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The Association of Motives with Problematic Smartphone Use: A Systematic Review

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Abstract

Motives for smartphone use may be key factors underlying problematic smartphone use (PSU). However, no study has reviewed the literature investigating the association of motives with PSU. As such, we conducted a systematic review to: (a) determine which smartphone use motives were associated with PSU; and (b) examine the potential indirect and moderating effects of motives in the relationship of psychosocial factors with PSU. We identified 44 studies suitable for inclusion in our systematic review. There was extensive heterogeneity in smartphone use motives measures across the studies, including 55 different labels applied to individual motives dimensions. Categorisation of these motives based on their definitions and item content identified seven motives that were broadly assessed across the included studies. Motives which reflected smartphone use for mood regulation, enhancement, self-identity/conformity, passing time, socialising, and safety were generally positively associated with PSU. There were indirect effects of depression, anxiety, and transdiagnostic factors linked to both psychopathologies on PSU via motives, particularly those reflecting mood regulation. Stress and anxiety variously interacted with pass-time, social, and a composite of enhancement and mood regulation motives to predict PSU. However, the heterogeneity in the measurement of smartphone use motives made it difficult to determine which motives were most robustly associated with PSU. This highlights the need for a valid and comprehensive smartphone use motives measure.

Keywords: problematic smartphone use; smartphone addiction; smartphone use disorder; motives; compensatory internet use theory; pathway model; systematic review

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Introduction

Smartphones can offer a range of benefits, such as helping people connect (Wanga et al., 2020), manage their finances (French et al., 2020), and access physical (Agu et al., 2013) and mental health (Hind & Sibbald, 2014) interventions. Given these benefits, it is unsurprising that smartphones have become ubiquitous (Deloitte, 2018, 2019a, 2019b). However, despite the smartphone's popularity, around 42% of Australians report a belief that they use them excessively, with this rising to 70% among young adults aged 18–24 years (Deloitte, 2019a). Similar rates of excessive use have been reported in other Western countries (Deloitte, 2018, 2019b). For some people, excessive and uncontrolled smartphone use results in harm or functional impairment in daily life, termed problematic smartphone use (PSU; Elhai, Yang, et al., 2020).

Conceptualising Problematic Smartphone Use

PSU is referred to synonymously with various terms in the literature, including smartphone addiction, smartphone use disorder, and problematic smartphone use (Elhai, Yang, et al., 2020). Likened to a behavioural addiction, research has found PSU to include the core components of addiction, such as excessive use, withdrawal, salience, mood modification, and loss of control (De-Sola Gutiérrez et al., 2016; Yu & Sussman, 2020). Despite similarities to addictive disorders, it has been argued that the consequences of PSU are less severe (Panova & Carbonell, 2018) and it is not recognised as a behavioural addiction in diagnostic manuals (American Psychiatric Association, 2013; World Health Organization, 2018). While some authors have emphasised understanding how PSU is similar to established addictive behaviours, others have focussed on its unique presentation. For example, Billieux et al. (2015) proposed that PSU is comprised of three distinct addictive (e.g., cravings), antisocial (e.g., phubbing), and risky (e.g., use while driving) patterns of smartphone use.

In addition to debate about whether PSU should be considered an addiction, there has been controversy about whether people become addicted to smartphone devices or their content (i.e., applications; Davazdahemami et al., 2016). There is now relative consensus that smartphone content is the primary object of problematic engagement (Elhai et al., 2019; Griffiths, 2021). Given this, it has been suggested that, like problematic internet use, PSU is an umbrella construct masking a spectrum of discrete problematic behaviours (e.g., social networking, gaming; Panova & Carbonell, 2018; Starcevic et al., 2021). However, it has also been argued that generalised PSU—that is, the excessive engagement in a range of content on a smartphone—may be a unique construct (I. H. Chen et al., 2020; Griffiths, 2021; Montag et al., 2021), an assertion supported with network analysis (Baggio et al., 2018). The distinctiveness of PSU may be due to the portability of the smartphone facilitating constant access to online (and offline) content (Elhai, Yang, et al., 2020) and unique patterns of problematic behaviour. This can include attachment to the device, use while driving, or use during face-to-face social interactions (Baggio et al., 2018). Therefore, the present study focuses on generalised PSU.

Regardless of conceptual controversy, PSU has been associated with several negative outcomes. In a recent systematic review, Busch and McCarthy (2021) found that PSU was robustly associated with poorer emotional health, such as depression, anxiety, and loneliness. PSU has also been associated with several other negative outcomes across a range of domains, including poor time management, lack of sleep, reduced productivity, interpersonal conflict, and use of a phone while driving (Busch & McCarthy, 2021). A challenge is that many emotional health variables may also be considered antecedents, and research is yet to confirm casual direction (see Elhai, Dvorak, et al., 2017). Notwithstanding this limitation, given the potential harms associated with PSU, it is important to identify risk factors for PSU.

Risk Factors and Aetiology of Problematic Smartphone Use

Research has generally found that adolescents and young adults report higher levels of PSU compared with older age groups (reviewed in Busch & McCarthy, 2021). Horwood et al. (2021) found that PSU levels remained consistent and relatively high from 18–35 years of age, before declining. However, Horwood et al. (2021) noted that higher levels of PSU among younger people may be a generational cohort effect. Most studies have also found that PSU levels are higher among females, but results are somewhat inconsistent (reviewed in Busch & McCarthy, 2021). While understanding demographic risk factors may be important for directing interventions, it is crucial that research identifies psychosocial factors associated with PSU. This will enhance understanding of what causes PSU and may inform interventions, such as challenging maladaptive motives for smartphone use in a clinical setting.

Arguably, the most comprehensive model of PSU proposes that it is driven by three causal pathways (Billieux et al., 2015). The excessive reassurance pathway describes those whose PSU is related to low psychosocial wellbeing (e.g., depression, anxiety) driving a desire to excessively maintain relationships and seek reassurance from others via a smartphone. The impulsive pathway describes those whose PSU is due to heightened levels of impulsive, aggressive, or psychopathic traits, or attention deficit hyperactivity disorder (ADHD). Finally, the extraversion pathway asserts that some people with heightened levels of extraversion, sensation seeking, and reward sensitivity engage in PSU for stimulation and socialising (Billieux et al., 2015). These pathways were proposed to differentially drive addictive, antisocial, and dangerous patterns of PSU (Billieux et al., 2015). Research has empirically validated the model, although risk factors from the extraversion pathway (except for sensation seeking) have shown limited associations with PSU (Canale et al., 2021; Pivetta et al., 2019). While this pathway model synthesises how various psychosocial factors may influence PSU, it does not explicitly identify variables that

may mediate the pathways—except for excessive reassurance seeking, a safety behaviour engaged in by people with psychopathological symptoms, such as depression and anxiety (Cogle et al., 2012). In recent years, research has shifted to investigating variables that may mediate the effects of more distal risk factors (e.g., psychopathology, personality) on PSU (Brand et al., 2019; Elhai et al., 2019), with motives identified as one promising construct (Kardefelt-Winther, 2014; Panova & Carbonell, 2018).

The Role of Motives in Problematic Smartphone Use

Motives have been defined as the reasons why a person engages in a behaviour, reflecting the needs and desires they seek to gratify (Cox & Klinger, 2004; Rubin, 2002; Sundar & Limperos, 2013). Motives, as they are conceptualised in the PSU literature, have roots in the media and substance use literature. The Alcohol Use Motivational Model (Cox & Klinger, 1988) describes motives as the value placed on achieving a desired effect of drinking (e.g., *I drink to have fun*; Cox & Klinger, 2004). This is in contrast with the related construct of expectancies, which reflects beliefs about the effects of a given behaviour (e.g., drinking is fun; Cox & Klinger, 2004). In the Alcohol Use Motivational Model, expectancies are thought to be important for forming motives, but motives are the more proximal determinant of behaviour (Kuntsche et al., 2010). In fact, the model considers motives to be the final common pathway to behaviour, funneling all other influences, such as psychosocial wellbeing and personality (Cox & Klinger, 2004). The model proposes four categories of motives based on crossing dimensions of valence (desired effect is reward or avoidance of punishment) and source (desired effect is derived internally or externally; Cox & Klinger, 2004). A couple of studies have found that coping, enhancement, and conformity smartphone use motives, which were adapted from the Alcohol Use Motivational Model (Cooper, 1994), predicted PSU, but social motives did not (C. Chen et al., 2017; K. Z. K. Zhang, Chen, & Lee, 2014). However, given the model was developed to explain alcohol use, further research is required to determine whether it is applicable to PSU.

The majority of research which has investigated the association of motives with PSU has been conducted from a Uses and Gratifications Theory (Katz, 1974) and/or Compensatory Internet Use Theory (Kardefelt-Winther, 2014) perspective. The Uses and Gratifications Theory proposes that motives drive the choice to use different types of media (Rubin, 2002; Sundar & Limperos, 2013). Based on this premise, research has identified a range of motives for using different types of media, including the internet (Song et al., 2004), mobile phones, and smartphones (e.g., Leung & Wei, 2000; Lin et al., 2014; Wei, 2008). The Compensatory Internet Use Theory builds on the Uses and Gratifications Theory by integrating it with research that has investigated the association of psychosocial wellbeing with problematic internet use (Kardefelt-Winther, 2014). Specifically, it frames problematic internet use as an effort to avoid negative emotions or circumstances, so motives to alleviate negative emotions should mediate or moderate the association of low psychosocial wellbeing with problematic internet use (Kardefelt-Winther, 2014). Several studies grounded by the Uses and Gratifications Theory and/or Compensatory Internet Use Theory have found that a range of motives are associated with PSU and mediate or moderate the effect of other psychosocial factors on PSU (e.g., Cheng & Meng, 2021; Elhai, Hall, et al., 2017; J.-H. Kim et al., 2015; Shen et al., 2021). However, neither theory was developed to explain PSU specifically and the latter does not consider the role of motives in potential positive reinforcement pathways to PSU, such as Billieux et al.'s (2015) extraversion pathway.

