

**ATTACHMENT TO MOBILE PHONES: AN EXAMINATION OF UNIVERSITY STUDENTS' MOBILE  
PHONE USE WITHIN AN ATTACHMENT THEORY FRAMEWORK**

by

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## **Abstract**

With the increasingly ubiquitous use of mobile phones in modern culture, particularly among university students, recent research has focused on the behaviours, characteristics, and effects of mobile phone use, with the evaluation of addictive features largely dominating work in this area. Given the lack of consensus regarding the etiology and standard measure of this addiction model, the objective of this study was to explore the possibility of an alternative framework for understanding university students' relationships with their mobile phones (i.e., that of attachment theory rather than addiction). To this end, data was collected from 403 undergraduate participants (between the ages of 18-25, who owned a smartphone with at least one active social media account) recruited from two large Canadian universities. Participants responded to an online questionnaire including measures of sociodemographic information (e.g., gender, ethnicity, mobile phone use), adult attachment dimensions, mobile phone attachment, problematic mobile phone use, and their device's perceived relationship-facilitating function. Findings indicated that, overall, participants were forming some degree of attachment to their mobile phones, and that this was particularly true for those higher in attachment anxiety. Further, attachment anxiety was found to be related to characteristics of problematic mobile phone use, and this relationship was mediated by features of mobile phone attachment. Thus, results from this study supported the use of an attachment theory framework for understanding what has typically been conceptualized as mobile phone addiction (i.e., there was an indirect relationship between attachment anxiety and problematic mobile phone use through participants' attachments to their mobile phones). As the first study to examine the relationship between mobile phone attachment and problematic mobile phone use, findings from this work have important implications for understanding university students' relationships with their mobile phones, while

offering insight into some of the alarming behaviours that have emerged alongside increasing mobile phone use.

## **Lay Summary**

Research into mobile phone use has largely focused on mobile phone addiction as a way of understanding people's constant connection to their devices. Seeing as this 'constant connection' is becoming increasingly common in modern culture, this study aimed to provide an alternative way of understanding university students' relationships with their mobile phones. Specifically, this study explored the use of a biologically-adaptive relationship model, rather than one of addiction, for understanding university students' mobile phone use. Findings from this study indicated that people who have difficulty trusting others in relationships are more likely to be attached to their mobile phones, and that this is related to their experiences of what is often described as mobile phone addiction. Thus, these findings contribute to the development of a more complete understanding of university student mobile phone use and can thus help inform intervention and prevention programs targeting mobile phone addiction.

## **Preface**

This thesis is an original intellectual product of the author, Natasha Parent. The data used in this study were collected as a joint endeavor between Master of Arts students, Natasha Parent and Takara A. Bond, under the supervision of Dr. Jennifer Shapka. All research presented as part of this thesis was approved by the University of British Columbia's Behavioural Research Ethics Board [certificate # H18-00752] and Wilfrid Laurier University's Research Ethics Board [certificate # 5719].

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# **Chapter 1: Introduction and Review of Literature**

## **1.1 Introduction**

With the ubiquity of mobile phones in modern culture, there has been increased interest in understanding the effects and behaviours related to mobile phone use. Though there is a clear lack of consensus regarding definition and standard measure, evaluation of the addictive features of mobile phone use has become a focus of research (e.g., Bianchi & Philips, 2005; Billieux, Van Der Linden, & Rochat, 2008; Takao, Takahashi, & Kitamura, 2009; Weller, Shackelford, Dieckmann, & Slovic, 2013). Given reports that 79% of smartphone owners have their phone on them for all but two of their waking hours (Levitas, 2013), along with the fact that the number of active mobile phone subscriptions now exceeds the total world population (Kemp, 2015), investigation into this seemingly problematic behaviour is not unfounded. Moreover, with about two thirds of people reporting distress upon being separated from their phone (King, et al., 2013), a proportion that is even higher for young adults (Sharma, Sharma, Sharma, & Wavare, 2015), some degree of dependence on mobile phones appears to be a normative phenomenon rather than an anomaly or a disorder. Thus, the overarching objective of this study is to explore the possibility of an alternative framework for understanding university students' relationships with their mobile phones. Specifically, seeing as most of the research in this area has examined these relationships within the lens of addiction, this study aims to explore the use of an attachment theory framework to account for university students' experiences of what has typically been conceptualized as problematic mobile phone use. This chapter begins with a brief overview of the current state of the literature on university student mobile phone use, but with a focus on problematic use and addiction. It then reviews John Bowlby's (1969) attachment theory. The remaining sections of this chapter then summarize the existing research examining

attachment to mobile phones, as well as the relationship between attachment anxiety and mobile phone addiction. Finally, the last section of this chapter provides a rationale for applying an attachment theory framework to the understanding of university students' relationships with their mobile phones, and outlines the research objectives for this thesis.

## **1.2 University Student Mobile Phone Use**

Over the past few years, mobile phone use has become an increasingly widespread phenomenon, with 31.2 million wireless subscribers in Canada (i.e., a .7 million increase since 2016; Canadian Wireless Telecommunications Association, 2017). According to a survey by the Pew Research Center (2015), 46% of smartphone users say their phone is something that they “could not live without”. This present-day fascination with mobile phones is especially intense for young adults, particularly university students (Forgays, Hyman, & Schreiber, 2014; Roberts, Pullig, & Manolis, 2014), who frequently demonstrate attachment to their devices through acts such as consistently sleeping besides their phones (Ezoe, Toda, Yoshimura, Naritomi, Den, & Marimoto, 2009), and texting or calling while driving (Bianchi & Phillips, 2005; Weller et al., 2013). