

Classifying Nomophobia as Smart-Phone Addiction Disorder

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Abstract

Can people become addicted to using their smart phones? To explore this possibility, this literature review summarizes previous research on smart-phone addiction, nomophobia, and addictive personality disorders. Specifically, this review defines smart-phone addiction and its symptoms along with comorbid disorders and uses disciplines from a cognitive, behavioral, neurobiological, and anthropological disciplines as evidence of its existence. Although this review also found that there is little research on nomophobia and smart-phone addiction, it argues that this should be a call for recognition of growing use smart-phone and potential behavioral addictions they pose. This review also suggests that nomophobia, the anxiety experienced from loss of a smart-phone, is not a specific phobia but rather a withdrawal symptom and proposes that “Smart-phone addiction disorder” be included in future revisions of the DSM, the Diagnostic and Statistical Manual of Mental Disorders.

Keywords: nomophobia, smart-phone, anxiety, depression, addiction, DSM-5

Introduction

Nomophobia is a specific phobia that is defined as “the discomfort or anxiety caused by the non-availability of a mobile phone, personal computer (PC) or any another virtual communication device” (King, Valença, Silva, Sancassiani, Machado, & Nardi, 2014). This phobia has emerged as computers and cellular phones become more technologically developed and versatile in applications and communication. Smart-phones are defined as “a mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, Internet access, and an operating system capable of running downloaded applications.” (“Smartphone,” 2016). Smart-phone functions such as texting, Internet browsing, and social media allow phones to become a simple medium of communication towards a wide number of people at any distance.

Nomophobia developed as a disorder due to the instantaneous communication and gratification smart-phones provide, growing into compulsive and addictive behavior. As more people communicate over their phones, smart-phones become the primary medium of communication between friends and family. Miller-Ott, Kelly, and Duran (2014) found that younger generations who owned a phone believed them to be necessary in order to keep in touch with parents and friends and without them could cause discomfort. This can be attributed to smart-phones being perceived as a necessary tool in developed countries because of the wide range of capabilities smart-phones can perform, so much so that users develop an extended sense of self through their phone which, if removed, could cause uneasiness and tension (Clayton, Leshner, & Almond, 2014).

Smart-phones can be addictive. Recent studies on smart-phone use and found positive correlations between certain demographics and smart-phone use (Robert, Yaya, & Manolis, 2014; Junco, Merson, & Salter, 2010). These studies found that participants who were women, African-American, Latino, or in a middle to high SES were the most likely to use smart-phones, between seven and nine hours. However, these studies drew samples from populations of undergraduate students, so age must be included in future studies of high smart-phone use as this could be the variable of interest.

According to Park (2005), “[t]he term addiction can be used to denote all types of extreme behavior, such as an unusual dependence on drugs (e.g. alcohol, narcotics), food, exercise, gambling, gaming, television viewing and Internet use” and “any compulsive or overused activity should be considered as addiction”. The reason some users experience addictive qualities can be attributed to the rewarding social benefits and distractions from daily stressors that smart-phones have (Chiu, 2014)

Smart-phones are not a chemically addictive substance per the DSM-V’s definition of what qualifies as a substance, but non-substance abuse has only recently been added to the Diagnostic and Statistical Manual for Mental Disorders fifth edition, (DSM-V) as a category of addiction and only contains gambling disorder (American Psychiatric Association, 2013). However, the DSM-5 does not currently include withdrawal symptoms of non-substance abuse. But Rumpf, Bischof, Wölfling, Leménager, Thon, Moggi, & Wurst (2015) identified common non-substance abuse withdrawal symptoms in those who are afflicted with gambling disorder and internet addiction, as “irritability, anxiety, or sadness when playing is not possible” coinciding with the symptoms of nomophobia.

Nomophobia and smart-phone addiction share many qualities, but the primary trait each disorder shares is that the smart-phone is a source of relief and comfort (Harkin, 2003). The key reason for this is that smart phones have become central in communication and are perceived necessary to own in order to stay in touch with others. This gives the user the option to use the phone compulsively to the point where it can be defined as behavioral addiction.