Motives for Generalised and Specific Problematic Smartphone Use

Of note, theoretical models of problematic internet use, such as the Interaction of Person-Affect-Cognition-Execution model (Brand et al., 2016, 2019), have conceptualised motives as important for identifying problematic engagement in specific types of online content accessible via a smartphone. For example, motives reflecting a desire for achievement were found to be a key predictor of problematic video gaming (Männikkö et al., 2017), whereas self-presentation motives were found to be a key predictor of problematic social networking (H. T. Chen & Kim, 2013). However, findings from research that identified unique motives for the problematic use of specific types of online content also suggests there are likely core motives (e.g., motives to cope with negative emotions) that influence the problematic engagement in content generally, irrespective of the type (A. Chen & Roberts, 2019; Jiang et al., 2022; Melodia et al., 2022). A body of literature has focussed on identifying what core motives influence generalised PSU (e.g., C. Chen et al., 2017; Wang et al., 2015; K. Z. K. Zhang, Chen & Lee, 2014), but there remains a lack of consensus on what these motives are. Therefore, the present review focusses on understanding the core motives associated with generalised PSU.

The Present Study

Despite the theoretical importance of motives to problematic behaviour, a growing literature investigating their role in PSU, and prior reviews of motives for substance use (Cooper et al., 2015; Kuntsche et al., 2005), no prior study has reviewed the literature investigating the association of motives with PSU. Through our review, we aimed to identify which motives were associated with PSU. Moreover, we aimed to examine whether motives mediate and/or moderate the association of other psychosocial factors with PSU. This was to assess the theoretical proposition that motives act as a final common pathway to PSU, and their integration with the pathway model.

Method

Search Strategy

We used the preferred reporting items for systematic reviews and meta-analysis (PRISMA) guidelines (Moher et al., 2015; Shamseer et al., 2015) to inform methodology. We searched for articles in the Web of Science, SCOPUS, PubMed, ProQuest, PsycINFO, PsycARTICLES, Psychology and Behavioural Sciences Collection, SAGE, Wiley Online Library, and Google Scholar. Our search terms included synonyms used in the literature for motives and PSU. We used proximity operators limited to five words and restricted our search to title, abstract, and keywords were possible and appropriate. For example, to search Web of Science we entered "(motiv* OR gratification* OR reason* OR need*) AND ((problem* OR addict* OR dependen* OR compulsive OR excessive) NEAR/5 (smartphone* OR "smart phone*" OR mobilephone* OR "mobile phone*" OR cellphone* OR "cell phone*"))". All citations identified were uploaded into Covidence.

Inclusion and Exclusion Criteria

We included studies which quantitatively tested the motives-PSU relationship, were written in English, and were published from 2008 to the time of writing this paper.¹ Studies were considered to have measured PSU if they included scales labelled with synonymous terms, such as smartphone addiction, problematic mobile phone use, and mobile phone involvement. Studies which examined the association of motives with objective measures of PSU would have also been retained, but none were identified through our search strategy. While young adults are the primary population of interest, we included all relevant studies irrespective of the age range of the sample. This was because initial searches indicated that there were a limited number of total studies ($N = 44$), with only seven restricting their sample to young adults and seven to adolescents. However, several additional studies ($n = 16$) used university student convenience samples not restricted to young adults, but likely comprised primarily of young adults.² Therefore, while young adults are not the only sampled population in the included studies, they and adolescents constituted the majority of participants across most included studies ($n = 30$). We excluded qualitative studies (Fullwood et al., 2017; Walsh et al., 2009; Yang et al., 2021).

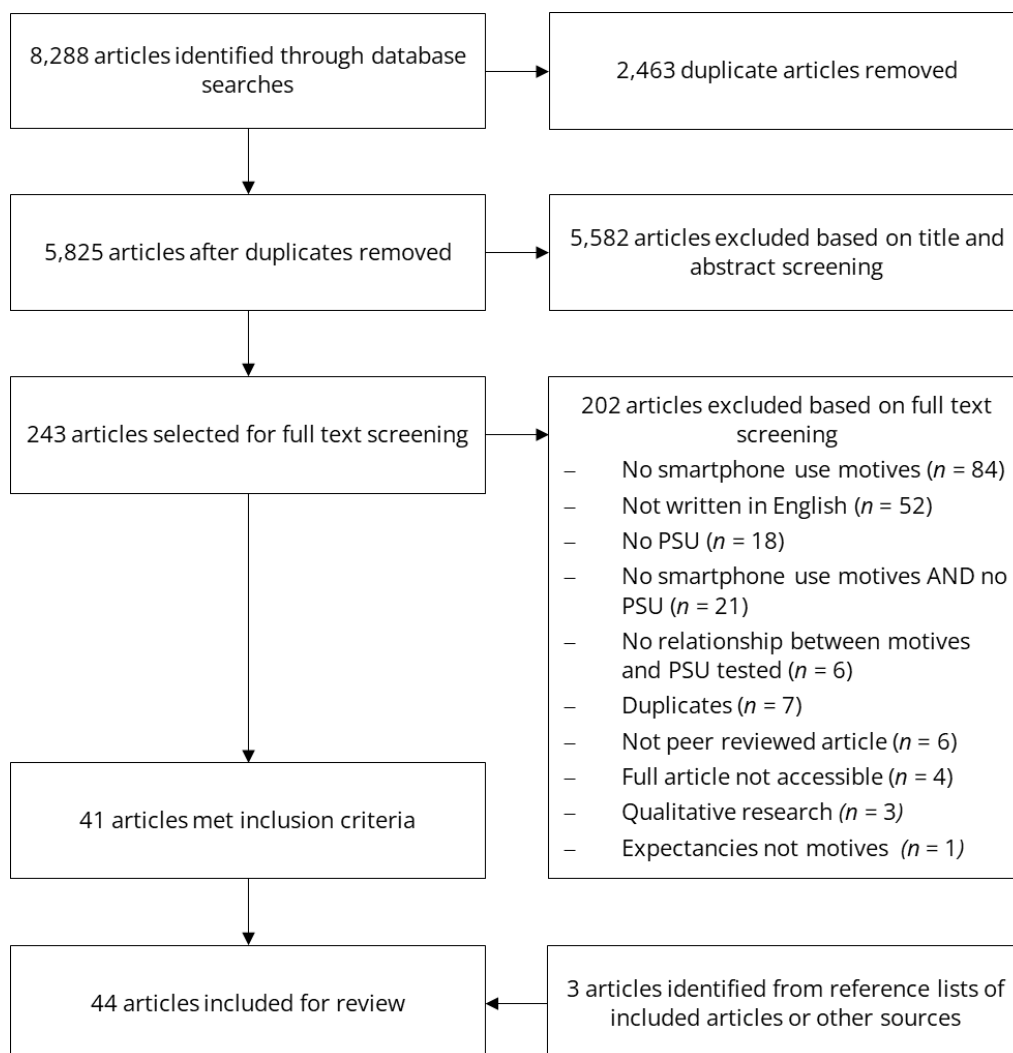
Noting motives and expectancies are conceptually distinct, we excluded one study (Y. Chen et al., 2021) because it operationalised smartphone use motives with items that appeared to include a mix of motives (e.g., *because I don't want to be alone*) and expectancies (e.g., *playing smartphone is cool*). Five other studies (C. Chen et al., 2017, 2019; Wen et al., 2022; K. Z. K. Zhang, Chen, & Lee, 2014; M. X. Zhang & Wu, 2022) operationalised motives with a variable labelled "perceived enjoyment", the items of which better reflected expectancies. However, we retained these studies because they included other variables that reflected different motives, but we excluded perceived enjoyment from our analysis. We included three studies (Casale et al., 2021; Elhai, Yang, et al., 2020; Hallauer et al., 2022) that tested the associations of the Smartphone Use Expectancies Scale with PSU, given the measure's items were more consistent with motives (e.g., *I use my smartphone to experience pleasure*).

As per PRISMA guidelines (Moher et al., 2015; Shamseer et al., 2015), studies were assessed for risk of bias with the National Heart, Lung, and Blood Institute's (NHLBI) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (NHLBI, 2014), consistent with prior research in the problematic social media use literature (Frost & Rickwood, 2017). The tool allows poor, fair, and good quality studies to be distinguished. The first and second authors independently assessed study quality and disagreements were resolved via discussion. Given almost all studies were cross-sectional and one was longitudinal (Rozgonjuk et al., 2019), clear causal inferences could not be drawn, so the maximum possible rating was fair.

Results

Our searches identified 8,288 journal articles for uploading into Covidence. A total of 2,463 duplicate articles were automatically removed by Covidence, with an additional seven duplicates removed during the screening process. A total of 41 articles met the inclusion criteria. One additional article was identified through examination of reference lists (Elhai, Yang, et al., 2020) and two through other sources (Hallauer et al., 2022; Horwood & Anglim, 2019). The screening process is summarised in Figure 1.

Figure 1. Flowchart for Study Inclusion.



Note. PSU = problematic smartphone use.

Risk of Bias

Due to homogeneity of study design, the risk of bias findings lacked variation. Most studies ($n = 40$) were of *fair* quality. For example, they included clear research aims, adequately sized and described (albeit often convenience) samples, and/or key covariates (e.g., age, gender). A minority of studies (AlBarashdi & Bouazza, 2019; Lin et al., 2014; Park et al., 2013; Zhitomirsky-Geffet & Blau, 2016) were assessed as *poor* (e.g., did not control for confounds, used measures that were not well defined, and/or provided a limited description of the population sampled). Given this lack of variation, we have not emphasised the specific risk of bias grade, but discuss several factors that influence risk of bias (e.g., study characteristics, measures) throughout.

Heterogeneity in Smartphone Use Motives Measures

Across the 44 included studies, there were 19 different smartphone use motives measures with a combined 72 motives dimensions (characteristics of the 19 smartphone use motives measures are summarised in Table 1). The

number of motives dimensions in each measure varied from two to eight and there were 55 different labels applied to those dimensions. This extensive heterogeneity limited our ability to integrate findings across studies and determine which motives were associated with PSU. Only one measure (Lin et al., 2014) developed items with in-depth interviews asking people why they used their smartphone. All other measures had either an unclear genesis ($n = 6$) or were largely adapted from prior measures designed to assess motives for using the internet, video games, social networking sites, email, instant messenger applications, online shopping sites, telephones, pagers, television, and alcohol ($n = 13$).

Table 1. Overview of Smartphone Use Motives Measures Used in the 44 Included Studies.

Title/Description	Author ^a	Motive Dimension Label ^b	Genesis ^c
Smartphone Usage Behaviour Questionnaire	AlBarashdi and Bouazza (2019)	<ol style="list-style-type: none"> 1) Social interaction 2) Information sharing and entertainment 3) Self-identity and conforming 4) Self-developing and safety 5) Freedom and privacy 6) Self-express and gossip 	<ul style="list-style-type: none"> • Adapted from internet use motives measures
Smartphone Use Expectancies Scale	Elhai, Yang, et al. (2020)	<ol style="list-style-type: none"> 1) Positive expectancies 2) Negative expectancies 	<ul style="list-style-type: none"> • Adapted from internet use expectancies measure • Items in measure reflect motives not expectancies
Motives for Mobile Phone Use	Hwang and Park (2015)	<ol style="list-style-type: none"> 1) Instrumental 2) Entertainment 3) Self-identity 	<ul style="list-style-type: none"> • Adapted from television and internet use motives measures • Incorporated earlier qualitative data on mobile phone use
Dispositional Media Use Motives	Khang et al. (2013)	<ol style="list-style-type: none"> 1) Information seeking 2) Social relationship 3) Pastime 4) Self-presence 	<ul style="list-style-type: none"> • Adapted from dispositional media use motives measure, not in English
Motivations for Smartphone Use	J.-H. Kim (2017)	<ol style="list-style-type: none"> 1) Escape 2) Relationship 	<ul style="list-style-type: none"> • Adapted from telephone, pager, television, and internet use motives measures
Motivations for Mobile Phone Use	J.-H. Kim et al. (2015)	<ol style="list-style-type: none"> 1) Alleviation 2) Pass-time 	<ul style="list-style-type: none"> • Adapted from telephone, pager, television, and internet use motives measures
Motives for Smartphone Use	Lee and Lee (2017)	<ol style="list-style-type: none"> 1) Obtaining infotainment 2) Gaining peer acceptance 3) Finding new people 	<ul style="list-style-type: none"> • Adapted from smartphone use motives measures, not in English
Motives for Mobile Phone Application Use	Lin et al. (2014)	<ol style="list-style-type: none"> 1) Social benefits 2) Immediate access and mobility 3) Entertainment 4) Self-status seeking 5) Pursuit of happiness 6) Information seeking 7) Socialising 	<ul style="list-style-type: none"> • Adapted from internet and social network site use motives measures • Incorporated qualitative data collected by the authors
Smartphone Use Motivations	Meng et al. (2020)	<ol style="list-style-type: none"> 1) Instrumental 2) Self-expression 3) Hedonic 4) Social relationship 	<ul style="list-style-type: none"> • Adapted from social networking site, email, and instant messaging application use motives measures
Motivation for Using a Smartphone	Paek (2019)	<ol style="list-style-type: none"> 1) Information seeking 2) Convenience 3) Social interaction 4) Entertainment 5) Passing time 	<ul style="list-style-type: none"> • Adapted from a tablet use motives measure, not in English

Smartphone Use Motivations	Park and Lee (2014)	<ol style="list-style-type: none"> 1) Search for information 2) Chat with others 3) Pass leisure time 4) Care for others 5) Follow the trend 6) Easy access to others 	<ul style="list-style-type: none"> • Adapted from internet, telephone, and pager use motives measures
Motivation for Social Inclusion and Instrumental Use	Park et al. (2013)	<ol style="list-style-type: none"> 1) Social inclusion 2) Instrumental 	NR
Smartphone Usage Motivation Scale	Shen et al. (2021)	<ol style="list-style-type: none"> 1) Social interaction 2) Entertainment 	<ul style="list-style-type: none"> • Adapted from social networking site use motives measure
Mobile Phone Uses and Gratifications Scale	Vanden Abeele (2016)	<ol style="list-style-type: none"> 1) Pass time 2) Fashion, identity, and status 3) Safety 4) Micro-coordination, mobility, and immediacy 5) School 6) Love 7) Social relationships 8) Avoid face-to-face contact 	<ul style="list-style-type: none"> • Prior research investigating mobile phone use motives, references NR
Process and Social Smartphone Usage	Van Deursen et al. (2015)	<ol style="list-style-type: none"> 1) Process usage 2) Social usage 	<ul style="list-style-type: none"> • Adapted from online communication application, telephone, pager, and internet use motives measures • Incorporated qualitative research from prior investigations into camera phone and photo tagging use
Smartphone Usage Motivation Scale	Wang et al. (2015)	<ol style="list-style-type: none"> 1) Entertainment 2) Escapism 	<ul style="list-style-type: none"> • Adapted from a social networking site use motives measure
Smartphone Use Motives	K. Z. K. Zhang, Chen, and Lee (2014)	<ol style="list-style-type: none"> 1) Perceived enjoyment 2) Information seeking 3) Social relationship 4) Mood regulation 5) Pastime 6) Conformity 	<ul style="list-style-type: none"> • Adapted from social networking site, microblogging, internet, and alcohol use motives measures
Reinforcement Motives for Smartphone Use	K. Z. K. Zhang, Chen, Zhao, and Lee (2014)	<ol style="list-style-type: none"> 1) Mood regulation 2) Instant gratification 	<ul style="list-style-type: none"> • Adapted from internet, alcohol, and online shopping site use motives measures
Motivations for Smartphone Use	Zhitomirsky-Geffet and Blau (2016)	<ol style="list-style-type: none"> 1) Virtual community 2) Emotional 3) Information 4) Follow the social environment 	<ul style="list-style-type: none"> • Prior research investigating mobile phone use motives, references NR

Note. ^a The Author column includes references for the study where the motives measure was first used/constructed in the context of smartphone use, as opposed to the study where the measure was first developed to assess motives for different behaviours. ^b The Motive Dimension Label column includes all motives dimensions assessed in the smartphone use motives measures. ^c The Genesis column describes how items for the smartphone use motives measures were developed. NR = not reported.

Categorising Smartphone Use Motives

Despite heterogeneity in the labels applied to smartphone use motives dimensions across the 19 measures, examination of the definitions/items used to operationalise them suggested many measured similar constructs. For example, J.-H. Kim's (2017) "relationship" motives included the item *I use/play with my smartphone to improve relationships with friends and family* and Shen et al.'s (2021) "social interaction" motives included the item *I use my smartphone to keep in touch with my friends and family*. Therefore, to enable synthesis of findings, we used the same approach as Kuntsche et al. (2005) in their systematic review of drinking motives, grouping smartphone use

motives dimensions into categories based on their items (where available) and descriptions. These motives categories were: (a) smartphone use to communicate, maintain relationships, and obtain social benefits (“social”); (b) smartphone use to gain identity and approval from a social group, and avoid social disapproval (“self-identity/conformity”); (c) smartphone use to obtain information (“information seeking”); (d) smartphone use to reduce negative emotions (“mood regulation”); (e) smartphone use to avoid boredom (“pass-time”); (f) smartphone use to obtain pleasure (“enhancement”); and (g) smartphone use to feel safe (“safety”). How each of the motives dimensions from the included studies aligns with our proposed motives categories is included in the Appendix.

It is important to note that there remained some heterogeneity within our proposed motives categories, particularly “social” motives. Four smartphone use motives measures (AlBarashdi & Bouazza, 2019; Lin et al., 2014; Park & Lee, 2014; Vanden Abeele, 2016) differentiated multiple types of social motives (e.g., smartphone use for general socialising, smartphone use for more meaningful social interactions, and smartphone use because it facilitates constant access to others). Given few studies/measures distinguished between different social motives, we grouped them together as “social” motives for the purpose of synthesising results, consistent with Kuntsche et al.’s (2005) approach in their review of drinking motives.

Ten motives dimensions could not be categorised due to conceptual overlap (see superscript in Table 2). For example, Van Deursen et al.’s (2015) process motives included the item *I use my smartphone in order to escape from real-life*, consistent with “mood regulation” motives. However, it also included the items *I use my smartphone because it is entertaining*, *I use my smartphone in order to stay up to date on the latest news*, and *I use my smartphone because it helps me passing time*, consistent with “enhancement”, “information seeking”, and “pass-time” motives, respectively. We were also unable to categorise the five motives dimensions in Paek’s (2019) study, given descriptions or example items were not available. Motives that could not be categorised were excluded from the following synthesis, except where we examined demographic differences, indirect effects, or moderating effects. This was because findings from the latter studies provide insight into how motives may operate in more complex mechanisms and whether they could be a final pathway to PSU.

The Association of Motives with Problematic Smartphone Use

Table 2 summarises the characteristics and findings from all 44 reviewed studies. Only one study used a longitudinal design (Rozgonjuk et al., 2019) and the remainder were cross-sectional. University students ($n = 21$) and school students ($n = 7$) were the most sampled populations. Most studies were conducted in East Asia ($n = 20$) or the United States of America ($n = 11$). Ten previously validated PSU scales were used across 33 of the included studies and 10 studies adapted their own PSU measure from scales designed to assess different problematic behaviours (e.g., problematic internet use and online video gaming). While the established PSU scales used had somewhat varied content and factor structures, they were mostly developed through a behavioural addiction framework, incorporating previous behavioural addiction research, and adapting internet addiction measures and diagnostic criteria for gambling addiction. Only one of the PSU scales was developed by directly adapting the diagnostic criteria for substance dependence (Chóliz, 2012). For additional analysis of PSU measures, see reviews by Harris et al. (2020) and Yu and Sussman (2020). The following paragraphs synthesise findings for the association of motives with PSU; the strength of both bivariate and multivariate associations were described as per Cohen’s (1988) conventions.

Table 2. Summary of Reviewed Studies.

Author	Sample	Design	PSU measure	Motives measure	Bivariate Results with PSU	Multivariate Results with PSU
AlBarashdi and Bouazza (2019)	849 university students in Oman	Cross-sectional	Adapted	Adapted	Social interaction ^a ; Information sharing and entertainment ^h ; self-identity and conforming^c $r = .12$; self-developing and safety^g $r = .16$; freedom and privacy ^a ; self-express and gossip^a $r = .15$	N/A
Casale et al. (2022)	364 participants in Italy aged 18–75 years ($M_{age} = 36.80$, $SD = 15.32$)	Cross-sectional	SAS—SV	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .28$; Social^a $r = .19$	Controlling for age and gender: FOMO → social → PSU; FOMO → meta-cognitions → social → PSU; FOBU → process → PSU $\beta = .01$; FOBU → meta-cognitions → process → PSU $\beta = .004$ Controlling for age, gender, FOMO, meta-cognitions: Social Controlling for age, gender, FOBU, meta-cognitions: Process $\beta = .09$
Casale et al. (2021)	535 participants aged 18–65 years ($M_{age} = 27.38$, $SD = 9.05$)	Cross-sectional	SAS—SV	Smartphone Use Expectancies Scale (Elhai, Yang, et al., 2020)	PSUE^f $r = .43$; NSUE^b $r = .57$	Controlling for metacognitions about smartphone use, age, and gender: Impulsivity → PSUE ^f ; Impulsivity → NSUE ^b ; psychological distress → PSUE^f $\beta = .17$; psychological distress → NSUE^b $\beta = .26$; boredom proneness → PSUE^f $\beta = .15$; boredom proneness → NSUE^b $\beta = .38$; PSUE^f → PSU $\beta = .19$; NSUE^b → PSU $\beta = .12$
Chang et al. (2022)	909 university students in China aged 17–25 years ($M_{age} = 20.21$, $SD = 1.27$)	Cross-sectional	SAS—C	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Social^a $r = .11$	N/A

C. Chen et al. (2019)	379 participants in China (91.29% aged 18–30 years)	Cross-sectional	Adapted	Smartphone Use Motives (K. Z. K. Zhang, Chen, & Lee, 2014)	N/A	Controlling for age, income, education, habit, perceived enjoyment: mood regulation^b $\beta = .42$
C. Chen et al. (2017)	384 university students in China (91.1% aged 18–30 years)	Cross-sectional	Adapted	Smartphone Use Motives (K. Z. K. Zhang, Chen, & Lee, 2014)	N/A	Controlling for perceived enjoyment: social relationships ^a ; mood regulation^b $\beta = .22$; pastime^d $\beta = .16$; conformity^c $\beta = .20$
Cheng and Meng (2021)	317 participants in the USA aged 18–35 years ($M_{age} = 30.25$, $SD = 6.04$), previously diagnosed with depression	Cross-sectional	SAS	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .56$; social^a $r = .30$	Controlling for depression and smartphone usage: process^h $\beta = .35$; social ^a
Elhai, Gallinari, et al. (2020)	316 university students in the USA aged 18–25 years ($M_{age} = 19.21$, $SD = 1.74$)	Cross-sectional	SAS—SV	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .31$; social^a $r = .20$	Controlling for gender: depression \rightarrow FOMO $\beta = .39$; anxiety \rightarrow FOMO $\beta = .27$; FOMO \rightarrow process^h $\beta = .24$; FOMO \rightarrow social ^a ; FOMO \rightarrow PSU $\beta = .09$; process^h \rightarrow PSU $\beta = .18$; social ^a \rightarrow PSU
Elhai, Hall, et al. (2017)	309 participants in the USA aged 18 years or more ($M_{age} = 33.15$, $SD = 10.21$)	Cross-sectional	SAS	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process ^h \rightarrow PSU facets: daily life disturbances; positive anticipation $r = .50$; withdrawal $r = .32$; cyberspace relationships $r = .34$; overuse $r = .38$; tolerance $r = .22$ Social ^a \rightarrow PSU facets: daily life disturbances $r = -.17$; positive anticipation $r = .27$; withdrawal $r = .15$; cyberspace relationships; overuse $r = .23$; tolerance	Controlling for age, gender: Process ^h \rightarrow PSU facets: daily life disturbances $\beta = -.19$; positive anticipation $\beta = .49$; withdrawal; cyberspace relationships; overuse $\beta = .24$; tolerance Social ^a \rightarrow PSU facets: daily life disturbances $\beta = -.34$; positive anticipation $\beta = .28$; withdrawal; cyberspace relationships; overuse $\beta = .25$; tolerance

Elhai et al. (2018)	305 university students in the USA ($M_{age} = 19.44$, $SD = 2.16$)	Cross-sectional	SAS	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .53$; social^a $r = .23$	N/A
Elhai, Levine, et al. (2017)	308 participants in the USA aged 18 years or more ($M_{age} = 33.15$, $SD = 10.21$)	Cross-sectional	SAS	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .40$; social^a $r = .16$	Controlling for age, gender: process^h $\beta = .57$; social^a $\beta = .19$; depression \rightarrow process ^h \rightarrow PSU; depression \rightarrow social ^a \rightarrow PSU; anxiety \rightarrow process^h \rightarrow PSU $\beta = .28$; anxiety \rightarrow social ^a \rightarrow PSU
Elhai, Yang, et al. (2020)	286 university students in the USA aged 18–25 years ($M_{age} = 19.72$, $SD = 2.60$)	Cross-sectional	SAS—SV	Adapted	PSUE^f $r = .39$; NSUE^b $r = .55$	Controlling for gender, rumination, depression, and anxiety: NSUE^b $\beta = .10$; PSUE ^f
Farhat et al. (2021)	200 participants (96% aged 36 years or less)	Cross-sectional	Adapted	Reinforcement Motives for Smartphone Use (K. Z. K. Zhang, Chen, Zhao, & Lee 2014)	N/A	Controlling for convenience and flow: mood regulation^b $\beta = .16$; instant gratification^f $\beta = .14$
Fu et al. (2020)	584 school students in China aged 13–18 years ($M_{age} = 16.13$, $SD = 2.80$)	Cross-sectional	MPPUS—SV	Motivations for Smartphone Use (J.-H. Kim, 2017)	Escape^b $r = .61$	Controlling for age, gender: Parental monitoring \rightarrow escape^b $\beta = .10$; escape^b \rightarrow PSU $\beta = .61$
Gentina and Rowe (2020)	463 school students in France aged 16–18 years ($M_{age} = 16.8$)	Cross-sectional	MPI	Process and Social Smartphone Usage (Van Deursen et al., 2015)	N/A	Process^h $\beta = .39$; social^a $\beta = .14$; youth materialism \rightarrow process^h \rightarrow PSU $\beta = .21$; youth materialism \rightarrow social ^a \rightarrow PSU

Hallauer et al. (2022)	352 university students in the USA aged 18–53 years ($M_{age} = 19.79$, $SD = 3.43$)	Cross-sectional	SAS—SV	Smartphone Use Expectancies Scale (Elhai, Yang, et al., 2020)	PSUE^f $r = .49$; NSUE^b $r = .54$	Controlling for mindfulness, gender, age, and social distancing: Depression → PSUE ^f ; depression → NSUE ^b ; anxiety → PSUE^f $\beta = .21$; anxiety → NSUE^b $\beta = .23$; PSUE^f → PSU $\beta = .43$; NSUE^b → PSU $\beta = .39$; depression → PSUE ^f → PSU; depression → NSUE ^b → PSU; anxiety → PSUE ^f → PSU; anxiety → NSUE ^b → PSU
Hao et al. (2022)	766 university students in China aged 17 year or more ($M_{age} = 20.10$, $SD = 1.15$)	Cross-sectional	SAS—SV	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .25$; social^a $r = -.10$	Controlling for age, gender, and academic burnout: Process^h $\beta = .04$; Social ^a
Horwood and Anglim (2018)	393 university students in Australia ($M_{age} = 24.4$, $SD = 7.1$)	Cross-sectional	MPPUS	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .60$; social^a $r = .27$	N/A
Horwood and Anglim (2019)	539 university students in Australia aged 18–65 years ($M_{age} = 25.1$, $SD = 7.8$)	Cross-sectional	MPPUS	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .64$; social^a $r = .31$	N/A

Hwang and Park (2015)	550 school students in South Korea aged 14–19 years ($M_{age} = 17.68$, $SD = 3.35$)	Cross-sectional	MPPUS	Adapted	N/A	Controlling for age, gender, peer conformity, impulsivity, imitation, loneliness, social anxiety, amount of smartphone use: Regression on attachment PSU facet: Instrumental^h $\beta = .14$; entertainment ^h ; self-identity ^c Regression on withdrawal PSU facet: instrumental^h $\beta = .11$; entertainment ^h ; self-identity ^c Regression on intrusion PSU facet: instrumental ^h ; entertainment ^h ; self-identity ^c
Khang et al. (2013)	290 university students in the USA ($M_{age} = 21$, $SD = 3.72$)	Cross-sectional	MPAS	Adapted	N/A	Controlling for time spent on smartphone, self-esteem, self-efficacy, self-control, media flow: information seeking ^e ; social relationship^a $\beta = .11$; pastime^d $\beta = .24$; self-presence^c $\beta = .27$
J.-H. Kim (2017)	930 participants in the USA aged 13–40 years ($M_{age} = 25.56$, $SD = 8.20$).	Cross-sectional	MPPUS and SAS	Adapted	Escape^b $r = .58$; relationship^a $r = .31$	Loneliness \rightarrow escape^b \rightarrow SMC \rightarrow PSU $b = 0.005$; Loneliness \rightarrow relationship^a \rightarrow F2F contact \rightarrow PSU $b = 0.0003$
J.-H. Kim et al. (2015)	395 participants in the USA aged 18–68 ($M_{age} = 31.64$, $SD = 9.69$).	Cross-sectional	Adapted	Adapted	N/A	Alleviation^b $\beta = .37$; pass-time^d $\beta = .26$; depression \rightarrow alleviation^b \rightarrow PSU $\beta = .12$; depression \rightarrow pass-time ^d \rightarrow PSU
Lee and Lee (2017)	3,000 school students in South Korea from grade 7–12	Cross-sectional	SAPS	Adapted	Obtaining infotainment^h $r = .24$; gaining peer acceptance^c $r = .46$; finding new people^h $r = .21$	Controlling for gender, school type, socio economic status, attachment to parents, attachment to friends, attachment to teachers: Obtaining infotainment^h $\beta = .10$; gaining peer acceptance^c $\beta = .37$; finding new people^h $\beta = .06$

Li et al. (2021)	1,034 school students in China aged 12–19 years ($M_{age} = 15.76$, $SD = 1.20$)	Cross-sectional	MPAI	Motivations for Smartphone Use (J.-H. Kim, 2017)	Escape^b $r = .52$	Controlling for gender and loneliness: escape^b $\beta = .44$ Controlling for gender: loneliness \rightarrow escape^b \rightarrow PSU $\beta = .11$; Escape^b x self-control $\beta = -.05$; Escape ^b x Impulsivity
Lin et al. (2014)	441 participants	Cross-sectional	Adapted	Adapted	N/A	Social benefits^a $\beta = -.23$; immediate access and mobility^a $\beta = -.22$; entertainment^f $\beta = -.24$; self-status seeking^c $\beta = .45$; pursuit of happiness^h $\beta = .49$; information seeking^e $\beta = .17$; socialising ^a
Meng et al. (2020)	8,261 school students in China aged 10–16 years ($M_{age} = 12.86$, $SD = 1.76$)	Cross-sectional	Adapted	Adapted	Instrumental^e $r = -.22$; self-expression^c $r = .10$; hedonic^h $r = .21$; social relationships^a $r = .09$	Controlling for age, gender, school grade, relationship with parents, parents' age, parents' education level, living district location, living district type, family annual income, smartphone functions: instrumental^e $\beta = -.23$; self-expression ^c ; hedonic ^h ; social relationships^a $\beta = -.17$
Paek (2019)	339 university students in South Korea aged 18–28 years ($M_{age} = 21.47$, $SD = 1.86$)	Cross-sectional	SAPS	Adapted	Information seeking ^h ; convenience ^h ; social interaction^h $r = .12$; entertainment^h $r = .33$; passing time^h $r = .23$	Controlling for gender, academic achievement, perceived stress: entertainment^h $\beta = .24$; passing time^h $\beta = .16$
Park et al. (2013)	852 participants in South Korea aged 17–49 years	Cross-sectional	Not reported	NR	Social inclusion^a $r = .46$; Instrumental^e use $r = .36$	Controlling for innovativeness, behavioural activation system, locus of control, perceived relationship control, perceived ease of use, perceived usefulness: Social inclusion^a $\beta = .25$; instrumental ^e
Park and Lee (2014)	275 university students in South Korea	Cross-sectional	Adapted	Adapted	Search for information ^e ; chat with others^a $t = 2.59$; pass leisure time ^d ; care for others^a $t = 4.14$; follow the trend^c $t = 3.73$; easy access to others^a $t = 2.65$	N/A

Rozgonjuk et al. (2019)	261 University students in the USA ($M_{age} = 19.73$, $SD = 3.52$)	Longitudinal	SAS—SV	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .31$; social^a $r = .15$	Process^h $\beta = .39$; social^a $\beta = .16$; intolerance of uncertainty \rightarrow process^h \rightarrow PSU $\beta = .17$; intolerance of uncertainty \rightarrow social ^a \rightarrow PSU
Sever and Özdemir (2022)	380 university students in Turkey aged 18–36 ($M_{age} = 21.22$, $SD = 2.02$)	Cross-sectional	SAS—SV	Smartphone Usage Motivation Scale (Wang et al., 2015)	Entertainment^h $r = .37$; escapism^d $r = .51$	Controlling for perceived stress and FOMO: Entertainment^h $\beta = .15$; escapism^d $\beta = .29$
Shen et al. (2021)	549 university students in China ($M_{age} = 18.39$, $SD = 1.92$)	Cross-sectional	SAS—C	Adapted	High PSU group: social interaction^a $r = .17$; entertainment^h $r = .29$ Low PSU group: social interaction^a $r = -.13$; entertainment ^h	Controlling for age, gender, anxiety: High PSU group entertainment ^h model: entertainment^h $\beta = .45$; entertainment^h x anxiety $\beta = .26$ High PSU group social interaction ^a model: social interaction^a $\beta = .31$; social interaction^a x anxiety $\beta = .79$ Low PSU group entertainment ^h model: entertainment ^h ; entertainment ^h x anxiety Low PSU group social interaction ^a model: social interaction^a $\beta = -.39$; social interaction ^a x anxiety
Shen and Wang (2019)	549 university students in China ($M_{age} = 18.39$, $SD = 1.92$)	Cross-sectional	SAS—C	Smartphone Usage Motivation Scale (Wang et al., 2015)	Entertainment^h $r = .24$; escapism^d $r = .41$	Controlling for age, gender, stress, stress x entertainment ^h : Entertainment ^h model: entertainment^h $\beta = .25$; loneliness \rightarrow entertainment^h \rightarrow PSU $\beta = -.05$; Stress x entertainment^h $\beta = .29$ Controlling for age, gender, stress, stress x escapism ^d : Escapism ^d model: escapism^d $\beta = .37$; loneliness \rightarrow escapism^d \rightarrow PSU $\beta = .12$; stress x escapism ^d
Van Deursen et al. (2015)	386 participants in the Netherlands aged 15–88 years ($M_{age} = 35.2$, $SD = 14.7$)	Cross-sectional	MPPUS	Adapted	Process^h $r = .43$; social^a $r = .18$	Controlling for age, gender, emotional intelligence, social stress, self-regulation, habitual smartphone behaviour: process^h $\beta = .15$; social ^a

Vezzoli et al. (2021)	528 university students aged 18–29 years ($M_{age} = 22.38$, $SD = 2.06$)	Cross-sectional	TMPD	Mobile Phone Uses and Gratifications Scale (Vanden Abeele, 2016)	N/A	Pass-time^d $\beta = .35$; status^c $\beta = .33$; safety^g $\beta = .09$; avoid F2F contact^a $\beta = .09$; micro-coordination ^a ; school ^a ; love ^a ; social relationships ^a
Wang et al. (2015)	549 university students in China ($M_{age} = 18.39$, $SD = 1.92$).	Cross-sectional	SAS—C	Adapted	High PSU group: entertainment^h $r = .29$; escapism^d $r = .22$ Low PSU group: entertainment ^h ; escapism^d $r = .35$	Controlling for age, gender, stress: High PSU group entertainment ^h model: entertainment^h $\beta = .29$; entertainment^h x stress $\beta = .21$ High PSU group escapism ^d model: escapism^d $\beta = .17$; escapism^d x stress $\beta = .12$ Low PSU group entertainment ^h model: entertainment ^h ; entertainment^h x stress $\beta = .13$ Low PSU group escapism ^d model: escapism^d $\beta = .28$; escapism ^d x stress
Wen et al. (2022)	746 adolescents aged 12–18 years ($M_{age} = 15.83$, $SD = 1.89$) and 600 adults aged 19–59 years ($M_{age} = 38.50$, $SD = 10.64$) in China	Cross-sectional	SAS-SV	Smartphone Use Motives (K. Z. K. Zhang, Chen, & Lee, 2014)	Social relationships^a $r = .11$; mood regulation^b $r = .33$; pastime^d $r = .36$; conformity^c $r = .30$	Controlling for gender, education level, and perceived enjoyment: Social relationships^a $r = .15$; mood regulation^b $r = .14$; pastime^d $\beta = .13$; conformity^c $\beta = .16$ Age x social relationships $\beta = -.06$; Age x mood regulation; Age x pastime; age x conformity
Wickord and Quaiser-Pohl (2022)	108 participants in Germany aged 17–70 ($M_{age} = 31.8$, $SD = 12.2$)	Cross-sectional	MPPUS-SV	Process and Social Smartphone Usage (Van Deursen et al., 2015)	Process^h $r = .56$; social^a $r = .28$	Controlling for habitual use, age, and gender: Process^h $\beta = .28$; social ^a
K. Z. K. Zhang, Chen, Zhao, & Lee (2014)	384 university students in China (91.1% aged 18–30 years)	Cross-sectional	Adapted	Adapted	N/A	Controlling for convenience, flow: mood regulation^b $\beta = .38$; instant gratification^f $\beta = .23$

K. Z. K. Zhang, Chen, & Lee (2014)	394 university students in China (91.3% aged 18–30 years)	Cross-sectional	Adapted	Adapted	N/A	Controlling for perceived enjoyment: information seeking ^e ; social relationships ^a ; mood regulation^b $\beta = .17$; pastime^d $\beta = .16$; conformity^c $\beta = .15$
M. X. Zhang and Wu (2022)	956 university students in China aged 16–28 years ($M_{age} = 19.35$, $SD = 1.07$)	Cross-sectional	SPAI	Smartphone Use Motives (K. Z. K. Zhang, Chen, & Lee, 2014)	Social relationships^a $r = .19$; mood regulation^b $r = .34$; pastime^d $r = .40$; conformity^c $r = .32$	Controlling for age, gender, perceived enjoyment, childhood adversity, and slow life history strategy: social relationships ^a ; mood regulation^b $\beta = .10$; pastime^d $\beta = .27$; conformity^c $\beta = .18$ Controlling for age and gender: Slow life history strategy \rightarrow pastime \rightarrow PSU $\beta = -.01$; Slow life history strategy \rightarrow conformity \rightarrow PSU $\beta = .007$; Slow life history strategy \rightarrow mood regulation \rightarrow PSU; Slow life history strategy \rightarrow social \rightarrow PSU
Zhen et al. (2019)	4,509 school students in China aged 10–19 years ($M_{age} = 14.5$, $SD = 1.82$)	Cross-sectional	MPPUS—SV	Motivations for Smartphone Use (J.-H. Kim, 2017)	Escape^b $r = .64$; relationship^a $r = .35$	Escape^b $\beta = .57$; relationship^a $\beta = .08$; PCR \rightarrow escape^b \rightarrow PSU $\beta = -.08$; PCR \rightarrow relationship^a \rightarrow PSU $\beta = -.00$; PCR \rightarrow loneliness \rightarrow escape^b \rightarrow PSU $\beta = -.02$; TSR \rightarrow escape^b \rightarrow PSU $\beta = -.04$; TSR \rightarrow relationship ^a \rightarrow PSU; TSR \rightarrow loneliness \rightarrow escape^b \rightarrow PSU $\beta = -.02$

Zhitomirsky-Geffet and Blau (2016)	209 participants in Israel aged 13–68 years	Cross-sectional	SAS	Adapted	PSU behaviour factor: virtual community ^a ; emotional ^b ; information ^e ; social environment^c $r = .32$ PSU emotional factor: virtual community ^a ; emotional^b $r = .30$; information ^e ; social environment^c $r = .33$ PSU social factor: virtual community ^a ; emotional ^b ; information^e $r = -.24$; social environment^c $r = .40$	Controlling for Big 5 personality factors, PSU emotional and social factors, and smartphone application usage: virtual community ^a ; emotional ^b ; information ^e ; social environment ^c
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Note. All relationships at $p \leq .05$ are in boldface. Sample size, country of origin, and age range and mean are reported where available. PSU = problematic smartphone use. USA = United States of America. Adapted = measure adapted by authors from prior measure designed for other problematic behaviour, or motives for other behaviour and/or prior research investigating motives for mobile phone/smartphone use. SAS—SV = Smartphone Addiction Scale—Short Version (Kwon, Kim, et al., 2013). SAS—C = Smartphone Addiction Scale for College Students (Su et al., 2014). SAS = Smartphone Addiction Scale (Kwon, Lee, et al., 2013). MPPUS—SV = Mobile Phone Problem Use Scale—Short Version (Foerster et al., 2015). MPI = Mobile Phone Involvement Questionnaire (Walsh et al., 2010). MPPUS = Mobile Phone Problem Use Scale (Bianchi & Phillips, 2005). MPAS = Mobile Phone Addiction Scale (Han & Hur, 2004). TMPD = Test of Mobile Phone Dependence (Chóliz, 2012). SAPS = Smartphone Addiction Proneness Scale (D. Kim et al., 2014). MPAI = Mobile Phone Addiction Index (Leung, 2008). → = relationship between x and y variables. PCR = parent-child relationship. TSR = teacher-student relationship. F2F = face-to-face. SMC = smartphone mediated communication. FOMO = fear of missing out. FOBU = fear of not being up to date. PSUE = positive smartphone use expectancies. NSUE = negative smartphone use expectancies. NR = not reported. ^a Categorized as “social” motives. ^b Categorized as “mood regulation” motives. ^c Categorized as “self-identity/conformity” motives. ^d Categorized as “pass-time” motives. ^e Categorized as “information seeking” motives. ^f Categorized as “enhancement” motives. ^g Categorized as “safety” motives. ^h Could not be categorised in motives categories.

Social Motives

Of the 29 studies that examined the association of “social” motives with PSU (see Table 2), most (24/29) found significant positive associations. In seven studies, significant positive associations of “social” motives with PSU became non-significant (Casale et al., 2022; Cheng & Meng, 2021; Elhai, Gallinari, et al., 2020; Van Deursen et al., 2015; Wickord & Quaiser-Pohl, 2022; M. X. Zhang & Wu, 2022) or changed direction (Meng et al., 2020) when additional motives and covariates were considered. One study (Shen et al., 2021) identified that “social” motives were positively and negatively associated with PSU among those who scored high ($\geq M$) and low ($< M$) on PSU, respectively, suggesting that “social” motives may maintain, but not precipitate PSU. Bivariate correlations and beta coefficients were generally small.

Three studies found evidence that specific sub-types of “social” motives may be differentially associated with PSU, although the pattern of significance is inconsistent. AlBarashdi and Bouazza (2019) found that smartphone use to self-express and gossip with friends and family was positively associated with PSU, but use for general socialising and because it facilitates freedom to contact people at any time were not. Lin et al. (2014) also found that smartphone use for general socialising was not associated with PSU, but use for social benefits and because it allows immediate access to people were negatively associated with PSU. Finally, Vezzoli et al. (2021) identified that smartphone use to talk to people you do not want to talk to in person was positively associated with PSU, but smartphone use to maintain social/familial relationships, romantic relationships, collaborate with school friends, and because it allows immediate access to others was not.

Mood Regulation Motives

All 16 studies that examined the association of “mood regulation” motives with PSU (see Table 2) found significant positive associations. Although in one study (Zhitomirsky-Geffet & Blau, 2016) “mood regulation” was only associated with an emotional PSU facet and not behavioural or social PSU facets. However, Zhitomirsky-Geffet and Blau (2016) measured motives with single items which may have attenuated relationships. Bivariate correlations and beta coefficients were mostly medium to large.

Self-Identity/Conformity Motives

All 13 studies that examined the association of “self-identity/conformity” motives with PSU (see Table 2) found significant positive results. Although the effect of “self-identity/conformity” motives was no longer significant in two of the 10 studies that adjusted for other motives and covariates (e.g., use of smartphone features, personality traits, demographic variables; Meng et al., 2020; Zhitomirsky-Geffet & Blau, 2016). This suggests that while self-identity/conformity motives are generally consistently associated with PSU, the association may be partly due to shared variance with other motives. Bivariate correlations were mostly medium, with two small effects. Conversely, beta coefficients were mostly small.

Pass-Time Motives

Ten of the 11 studies that examined the association of “pass-time” motives with PSU (see Table 2) found significant positive associations. The one study (Park & Lee, 2014) that found a non-significant effect used a dichotomised measure of PSU as the independent variable (high versus low), which may have attenuated the effect of motives. Notably, in contrast to “social” motives, “pass-time” motives were positively associated with PSU among those who scored high ($\geq M$) and low ($< M$) on PSU, suggesting “pass-time” motives may be both a precipitating and maintaining factor (Wang et al., 2015). Four of the six bivariate correlations were medium, one was large, and one was small. The beta coefficients were mostly small.

Information Seeking

Seven studies examined the association of “information seeking” motives with PSU (see Table 2), with mixed results. Two studies found significant positive associations (Lin et al., 2014; Park et al., 2013) and two found significant negative associations (Meng et al., 2020; Zhitomirsky-Geffet & Blau, 2016) of “information seeking” motives with PSU, with the remainder identifying no significant relationship. However, in two of the studies that

found significant associations (Park et al., 2013; Zhitomirsky-Geffet & Blau, 2016), the effects became non-significant when motives and other psychosocial covariates were considered. Taken together, findings suggest “information seeking” motives likely have a limited association with PSU. Two of the three bivariate correlations were small and one was medium. The two beta coefficients were small.

Enhancement Motives

Of the six studies that examined the association of “enhancement” motives with PSU (see Table 2), five found significant positive associations and one (Lin et al., 2014) found a negative association. The study that found a negative association for “enhancement” motives with PSU also found a negative association for “social” motives with PSU, in contrast with the majority of findings. Lin et al. (2014) used a PSU measure not employed in any of the other reviewed studies, possibly explaining their divergent results. Another study (Elhai, Yang, et al., 2020) found “enhancement” motives were positively associated with PSU in a bivariate analysis, but the motives did not predict a severe PSU class from a mild PSU class (distinguished through latent class analysis). All bivariate correlations were medium and most of the beta coefficients were small.

Safety Motives

The association of “safety” motives with PSU were only examined in two studies, both finding significant positive associations (AlBarashdi & Bouazza, 2019; Vezzoli et al., 2021). The one bivariate correlation was small, as was the beta coefficient.

Demographic Differences in the Association of Motives with Problematic Smartphone Use

Of the 44 studies, one (Wen et al., 2022) tested whether there were age differences in the association of smartphone use motives with PSU. Wen et al. (2022) found that age interacted with “social” motives, but not “mood regulation”, “pass-time”, or “self-identity/conformity” motives, to predict PSU; specifically, “social” motives positively predicted PSU among adults, but not adolescents. Two studies examined potential gender differences in the association of motives with PSU (C. Chen et al., 2017; Gentina & Rowe, 2020). C. Chen et al. (2017) identified that “self-identity/conformity” motives were the strongest predictor of PSU for males, whereas for females, “mood regulation” motives were the strongest predictor. Gentina and Rowe (2020) identified indirect effects of youth materialism on PSU via “social” motives among females, and via process motives (conceptualised broadly to overlap with “information seeking”, “mood regulation”, “pass-time”, and “enhancement” motives) among males (Gentina & Rowe, 2020).

Motives as Mediators or Moderators of Pathways to Problematic Smartphone Use

The Alcohol Use Motivational Model proposes that motives are the final common pathway to behaviour (Cox & Klinger, 2004). To assess this claim in the context of PSU, we synthesised research which investigated the indirect or interacting effects of smartphone use motives on the association of various psychosocial factors with PSU. Moreover, we framed findings within Billieux et al.’s (2015) pathways to PSU, to judge whether different motives mediate or moderate each pathway.

Excessive Reassurance Pathway

Consistent with an excessive reassurance or compensatory pathway to PSU, 12 studies tested whether there were indirect effects for psychosocial factors linked to negative affectivity on PSU via motives. Six of those studies included depression and/or anxiety, with findings showing positive indirect effects on PSU via “mood regulation”, “enhancement”, and process motives (conceptualised broadly to overlap with “information seeking”, “mood regulation”, “pass-time”, and “enhancement” motives; Casale et al., 2021; Cheng & Meng, 2021; Elhai, Gallinari, et al., 2020; Elhai, Levine, et al., 2017; Hallauer et al., 2022; J.-H. Kim et al., 2015). Notably, two studies found that anxiety, but not depression, had positive indirect effects on PSU via process, (Elhai, Levine, et al., 2017), “mood regulation”, and “enhancement” motives (Hallauer et al., 2022). This suggests that the association of depression with motives reflecting “mood regulation” and “enhancement” may be at least in part due to shared variance with anxiety.

Four additional studies found that loneliness—a transdiagnostic factor linked to depression, anxiety, and other psychopathologies—had positive indirect effects on PSU via “mood regulation”, pass-time, and “social” motives (J.-H. Kim, 2017; Li et al., 2021; Shen & Wang, 2019; Zhen et al., 2019). Rozgonjuk et al. (2019) found another transdiagnostic psychopathological factor intolerance of uncertainty had a positive indirect effect on PSU via process motives. Crucially, Rozgonjuk et al. (2019) was the only study in this review that employed a longitudinal design, with intolerance of uncertainty and motives measured at time 1 and PSU at time 2, providing some evidence for process motives relating to a subsequent increase in PSU. Casale et al. (2022) found that fear of not being up to date on new information—which is similar to the transdiagnostic factor fear of missing out—was indirectly associated with PSU via process motives. Interestingly, several of these studies found non-significant indirect effects for depression, anxiety, loneliness, intolerance of uncertainty, or fear of missing out on PSU via “social” motives (Casale et al., 2022; Cheng & Meng, 2021; Elhai, Gallinari, et al., 2020; Elhai, Levine, et al., 2017; Rozgonjuk et al., 2019; Zhen et al., 2019). This indicates that smartphone use for social interaction or to maintain relationships may play a limited role in efforts to compensate for low psychosocial wellbeing.

Three studies tested whether psychosocial wellbeing factors interacted with motives to predict PSU. Shen et al. (2021) found that entertainment (conceptually overlapped with “enhancement” and “mood regulation” motives) and “social” motives positively predicted PSU when anxiety was high. Wang et al. (2015) identified that the same entertainment motives and “pass-time” motives were positively associated with PSU only when stress was high. However, using the same predictor and moderator variables, Shen and Wang (2019) found different results; stress only interacted with entertainment motives, not “pass-time” motives, with entertainment motives positively associated with PSU only when stress was low. These divergent results are probably due to different levels of PSU among the analytic samples. Wang et al. (2015) split their sample into those who scored high ($\geq M$) and low ($< M$) on PSU, with the above effect among those who scored high; whereas Shen and Wang (2019) did not split their sample based on level of PSU. This suggests that smartphone use for “enhancement”, “mood regulation”, or “pass-time” as a coping strategy for stress may be particularly important for maintaining or increasing PSU among those with already high levels of PSU.

Impulsive and Extraversion Pathways

Three studies tested whether motives had indirect or interacting effects on the association of psychosocial factors relevant to the impulsive and/or extraversion pathways with PSU. Casale et al. (2021) found that boredom proneness had indirect effects on PSU via “mood regulation” and “enhancement” motives. However, the same indirect effects of impulsivity on PSU were non-significant. Although, Li et al. (2021) found that self-control (conceptually similar to impulsivity), interacted with “mood regulation” motives to predict PSU, such that “mood regulation” motives were more strongly associated with PSU when self-control was low. M. X. Zhang and Wu (2022) found that a fast life history strategy, which involves impulsive behaviour and engagement in immediately gratifying activities, had an indirect effect on PSU via “pass-time” motives. Interestingly, they also found that a slow life history strategy, which describes those who are less impulsive and can delay immediate gratification for future benefits, was indirectly associated with PSU via “self-identity/conformity” motives.

Discussion

We reviewed the literature that investigated the association of smartphone use motives with PSU. We aimed to determine which motives are associated with generalised PSU and whether motives had indirect or moderating effects on the association of other psychosocial factors with PSU. The extensive heterogeneity of smartphone use motives measures made it challenging to identify which motives were associated with PSU. To help overcome this, we grouped motives dimensions from the included studies under seven broad motives categories, based on their item content and descriptions. Motives which appeared to be related to “mood regulation”, “self-identity/conformity”, “pass-time”, “social”, and “enhancement” were generally positively associated with PSU across the literature. “Mood regulation” motives generally showed the stronger effects, although there was limited evidence to indicate “social” motives may be particularly important for females and adults, and “self-identity/conformity” motives may be important for males. “Safety” motives were also associated with PSU, but they only appeared in two studies. Consistent with the theoretical proposition that motives are the final common pathway to behaviour, there were indirect and interacting effects of motives on the association of low psychosocial wellbeing with PSU, although more (particularly longitudinal) research is required to corroborate and extend these effects.

The Role of Motives in Pathways to Problematic Smartphone Use

Several studies found support for the role of motives in negative reinforcement pathways to PSU. Both the compensatory internet use theory and excessive reassurance pathway broadly frame PSU as excessive smartphone use to relieve negative emotions (Billieux et al., 2015; Kardefelt-Winther, 2014). Consistent with this, motives reflecting smartphone use for “mood regulation” had indirect and interacting effects on the associations of several psychosocial wellbeing variables with PSU. There was also limited support for indirect and interacting effects of “pass-time” and “social” motives on the associations of stress, anxiety, and loneliness with PSU (J.-H. Kim, 2017; Shen & Wang, 2019; Shen et al., 2021; Wang et al., 2015), suggesting that some people use their smartphone to avoid boredom and socialise as a coping strategy for low psychosocial wellbeing. Although, “social” motives also had several non-significant indirect effects on the associations of depression and anxiety with PSU. Theoretically, “self-identity/conformity” and “safety” motives may also mediate the effect of low psychosocial wellbeing on PSU, given both reflect efforts to avoid negative feelings (i.e., social disapproval and fear, respectively), and both were positively associated with PSU. However, neither “self-identity/conformity” nor “safety” motives were included in indirect or interacting effects models with PSU. Moreover, indirect effects of some key excessive reassurance pathway risk factors—such as social anxiety and behavioural inhibition—on PSU via motives are yet to be examined.

There was a lack of research investigating the role of motives in Billieux et al.’s (2015) impulsive and extraversion pathways to PSU. The impulsive pathway describes those who, due to heightened levels of impulsive traits and ADHD, are unable to control their smartphone usage. The extraversion pathway describes those who, due to heightened traits like sensation seeking and reward sensitivity, engage in PSU to socialise or for stimulation (Billieux et al., 2015). Consistent with motives operating within the impulsive pathway, one study found “mood regulation” motives had a stronger association with PSU when self-control was low (Li et al., 2021). Moreover, boredom proneness—which is associated with ADHD (Golubchik et al., 2020; Malkovsky et al., 2012) and sensation seeking (Nabilla et al., 2019), and reflected in facets of impulsivity (Whiteside & Lynam, 2001)—was associated with PSU via both “enhancement” and “mood regulation” motives (Casale et al., 2021). There was also an indirect effect of fast life history strategy, which encompasses aspects of impulsivity and sensation seeking (Csathó & Birkás, 2018), on PSU via “pass-time” motives. However, no studies examined whether psychosocial factors from the extraversion pathway, such as sensation seeking or reward sensitivity, had indirect effects on PSU via “social” and “enhancement” motives, despite those motives aligning with the pathway.

As Billieux et al. (2015) proposed, research has found that psychological factors from the excessive reassurance (e.g., social anxiety), impulsive (e.g., urgency) and extraversion (e.g., sensation seeking) pathways differentially drive addictive, antisocial, and risky patterns of PSU (Canale et al., 2021; Pivetta et al., 2019). Therefore, it follows that certain motives may differentially influence these distinct patterns of PSU. However, no studies have tested such a model.

Measurement and Conceptual Heterogeneity of Smartphone Use Motives

There was significant diversity in smartphone use motives measures, with 19 different measures and 55 different labels applied to individual motives dimensions. This made it difficult to synthesise findings and draw strong conclusions about which motives were associated with PSU. Moreover, most smartphone use motives measures were comprised of items adapted from earlier measures designed to assess motives for other behaviours. Given research has identified unique motives for new media—such as televisions, mobile phones, social media, and video games (Sundar & Limperos, 2013)—there may be smartphone use motives integral to PSU still to be identified.

Some studies in the PSU literature appear to conflate motives and expectancies—that is, some measured expectancies with items that better reflect motives (Casale et al., 2021; Elhai, Yang, et al., 2020; Hallauer et al., 2022) and others measured motives with items that better reflect expectancies (C. Chen et al., 2017; Y. Chen et al., 2021; Elhai, Yang, et al., 2020; Hallauer et al., 2022; K. Z. K. Zhang, Chen, & Lee, 2014). We treated motives and expectancies as separate constructs based on theoretical considerations. However, no studies concurrently examined the association of motives and their corresponding expectancies with PSU, so whether they are empirically discrete in the context of PSU, as they are in the context of substance use (Kuntsche et al., 2010), is yet to be determined.

Finally, as Cheng and Meng (2021) have previously argued, smartphone use *motives* and smartphone *uses* sometimes appear to be conflated in the PSU literature. In the alcohol use literature, motives have been conceptualised as the value placed on the desired effects of a behaviour (Cox & Klinger, 2004), with different categories of motives reflecting the valence (reward/avoidance) and source (internal/external) of the desired effect (Kuntsche et al., 2010). Most of the smartphone use motives identified through the present review are consistent with this definition of motives. “Social” and “enhancement” motives reflect externally and internally sourced rewards, respectively. “Mood regulation”, “pass-time”, and “safety” motives reflect internally sourced avoidance of negative feelings. “Self-identity/conformity” motives reflect externally sourced avoidance. However, “information seeking” motives do not have a clearly identifiable valence and may be better conceptualised as a type of smartphone *use*, rather than a motive for use. That is, people use smartphones to search for information, but a range of motives (e.g., “pass-time”, “mood regulation”, “enhancement”) could plausibly influence such use.

Limitations and Directions for Future Research

There were several limitations identified across the literature which should be addressed with future research. Due to a lack of prospective investigations, we were unable to infer temporal relationships of smartphone use motives with PSU. Moreover, most studies investigating the association of motives with PSU were conducted in East Asia, highlighting the need for further studies in Western contexts. More research focussing on whether motives have differential associations with PSU across age and gender groups would also be useful in understanding what motivates PSU. Additionally, nineteen of the studies were published between 2020 and 2022, so were more likely to have collected data during Covid-19. Perhaps, Covid-19 influenced motives for smartphone use, although this cannot be ascertained from the studies in the review.

Future research should address the measurement and conceptual heterogeneity of smartphone use motives. That is, a comprehensive and valid smartphone use motives measure that considers unique motives which may drive *smartphone* use, as opposed to any other behaviour is required. Moreover, this measure should be empirically and conceptually distinct from the related constructs of *expectancies* and *uses*. The measure should then be applied to investigating PSU. Specifically, research should focus on the role of motives as mediators of different pathways to PSU, such as Billieux et al.’s (2015) proposed excessive reassurance, impulsive, and extraversion pathways. Research should also examine whether motives differentially relate to distinct patterns of PSU (e.g., addictive, antisocial, and risky).

We acknowledge that this review does not provide insight into the differential association of motives with the problematic use of *specific* types of smartphone content (e.g., social networking, gaming). Consistent with substance use (Bachrach et al., 2012; George et al., 2018), it has been proposed that certain motives are likely unique to the problematic engagement in specific types of content accessible via a smartphone (Brand et al., 2019; Brand et al., 2016; Panova & Carbonell, 2018). However, as has been seen in the substance use literature (Cooper, 1994; Cooper et al., 2015; Kuntsche et al., 2005), there is also likely to be a set of core motives underlying generalised PSU, although there is yet to be consensus on precisely which motives. Therefore, the present review contributes to the identification of core motives which influence generalised PSU. Future research might expand upon it to identify motives which influence specific types of smartphone content.

Conclusions and Implications

Determining which motives are associated with PSU may help identify those at risk of developing PSU and inform early intervention strategies, such as school-based psychoeducation and group programs. Moreover, key treatments of problematic behaviours (i.e., motivational counselling) can help people recognise what motives drive their engagement in problematic behaviour (Cox & Klinger, 2004). Therefore, discovering which motives underlie PSU may inform the development of interventions which identify alternate means of satisfying those motives (Augner et al., 2022). Our findings support the application of motivational models to PSU. Specifically, some motives are robustly associated with PSU. Additionally, several factors were discovered which influenced the relationships of motives with PSU (e.g., psychopathology and personality). Perhaps then, motives may operate as a final pathway to PSU. However, heterogeneity in the measurement of motives, as well as potential overlap with expectancies and uses in some instances, makes it difficult to isolate which smartphone use motives were associated with PSU. To address this, it is imperative that a comprehensive smartphone use motives scale (distinct from expectancies and uses) is developed.

Footnotes

¹ The cut-off was set at 2008 because the first iPhone was released in 2007, launching the era of smartphones. The final search was conducted on 13 September 2022.

² For example, C. Chen et al.'s (2017) study was conducted with a sample of 384 university students in China, 91.1% of which were aged 18–30 years. However, some of the participants were up to 40 years of age.

Conflict of Interest

The authors have no conflicts of interest to declare.

Authors' Contribution

Beau Mostyn Sullivan: conceptualization, data curation, formal analysis, investigation, methodology, writing—original draft. **Amanda M. George:** conceptualization, formal analysis, methodology, supervision, writing—review & editing.

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Appendix

Table A1. *The Seven Motives Categories Based on Motives Dimensions From the Reviewed Studies.*

Motives Category ^a	Motives Dimension ^b	Author ^c
	Motives Category Description	
Social	Smartphone use to communicate, maintain relationships, and obtain social benefits	
	1) Social interaction	AlBarashdi and Bouazza (2019)
	2) Self-express and gossip	AlBarashdi and Bouazza (2019)
	3) Freedom and privacy	AlBarashdi and Bouazza (2019)
	4) Social relationship	Khang et al. (2013)
	5) Relationship	J.-H. Kim (2017)
	6) Social benefits	Lin et al. (2014)
	7) Socialising	Lin et al. (2014)
	8) Immediate access and mobility	Lin et al. (2014)
	9) Social relationships	Meng et al. (2020)
	10) Social inclusion	Park et al. (2013)
	11) Chat with others	Park and Lee (2014)
	12) Care for others	Park and Lee (2014)
	13) Easy access to others	Park and Lee (2014)
	14) Social interaction	Shen et al. (2021)
	15) Micro-coordination, mobility, and immediacy	Vanden Abeele (2016)
	16) School	Vanden Abeele (2016)
	17) Love	Vanden Abeele (2016)
	18) Social relationships	Vanden Abeele (2016)
	19) Avoid face-to-face contact	Vanden Abeele (2016)
	20) Social usage	Van Deursen et al. (2015)
	21) Social relationships	K. Z. K. Zhang, Chen, and Lee (2014)
	22) Virtual community	Zhitomirsky-Geffet and Blau (2016)
Self-identity/conformity	Smartphone use to gain identity and approval from a social group, and avoid social disapproval	
	1) Self-identity and conforming	AlBarashdi and Bouazza (2019)
	2) Self-identity	Hwang and Park (2015)
	3) Self-presence	Khang et al. (2013)
	4) Gaining peer acceptance	Lee and Lee (2017)
	5) Self-status seeking	Lin et al. (2014)
	6) Self-expression	Meng et al. (2020)
	7) Follow the trend	Park and Lee (2014)
	8) Fashion, identity, and status	Vanden Abeele (2016)
	9) Conformity	K. Z. K. Zhang, Chen, and Lee (2014)
	10) Follow the social environment	Zhitomirsky-Geffet and Blau (2016)
Information seeking	Smartphone use to search for and learn new information	
	1) Information seeking	Khang et al. (2013)
	2) Information seeking	Lin et al. (2014)
	3) Instrumental	Meng et al. (2020)
	4) Search for information	Park and Lee (2014)
	5) Instrumental	Park et al. (2013)
	6) Information seeking	K. Z. K. Zhang, Chen, and Lee (2014)
	7) Information	Zhitomirsky-Geffet and Blau (2016)

Mood regulation	Smartphone use to reduce negative emotions	
	1) Negative expectancies	Elhai, Yang, et al. (2020)
	2) Escape	J.-H. Kim (2017)
	3) Alleviation	J.-H. Kim et al. (2015)
	4) Mood regulation	K. Z. K. Zhang, Chen, and Lee (2014)
	5) Mood regulation	K. Z. K. Zhang, Chen, Zhao, and Lee (2014)
	6) Emotional	Zhitomirsky-Geffet and Blau (2016)
Pass-time	Smartphone use to avoid boredom	
	1) Pastime	Khang et al. (2013)
	2) Pass-time	J.-H. Kim et al. (2015)
	3) Pass leisure time	Park and Lee (2014)
	4) Pass time	Vanden Abeele (2016)
	5) Escapism	Wang et al. (2015)
	6) Pastime	K. Z. K. Zhang, Chen, and Lee (2014)
Enhancement	Smartphone use to have fun and obtain pleasure	
	1) Positive expectancies	Elhai, Yang, et al. (2020)
	2) Entertainment	Lin et al. (2014)
	3) Instant gratification	K. Z. K. Zhang, Chen, Zhao, and Lee (2014)
Safety	Smartphone use to feel safe	
	1) Self-developing and safety	AlBarashdi and Bouazza (2019)
	2) Safety	Vanden Abeele (2016)

Note. ^a The Motives Category column includes the seven motives that we propose have broadly been assessed in the reviewed literature. ^b The Motives Dimensions column includes motives from each motives measure used across the reviewed studies. ^c The Author column includes references for the study where the individual motives were first used in the context of smartphone use.

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