186. <https://doi.org/10.1186/s12888-019-2170-z>
- Li, L., & Lin, T. T. C. (2019b). Smartphones at work: A qualitative exploration of psychological antecedents and impacts of work-related smartphone dependency. *International Journal of Qualitative Methods*, 18, 1–12. <https://doi.org/10.1177/1609406918822240>
- Lin, Y. H., Chang, L. R., Lee, Y. H., Tseng, H. W., Kuo, T. B. J., & Chen, S. H. (2014). Development and validation of the smartphone addiction inventory (SPAI). *Plos One*, 9(6). <https://doi.org/10.1371/journal.pone.0098312>
- Lin, Y. H., Chiang, C. L., Lin, P. H., Chang, L. R., Ko, C. H., Lee, Y. H., & Lin, S. H. (2016). Proposed diagnostic criteria for smartphone addiction. *Plos One*, 11(11), 1–11. <https://doi.org/10.1371/journal.pone.0163010>
- Lopez-Fernandez, O. (2017). Short version of the smartphone addiction scale adapted to Spanish and French: Towards a cross-cultural research in problematic mobile phone use. *Addictive Behaviors*, 64, 275–280. <https://doi.org/10.1016/j.addbeh.2015.11.013>
- Luk, T. T., Wang, M. P., Shen, C., Wan, A., Chau, P. H., Oliffe, J., ... Lam, T. H. (2018). Short version of the smartphone addiction scale in Chinese adults: Psychometric properties, socio-demographic, and health behavioral correlates. *Journal of*



- Behavioral Addictions*, 7(4), 1157–1165. <https://doi.org/10.1556/2006.7.2018.105>
- McAlaney, J., Almourad, M. B., Powell, G., & Ali, R. (2020). Perceptions and misperceptions of smartphone use: Applying the social norms approach. *Information (Switzerland)*, 11(11), 1–10. <https://doi.org/10.3390/info11110513>
- Mendoza, J. S., Pody, B. C., Lee, S., Kim, M., & McDonough, I. M. (2018). The effect of cellphones on attention and learning: The influences of time, distraction, and nomophobia. *Computers in Human Behavior*, 86, 52–60. <https://doi.org/10.1016/j.chb.2018.04.027>
- Montag, C., Wegmann, E., Sariyska, R., Demetrovics, Z., & Brand, M. (2021). How to overcome taxonomical problems in the study of internet use disorders and what to do with “smartphone addiction”. *Journal of Behavioral Addictions*, 9(4), 908–914. <https://doi.org/10.1556/2006.8.2019.59>
- Mostyn Sullivan, B., George, A. M., & Rickwood, D. (2024). An exploration of motives that influence problematic smartphone use in young adults. *Behaviour & Information Technology*, 1–15. <https://doi.org/10.1080/0144929X.2024.2380102>
- Musetti, A., Cattivelli, R., Giacobbi, M., Zuglian, P., Ceccarini, M., Capelli, F., ... Castelnovo, G. (2016). Challenges in internet addiction disorder: Is a diagnosis feasible or not? *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.00842>
- Olson, J. A., Sandra, D. A., Colucci, É. S., Al Bikaii, A., Chmoulevitch, D., Nahas, J., ... Veissière, S. P. L. (2022). Smartphone addiction is increasing across the world: A meta-analysis of 24 countries. *Computers in Human Behavior*, 129(November 2021). <https://doi.org/10.1016/j.chb.2021.107138>
- Panova, T., & Carbonell, X. (2018). Is smartphone addiction really an addiction? *Journal of Behavioral Addictions*, 7(2), 252–259. <https://doi.org/10.1556/2006.7.2018.49>
- Parry, D. A., Davidson, B. I., Sewall, C. J. R., Fisher, J. T., Mieczkowski, H., & Quintana, D. S. (2021). A systematic review and meta-analysis of discrepancies between logged and self-reported digital media use. *Nature Human Behaviour*, 1–13.
- Pedrero-Pérez, E. J., Morales-Alonso, S., Rodríguez-Rives, E., Díaz-Olalla, J. M., Álvarez-Crespo, B., & Benítez-Robredo, M. T. (2019). Smartphone nonusers: Associated sociodemographic and health variables. *Cyberpsychology, Behavior, and Social Networking*, 22(9), 597–603. <https://doi.org/10.1089/cyber.2019.0130>
- Recio-Rodríguez, J. I., Rodríguez-Martin, C., Gonzalez-Sanchez, J., Rodríguez-Sanchez, E., Martin-Borras, C., Martínez-Vizcaino, V., ... García-Ortiz, L. (2019). EVIDENT smartphone app, a new method for the dietary record: Comparison with a food frequency questionnaire. *JMIR mHealth and uHealth*, 7(2), e11463. <https://doi.org/10.2196/11463>
- Roberts, J. A., & David, M. E. (2016). My life has become a major distraction from my cell phone: Partner phubbing and relationship satisfaction among romantic partners. *Computers in Human Behavior*, 54, 134–141. <https://doi.org/10.1016/j.chb.2015.07.058>
- Sohn, S., Rees, P., Wildridge, B., Kalk, N. J., & Carter, B. (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: A systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry*, 19, 356. <https://doi.org/10.1186/s12888-019-2350-x>
- Stavrinou, D., Pope, C. N., Shen, J., & Schwebel, D. C. (2018). Distracted walking, bicycling, and driving: Systematic review and meta-analysis of Mobile technology and youth crash risk. *Child Development*, 89(1), 118–128. <https://doi.org/10.1111/cdev.12827>
- Stirnberg, J., Margraf, J., Precht, L.-M., & Brailovskaia, J. (2024). The relationship between reasons for smartphone use, addictive use tendencies, fear of missing out, depression, and life satisfaction: A qualitative and quantitative analysis. *Psychopathology*, 57(5), 359–368. <https://doi.org/10.1159/000538263>
- Su, S., Cousijn, J., Molenaar, D., Freichel, R., Larsen, H., & Wiers, R. W. (2024). From everyday life to measurable problematic smartphone use: The development and validation of the smartphone use problems identification questionnaire (SUPIQ). *Journal of Behavioral Addictions*, 13(2), 506–524.