Several studies on nomophobia also attribute the behavior to addiction (King et al. 2014; Bivin, Matthew, Thulasi, & Philip, 2013). Since specific phobias are defined in the DSM-5 as “the fear or anxiety is circumscribed to the presence of a particular situation or object, which may be termed the phobic stimulus” (American Psychological Association, 2013). Since nomophobia is characterized as the absence of mobile phone or PC, and specific phobias are characterized by the introduction of a particular situation or object, nomophobia does not fit the definition of specific phobia.

Both nomophobia and Smart-Phone Addiction Disorder have many comorbid disorders, two or more disorders within an individual, such as: anxiety and panic disorder, other forms of phobia (and in particular social phobia disorder), obsessive-compulsive disorder, eating disorders, any disorder under the umbrella of depression from dysthymia to major depressive disorder, alcohol and drug addiction, as well as other behavioral addiction disorders (including mobile and/or internet dependence, gambling, online gaming, compulsive shopping, and sexual behaviors) and personality disorders (borderline, antisocial, and avoiding) (Bragazzi & Puente, 2014; Clayton et al., 2015).

This literature review makes an evidence-based argument from multiple disciplines that nomophobia must be renamed as “Smart-Phone Addiction Disorder” and

reclassified, not as a new specific phobia, but listed in future revisions of the DSM under “Non-Substance Abuse Disorders” along with its potential comorbid disorders.

Methods

Articles for this literature review were gathered from PsycINFO and Google Scholar and contains only empirical, peer-reviewed articles, and one doctoral dissertation. Because smartphone-use is a recent trend, articles before 2007 will not be relevant except for definitions not in the DSM-5 (2013). Relevant articles to this review were retrieved by using the keywords “cell/smart/mobile-phone,” “dependence,” “non-substance addiction,” and “nomophobia”. The DSM-5 (2013) was used for gathering definitions of disorders and for basing the definition of Smart-Phone Addiction Disorder on other disorders such as internet gaming disorder, gambling disorder, specific phobia, and social anxiety disorder.

Definitions

Bragazzi and Puente (2014) provide a more in-depth definition of nomophobia. They highlight the attributes of nomophobia as:

- To use regularly a mobile phone and to spend considerable time on it, to have one or more devices, to always carry a charger with oneself.
- To feel anxious and nervous at the thought of losing one’s own handset or when the mobile phone is not available nearby or is misplaced or cannot be used because of lack of network coverage, expended battery, and/or lack of data available to access internet, and try to avoid as much as possible the places and the situations in which the use of the device is banned (such as public transit, restaurants, theaters, and airports)

- To look at the phone's screen to see whether messages or calls have been received (also know as "ringxiety")
- To keep the mobile phone always switched on (24 hours a day), to sleep with the mobile device in bed
- To have few social face-to-face interactions with humans which would lead to anxiety and stress; to prefer to communicate using the new technologies
- To incur debts or great expense from using the mobile phone (incurring large amounts of debt for data-use or purchasing expensive smart-phones).

Although there are multiple definitions of "smart-phone" or "mobile-phone" addiction, there is no consensus on an operational definition for it. Lepp, Barkley, and Karpinski (2015) found an average time of use of smart-phone among college students was 300 minutes, and Clayton et al. (2015) found that smart-phone users send an average of 109.5 texts per day while checking their phones around 60 times a day. By these definitions, any excess use beyond these times could be considered excessive smart-phone use and addictive behavior.

Smart-phones are also imprecise to define, Park (2005) states, "the definition of mobile phone is undergoing reinterpretation as the mobile phone blurs the distinction between personal communicator and mass media". However, most of the literature on smart-phone addiction and nomophobia align in that the uses for these devices are not the devices themselves. Park (2005) makes the distinction between the medium (smart-phones/phones) and the specific content (Facebook, text messaging). Therefore, the main attributes of smart-phones and their distinction from cell-phones are capabilities such as accessing Facebook, web browsing, and texting.

Symptomology of Nomophobia

Symptoms of nomophobia are anxiety, depression, trembling, perspiration, tachycardia, loneliness, and even panic attacks in extreme cases (King et al., 2014). A case study performed by King, Valença, Silva, Baczynski, Carvalho, & Nardi, (2013) on an individual who suffered from extreme social phobia disorder found that he used his smart-phone and personal computer as a means for relieving his symptoms. King et al. (2013) proposed that this individual suffered from nomophobia and had comorbid disorders of social phobia and obsessive-compulsive disorder. However, it is only when he was taken away from his devices (instead of introducing a stressor, for example) that this individual suffered from nomophobic symptoms, inconsistent with the definition of phobia since the stimulus (smart-phone) was taken away rather than introduced and more consistent with the definition of withdrawal.

Smart-phone withdrawal also shares the same exact set of symptoms that nomophobia has (Park, 2005; Bragazzi & Puente, 2014). Nomophobia and smart-phone withdrawal are too similar in symptomology that they could not be unrelated disorders manifesting independently.

Clayton et al. (2015) conducted a study on iPhone users that involved the separation of their iPhones. Participants were measured on self-reported anxiety, heart rate, and blood pressure. The experimenters found that the participant's somatic responses were raised when possessing their phone and then separated from them. Conversely, participants who were already separated from their phones and then repossessed them reported lower states of anxiety (see Table 2). The most important part of this study was that participants who were separated from and then repossessed their

phones reported even lower states of anxiety, and had lower physical responses than the group starting the experiment already possessing their phones without the initial separation. This experiment shows negative reinforcement phone repossession has over initial possession and smart-phone separation is more aptly described as non-substance withdrawal.

Rumpf et al. (2015) describes non-substance addiction symptoms as “criteria that are similar to diagnostic aspects of substance-related disorders such as tolerance, withdrawal, or loss of control but cover as well specific symptoms such as to escape or relieve a negative mood.” This is consistent with Chiu’s (2014) and Park’s (2005) findings that this addiction could be to manage other life stresses, and smart-phones are a means of relief. So, rather than smart-phones causing the addiction, it is the social reward and distraction they provide from the symptoms. The symptoms manifest when that distraction being taken away and life stress being returns. This fits with the definition of avoidant coping which is “denial and withdrawal [in response to a stressor], generally is associated with psychological distress” (Endler, 1996). Using smart-phones as a way of coping with life stress.

Comorbidity

Smart-phone addiction and nomophobia share comorbid disorders such as social phobia, obsessive-compulsive disorder, loneliness, and atypical depression (King et al. 2013; Park, 2005). The DSM-5 (2013) states that non-substance addictions and conventional addictions have a high comorbidity with other disorders such as alcoholism and major depressive disorder. Although there are existing measures for problematic phone use (see Table 1), they were created with subjects in either a community,

university setting or with adolescents (Billieux, 2012). This puts into question the generalizability of these tests outside of those settings.

Much of the literature on nomophobia states that the DSM-5 social phobia disorder is the most likely comorbid disorder with nomophobia (Bragazzi & Puente, 2014; King et al.; 2013). Rumpf et al. (2015) found that internet addiction disorder, a proposed non-substance addiction in the DSM-5 (2013), was correlated with many comorbid disorders: “Substance Dependence 46.7 %, Mood Disorders 46.7 %, Anxiety Disorders 23.3 %, Cluster A personality disorder 4%, Cluster B personality disorder 12.0 %, Cluster C personality disorder 24.0”. Because smart-phones are capable of accessing the internet, internet addiction disorder and its comorbidities would also fall under the umbrella of smart-phone addiction.

Psychosocial Role

According to Clayton et al. (2015), smart-phone addiction may have psychosocial causes stemming from the need to keep in touch with others. One theory that supports this is FoMO (Fear of Missing Out) (Przybylski et al., 2013). FoMO is defined as “a pervasive apprehension that others might be having rewarding experiences from which one is absent; FoMO is characterized by the desire to stay continually connected with what others are doing.” (Przybylski et al., 2013). Just like smart-phone addiction and nomophobia, FoMO was established as a result of smart-phone use and is based upon the psychosocial need to stay in good social standing with peers and to be constantly involved among in-groups. As Chiu (2014) stated, this may provide a connection with social groups and an outlet for daily stresses.

Embodied Cognition and Extended Self

Embodied Cognition can be defined as “psychological processes are influenced by the body, including body morphology, sensory systems, and motor systems” (Glenberg, 2010). Embodied Cognition can be further defined into more specific views. Margaret Wilson (2002) defined six views of Embodied Cognition as: cognition is situated, time pressured, we off-load cognition into the environment [such as maps and recordings to ease our cognitive load], the environment is part of our cognition [the mind did not evolve independently from the environment], cognition is for action, and off-line cognition is body based. Specifically, the third view that cognition can be off-loaded onto the environment applies to smart-phones. Since smart-phones have internet capability, there is no cognitive task for recalling declarative memories like facts and events. Instead of reinforcing memories, smart-phones limit the ability to remember declarative memories with web searching.

Extended Self Theory is defined as “an individual’s possessions, whether knowingly or unknowingly, intentionally or unintentionally, can become an extension of one’s self” (Belk, 1988). For example, someone [basketball player or carpenter] who uses a tool [basketball or hammer] regularly encodes the tool into their neural network. The weight and the dimensions of the tool are innate to the user and can manipulate the tool with ease compared to someone who has never used the tool. The Extended Self Theory can be applied to smart-phone users as well; Clayton et al. (2015) references Belk (2013) in their explanation of smart-phone loss as the “unintentional loss of a possession should be regarded as a loss or lessening of self”. However, this should be regarded as more of tool for a habitual routine rather than a loss of one’s self.

Digital/Cyborg Anthropology

Digital/Cyborg Anthropology is a new field of Anthropology that “explores the production of humanness through machines” (Gray, 1995). Case (2007) stated that smart-phones have “effects of widespread mobile telephony on the social and spatial relations of individuals in the postmodern state”. Distinct from current phones, older phones were situated in one area such as the home or in a telephone booth and modes such as mail took time. These modes had time and space as factors and Case argues that because phones are mobile and in real-time, phones can compress time and space, giving users more control over communication.

Case also argued that there is a “technosocial” movement where there is a degree of control over social interaction because of technology. Because there are no nonverbal cues such as facial movement or body position, she states that “a cell phone interaction provides one half of a conversation equation”. Posturing and making one’s “image” seem more socially desirable.

She also argued that phones provide a “liminal” space. Liminal in the context of mobile-phones is defined as “The intersection between face-to-face interaction and cell phone conversations is a 'betwixt and between' social space, in which a caller is neither fully engaged with those who are physically co-present, not fully mentally co-present (except for the technically mediated auditory connection) with the person on the other end of the line” and shows the isolation of smart-phone communication (Case, 2007).

Flow, Impulsivity, & Reinforcement

Some studies on phone-addiction attribute phone use to either positive or negative experiences and reinforcers (Przybylski et al., 2013). One study in particular measured

flow, the mindset of an individual who is fully immersed and hyperfocused in an activity whilst experiencing pleasure (known colloquially as “in the zone”), and convenience of a phone to the amount of use to see if there was a correlation. (Zhang, Chen, Zhao, & Lee, 2014). They found that flow had a positive correlation with phone use but convenience allowed flow to provide instant gratification and positively reinforced smart-phone use.

While flow is a positive reinforcer for smart-phone use, impulsivity may be regarded as the negative reinforcer. One study in particular found that impulsivity, the urgency to check a phone and the inability to focus on a task, was positively correlated with perceived dependence of a smart-phone (Billieux, Linden, Acremon, Ceschi & Zermatten, 2007). In the context of addiction, impulsivity is associated with negative affect. If an addict feels negative emotions, they take their stimulus to stop the negative emotions. Billieux et al. (2007) found that their participants used their phones when they were feeling “bad” or “bored” and would negatively reinforce their behavior.

These patterns of positive and negative reinforcement follow the same pattern of behavioral addiction, which has been shown to follow the same neurobiological path as substance addiction in terms of reward and reinforcement (Grant, Brewer, & Potenza, 2006).

Collectively, these rewards (social gratification, more control of social interaction through liminal space, offloading cognitive tasks, avoidance coping) compounded with consequences (anxiety or “nomophobia”, FoMO, impulsivity, isolation) show that excess smart-phone use follows the same pattern as any addiction in terms of positive and then negative reinforcement, especially if the user has an existing disorder (social anxiety,

depression, low-self esteem) and that nomophobia be classified as Smart-Phone Addiction.

Conclusion

This literature review calls for the inclusion of “S.P.A.D.” in future revisions of the DSM in the new “Non-Substance Addiction” category and be defined as “[t]he compulsive use of a smart-phone that, in excess, causes significant impairment of social, physical, and cognitive function. Internal symptoms are emotions such as anxiety, depression, and low self-esteem. External symptoms are using phones in inappropriate settings (walking, bathroom, driving), compulsive smart-phone use, and smart-phone dependence. Specific criteria for S.P.A.D. should include:

- Constant preoccupation with a smart-phone such as checking a smart-phone notifications or texts even if there is no audible ring or vibration.
- The individual has possession of their smart-phone at all times.
- Loss or separation of smart-phone (either physical or loss of battery power) causes at least five of the following symptoms: intense fear or anxiety, depression, trembling, perspiration, tachycardia, increased blood pressure, feelings of loneliness, and panic attacks (what was previously known as “nomophobia”) and receiving phone stops symptoms.
- Individuals using their smart phone for more than seven hours a day.
- The individual is physically asocial and prefers to use their smart-phone.
- Attenuation of possible smart-phone loss by having backup batteries, charging cords, and charging in inappropriate settings (classroom, family meetings, social meetings).

- Using smart-phones to relieve negative moods (being in socially stressful situations, guilt, anxious situations) or using it in inappropriate settings (classroom, bathroom, before sleeping, and driving).
- Need to be positively evaluated through social media or texting.

Comorbid disorders would include: Obsessive compulsive personality disorder, social anxiety disorder, dependent personality disorder, agoraphobia, or major depressive disorder”. These criteria are based upon the Billieux (2012) Pathway Model (see Figure 2).

Tests such as Proactive Coping Inventory, Multidimensional Scale of Perceived Social Support, State-Trait Anxiety Inventory, and Beck’s Depression Inventory should be scales to determine any comorbid disorders (Greenglass, Schwarzer, Jakubiec, Fiksenbaum, & Taubert, 1999; Zimet, Dahlem, Zimet, & Farley, 1988; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983; Beck, Ward, Mendelson, Mock, & Erbaugh., 1961)

Further research on smart-phone addiction and nomophobia should include replications of previous research, new empirical studies employing the tests used in this article, operationally defining excessive smart-phone use and symptoms, and unification of existing measures. This will ensure that smart-phone addiction will become public knowledge and will eventually lead to developing a course of strategy for identifying potential underlying causes and undiagnosed disorders.

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Table 1. Existing measures of problematic mobile phone use

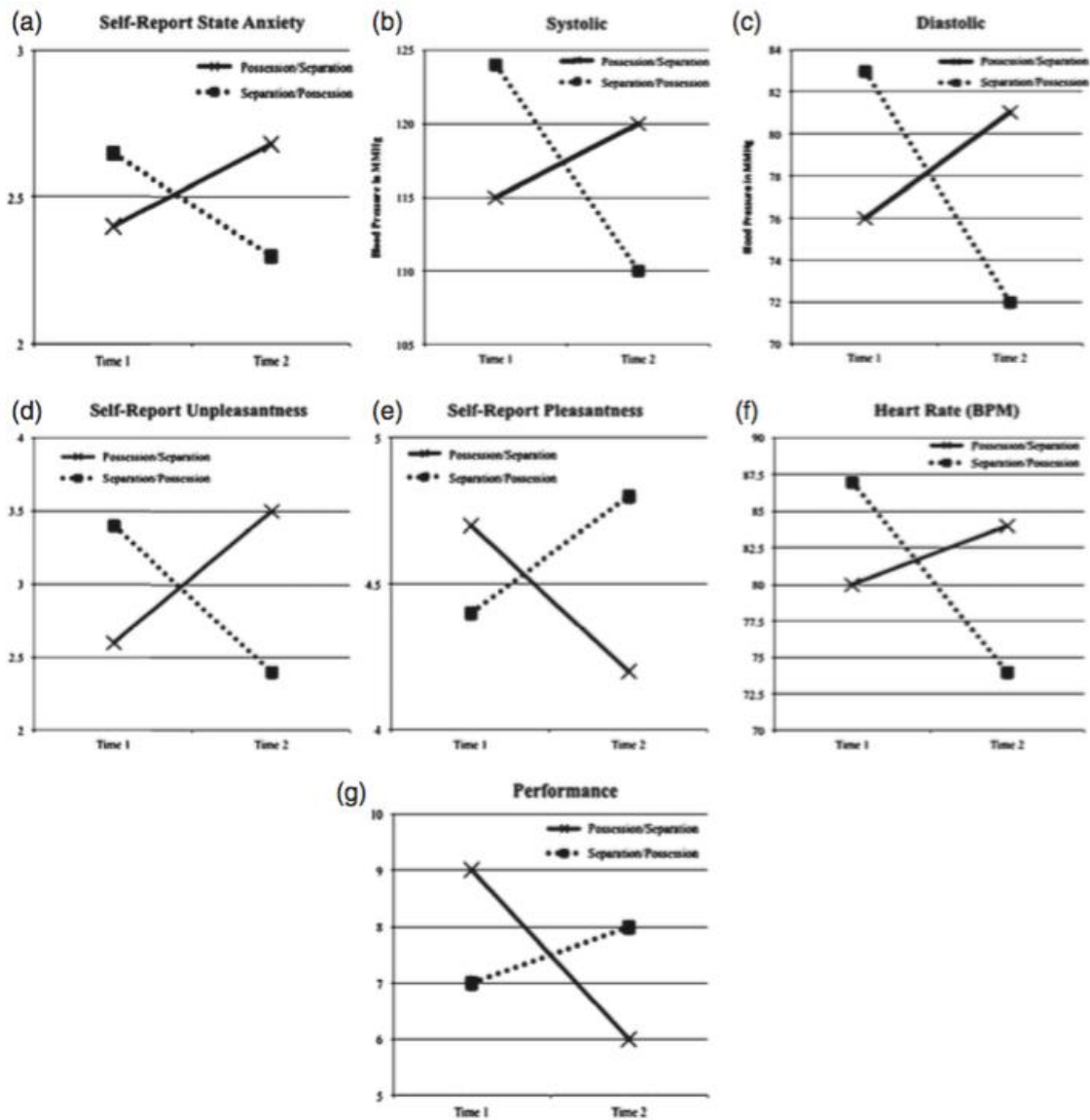
Measure	Authors	Basis	Subjects	Items	Factor(s)	Validation Technique
Mobile Phone Problem Use Scale (MPPUS)	Bianchi and Phillips (2005) [12]	Substance abuse literature	University students and community participants	28-item Likert (10 points)	Unique factor of problem use [†]	Index of reliability, external and internal validity. Factorial structure not reported
Problematic Mobile Phone Use Questionnaire (PMPUQ)	Billieux <i>et al.</i> (2008) [6]	Existing studies on problem mobile phone use	Community participants	30-item Likert (4 points)	Prohibited use dangerous use; dependence; financial problems	Index of reliability, external and internal validity. Exploratory and confirmatory factor analyses
Text-Message Dependency Scale (TMDS)	Igarashi <i>et al.</i> (2008) [22]	Existing studies on text-message use/Young's criteria for Internet addiction	College students (15-18 years old)	15-item Likert (5 points)	Emotional reaction; excessive use; relationship maintenance	Index of reliability, external and internal validity. Exploratory and confirmatory factor analyses
Mobile Phone Dependence Questionnaire (MPDQ)	Toda <i>et al.</i> (2004) [11]	Evidence of excessive and prohibited use in students	Female university students	20-item Likert (4 points)	Unique factor of problem use	Index of reliability, external and internal validity. Exploratory factor analysis
SMS Problem Use Diagnostic Questionnaire (SMS-PUDQ)	Rutland <i>et al.</i> (2007) [23]	Young's criteria for Internet addiction	University students	8-item dichotomous	Pathological use; excessive use	Index of reliability, external and internal validity. Exploratory factor analysis
Mobile Phone Involvement Questionnaire	Walsh <i>et al.</i> (2010) [18]	Substance abuse literature	Community participants	8-item Likert (7 points)	Unique factor of problem use	Index of reliability, external and internal validity. Principal component analysis
Problem Cellular Phone Use Questionnaire (PCPU-Q)	Yen <i>et al.</i> (2009) [19]	Substance abuse literature	Adolescents	12-item dichotomous	Symptoms of problematic use [‡] ; functional impairment	Index of external and internal validity, cut-off analysis

[†]Although the validation article of the MPDQ (published in Japanese) proposed a six-factor solution of the scale, subsequent studies by the same authors considered either a one-factor solution or dissimilar multifactorial factorial structures. Accordingly, this scale is here mentioned as a one-factor scale.

[‡]A cut-off of at least four of the seven symptoms composing the scale is proposed to define pathological mobile phone use.

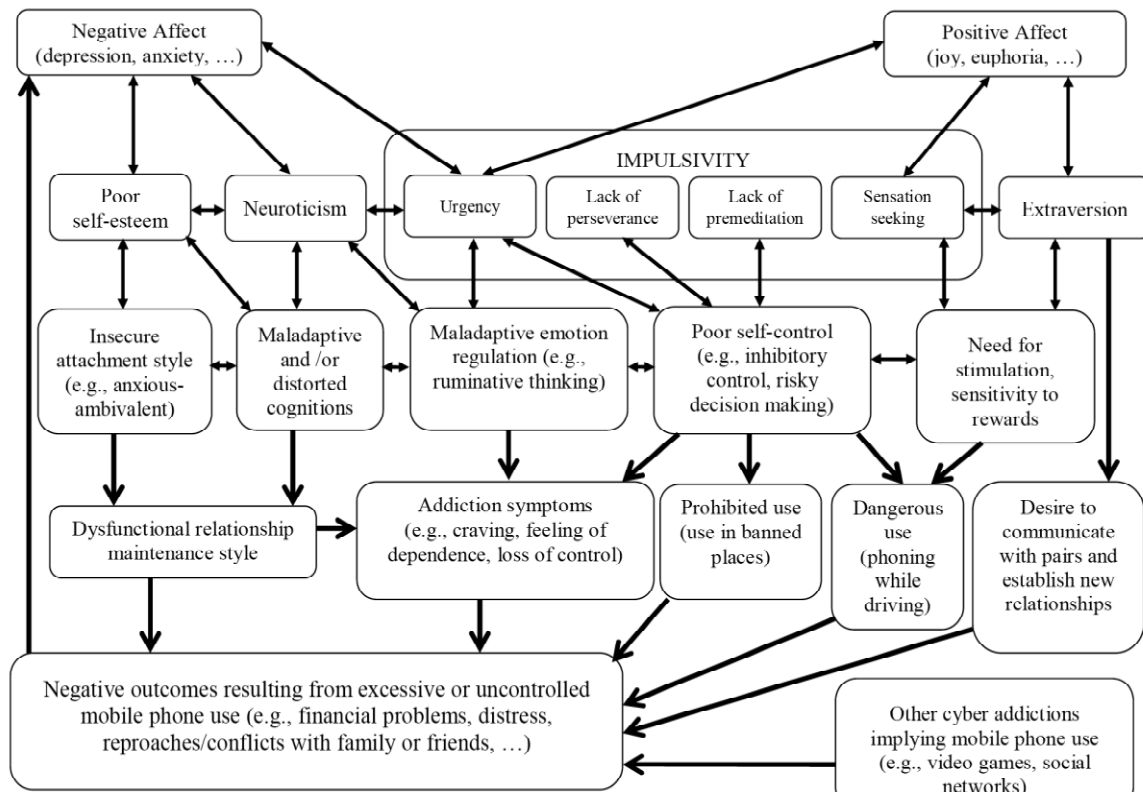
From “Problematic use of the mobile phone: a literature review and a pathways model,” by Billieux, 2012, *Current Psychiatry Reviews*, 8(4), 299-307. Copyright 2012 by Current Psychiatry Reviews

Figure 1. Measures A - G shows that repossession of the phone is even lower than initial possession across all measures. The bold lines represent possession then separation of the smart-phone and the dotted lines as separation then repossession of the smart-phone.



From “The extended iSelf: the impact of iPhone separation on cognition, emotion, and physiology” by Clayton, R. B., Leshner, G., & Almond, A, 2015, *Journal of Computer-Mediated Communication*, 20(2), 119-135. Copyright 2015 by Journal of Computer-Mediated Communication

Figure 2. Integrative model depicting four pathways to problematic mobile phone use: (1) the impulsive pathway; (2) the relationship maintenance pathway, (3) the extraversion pathway, and (4) the cyber addiction pathway.



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