

Profiles of Problematic Smartphone Users: A Comparison of South Korean and U.S. College Students

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There is increasing public concern in Asian countries over the effects of increased mobile media use on individuals and society. Chief among these concerns is the fear that young people are becoming addicted to internet-enabled “smartphones.” The current research seeks to determine the antecedents and consequences of smartphone addiction (i.e., problematic smartphone use), using samples from South Korea (N = 241) and the U.S. (N = 222). In both samples, we find that lower levels of self-control and higher levels of need for belonging are both uniquely associated with problematic smartphone use and that checking social media is the type of phone use exhibiting the strongest association with problematic use. This suggests that problematic smartphone use is not culturally specific, and that self-regulatory and social components both contribute to its development.

Key Words: mobile phone, smartphone, problematic use, media addiction, self-control

I. Introduction

The rapid popularization of Internet-enabled mobile phones (i.e., “smartphones”) among young people in Asia has increased public concern over widespread effects of increased smartphone use (Chen 2015). Chief among these concerns is the fear that young people are becoming addicted to smartphones. In such instances, which are referred to by media researchers as “problematic use” (PU), individuals are unable to

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control their use and use interferes with their abilities to lead their lives. Signatures of problematic use include feelings of anxiety when deprived of the device, complaints from one's friends and family regarding the amount of use, and disruption of one's life (e.g., being late to meetings) due specifically to use of the device.

This topic is of particular interest to public health officials in countries in which smartphone diffusion is high, such as South Korea (Newzoo 2017). South Korea's Ministry of Health and Welfare has conducted survey research on this topic, finding that nearly one quarter of South Korean women aged 18 to 29 years exhibit characteristics of problematic smartphone use (Kang 2017). In response to the public health threat, the South Korean government is planning to create more rehabilitation centers designed to break young people of the habit of incessant smartphone use (Fawcett 2016).

Research provides evidence of links between mobile phone PU¹ and various negative outcomes such as depression (Jun, 2016), chronic psychological distress (Beranuy, Oberst, Carbonell and Chamarro 2009) and disrupted sleep (Thomée, Härenstam and Hagberg 2011). However, questions remain regarding whether or not all smartphone users are equally susceptible to problematic use and, if this is not the case, what types of individuals are more likely to exhibit thoughts, feelings, and behaviors indicative of problematic use. As such, many studies of the consequences of mobile phone PU fail to address questions about whether or not, or to what extent, the observed links are the result of some pre-existing characteristics of individuals, the technology itself, or some combination thereof.

Additionally, most studies of antecedents of mobile phone PU do not differentiate among different types of use. Many widely-cited studies of mobile phone PU pre-date the popularization of multi-use smartphones (e.g., Bianchi and Phillips 2005; Billieux, Van Der Linden, and Rochat 2008). The "profile" of the problematic user (i.e., the types of use in which they engage; the psychological predictors of phone PU) may have changed as smartphones offered users more options. Thus, it is unclear as to whether smartphone PU is associated with particular types of use, a general lack of awareness of one's behavior, a general inability to resist temptations, and/or some other pre-existing psychological trait. The current research provides an updated profile of the mobile phone problematic user, one that differentiates among different types of smartphone use. We acknowledge that smartphones provide a wide variety of uses and applications and that

1. We use "mobile phone PU" when referring to research that was conducted at a time and place where smartphone use was prevalent. We use "smartphone PU" to refer to research conducted specifically on smartphone users.

smartphones are unlikely to be, in and of themselves, addictive or otherwise bad for individuals or society. Rather, we surmise that particular uses may interact with particular pre-existing psychological traits to result in problematic use.

In addition, the research on mobile phone PU originates from a variety of cultural milieus. It is possible that differences in the use of mobile media across cultures account for differences in the findings, though it is also possible that changes over time or changes in the measures may be responsible for the differences in findings. In order to facilitate comparison of inter-cultural differences in the profiles of mobile phone PU, we use one set of measures at one point in time, comparing the profile of problematic smartphone users in two cultural contexts: South Korea and the United States.

II. Literature Review

A. Conceptualizing Problematic Media Use

Researchers interested in negative consequences of heavy media use could (and often do) simply measure amounts of use and demonstrate the ways in which heavy use is correlated with negative outcomes. However, measures of amount or frequency of use tell us little about an individual's ability to change his or her behavior. Such measures do not provide information about the extent to which an individual is aware of the behavior, nor do they convey media users' appraisals of their behavior. Behaviors that an individual does not judge to be undesirable will likely respond to different methods of behavior change than behaviors of which an individual is aware and/or judges to be undesirable. Measures of PU are useful for identifying a particular orientation toward media use rather than as a simple index of amount or frequency of use.

Much of the initial research on media PU concerns either television (e.g., McIlwraith, Jacobvitz, Kubey, and Alexander 1991) or internet use (e.g., Young 1998). Researchers identified particular uses associated with internet addiction, namely online gaming (Király, Nagygyörgy, Griffiths, and Demetrovics 2014) and pornography (Wéry and Billieux 2015). After social media became more popular, researchers found evidence of a link between heavy social media use and internet PU (Andreassen et al. 2016). Symptoms of Attention Deficit/Hyperactivity Disorder (ADHD), Obsessive-Compulsive Disorder (OCD), anxiety, and depression have been found to be associated with both social media and video gaming addiction (Andreassen et al. 2016). Video game addiction has been found to be positively related to depression, poorer academic performance

and conduct problems; however, time spent on video games was not correlated to the negative outcomes (Brunborg, Mentzoni, and Frøyland 2014). These findings support the notion that problematic use should be evaluated in terms of activities rather than medium (Griffiths and Szabo 2013) and is not synonymous with heavy use.

