



# The Overlap Between Problematic Smartphone Use and Problematic Social Media Use: a Systematic Review

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## Abstract

**Purpose of Review** Over the last decade, problematic smartphone use (PSU) and problematic social media use (PSMU) have emerged as new potential problematic behaviours. Several studies have suggested that smartphones are predominantly used for social purposes (i.e., using messaging apps and social networking sites). The aim of the current article is to provide a systematic review of the extant literature that has explicitly analysed the association between PSU and PSMU in order to examine study characteristics in terms of samples analysed and effect sizes of the associations reported. This systematic review is based on the ongoing debate about whether the smartphone can be considered as the medium of one or more problematic activities, including PSMU.

**Recent Findings** Existing evidence suggests that the effect sizes of the associations between PSU and PSMU are medium to large and large across the 13 studies included, with the largest correlations observed between PSU and problematic WhatsApp use or general PSMU. Overall, reviewed results suggest a partial overlap between the two problematic behaviours.

**Summary** PSU and PSMU are overlapped mostly because the smartphone is a common medium to use social media, especially concerning instant messaging apps like WhatsApp. Moreover, PSU should be preferentially studied with a focus on specific types of apps used rather than a more holistic phenomenon.

**Keywords** Problematic smartphone use · Problematic social media use

## Introduction

In modern society, the use of smartphones and social media is enormously widespread with about 66% of the world's total population owning a mobile phone and about 53% accessing social media apps (such as Whatsapp, WeChat, Facebook, and Instagram) [1]. In Europe, in 2021, 83% of individuals used their smartphones to access the Internet in the previous 3 months and about 60% used the Internet to participate in social networking sites or in calls and video calls [2]. Moreover, the EU Kids Online 2020 report indicated that most European children prefer smartphones to access the Internet as constant connectivity and availability are guaranteed [3].

Despite the positive opportunities offered by technological devices and services (for example in terms of social connection and information searching), there is an ongoing debate about the negative consequences for everyday life of unregulated use of smartphones [4•]. Thus, over the last decade, problematic smartphone use (PSU) (variously termed

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smartphone use disorder, smartphone addiction, etc. [5]) has emerged as new potential problematic behaviour.

## Problematic Smartphone Use

Given the emerging research area of PSU, its definitions are still evolving [6–10]. PSU is broadly defined as an uncontrolled and compulsive (over)use of the smartphone linked to negative consequences (e.g. withdrawal, impeded user productivity, social relationships, physical health) which can result in the impairment of daily functioning of the user [6, 11–13]. The prevalence of PSU among children and young people is 23.3% (based on 31 studies with a prevalence between 10 and 30%, see Sohn et al. [14] for a systematic review and meta-analysis). Although PSU is characterized by shared “symptoms” with addictive behaviours (e.g., tolerance-like and withdrawal-like phenomena and loss of control) (see De-Sola Gutiérrez et al., [13] for a review), its recognition as a potential behavioural addiction is debated [9, 10].

From the framework proposed by Billieux and colleagues [12, 15], PSU is described as a multi-faceted phenomenon entailing a variety of dysfunctional manifestations (addictive, antisocial, and dangerous use), each being associated with distinct developmental pathways, including (1) excessive reassurance (e.g. the need to maintain relationships and obtain reassurance from others), (2) impulsivity (mainly driven by poor impulse control, which in turn might result in uncontrolled urges and dysregulated use), and (3) extraversion [e.g. the need for stimulation and a high sensitivity to rewards, which in turn might result in a wide range of risky behaviours (e.g. sexting and phoning while driving)].

In its infancy, smartphone was studied as a holistic phenomenon without considering the app used. More recently, literature has also begun focussing on PSU in relation to technology features, such as various mobile apps, social networking sites and instant messaging, gaming, Internet addiction/app addiction, and task context (see Busch and McCarthy for a recent review [4•]). In addition, previous research showed that PSU is also related to the setting in which the smartphone is used [8, 16, 17]. Indeed, PSU in the classroom has been associated with procrastination [18], while PSU in the bedroom during normal hours of sleep has been associated with poor sleep quality and sleep disorders [19]. Thus, recent research has highlighted the role of specific types of apps available on the smartphone and the setting in which the smartphone is used for the development of PSU.

Several studies [20••, 21] suggested that smartphones are predominantly used for social purposes (i.e. for the use of instant messaging apps and social networking sites). In line with recent arguments about the importance of understanding “what” users do on their smartphone and which types of app are more likely to contribute to the development of PSU

[20••, 22], the aim of the current systematic review is to describe to which extent PSU is associated with problematic social media use (PSMU) considering the problematic use of social media apps (e.g. Instagram, Facebook, WhatsApp, Snapchat, WeChat).

## Problematic Social Media Use

As in the case of PSU, PSMU (variously termed social media disorder, social media addiction, etc. [23]) has not been recognized as a proper behavioural addiction. Rather, it has been defined as the use of social media characterized by “addiction-like” symptoms and causing impairments in users’ daily life in terms of school and job failure and conflicts with family and friends [24]. PSMU has been variously conceptualized, termed, and assessed [23]. A substantial number of early studies adopted the six core criteria of the addiction component model (i.e., salience, mood modification, tolerance, withdrawal, conflict, and relapse; see [25, 26]) or reflected the 9 criteria proposed for the assessment of Internet gaming disorder, such as in the case of the Social Media Disorder Scale that includes three additional criteria (namely problems in important life domains, displacement of activities, and deception) [27]. Using the latter scale and a cut-off of 6 symptoms (instead of 5 as in the case of IGD) [28], the recent international report of the Health Behaviors in School-aged Children (HBSC) survey indicated a prevalence of PSMU in adolescents of 7% across Europe and Canada [28]: that is 7% of adolescents reported 6 or more symptoms adapted from the criteria for Internet gaming disorder (i.e. preoccupation, tolerance, withdrawal, persistence, escape, conflict, problems in important life domains, displacement of activities, and deception [29, 30]). However, the prevalence of PSMU tends to vary widely across cultures and in methods of assessment [31]. PSMU is an umbrella term covering problematic use of a variety of websites and applications, such as blogs, YouTube, traditional social networking sites (SNSs, such as Facebook, Instagram, and Snapchat) as well as instant messaging apps (such as WhatsApp and Facebook messenger), which are more likely to be accessed by smartphones. Indeed, there is evidence that “general” PSMU is associated with PSU. However, it has been suggested that the problematic use of specific social apps (such as smartphone-based applications like WhatsApp) might be more strictly related to the PSU [32••].

## Aim

It has been argued that comparing problematic use of the device and of the types of applications is crucial because certain online activities may be more problematic than others [33••]. The debate about the overlap and the differences between “addiction *to* the Internet” versus “addiction *on* the

Internet” was raised, about 20 years ago, by Griffiths [34], who suggested that problematic Internet users use the Internet to fuel other addictive behaviours, such as gambling, compulsive shopping and sex, gaming, and social networking sites use, rather than being addicted to the Internet per se. Similarly, there is an ongoing debate about the overlap and differences between generalized problematic use of smartphones as a medium (addiction *to* the smartphone) and problematic use of specific apps available on smartphones (addiction *on* the smartphone) [35•, 36], that is the smartphone is the medium of one or more problematic activities. Beyond these different views, Barnes and colleagues [33••] have highlighted that research about smartphones and social media has tended to follow two distinct routes or “streams of research”. However, the problematic use of smartphones and social media is related, mostly because social media are often engaged via smartphones [37]. Recently, an increasing number of studies have been explicitly analysing the overlap between PSU and PSMU using different approaches. Therefore, the aim of the current article is to provide a systematic review of the studies that have investigated the association between PSU and PSMU, thus informing the development of future research.

## Methods

This systematic literature review follows the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines (2009 [38]). From November 2020 to January 2021, we searched four comprehensive bibliographic databases: *PubMed*, *Web of Science*, *Google Scholar*, and *EBSCO* that included *Academic Search Complete*, *PsycARTICLES*, and *PsycINFO* for articles published in English after 2007. The release of the smartphone occurred after 2007; therefore, we have included studies published after this year. We did this in order to assemble data from participants using primarily smartphones rather than older mobile phones. The search was conducted using the following algorithm: smartphone (cellphone OR mobile phone) AND use disorder (overuse OR addict\* OR abuse OR use severity OR problematic OR dependence), AND social media (OR social networking site OR SNS) AND problematic use (OR usage OR disorder OR addict\*) OR Internet communication disorder.

The inclusion criteria for eligible studies in the present review were the following: (i) having been published in scientific journals from 2007 to January 2021; (ii) being written in English; (iii) containing enough quantitative empirical data; and (iv) reporting the association between the PSU and PSMU. Moreover, studies were excluded if they assessed problematic Internet use, in general, and the frequency of use of social media or smartphone but not of

problematic uses. Systematic reviews and meta-analyses were not included.

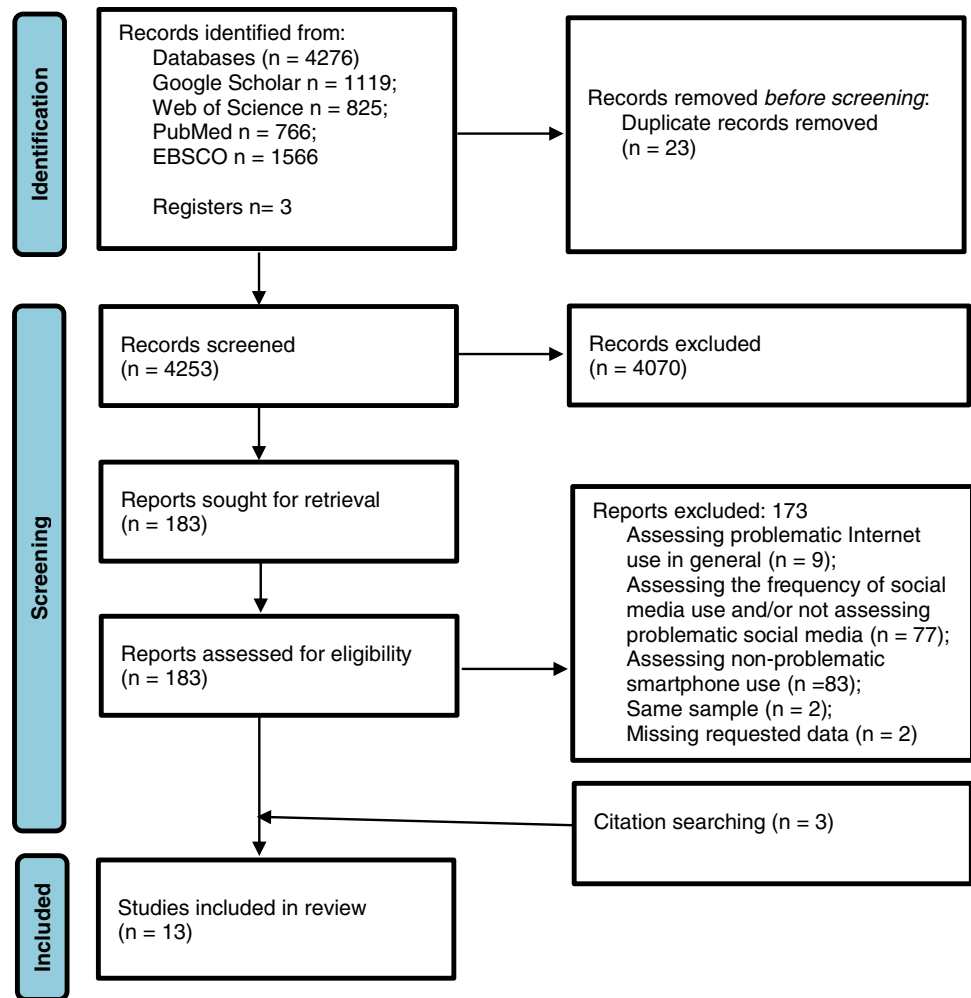
## Study Selection

After performing the aforementioned searches, a total of 4276 hits (Google Scholar  $n = 1119$ ; Web of Science  $n = 825$ ; PubMed  $n = 766$ ; EBSCO  $n = 1566$ ) were initially identified. The flow diagram in Fig. 1 details the selection process. Following the initial literature searches and a first removal of duplicates ( $n = 23$ ), each study title and abstract was examined for eligibility ( $n = 4253$ ) and 4070 publications were excluded because of unsuitability for the present review based on the inclusion and exclusion criteria. Consequently, we collected 183 articles (Google Scholar  $n = 96$ ; Web of Science  $n = 38$ ; PubMed  $n = 14$ ; EBSCO  $n = 38$ ) and 3 articles, reported in references lists, were hand searched. Full texts of all 186 potentially relevant articles were then retrieved and further examined to determine whether they could be included in the review. From 186 articles, 173 were excluded because they did not meet one or more inclusion criteria: assessing problematic Internet use, in general ( $n = 9$ ); assessing the frequency of social media use and/or not assessing problematic social media ( $n = 77$ ); assessing non-problematic smartphone use ( $n = 83$ ); same sample ( $n = 2$ ); and missing requested data ( $n = 2$ ). Following this process, a total of 13 articles were identified for inclusion in the present review. All studies were double screened by two authors (CM and FM) for inclusion. Then, the selected studies were double coded by the same two authors, extracting (1) the identification of the study (authors, year of publication, national setting); (2) the characteristics of the sample (sample size, mean age and range, gender ratio); (3) the design of the study (cross-sectional vs. longitudinal design); (4) the assessment of PSU and PSMU (operationalization, measurement); and (5) the relationship between PSU and PSMU (correlations and paired  $t$ -test). There were two cases of disagreement among coders that were discussed until agreement was met. If correlations were not reported, we contacted the corresponding authors to ask for an ad hoc analysis (if no response was received, a second e-mail was sent 2 weeks after the first one; we received the requested data for 1 out of 3 requests). Table 1 provides a summary of details regarding characteristics of included studies.

## Description of Included Studies

The first study explicitly showing the association between PSU and PSMU was published in 2015. The remaining articles were published after 2016 (mostly in 2020), confirming the newness of research interest in this topic. First, socio-demographic characteristics of the study samples are

**Fig. 1** Flow diagram (adapted from Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. <https://doi.org/10.1136/bmj.n71>)



described in order to provide the overall context of the current summary of the literature.

With regard to gender, samples were overall equally distributed across males and females with a slightly observed majority of females in a few studies [e.g., 33••, 39]. Two studies reported correlations between PSU and PSMU by gender with a similar pattern of associations among males and females [20••, 52]. Nevertheless, higher levels of PSMU are commonly detected among females [57] but, since smartphone use includes a variety of online activities, it might be interesting to explore whether PSU shows different patterns by gender based on preferred apps.

With regard to the national setting, three studies used German-speaking samples, three studies were carried out in China, two samples were from the USA, two from Turkey, two from Iran, and one from Hungary, thus, suggesting a certain degree of heterogeneity by country and none used a nationally representative sample. The different national settings of the reviewed studies should be acknowledged as social media apps are differently spread among different countries and the shared cultural use of technological

devices and social media may vary. As an example, WeChat is a widespread form of social media in China whereas Instagram and Facebook are more commonly used in Europe and in the USA [58]. Moreover, although it is not possible to detect a clear trend of associations between PSU and PSMU across regions, nor to compare the findings across studies, it should be noted that the strongest association is observed in a sample from the USA [40] and the lowest in a sample from Iran [45], when considering “general” PSMU. One possible reason for this may be related to recent global statistics [59] showing that the penetration rate of mobile social networks use is higher in Eastern Asia (70%) and Northern and South America (61%) and tends to be lower in Western Asia and Europe (about 45%).

With regard to the age range of the samples, it varies considerably. As an example, the German-speaking samples included smartphone users from 12 to 75 years of age [20••, 32••, 52]. Only 2 studies were focused on adolescents [45, 49], whereas in the remaining studies, the sample mainly comprised young adults. Despite the large range of ages of some samples provides an overall picture of the phenomena,

**Table 1** Journal articles that have examined the relationship between Problematic Smartphone Use (PSU) and Problematic Social Media Use (PSMU)

Authors	Sample size	% of females	Mean age (SD) of sample [age range]	National setting	Study design	Measure of PSU	Measure of PSMU	Relationship between PSU and PSMU
Karadag et al. [39]	401	71.6	21.9	Turkey	Cross-sectional	Construct: mobile phone addiction (MPA) Scale: Mobile Phone Usage Addiction Scale (developed by the authors through focus group)	Construct: social media addiction (SMA) Scale: Social Media Addiction Scale (developed by the authors of the study)	Correlation between MPA and SMA: $r=0.52; p<0.01$
Burnell and Kuther [40]	256	62	25.41	USA	Cross-sectional	Construct: mobile phone dependency Scale: Mobile Phone Problem Use Scale (Bianchi and Phillips [41])	Construct: social network site (SNS) dependency Scale: Social Media Addiction Scale (Al-Menayes [42])	Correlation between phone dependency and SNS dependency: $r=0.76; p<0.01$
Mohammadi et al. [43]	321	64.8	21.83 ± 1.81	Iran	Cross-sectional	Construct: cell phone overuse (CPO) Scale: Cell Phone Overuse Scale Questionnaire (Toda et al. [44])	Construct: addiction to social networks (ASN) Scale: Social network Addiction Questionnaire (developed by the authors)	Correlation between CPO and ASN: $r=0.68; p<0.001$
Lin et al. [45]	3807	46.9	15.53(1.2)	Iran	Cross-sectional	Construct: smartphone application-based addiction (SABA) Scale: Persian version of the Smartphone Application-Based Addiction Scale (SABAS [46])	Construct: social media addiction (SMA) Scale: Persian version of the Bergen Social Media Addiction Scale (BSMAS [26])	Correlation between SABA and SMA: $r=0.34; p<0.001$

Table 1 (continued)

Authors	Sample size	% of females	Mean age (SD) of sample [age range]	National setting	Study design	Measure of PSU	Measure of PSMU	Relationship between PSU and PSMU
Sha et al. [20●●]	2299	39.2	30.33(9.89) [12–75]	Germany Austria Switzerland	Cross-sectional	Construct: smartphone use disorder (SUD) Scale: German short version of the Smartphone Addiction Scale (SAS) (d-KV-SSS [47])	Constructs: What-sApp use disorder (WUD); Facebook use disorder (FUD) Scales: WhatsApp and Facebook use disorder were assessed with slightly changed versions of the Smartphone Addiction Scale (changing the word “smartphone” to “WhatsApp” or “Facebook” to assess the respective content	Correlation between SUD and WUD: $r=0.68$ ; $p<0.01$ Correlation between SUD and FUD: $r=0.47$ ; $p<0.01$
Barnes et al. [33●●]	140	68.8	18+	USA	Cross-sectional	Construct: Smartphone addiction Scale: Five items were included from Charlton and Danforth [48] + 2 items “I feel lost without [social networking apps/my smartphone]” and “I tend to get easily distracted by [social networking apps/my smartphone].”	Construct: addiction to social networking services Scale: The used measure was identical to the one on smartphone and differed in terms of focus on “my smartphone” or “social networking apps”	Paired $t$ -test $t=7.303(139)$ $p<0.001$
Tunc-Aksan and Akbay [49]	296	45.9	High school students (from 9 to 12th grades)	Turkey	Cross-sectional	Construct: smartphone addiction (SA) Scale: Smartphone Addiction Scale (SAS; Kwon et al. [50])	Construct: social media addiction (SMA) Scale: Social Media Disorder Scale (SMDS; [27, 51])	Correlation between SA and SMA: $r=0.49$ ; $p<0.001$

**Table 1** (continued)

Authors	Sample size	% of females	Mean age (SD) of sample [age range]	National setting	Study design	Measure of PSU	Measure of PSMU	Relationship between PSU and PSMU
Rozgonjuk et al. [52]	439	61.7	25.08 (9.74) [12+]	Germany Austria Switzerland	Cross-sectional	Construct: smartphone use disorder (SmUD) Scale: German version of the short Smartphone Addiction (SAS) (d-KV-SSS [50])	Constructs: WhatsApp use disorder (WAUD), Facebook use disorder (FBUD), Instagram use disorder (IGUD), and Snapchat use disorder (SCUD) Scales: the word “smartphone”, from the SAS was substituted with the name of the platform in each item of the scale	Correlation between SmUD and WAUD: $r=0.76; p<0.001$ Correlation between SUD and FBUD: $r=0.44; p<0.001$ Correlation between SUD and IGUD: $r=0.64; p<0.001$ Correlation between SUD and SCUD: $r=0.31; p<0.001$
Rozgonjuk et al. [32••]	949	64.7	31.82(11.38) [13–76]	Germany Austria Switzerland Liechtenstein	Cross-sectional	Construct: problematic smartphone use (PSU) Scale: German short version of the Smartphone Addiction Scale (SAS) (d-KV-SSS [50])	Constructs: problematic WhatsApp use (PWU); problematic Facebook use (PFU); problematic Instagram use (PIU) Scales: PWU, PFU, and PIU were assessed with slightly changed versions of the SAS (changing the word “smartphone” to “WhatsApp” or “Facebook” or “Instagram” to assess the respective content)	Correlation between PSU and PWA: $r=0.76; p<0.001$ Correlation between PSU and PFU: $r=0.48; p<0.001$ Correlation between PSU and PIU: $r=0.57; p<0.001$
Chen et al. [35•]	308	67.5	23.75(5.15)	China	Longitudinal	Construct: smartphone application-based addiction (SABA) Scale: Smartphone Application-Based Addiction Scale (SABAS [46])	Construct: social media addiction (SMA) Scale: Bergen Social Media Addiction Scale (BSMAS; [26])	Correlation between SABA-TI and SMA-TI: $r=0.55; p<0.001$



Table 1 (continued)

Authors	Sample size	% of females	Mean age (SD) of sample [age range]	National setting	Study design	Measure of PSU	Measure of PSMU	Relationship between PSU and PSMU
Leung et al. [53]	306 (Hong Kong) + 336 (Taiwan)	67.6 (Hong Kong) 50.3 (Taiwan)	24.08(5.06) (Hong Kong) 20.51(1.22) (Taiwan)	China	Cross-sectional	Construct: smartphone use addiction (SUA) Scale: Smartphone Application-Based Addiction Scale (SABAS [46])	Construct: social media addiction (SMA) Scale: Bergen Social Media Addiction Scale (BMAS [26])	Correlation between SUA and SMA: $r=0.47$ ; $p<0.001$
Liu and Ma [54]	465	69.2	18.83(1.08)	China	Cross-sectional	Construct: problematic smartphone use (PSU) Scale: Smartphone Addiction Scale (SAS [50])	Construct: social networking site (SNS) addiction Scale: Chinese social media addiction scale [55]	Correlation between PSU and SNS addiction: $r=0.66$ ; $p<0.01$
Zsido et al. [56]	499	47.9	33.11(11.67) [18–60]	Hungary	Cross-sectional	Construct: problematic smartphone use (PSU) Scale: Smartphone Addiction Scale (SAS [50])	Construct: problematic social media use (PSMU) Scale: Bergen social media addiction scale (BMAS [26])	Correlation between PSU and PSMU (result from Structural Equation Modeling): $r=0.51$ ; $p<0.05$

adolescents and adults might engage in different social media and might have different addictive tendencies towards the digital technologies [52]. In 2019, the European School Survey Project on Alcohol and Other Drugs [60] reported that almost all students aged 15–16 years (94%) used social media in the previous week (e.g. WhatsApp, Twitter, Facebook, Skype, Blogs, Snapchat, Instagram, Kik) with about half (about 46%) reporting self-perceived problems with such use (in terms of too much time spent online and family concerns), thus suggesting that technology-related behaviours are relevant among adolescents. Future studies focusing on different age groups and highlighting whether and how specific social media are more likely to be associated with PSU for youth as compared to adults are warranted.

### Methods of Assessing Problematic Smartphone Use and Problematic Social Media Use

Six studies used the Smartphone Addiction Scale (SAS; 3 used the original version by Kwon et al. [50]; and 3 used the German version by Montag et al. [47]). The SAS is a 10-item single factor scale, derived from a longer 33-item version, assessing addictive-like symptoms, such as daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. In its original version, the SAS includes a specific item related to the use of social media: “Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook”, whereas the item ends with the word “conversations” in the German version. Accordingly, the 3 German studies used an adapted version of the SAS in order to assess WhatsApp, Facebook, and Instagram Disorders, by replacing the word “smartphone” with the name of each social media and discussed the overlap between PSU and specific PSMU, finding higher correlations between PSU and problematic WhatsApp use as compared to problematic use of Facebook, Instagram, and Snapchat.

Three studies [35•, 45, 53] used the Smartphone Application-Based Addiction Scale (SABAS [46]), which assesses the risk of being addicted to smartphone applications [based on the six addiction criteria proposed by Griffiths [25] (salience, mood, modification, tolerance, withdrawal conflict, and relapse)] and the Bergen Social Media Addiction Scale (BMAS [26]) that assesses the same six criteria of the addiction component model in relation to general social media use.

The remaining studies used 4 different scales to assess slightly different constructs akin to PSU, that is mobile phone addiction and dependency, cell phone overuse, and addiction to smartphone (see Table 1 [33••, 39, 40, 43]). Moreover, either a validated scale (Social Media Disorder Scale [27], Chinese Social Media Addiction Scale [54, 55])



or ad hoc measures [39, 43] or an adaptation of the scale was used to assess PSMU.

Overall, PSU and PSMU are variously conceptualized using similar theoretical frameworks and are assessed with measures reflecting the same “addiction-like” criteria. One study [32••] demonstrated the overlap between symptoms of PSU and problematic WhatsApp use on item level of the SAS, providing also promising insights about the likelihood of problematic Instagram and Facebook use to be separated constructs from PSU. Further studies are needed in order to verify the overlap of smartphone- and social media-related symptoms item by item.

### Association Between PSU and PSMU

The present review was aimed at synthesizing the association between PSU and PSMU providing an estimation of their correlation. Cohen [61] proposed conventional values as benchmarks for what are considered to be “small”, “medium”, and “large” effects ( $r=0.1$ ,  $0.3$ , and  $0.5$ , respectively). Overall, following these benchmarks, the associations between PSU and PSMU range from medium to large across the included studies. Specifically, the 18 correlations observed in 12 studies indicated that 7 correlations ranged between  $0.30$  and  $0.50$  (i.e., the associations between PSU and problematic Snapchat and Facebook use and social media, in general); 8 correlations ranged between  $0.50$  and  $0.70$  (i.e., the associations between PSU and social media, in general, or Facebook and Instagram); and 3 correlations were higher than  $0.70$  (i.e., the associations between PSU and problematic WhatsApp use and social media, in general). Only three studies examined the multicollinearity concluding that it was not a concern [33••, 39, 40]. However, given the large observed associations, future studies should include a formal test for multicollinearity.

Overall, higher associations were found in studies comparing PSU with PWU and social media, in general, followed by Instagram and Facebook. First, although accessible also via laptop-based browsers, WhatsApp is a messaging app specifically developed for text messaging on smartphone that is susceptible to promote the development of PSU [32••] (for a review about the addictive features of WhatsApp and other apps, see Montag et al. [62]). Second, when participants complete a scale assessing problematic use of social media or SNS, in general, they may tend to think about the apps they use the most, but these might be different across users, countries, and studies. This could be one of the reasons why the range of associations between PSU and PSMU, in general, tend to vary considerably across studies.

Twelve out of 13 studies employed a cross-sectional design: it could be that PSMU contributes to worsening the levels of PSU as social media are predominantly used on

smartphones and they might be addictive per se because they are specifically designed to prolong engagement time [62, 63]. However, the alternative explanation may also be plausible in that the constant availability and portability of smartphones might induce users to repeatedly check notifications and feel the social pressure to send and reply to texts and access social media. The only longitudinal study [35•] highlighted the effect of PSU and PSMU in predicting psychological distress but the longitudinal relationships between PSU and PSMU remain unclear. As a note, Barnes et al. [33••] did not report the correlations between constructs but highlighted that PSU was higher than PSMU in their sample because, beyond social media use, PSU also covers other potential problematic behaviours (such as watching videos and gaming). In addition to the variety of available apps with specific features, PSU may also lay in its embedded elements that may drive users to endless scrolling, repeated unblocking of the screen and need for touch [64], checking habits, and compulsively accessing different apps due to poor impulse control [e.g., 65,66]. Technology features, such as need for touch, unlimited mobile data, personalization of components and capacities, speed, portability, and accessibility, have been found to be associated with PSU (see Bush and McCarthy [4•] for a systematic review and meta-analysis).

### Conclusions

Overall, the large associations observed between PSU and PSMU indicate that the two phenomena are partially overlapping mostly because the smartphone is a common medium to use social media, especially concerning instant messaging apps like WhatsApp [37, 63]. Despite the evidence that engagement in social media/networking sites may cover the main amount of time spent on smartphones [63, 67], the overlap between the two problematic uses is partial, likely because smartphones allow the use of a number of other applications and potentially problematic activities (including web surfing, gaming, series watching, pornography, gambling). Moreover, social media can be also accessed through other mobile devices (such as tablets) [68] and non-mobile ones (such as desktop computers and laptops)—which are not characterized by the same capabilities of smartphones, thus suggesting that the behaviour of social media use, rather than the used medium per se, might be problematic [e.g., 67,69]. However, only a few studies on PSMU reported the preferred device used by participants to access social media [e.g., 70]. Future studies should aim at analysing whether people differ in their levels of PSMU depending on the medium they use the most (the smartphone vs. other devices) in order to clarify whether mobile features actually contribute to the risk of developing problematic

behaviours [71]. Moreover, more research on what social media activities (such as photo editing, scrolling, chatting, video making/watching) can become more problematic if done on the smartphone compared to other devices might be interesting [see for example 72,73]. Importantly, studies should consider that the context in which people use technology devices (when driving, working, studying) can make a specific activity more or less problematic [e.g., 4•, 67]. In this view, the definition of PSU itself could be updated considering the actual negative impact of maladaptive smartphone use on daily life. Thus, according to Montag and colleagues [62], the content or the preferred online application and the specific device used should be taken into account when investigating PSU and PSMU.

Results of the present systematic review indicate that the definition and assessment of PSU and PSMU may influence the degree of overlap between the two phenomena, thus suggesting the need for accepted criteria and shared construct validity of online behaviours [74]. Our work is thus relevant in relation to the current debates about the conceptualization of PSU and suggests that this problematic behaviour should preferentially be studied with a focus on specific types of apps used rather than as a more holistic phenomenon [4•]. For example, given that WhatsApp or other instant messaging services are strongly associated with smartphone use (more than other social networking sites), future studies are invited to specify the types of social media they refer to when assessing PSMU.

Some conclusions can be drawn. First, we found a partial overlap between PSU and PSMU, meaning that differences (in addition to commonalities) should be taken into account.

Second, a number of correlates have been found to be associated with both PSU and PSMU [56], including adverse psychological consequences and social and individual characteristics [e.g. 14, 75, 76]. Therefore, it might be useful to look at psychological profiles of users who are more likely to suffer some distress due to smartphone and social media use, thus highlighting further differences, shared mechanisms, and factors and consequences for well-being [4•, 33••, 56].

Third, comparisons across countries should be cautiously looked at and studies using representative samples are needed. Lastly, self-reported use of smartphone and social media may not be accurate [e.g., 77] and it is very common that people use more than one social media on their smartphone, thus increasing the probability of a multiplier effect in problematic symptoms. Therefore, future studies would benefit from the use of objective data gathered from smartphone applications and social media [78] in order to combine symptoms of problematic use with the actual and cumulative use of different applications.

In conclusion, giving the overlapping nature of the phenomena, studies could consider focussing on PSU and/or PSMU taking into account the precautions described above.

Depending on the specific goals or research questions, researchers could consider the utility of controlling for PSMU when assessing PSU (and vice versa), especially if interested in the mechanism underlying problematic behaviours.

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## References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

1. We are Social 2021. <https://wearesocial.com/blog/2021/01/digital-2021-the-latest-insights-into-the-state-of-digital>.
2. Eurostat 2021. [https://ec.europa.eu/eurostat/databrowser/view/isoc\\_ci\\_im\\_i/default/table?lang=en](https://ec.europa.eu/eurostat/databrowser/view/isoc_ci_im_i/default/table?lang=en).
3. Smahel D, Machackova H, Mascheroni G, Dedkova L, Staksrud E, Ólafsson K, et al. EU kids online 2020: survey results from 19 countries. *EU Kids Online*. 2020.
- 4• Busch PA, McCarthy S. Antecedents and consequences of problematic smartphone use: a systematic literature review of an emerging research area. *Comput Hum Behav*. 2020;114:106414. **In this systematic review, the authors present a comprehensive summary of the antecedents and consequences of PSU showing findings about users characteristics and problematic features of smartphone use.**
5. Jin Jeong Y, Suh B, Gweon G. Is smartphone addiction different from Internet addiction? Comparison of addiction-risk factors among adolescents. *Behav Inform Technol*. 2020;39(5):578–93.
6. Horwood S, Anglim J. Personality and problematic smartphone use: a facet-level analysis using the five factor model and HEXACO frameworks. *Comput Hum Behav*. 2018;85:349–59.
7. Nahas M, Hlais S, Saberian C, Antoun J. Problematic smartphone use among Lebanese adults aged 18–65 years using MPPUS-10. *Comput Hum Behav*. 2018;87:348–53.
8. Billieux J, Van Rooij AJ, Heeren A, Schimmenti A, Maurage P, Edman J, Kardefelt-Winther D. Behavioural Addiction Open Definition 2.0—using the Open Science Framework for collaborative and transparent theoretical development. *Addict*. 2017;112(10):1723–4.
9. Montag C, Wegmann E, Sariyska R, Demetrovics Z, Brand M. How to overcome taxonomical problems in the study of Internet use disorders and what to do with “smartphone addiction”? *J Behav Addict*. 2021;9(4):908–14.

10. Panova T, Carbonell X. Is smartphone addiction really an addiction? *J Behav Addict*. 2018;7(2):252–9.
11. Lepp A, Li J, Barkley JE. College students' cell phone use and attachment to parents and peers. *Comput Hum Behav*. 2016;64:401–8.
12. Billieux J, Maurage P, Lopez-Fernandez O, Kuss DJ, Griffiths MD. Can disordered mobile phone use be considered a behavioral addiction? An update on current evidence and a comprehensive model for future research. *Cur Addict Rep*. 2015;2(2):156–62.
13. De-Sola Gutiérrez J, Rodriguez de Fonseca F, Rubio G. Cell-phone addiction: a review. *Front Psychiat*. 2016;7:175.
14. Sohn S, Rees P, Wildridge B, Kalk NJ, Carter B. 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*. 2019;19(1):1–10.
15. Canale N, Moretta T, Pancani L, Buodo G, Vieno A, Dalmaso M, Billieux J. A test of the pathway model of problematic smartphone use. *J Behav Addict*. 2021;10(1):181–93.
16. Shin C, Dey AK. Automatically detecting problematic use of smartphones. In *Proceedings of the 2013 ACM international joint conference on pervasive and ubiquitous computing*. 2013:335–44.
17. Soror AA, Steelman ZR, Limayem M. Discipline yourself before life disciplines you: Deficient self-regulation and mobile phone unregulated use. In *2012 45th Hawaii international conference on system sciences*. 2012:849–58.
18. Rozgonjuk D, Kattago M, Täht K. Social media use in lectures mediates the relationship between procrastination and problematic smartphone use. *Comput Hum Behav*. 2018;89:191–8.
19. Bernroider EWN, Krumay B, Margiol S. Not without my smartphone! Impacts of smartphone addiction on smartphone usage. In *Proceedings of the 25th Australasian conference on information systems (ACIS)*. 2014. Auckland, New Zealand.
- 20.●● Sha P, Sariyska R, Riedl R, Lachmann B, Montag C. Linking internet communication and smartphone use disorder by taking a closer look at the Facebook and WhatsApp applications. *Addict Behav Rep*. 2019;9:100148. **This is the first study examining the association between PSU and problematic use of three different social media.**
21. Horvath J, Mundinger C, Schmitgen MM, Wolf ND, Sambataro F, Hirjak D, et al. Structural and functional correlates of smartphone addiction. *Addict Behav*. 2020;105:106334.
22. Roberts JA, Yaya LHP, Manolis C. The invisible addiction: Cell-phone activities and addiction among male and female college students. *J Behav Addict*. 2014;3(4):254–65.
23. Sun Y, Zhang Y. A review of theories and models applied in studies of social media addiction and implications for future research. *Addict Behav*. 2020;114:106699.
24. Andreassen CS, Pallesen S. Social network site addiction: an overview. *Curr Pharm Des*. 2014;20(25):4053–61.
25. Griffiths MD. A “components” model of addiction within a biopsychosocial framework. *J Subs Use*. 2005;10(4):191–7.
26. Andreassen CS, Billieux J, Griffiths MD, Kuss DJ, Demetrovics Z, Mazzoni E. The relationship between addictive use of social media and video games and symptoms of psychiatric disorder: A large-scale cross-sectional study. *Psychol Addict Behav*. 2016;30(2):252–62.
27. Van den Eijnden RJJM, Lemmens J, Valkenburg PM. The social media disorder scale: Validity and psychometric properties. *Comput Hum Behav*. 2016;61:478–87.
28. Inchley J, Currie D, Budisavljevic S, Torsheim T, Jåstad A, Cosma A, et al. (Eds.). *Spotlight on adolescent health and well-being. Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada*. International report. Volume 2. Key data. Copenhagen: WHO Regional Office for Europe; 2020.
29. APA. *Diagnostic and statistical manual of mental disorders (DSM-5)*. Washington, DC: 2013.
30. Lemmens J, Valkenburg P, Gentile D. The internet gaming disorder scale. *Psychol Assess*. 2015;27:567–82. <https://doi.org/10.1037/pas0000062>.
31. Cheng C, Lau YC, Chan L, Luk, JW. Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values. *Addictiv Behav*. 2021;106845.
- 32.●● Rozgonjuk D, Sindermann C, Elhai JD, Christensen AP, Montag C. Associations between symptoms of problematic smartphone, Facebook, WhatsApp, and Instagram use: An item-level exploratory graph analysis perspective. *J Behav Addict*. 2020;9(3):686–97. **This study shows the overlap between symptoms of PSU and problematic WhatsApp/Facebook/Instagram use on item-level of the Smartphone Addiction Scale.**
- 33.●● Barnes SJ, Pressey AD, Scornavacca E. Mobile ubiquity: Understanding the relationship between cognitive absorption, smartphone addiction and social network services. *Comput Hum Behav*. 2019;90:246–58. **This study examined the differences between PSU and PSMU assessing the influence of user perceptions of PSU. It also provides a discussion about definitions and theories in the field.**
34. Griffiths MD. Does Internet and computer “addiction” exist? Some case study evidence. *CyberPsychol Behav*. 2000;3:211–8.
- 35.● Chen IH, Pakpour AH, Leung H, Potenza MN, Su JA, Lin CY, Griffiths MD. Comparing generalized and specific problematic smartphone/internet use: longitudinal relationships between smartphone application-based addiction and social media addiction and psychological distress. *J Behav Addict*. 2020;9(2):410–9. **This longitudinal study provides a clear theoretical background for PSU and shows the impact of PSU and PSMU on mental health.**
36. Davazdahemami B, Hammer B, Soror A. Addiction to mobile phone or addiction through mobile phone?. In *2016 49th Hawaii international conference on system sciences (HICSS)* 2016;1467–76.
37. Kuss DJ, Griffiths MD. Social networking sites and addiction: ten lessons learned. *Int J Env Res Pub He*. 2017;14:311.
38. Moher D, Liberati A, Tetzlaff J, Altman DG, Prisma Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*. 2009;6(7):e1000097.
39. Karadağ E, Tosuntaş ŞB, Erzen E, Duru P, Bostan N, Şahin BM, et al. Determinants of phubbing, which is the sum of many virtual addictions: a structural equation model. *J Behav Addict*. 2015;4(2):60–74.
40. Burnell K, Kuther TL. Predictors of mobile phone and social networking site dependency in adulthood. *Cyberpsychol Behav Soc Netw*. 2016;19(10):621–7.
41. Bianchi A, Phillips DJG. Psychological predictors of problem mobile phone use. *CyberPsychol Behav*. 2005;8:39–51.
42. Al-Menayes J. Psychometric properties and validation of the Arabic social media addiction scale. *J Addict*. 2015;29:1743.
43. Mohammadi S, Valinejadi A, Saman JA, Karimpour H, Kavianfar M, Safaeipour M, et al. Assessment of addiction to internet, smartphone and social networks among students of medical sciences: a cross sectional study. *Electron J Gen Med*. 2018;15(4):em35.
44. Toda M, Monden K, Kubo K, Morimoto K. Mobile phone dependence and health related lifestyle of university students. *Soc Behav Personal Int J*. 2006;34(10):1277–84.

45. Lin CY, Imani V, Broström A, Nilsen P, Fung XC, Griffiths MD, Pakpour AH. Smartphone application-based addiction among Iranian adolescents: A psychometric study. *Int J Ment Health Ad.* 2019;17(4):765–78.
46. Csibi S, Griffiths MD, Cook B, Demetrovics Z, Szabo A. The psychometric properties of the Smartphone Application-Based Addiction Scale (SABAS). *Int J Ment Health Ad.* 2018;16(2):393–403.
47. Montag C. *Homo Digitalis: smartphones, soziale Netzwerke und das Gehirn.* Springer Fachmedien Wiesbaden GmbH; 2018.
48. Charlton JP, Danforth IDW. Distinguishing addiction and high engagement in the context of online game playing. *Comput Hum Behav.* 2007;23(3):1531–48.
49. Tunc-Aksan A, Akbay SE. Smartphone addiction, fear of missing out, and perceived competence as predictors of social media addiction of adolescents. *Eur J Edu Res.* 2019;8(2):559–66.
50. Kwon M, Kim DJ, Cho H, Yang S. The smartphone addiction scale: development and validation of a short version for adolescents. *PloS One.* 2013;8(12):e83558.
51. Tas I. Ergenler için Sosyal Medya Bagimlilik Olcegi Kisa Formunun (SMBO-KF) gecerlik ve guvenirlilik calismasi [The study of validity and reliability of the Social Media Addiction Scale Short Form for adolescents]. *Online J Technol Addict & Cyberbull.* 2017;4(1):27–40.
52. Rozgonjuk D, Sindermann C, Elhai JD, Montag C. Comparing smartphone, WhatsApp, Facebook, Instagram, and Snapchat: which platform elicits the greatest use disorder symptoms? *Cyberpsychol Behav Soc Netw.* 2021;24(2):129–34.
53. Leung H, Pakpour AH, Strong C, Lin YC, Tsai MC, Griffiths MD, et al. Measurement invariance across young adults from Hong Kong and Taiwan among three internet-related addiction scales: Bergen social media addiction scale (BSMAS), smartphone application-based addiction scale (SABAS), and internet gaming disorder scale-short form (IGDS-SF9)(study Part A). *Addict Behav.* 2020;101:105969.
54. Liu C, Ma J. Social support through online social networking sites and addiction among college students: the mediating roles of fear of missing out and problematic smartphone use. *Curr Psychol.* 2018;39:1892–9.
55. Liu C, Ma J. Development and validation of the Chinese social media addiction scale. *Pers Ind Differ.* 2018;134(11):55–9.
56. Zsido AN, Arato N, Lang A, Labadi B, Stecina D, Bandi SA. The role of maladaptive cognitive emotion regulation strategies and social anxiety in problematic smartphone and social media use. *Pers Ind Differ.* 2021;173:110647.
57. Marino C, Lenzi M, Canale N, Pierannunzio D, Dalmaso P, Borraccino A, et al. Problematic social media use: associations with health complaints among adolescents. *Annali dell'Istituto Superiore di Sanità.* 2020;56(4):514–21.
58. Statista <https://www.statista.com/statistics/200843/social-media-activities-by-platform-usa/>. Accessed 1 Apr 2021.
59. Statista <https://www.statista.com/statistics/412257/mobile-social-penetration-rate-region/0>. Accessed 1 Apr 2021.
60. ESPAD Group. ESPAD Report 2019 Results from the European School Survey Project on Alcohol and Other Drugs. Luxembourg: EMCDDA Joint Publications, Publications Office of the European Union; 2020.
61. Cohen J. A power primer. *Psychol Bull.* 1992;112:155–9.
62. Montag C, Lachmann B, Herrlich M, Zweig K. Addictive features of social media/messenger platforms and freemium games against the background of psychological and economic theories. *Int J Env Res Pub He.* 2019;16(14):2612.
63. Cha SS, Seo BK. Smartphone use and smartphone addiction in middle school students in Korea: Prevalence, social networking service, and game use. *Health Psychol Open.* 2018;5(1):1–15.
64. Lee YK, Chang CT, Lin Y, Cheng ZH. The dark side of smartphone usage: psychological traits, compulsive behavior and technostress. *Comput Hum Behav.* 2014;31:373–83.
65. Duke É, Montag C. Smartphone addiction, daily interruptions and self-reported productivity. *Addict Behav Rep.* 2017;6:90–5.
66. Salehan M, Negahban A. Social networking on smartphones: when mobile phones become addictive. *Comput Hum Behav.* 2013;29(6):2632–9.
67. Griffiths MD. Internet use disorders: What's new and what's not.●: commentary on: how to overcome taxonomical problems in the study of Internet use disorders and what to do with "smartphone addiction"?(Montag et al., 2019). *J Behav Addict.* 2021;9(4):934–7.
68. Ahmed O, Siddiqua SJN, Alam N, Griffiths MD. The mediating role of problematic social media use in the relationship between social avoidance/distress and self-esteem. *Technol Soc.* 2021;64:101485.
69. Starcevic V, King DL, Delfabbro PH, Schimmenti A, Castro-Calvo J, Giardina A, Billieux J. "Diagnostic inflation" will not resolve taxonomical problems in the study of addictive online behaviours.●: commentary on: how to overcome taxonomical problems in the study of Internet use disorders and what to do with "smartphone addiction"?(Montag et al., 2020). *J Behav Addict.* 2021;9(4):915–9.
70. Schivinski B, Brzozowska-Wos MM, Stansbury E, Satel J, Montag C, Pontes HM. Exploring the role of social media use motives, psychological well-being, self-esteem, and affect in problematic social media use. *Front Psychol.* 2020;11:3576.
71. Rumpf HJ, Browne D, Brandt D, Rehbein F. Addressing taxonomic challenges for Internet Use Disorders in light of changing technologies and diagnostic classifications.●: commentary on:"how to overcome taxonomical problems in the study of Internet use disorders and what to do with 'smartphone addiction'?"(Montag et al., 2020). *J Behav Addict.* 2021;9(4):942–4.
72. Balakrishnan J, Griffiths MD. Social media addiction: what is the role of content in YouTube? *J Behav Addict.* 2017;6:364–77.
73. Balakrishnan J, Griffiths MD. An exploratory study of 'selfitis' and the development of the Selfitis Behavior Scale. *Int J Ment Heal Addict.* 2018;16:722–36.
74. Yu S, Sussman S. Does smartphone addiction fall on a continuum of addictive behaviors? *Int J Env Res Pub He.* 2020;17(2):422.
75. Marino C, Gini G, Vieno A, Spada MM. A comprehensive meta-analysis on problematic Facebook use. *Comput Hum Behav.* 2018;83:262–77.
76. Hussain Y, Wegmann E, Yang H, Montag C. Social networks use disorder and associations with depression and anxiety symptoms: a systematic review of recent research in China. *Front Psychol.* 2020;11:211.
77. Marino C, Finos L, Vieno A, Lenzi M, Spada MM. Objective Facebook behaviour: differences between problematic and non-problematic users. *Comput Hum Behav.* 2017;73:541–6.
78. Ryding FC, Kuss DJ. Passive objective measures in the assessment of problematic smartphone use: a systematic review. *Addict Behav Rep.* 2020;11:100257.

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