- Sun, H., & Tang, K. (2025). Psychometric evaluation and measurement invariance of the problematic smartphone use scale among college students: A national survey of 130 145 participants. *Addiction*, 120(4), 629–641. <https://doi.org/10.1111/add.16699>
- Taylor, P. (2024). *Number of smartphone mobile network subscriptions worldwide from 2016 to 2023, with forecasts from 2023 to 2028 (in millions)*. Statista. <https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>.
- Tiffany, S. T., & Wray, J. M. (2012). The clinical significance of drug craving: Tiffany & Wray. *Annals of the New York Academy of Sciences*, 1248(1), 1–17. <https://doi.org/10.1111/j.1749-6632.2011.06298.x>
- Trub, L., & Barbot, B. (2016). The paradox of phone attachment: Development and validation of the Young Adult Attachment to Phone Scale (YAPS). *Computers in Human Behavior*, 64, 663–672. <https://doi.org/10.1016/j.chb.2016.07.050>
- Vallentin-Holbech, L., Rasmussen, B. M., & Stock, C. (2017). Are perceptions of social norms regarding peer alcohol and other drug use associated with personal use in Danish adolescents? *Scandinavian Journal of Public Health*, 45(8), 757–764. <https://doi.org/10.1177/1403494817724313>
- Van Deursen, A. J. A. M., Bolle, C. L., Hegner, S. M., & Kommers, P. A. M. (2015). Modeling habitual and addictive smartphone behavior: The role of smartphone usage types, emotional intelligence, social stress, self-regulation, age, and gender. *Computers in Human Behavior*, 45, 411–420. <https://doi.org/10.1016/j.chb.2014.12.039>
- Van Rooij, A. J., Schoenmakers, T. M., Vermulst, A. A., Van Den Eijnden, R. J. J. M., & Van De Mheen, D. (2011). Online video game addiction: Identification of addicted adolescent gamers. *Addiction*, 106(1), 205–212. <https://doi.org/10.1111/j.1360-0443.2010.03104.x>
- Vanden Abeele, M. M. P. (2020). Digital wellbeing as a dynamic construct. *Communication Theory*, 00, 1–24. <https://doi.org/10.1093/ct/ctaa024>
- VERBI Software. (2021). MAXQDA 2022 [Computer software]. VERBI Software. <https://www.maxqda.com/new-maxqda-2022>.
- Wang, Y., Luo, Y., Yan, N., Esi Mackay, L., Wang, Y., Wang, Y., ... Wang, W. (2025). The longitudinal relationships between problematic smartphone use and anxiety symptoms among Chinese college students: A cross-lagged panel network analysis. *Addictive Behaviors*, 160, 108170. <https://doi.org/10.1016/j.addbeh.2024.108170>

- Weinstein, E., Kleiman, E. M., Franz, P. J., Joyce, V. W., Nash, C. C., Buonopane, R. J., & Nock, M. K. (2021). Positive and negative uses of social media among adolescents hospitalized for suicidal behavior. *Journal of Adolescence*, 87(1), 63–73. <https://doi.org/10.1016/j.adolescence.2020.12.003>
- Wiers, R. W., & Verschure, P. (2021). Curing the broken brain model of addiction: Neurorehabilitation from a systems perspective. *Addictive Behaviors*, 112(July 2020), 106602. <https://doi.org/10.1016/j.addbeh.2020.106602>
- Wilmer, H. H., Sherman, L. E., & Chein, J. M. (2017). Smartphones and cognition: A review of research exploring the links between mobile technology habits and cognitive functioning. *Frontiers in Psychology*, 8(APR), 1–16. <https://doi.org/10.3389/fpsyg.2017.00605>
- Wood, A. M., Brown, G. D. A., & Maltby, J. (2012). Social norm influences on evaluations of the risks associated with alcohol consumption: Applying the rank-based decision by sampling model to health judgments. *Alcohol and Alcoholism*, 47(1), 57–62. <https://doi.org/10.1093/alcalc/agr146>
- World Health Organization. (2019). *Frozen version of ICD11 for implementation*. <https://www.who.int/classifications/classification-of-diseases>.
- Yang, Z., Asbury, K., & Griffiths, M. D. (2019). “A Cancer in the Minds of Youth?” A qualitative study of problematic smartphone use among undergraduate students. *International Journal of Mental Health and Addiction*, 19(4), 934–946. <https://doi.org/10.1007/s11469-019-00204-z>