Despite the fact that smartphones have come to resemble the internet in terms of the diversity and number of their uses, they still possess unique affordances that have prompted researchers to treat them as a discrete form of communication technology. In particular, the extent to which portability allows smartphones to become embedded in everyday life contexts set them apart from “domestic” media technologies such as the television. The embedded nature of smartphones and the ease with which they are accessed on a moment-to-moment basis likely contribute to the extent to which smartphone use becomes habitual and/or compulsive behavior. For these reasons, it is useful for researchers to treat smartphone PU as a concept distinct from other types of media PU.

B. Predictors of Mobile Phone PU

A variety of psychological traits have been examined in terms of their relationships with mobile phone PU. Traits that predict mobile phone PU include low self-esteem (Bianchi and Phillips 2005; Kim & Kaoru 2015; Khang, Kim, and Kim 2013), high need for arousal (Leung 2008), and high materialism (Roberts and Pirog 2012). Among the more consistent predictors of mobile phone PU are traits related to self-regulation failures, such as impulsivity (Billieux et al. 2008; Billieux, Van Der Linden, d’Acremont, Ceschi, and Zermatten 2007; Roberts and Pirog 2012). The connection is consistent with previous research establishing correlations between trait impulsivity and substance abuse (Dawes, Tarter, and Kirisci 1997) or gambling (Vachon, Vitaro, Wanner, and Tremblay 2004). This association between impulsivity and mobile phone PU leaves unresolved the matter of whether individuals are unable to resist the temptation presented by their phones or if they simply lack awareness of their behavior (LaRose, Lin, and Eastin 2003). The ability to be fully aware of one’s own behavior has been conceptualized by psychologists as “mindfulness.” This trait, popularized in the research of Jonathan Kabat-Zinn (2003), has been linked to a wide variety of behaviors. Most relevant to the current research, the frequency of risky phone use behaviors, such as texting while driving, has been shown to correlate negatively with mindfulness (Panek, Bayer, Dal Cin, and Campbell 2016). Given the unconscious or automatic nature of mobile phone use (Bayer, Dal Cin, Campbell, and Panek 2016), it is likely that smartphone PU is,

at least in part, a consequence of a general inability to be fully aware of one's own behavior.

H1: Mindfulness will be negatively related to smartphone PU.

In addition to mindfulness, a simple inability to resist temptations may account for smartphone PU. In instances in which one's desires conflict with one's long-term goals, trait self-control often determines whether such desires are acted upon and whether the recurring cycle of conflict between one's behavior and one's long-term goals that is indicative of problematic use may develop (Hofmann, Baumeister, Förster, and Vohs 2012). In a study of self-control and everyday desires, Hofmann and colleagues (2012) found urges to use media to be more common than desires for sex, alcohol, or social contact, exceeded in its commonness only by basic bodily needs (e.g., the desire for food). Smartphones condense many forms of media experiences into one, continually accessible device. Though not all media use is likely to conflict with long-term goals, the aforementioned research suggests that smartphones provide ample opportunity for such cycles of conflict to occur.

Trait self-control is distinct from the broader concept of "self-regulation," which is often conceptualized as having more to do with the ability to sustain *attention* than with resisting temptations (van Deursen, Bolle, Hegner, and Kommers 2015). Trait self-control has been found to be negatively associated with the likelihood of developing internet addiction (Khang et al. 2013; Ozdemir, Kuzucu, and Ak 2014) as well as the amount of social networking site (SNS) use (Panek 2014). Khang and colleagues (2013) found a negative correlation between trait self-control and a measure of mobile phone addiction among U.S. college students, a finding that was later replicated among Korean adolescents (Kim, Min, Min, Lee, and Yoo 2018). This provides the basis for our second hypothesis:

H2: Self-control will be negatively related to smartphone PU.

C. Socio-Psychological Factors

Several personality traits are also believed to be predictors of mobile phone PU (Roberts, Pullig, and Manolis 2015). Shyness (Bian and Leung 2015), agreeability (Phillips, Butt, and Blaszczynski 2006), and extraversion (Augner and Hacker 2012; Hong, Chui, and Huang 2012) have all been found to be positively related to mobile phone PU. Many of these personality traits (e.g., extraversion) are related to individuals' inclination to be social, an unsurprising finding given the affordances of mobile phones. Mobile phones have always been used to connect individuals to one another, though

smartphones combine social media use with a wide variety of ostensibly non-social uses (e.g., looking up information, or consuming entertainment).

Prior research on mobile phone PU supports the inclusion of a socio-psychological factor as a predictor of smartphone PU. Takao and colleagues (2009) find that people inclined to seek approval from their peers are more likely to engage in mobile phone PU. Walsh, White and Young (2007) and Khang and colleagues (2013) both report that seeking social gratification was a significant predictor of mobile phone involvement. Seo, Kim, and David (2015) find that a strong need for social assurance positively predicts mobile phone PU. Aligned with this previous research as well research on social media use and trait need for belonging (Reich and Vorderer 2013), we hypothesize the following:

H3: Need for belonging will be positively related to smartphone PU.

D. Types of Mobile Phone Use

Given the variety of activities that can be performed with mobile phones, it is important to differentiate among them when assessing mobile phone use. It is possible that an individual could engage in a particular phone use (e.g., looking up information) very frequently but not exhibit characteristics of PU. Particular motivations (e.g., entertainment) are associated with mobile phone PU (Wang, Wang, Gaskin, and Wang 2015), suggesting that uses corresponding to those motivations (e.g., reading or watching entertaining content on a smartphone) will be positively associated with smartphone PU. Given the fact that some motivations are more predictive of PU while others (information seeking) are not, it behooves researchers seeking to understand smartphone PU to differentiate among the types of phone use in which problematic smartphone users tend to engage.

Prior findings on the link between particular smartphone uses and PU are limited. Much of the research on mobile phone PU pre-dates the rise of multi-use smartphones. Thus, most phone use measures in such studies only assess the frequency or duration of voice calls and the frequency of text messaging. Salehan and Negahban (2013) demonstrate a link between mobile SNS use and PU, a finding that is expected given the popularity of mobile SNS as well as established links between internet PU and social media use (Andreassen et al. 2016). Even among a certain class of uses such as “social uses,” there may be differences among the extents to which uses relate to smartphone PU. Whereas text messaging, voice calls, and email necessitate active one-to-one or group communication, SNS use can be an essentially passive experience in which users

check social media sites to see if others have posted information.

Given the established connections between the desires to communicate, to be entertained, to manage others' impressions of one's self, and digital media PU, we hypothesize the following:

H4: Communication, entertainment, and impression management smartphone use will be positively related to smartphone PU.

E. Negative Outcomes Associated with Mobile Phone PU

Smartphone PU, in and of itself, may be considered an undesirable outcome. Standard measures of mobile phone PU (e.g., MPPUS) include items assessing levels of phone-related anxiety and problems with relationships caused by phones, both of which are generally considered to be undesirable. Beyond these, several other non-phone-specific negative outcomes have been linked to mobile phone PU, including disrupted sleep (White, Buboltz, and Igou 2011) and poor academic performance (Li, Lepp, and Barkley 2015). We briefly review the literature on the links between mobile phone PU and non-phone-specific negative outcomes below.

Numerous studies have found links between mobile phone use and disrupted sleep. Some studies link the amount of phone use to poor sleep quality (e.g., Thomée et al. 2011) while others link phone use in particular contexts to poor sleep quality (e.g., Munezawa et al. 2011). These studies find that individuals will receive messages on their phones in the middle of the night, disrupting their sleep, or will continue use immediately before falling asleep, possibly delaying the point at which they fall asleep. Neither amount of use nor context capture users' orientation toward mobile media use, though they suggest that individuals experiencing smartphone PU are more likely to stay up late and thereby sleep less while also experiencing poorer sleep quality than others. Thus, we hypothesize the following:

H5a: Smartphone PU will be negatively related to individuals' amount of sleep.

H5b: Smartphone PU will be negatively related to individuals' sleep quality.

In addition to disrupted or truncated sleep, poor academic performance is a potential negative outcome associated with smartphone PU. Lepp and colleagues found a negative relationship between grade point average (GPA) and self-reported amount of cell phone use, even when controlling for other factors known to be associated with academic performance (Lepp, Barkley, and Karpinski 2014). Analyses of student time diaries indicate that students are spending less time on schoolwork than they are on mobile phone use for social purposes, suggesting a displacement effect (Hanson, Drumheller,

Mallard, McKee, and Schlegel 2010). Among South Koreans, students who participate in more school activities and are more satisfied with school are less likely to exhibit the symptoms of smartphone PU (Lee and Lee 2017). As with research on mobile phone use and sleep disturbance, these studies offer little insight into individuals' orientation toward their media use. Research on other kinds of problematic media use (e.g., problematic use of video games) shows a negative relationship between PU and academic achievement (Hagbin, Shaterian, Hosseinzadeh, and Griffiths 2013; Jeong and Kim 2011). Based on this research, we hypothesize the following:

H6a: Smartphone PU will be negatively related to the amount of time students spend on homework.

H6b: Smartphone PU will be negatively related to students' scores on a standardized test.

F. Cultural Differences in Problematic Mobile Media Use

As stated previously, research on mobile phone PU has drawn participants from a variety of cultural contexts. While this variety has the potential advantage of demonstrating generalizability of findings across cultures, differences in the measures used and the time at which data was collected raise a question about inconsistent results: are such inconsistencies the result of intercultural differences, or are they the result of differences in research methods and/or changes in technology and culture over time? By using a single set of measures at one point in time, we hope to provide some evidence of the cross-cultural generalizability (or lack thereof) of the user profiles of problematic users of mobile phones.

For this study, we have selected the United States and South Korea for the purposes of cross-cultural comparison. According to a report in 2010, Korean adolescents start using the mobile phones at the earliest age among those countries (National IT Industry Promotion Agency 2010). According to a government survey, 32.6% of young adolescents in South Korea report being addicted to mobile phones (National Information Society Agency 2015). Thus, scholarly and public concerns about problematic use of mobile phone have considerably increased in South Korea.

Of the predictors the current study examines, need for belonging could be a culturally specific predictor of smartphone PU. When pursuing goals, Kim (1993) argued that social relational concerns are more salient in collectivistic cultures, whereas task-oriented emphases tend to predominate in individual cultures. Social relational constraints underscore concerns for others' relations to one's self (e.g., minimizing a burden to others, and

avoiding negative evaluation by others) (Kim 1993). Members of collectivistic cultures tend to stress social relational concerns, placing greater importance on face-supporting behavior than members of individualistic cultures (Gudykunst and Lee 2003).

As a personality trait of an individual seeking social assurance and approval from their peers, “need for belonging” is anticipated to have a greater influence on smartphone PU in collectivist cultures. The U.S. is identified as being primarily individualistic, while South Korea exhibits highly collectivistic features (Hofstede and Hofstede 2005). Thus, we propose the following hypothesis:

H7: Need to belong will be a stronger predictor of smartphone PU in South Korea than it will be in the United States.

Despite the consistency between findings of the research on mobile phone PU among South Koreans and mobile phone PU in the United States (e.g., the link between impulsivity and mobile phone PU), it is unclear as to whether other predictors of mobile phone PU, such as mindfulness, are culturally specific, and whether or not types of smartphone use associated with mobile phone PU are culturally specific. This study provides a means by which a cross-cultural comparison of the antecedents and behaviors associated with smartphone PU can be made.

RQ1: In what ways will the predictors and outcomes related to smartphone PU differ between South Korean and U.S. college students?

III. Methods

For the purposes of testing the aforementioned hypotheses and research question, a survey was designed that included measures to assess each of the following concepts.

A. Measures

Smartphone problematic use. Measures of mobile phone PU, like measures of other forms of media PU, capture a wide variety of factors including feelings about use such as the feeling that one has lost the ability to control one’s mobile phone use (Augner and Hacker 2012; Beranuy et al. 2009), actual use behaviors (Park, 2005), and consequences of use (Augner and Hacker 2012; Beranuy et al. 2009; Hong et al. 2012). The Mobile Phone Problematic Use Scale (MPPUS), a unifactorial measure covering craving, withdrawal, and consequences of use, is among the most widely used measurements and suits our needs for this study. The original scale, developed by Bianchi and Phillips

(2005), was translated into Korean and used for the Korean sample, while a previously validated shortened 10-item version of the MPPUS was used to assess levels of smartphone PU in the U.S. sample (Foerster, Roser, Schoeni, and Rööslü 2015). Participants are asked to report the extent to which they believe that 10 statements describe them (example statements: “I find it difficult to switch off my mobile phone”; “My friends and family complain about my use of the mobile phone”; “I am often late for appointments because I’m engaged on the mobile phone when I shouldn’t be.”). Answers range from “Not at all like me” (1) to “Just like me” (7). Values on each item are summed to create a single value (South Korean sample $M = 42.30$; $SD = 9.69$; $\alpha = .81$. U.S. sample $M = 37.82$; $SD = 11.56$; $\alpha = .88$).

Mindfulness. A previously validated mindfulness scale, the Mindfulness Attention Awareness Scale (MAAS) was used to assess levels of trait mindfulness (Brown and Ryan 2003). Participants are asked to report the frequency with which they engage in 16 experiences (example experience: “I rush through activities without really being attentive to them”). Answers range from “Never” (1) to “All the time” (5). Values on each item are summed to create a single value (South Korean sample $M = 46.96$; $SD = 6.12$; $\alpha = .64$. U.S. sample $M = 47.31$; $SD = 10.31$; $\alpha = .85$).

Self-Control. A previously validated self-control scale, the Brief Self-Control Scale (BSCS) was used to assess levels of trait self-control (Tangney, Baumeister, and Boone 2004). Participants are asked to report the extent to which they believe that 13 statements describe them (example statement: “I have a hard time breaking bad habits”). Answers range from “Not at all like me” (1) to “Just like me” (7). Values on each item are summed to create a single value (South Korean sample $M = 52.40$; $SD = 9.94$; $\alpha = .81$. U.S. sample $M = 52.15$; $SD = 11.60$; $\alpha = .82$).

Need for belonging. A previously validated measurement, the Need to Belong Scale (NTBS), was used to assess levels of trait need for belonging (Leary, Kelly, Cottrell, and Schreindorfer 2013). Participants are asked to report the extent to which they believe that 10 statements describe them (example statement: “I try hard not to do things that will make other people avoid or reject me”). Answers range from “Not at all like me” (1) to “Just like me” (7). Values on each item are summed to create a single value (South Korean sample $M = 45.96$; $SD = 8.64$; $\alpha = .82$. U.S. sample $M = 43.53$; $SD = 9.93$; $\alpha = .82$).

Mobile phone uses. Nine questions were devised for the study to measure the frequency with which participants engaged in ten distinct mobile phone activities or uses. Participants were asked to rate how frequently they engaged in each of the activities. In the U.S. survey, these values ranged from “Never” (1) to “More than

once every 30 minutes” (7). In the South Korea survey, these values ranged from “Less than once a week” (1) to “More than 2-3 times a day” (7). Nine activities were measured: texting/instant messaging; speaking with someone (voice); looking up information; checking social media; posting on social media (text, picture, or video); playing a game; checking or sending email; reading or watching news; reading or watching something entertaining or funny. Texting, voice calling, and email are considered communication uses. Checking and posting on social media are considered impression management uses. Looking up information and reading or watching news are considered information seeking uses. Reading or watching something funny or entertaining is considered an entertainment use.

Sleep amount and quality. Two aspects of participants’ sleep were measured: amount and quality. Both were measured with self-report survey questions, asking participants to report the average number of hours of sleep they had each night and to rate their quality of sleep on a scale ranging from “Very bad” (1) to “Very good” (5) (Amount of sleep South Korean sample $M = 5.93$; $SD = 1.39$. Amount of sleep U.S. sample $M = 6.95$; $SD = 1.32$. Quality of sleep South Korean sample $M = 3.04$; $SD = .96$. Quality of sleep U.S. sample $M = 3.24$; $SD = .96$).

Academic performance and time devoted to homework. Two aspects of participants’ academic activities were assessed: their performance on a standardized test and a self-report measure of the amount of time, in minutes, each participant devoted to homework on an average day. In the South Korea, sample participants were asked to report their percentile score on a standardized test (i.e., the percent of students who achieve a higher score on the test; ranging from a low score of 99 to a high score of 1) while in the U.S. sample, participants were asked to report their ACT score (ranging from a low score of 1 to a high score of 36). (Amount of time devoted to homework South Korean sample $M = 136.99$; $SD = 92.14$. Amount of time devoted to homework U.S. sample $M = 151.95$; $SD = 95.92$. Test percentile score South Korean sample $M = 12.88$; $SD = 11.62$. ACT score U.S. sample $M = 25.67$; $SD = 4.35$).

B. Participants and Procedure

A survey containing the aforementioned measures was translated from English into Korean by one of the authors. Participants were recruited via in-class announcements. The surveys, which took roughly 30 minutes to complete, were administered to undergraduate college students enrolled in communication studies courses at a college in South Korea ($n = 241$) and a large university in the South-eastern United States (n

= 222) during the spring of 2016. Participants filled out the survey online in exchange for course credit. Participants in the South Korean sample were asked to report their age and gender (age $M = 21.25$; $SD = 2.18$; 65% female).

IV. Results

Correlations between smartphone PU and predictor variables are presented in Tables 1a and 1b. Among the South Korean sample, self-control is negatively correlated with smartphone PU while need to belong, texting, looking up information, checking social media, and consuming entertainment are all positively correlated with smartphone PU. Among the U.S. sample, self-control and mindfulness are negatively correlated with smartphone PU while need for belonging, texting, looking up information, checking social media, posting on social media, checking email, and consuming entertainment are all positively correlated with smartphone PU. Though these correlations provide some insight into the characteristics of problematic users of mobile phones, they do not describe the unique contributions of each characteristic to the variance in smartphone PU.

Table 1a. Bivariate Correlations Among Predictors and Smartphone PU, South Korean Sample

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. PU	-.42***	-.30***	.47***	-.10	.17**	.13*	.20***	.35***	.05	-.12	-.04	-.12	-.09	.13*
2. Self-Control	-	.46***	-.26**	-.10	.03	-.09	-.14*	-.13*	-.10	-.03	.03	.05	-.03	-.19**
3. Mindful		-	.19**	-.01	-.20**	-.14*	-.08	-.01	.01	.12	.03	.05	.09	.01
4. Belonging			-	-.08	.06	.12	.18**	.35**	.12	-.12	.15*	-.09	-.04	.04
5. Age				-	-.26**	-.13*	.06	-.07	.08	-.03	-.06	.17**	.26**	.06
6. Gender					-	.10	-.02	.05	-.08	-.31**	-.03	-.14*	-.20**	-.07
7. Texting						-	.29***	.29***	.05	-.16*	.17**	-.08	-.06	.06
8. Info							-	.41***	.09	-.03	.15*	.01	.30**	.44***
9. Check SM								-	.19**	-.17**	-.02	-.14*	.08	.26***
10. Post SM									-	-.03	.02	.10	.13*	.06
11. Gaming										-	.06	.24***	.04	.01
12. Voice											-	.27***	.06	.06
13. Email												-	.22**	.04
14. News													-	.38***
15. Entertain														-

Correlation coefficients are presented. * $p < .05$; ** $p < .01$; *** $p < .001$. Gender: 1 = male; 2 = female.

Table 1b. Bivariate Correlations Among Predictors and Smartphone PU, U.S. Sample

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. PU	-.41***	-.35***	.36***	.24***	.23**	.37***	.14*	-.01	-.03	.15*	.10	.29***
2. Self-Control	-	.36***	-.18**	-.11	-.15*	-.14*	-.07	-.12	.03	.03	-.10	-.18**
3. Mindful		-	-.09	-.02	-.13	-.13	-.12	-.16*	.01	-.02	-.03	-.08
4. Belonging			-	.13	.08	.20*	.02	-.09	-.08	.16*	.01	.09
5. Texting				-	.36***	.61***	.25*	-.06	.27**	.31***	.22**	.37***
6. Info					-	.49***	.28***	.10	.27**	.44***	.47***	.57***
7. Check SM						-	.29**	-.01	.27***	.38***	.30***	.57***
8. Post SM							-	.04	.27***	.35***	.25***	.20**
9. Gaming								-	.05	-.04	.16*	.10
10. Voice									-	.28***	.15*	.15*
11. Email										-	.34***	.37***
12. News											-	.49***
13. Entertain												-

Correlation coefficients are presented. * $p < .05$; ** $p < .01$; *** $p < .001$

To test the hypotheses relating to the antecedents of smartphone PU, we performed a two-step regression analysis predicting levels of smartphone PU for each sample. In the first step of both regression analyses, the psychological traits of self-control, mindfulness, and need for belonging were predictors. In the South Korean sample, age and gender were included as predictors as well. In the second step of both analyses, cell phone uses were predictors. Results of these regression analyses are presented in Table 2.

To confirm that discrepancies between bivariate correlation results and regression analyses results were not due to multicollinearity, a multicollinearity diagnostic test was performed. The variance inflation factor (VIF), a commonly used statistic reflecting the degree of multicollinearity among predictor variables, was within the acceptable range of 0 - 5 for all predictor variables in both samples (the highest VIF value in the South Korean sample was 1.64, for looking up information; the highest VIF value in the U.S. sample was 1.06, for checking social media). Given the lack of evidence of multicollinearity, we interpret the results of the regression analyses as the most robust evidence of the unique contribution of each predictor variable to variance in smartphone PU.

Results of the regression analyses show relatively consistent patterns across the two samples. Evidence supports H1 in both samples: self-control is negatively associated with smartphone PU. H3 is also confirmed in both samples: need for belonging is

Table 2. Regression Analyses Predicting Smartphone PU in South Korean and U.S. College Students

	S.K. Sample (n = 226)		U.S. Sample (n = 222)	
Self-control	-.30***	-.28**	-.27***	-.24***
Mindfulness	-.07	-.07	-.23***	-.21**
Need for Belonging	.37***	.32***	.29***	.23***
Age	-.07	-.06		
Gender	.13*	.10		
Texting		-.02		.04
Talking		-.10		-.09
Looking up Info		.05		.01
Social Media Checking		.16*		.20*
Social Media Posting		-.03		.04
Gaming		-.02		-.06
Email Checking		.03		.01
News		-.09		-.05
Entertainment		.06		.11
Adjusted R squared	.34	.36	.28	.35
F	25.48***	10.75***	30.17***	10.55***

Standardized Beta values are presented. * p < .05; ** p < .01; *** p < .001.
Gender: 1 = male; 2 = female.

positively associated with smartphone PU. H2 is confirmed in the U.S. sample but not in the South Korean sample. Evidence from both samples indicates that the frequency with which one checks social media is the only significant smartphone use behavior that positively predicts smartphone PU. This provides partial support of H4: one impression management use is associated with smartphone PU, but other impression management uses, communication uses, and entertainment uses are not.

To test the hypotheses and research questions relating to the outcomes of smartphone PU, we tested correlations between smartphone PU and various outcomes in both samples (see Tables 3a and 3b). There were no significant relationships between

Table 3a. Bivariate Correlations Among Smartphone PU and Outcome Variables, South Korean Sample

	Sleep Amount	Sleep Quality	Test Scores	Homework
PU	.03	-.07	.08	-.06
Sleep Amount	-	.38***	-.02	-.13*
Sleep Quality		-	-.07	-.06
Test Scores			-	.07

Correlation coefficients are presented. * p < .05; ** p < .01; *** p < .001.

Table 3b. *Bivariate Correlations Among Smartphone PU and Outcome Variables, U.S. Sample*

	Sleep Amount	Sleep Quality	ACT	Homework
PU	-.12	-.12	-.02	.03
Sleep Amount		.48***	.05	-.18*
Sleep Quality			.12	-.03
ACT Scores				.03

Correlation coefficients are presented. * $p < .05$; ** $p < .01$; *** $p < .001$.

smartphone PU and sleep or academic outcomes in either sample, failing to provide any support for Hypothesis 4 or 5.

V. Discussion

The evidence suggests that there are two distinct psychological traits associated with smartphone PU relating to self-regulation and social orientation. These traits predict smartphone PU in both South Korean and U.S. college students². No previous study has compared the relative contribution of these common traits to the likelihood of PU in smartphone users, nor has any study determined whether those contributions are the same across cultures.

The activities most likely to be associated with smartphone PU are also consistent across cultures. In both samples, only social media checking frequency is a unique predictor of smartphone PU. Neither sample provides evidence that active or interactive social uses (texting, voice calling, or posting on social media) are uniquely associated with smartphone PU. While some prior research found that a wide variety of motivations were positively associated with smartphone PU (Lee and Lee 2017), the list of possible motivations from which participants chose was limited, and thus introduced a kind of artificial constraint on reporting behavior. We believe that by providing an exhaustive list of phone use behaviors to participants, our study design does not possess such a constraint. The fact that we fail to find a relationship between entertainment uses and PU while previous studies (e.g., Wang et al. 2015) have found a connection between entertainment motivations and PU reinforces our belief that behavior (what people do)

2. To support the contention that there are no differences in the relationships of psychological traits to smartphone PU between our South Korea and U.S. samples, we performed a regression using a combined South Korea and U.S. data set and interaction predictor variables (e.g., country X self-control). None of the interaction terms were significantly related to smartphone PU.

and motivations (why they do it) should not be conflated.

The fact that so few types of smartphone uses are associated with smartphone PU shows that not all frequent users of smartphones possess qualities of problematic users. Within both samples, individuals who used their smartphones very frequently for the purposes of voice calls, posting on social media, or checking/sending emails to others were no more likely to score high on smartphone PU than others. Upon their initiation, the acts of calling, posting, or sending require users to think about what to say, unlike the act of checking what others have said on social media. It is this additional step of deliberation, however brief, that may differentiate purposeful acts from impulsive, problematic use.

Among college students who are heavy users of social media, we might be seeing a growing divide between active “connecters” (people frequently posting to social media) and passive “consumers” (people frequently checking to see what others have posted). A recent meta-analysis of research on the connection between SNS use and wellbeing finds that *active* use is commonly associated with gains in wellbeing while *passive* use is commonly associated with declines (Verduyn, Ybarra, Resibois, Jonides, and Kross 2017). The observed differences in the ways in which passive uses of social media (i.e., social media checking) and active uses of social media (e.g. texting or posting on social media) relate to smartphone PU prompt broader questions about social media use: if users visit social media websites or applications frequently but do not post, are they participating in social activity online or are they, in some sense, compulsively consuming content posted by other users? How different is the experience of checking a social media feed from “channel surfing” television or entertainment websites? Our findings suggest that heavy social media “consumers” in both South Korea and the U.S. do not feel positively about their smartphone use while heavy social media “connecters” feel less conflicted about their relationships with their smartphones.

The results fail to provide support for the belief that smartphone PU is associated with disrupted sleep or poor academic performance. The inconsistency between the null findings regarding the relationship between smartphone PU and sleep and our expectations are most likely the result of differences in what, precisely, was measured in our study and what was measured in prior research as well as cultural differences between our samples and samples analyzed in prior research. Several of these studies (Munezawa et al. 2011; Van Den Bulck 2007) assess use in a particular context that would most likely affect sleep - immediately before sleep – whereas we do not measure use but rather orientation toward use. The relationship between smartphone PU and sleep quality among U.S. college students as observed in White and colleagues’ (2011) study is a

relatively weak one ($r = .17$, R^2 of .03). In our U.S. sample, the relationship between sleep quality and MPPUS was actually close to significant ($r = .12$, $p = .07$) and, thus, is not entirely inconsistent with White and colleagues' observations. In a study of Turkish college students, Sahin and colleagues (2013) find a more robust connection between smartphone PU and a measure of sleep quality ($r = .29$; $p < .001$). Given that the connection between smartphone PU and sleep quality has only been firmly established in one cultural context, we surmise that the connection between smartphone PU and sleep quality may be culturally specific.

The null findings regarding academic outcomes can similarly be explained by differences in concepts measured and cultural differences among populations studied. Most prior studies of smartphone use and academic performance (e.g., Lepp et al. 2014) focus on use rather than orientation toward media use. Many of the studies that are purported to show a connection between smartphone use and academic outcomes actually implicate a behavior – task-switching between schoolwork and social media – that is not specific to mobile media (Judd 2014; Rosen, Carrier, and Cheever 2013). The one study that establishes a negative correlation between smartphone addiction and an academic outcome finds a modest-sized correlation ($r = -.14$; $p > .01$) in a particular cultural context (Lebanon) (Samaha and Hawi 2016). Given our findings, it seems most likely that negative outcomes are associated with a precise type and frequency of smartphone use and not with a particular orientation toward that use.

The lack of discernible differences between the contributions to smartphone PU in these two distinct cultures is inconsistent with our original suppositions. In addition to aggregate differences between the U.S. and Korean populations regarding the need for belonging, there are, within each country, individuals to which belonging matters more and those to which it matters less. Our results suggest that problematic use is more apt to be seen in those to which belonging matters more, regardless of what country they are from. Our study does not test the prevalence of such people in either culture, and thus cannot speak directly to the question of overall cultural impact of smartphone PU. However, it stands to reason that if the need for belonging is more common in a given culture, smartphone PU will be more prevalent.

A. Limitations

It is important to acknowledge several limitations of our study. The data collected in this study is cross-sectional; as such, we cannot make definitive claims regarding the causal direction of the relationship among variables. For example, it is possible that

a pre-existing need for belonging predisposes one to develop smartphone PU, and it is possible that smartphone PU may increase one's need for belonging. Future studies should implement longitudinal survey designs to contribute to our knowledge of the causal directions of these relationships. We also must note that as a study of college student samples, our research is not necessarily generalizable to other populations, such as older adults, for whom social media use may not be as important to everyday living. Several of the most highly-cited studies of negative outcomes of mobile phone use (e.g., Van den Bulck 2007) involve children and adolescents, groups that differ from college students in terms of cognitive development and the extent to which their daily lives are structured. A more complete profile of problematic smartphone use and its consequences could be produced by replicating our study using older and younger participants.

Measures of media use frequency relied on users' abilities to accurately recall use. Frequent media use often is often engaged in unconsciously or habitually, and thus may be more difficult to accurately recall than less frequent, more purposeful behavior. Additionally, our measures of social media use did not differentiate among types of social media (e.g., KakaoTalk, Facebook). Future studies should endeavor to use measures that differentiate among these types of social media as well as supplement recall measures with other measures of use. Due to limitations in survey length, we were unable to include measures of other psychological traits known to be associated with problematic media use, such as loneliness and sensations-seeking. Future studies should include these traits in their models of problematic smartphone use.

It also should be noted that the reliability of our measure of mindfulness was low within the South Korean sample ($\alpha = .64$). This suggests that we should exercise caution in our interpretation of the lack of expected negative correlation between mindfulness and smartphone PU among South Koreans. Future studies would do well to confirm that the items in the MAAS are properly understood by all participants, and should consider using other measures of this concept (e.g., the Five Facet Mindfulness Questionnaire). Additionally, we were unable to assess the age or gender of participants in the U.S. sample. Future studies should include these measures.

The cross-cultural comparisons made in this study are limited to two cultures and should not be interpreted as definitive evidence that the relationships between psychological antecedents, smartphone PU, and smartphone use behaviors hold true throughout the world. As distinct as South Korean and U.S. cultures are from one another, they share some characteristics (e.g., relatively high average levels of disposable income among their populations; high levels of democracy) that set them apart from other cultures. Our null findings regarding outcomes associated with smartphone PU differ from studies

with samples drawn from Lebanon (Samaha and Hawi 2016) and Turkey (Sahin et al. 2013), both of which are not as wealthy or as clearly democratic as the U.S. or South Korea (freedomhouse.org). This suggests that future cross-cultural studies of smartphone PU should make comparisons across these categories (GDP; degree of democracy). For the time being, it is appropriate to interpret the findings as evidence that psychological antecedents of smartphone PU are not unique to a particular culture rather than to interpret the findings as evidence that they are culturally universal.

B. Implications for Research on Smartphone Addiction in Korea

The present study contributes to a robust body of research on smartphone overuse and addiction in South Korea. Since 2012, there have been over 130 articles in academic journals on this topic (Park and Seo 2017). In their review of this research, Park and Seo (2017) find that the majority of these studies identify characteristics of the family as the source of problematic use; social, technological, and psychological factors were less frequently addressed. To the extent that prior research addressed psychological correlates of problematic smartphone use, Park and Seo found the focus to be on pathologies such as depression, anxiety, and attention deficit hyperactivity disorder (ADHD). Less is known about the extent to which particular cognitive-affective attributes contribute to the likelihood of smartphone PU in Korea, and whether or not such contributions are unique to the Korean cultural context.

Our findings corroborate those of previous studies of U.S. college students (Khang et al. 2013) and Korean adolescents (Kim et al. 2018) that provided evidence that individuals who are low in self-control are more likely to experience smartphone PU. They supplement these findings by implicating another trait – high need for belonging – that contributes to smartphone PU over and above the contributions of the self-control trait. Though a great deal of attention in this research area has been directed at social media use, extant studies (e.g., Cha and Seo 2018) fail to differentiate among social media use behaviors. Regarding the precise nature of smartphone PU, we find that it is not necessarily indicative of a compulsion to communicate. Rather, there is clearer evidence that, among this sample, problematic use is indicative of a habitual consumption of something enjoyable and highly relevant – information about one’s peers. This quality of smartphone PU is consistent across the two cultures examined in this study. As different as some cultures are, the manner in which mobile phones appeal to some users’ desire for passive social experiences and their ability to disrupt these users’ lives transcend such differences.

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Appendix

MPPUS Measure for Korean Sample (Bianchi & Phillips, 2005).

MPPUS 아래 서술은 평소의 귀하를 얼마나 잘 나타내주고 있는 지 해당 사항에 체크해 주세요. (1: 전혀 아니다, 2: 아니다, 3: 대체로 아니다, 4: 보통, 5: 약간 그렇다, 6: 그렇다, 7: 매우 그렇다).

1. 휴대전화 사용 시간은 늘 부족하다.
2. **기분이 꿀꿀할 때면 기분 전환을 위해 휴대전화를 사용한다.** (US_1)
3. 할 일을 제 때에 끝내지 못하면 문제가 있을 것을 알면서도 휴대전화 사용에 골몰해 있는 내 자신을 발견하다.
4. 친구들은 모두 휴대전화를 가지고 있다.
5. 휴대전화 총 사용시간을 다른 사람에게는 감추고 싶은 적이 있다.
6. 휴대전화를 사용하면서 잠을 설친 적이 있다.
7. 휴대전화를 너무 많이 사용하여 내가 지불하지 못할 만큼의 사용료를 청구 받은 적이 있다.
8. **전파 수신이 안되는 지역에 있으면 혹시 전화를 못 받을까 초조하다.** (US_2)
9. 휴대전화를 사용하면서 타인과의 대화나 내가 하는 일에 집중하지 못하는 때가 있다.
10. **지난 1 년 동안 휴대전화 사용시간이 많이 늘었다.** (US_3)
11. 외로울 때 누군가와 통화하기 위해 휴대전화를 사용해 본 적이 있다.
12. 휴대전화 사용시간을 줄이려고 시도해봤지만 번번히 실패했다
13. **휴대전화를 꺼 놓기 힘들어 하는 나를 깨닫곤 한다.** (US_4)
14. **오랜 시간 동안 휴대전화 사용을 못하거나 문자메시지를 확인하지 않으면 불안하다.** (US_5)
15. 휴대전화에 관련된 꿈을 자주 꾀다.
16. **친구나 가족들이 나의 휴대전화 사용에 대해 불평을 늘어 놓는다.** (US_6)
17. **내게 휴대전화가 없으면 친구들이 나와 연락하기 힘들 것이다.** (US_7)
18. 휴대전화 사용은 내 일의 능률을 떨어뜨리는 데 직접적인 영향을 준다.
19. 휴대전화 사용과 관련된 통증이나 고통을 겪고 있다.
20. **원래 계획보다 더 오랜 시간 휴대폰을 사용하고 있는 자신을 발견하곤 한다.** (US_8)
21. 해야할 일을 처리하기 보다는 휴대전화를 사용하고 있는 자신을 발견할 때가 있다.
22. **휴대전화를 사용하다 늦지 말아야 할 약속에 늦은 적이 있다.** (US_9)
23. 회의, 식사 약속 혹은 극장에서 휴대전화를 꺼 놔야 할 때는 초조하다.

- 24. **휴대전화 사용을 너무 오래한다는 애길 들곤 한다.** (US_10)
- 25. 회의, 수업, 극장에서 휴대전화가 울려서 난처해 본 적이 있다.
- 26. 친구들은 내가 휴대전화를 꺼 놓는 걸 좋아하지 않는다.
- 27. 휴대전화가 없다면 나는 혼란스러울 것 같다.

Note. Statements in bold are matched with MPPUS measure for U.S. sample (item number used below).

MPPUS Measure for U.S. Sample (Foerster et al., 2015).

Using the scale provided, please indicate how much each of the following statements reflects how you typically are (1 = not at all like me; 7 = Just like me).

- 1. “I have used my mobile phone to make myself feel better when I was feeling down.”
- 2. “When out of range for some time, I become preoccupied with the thought of missing a call.”
- 3. “The time I spend on the mobile phone has increased over the last 12 months.”
- 4. “I find it difficult to switch off my mobile phone.”
- 5. “I feel anxious if I have not checked for messages or switched on my mobile phone for some time.”
- 6. “My friends and family complain about my use of the mobile phone.”
- 7. “If I don't have a mobile phone, my friends would find it hard to get in touch with me.”
- 8. “I find myself engaged on the mobile phone for longer periods of time than intended.”
- 9. “I am often late for appointments because I'm engaged on the mobile phone when I shouldn't be.”
- 10. “I have been told that I spend too much time on my mobile phone.”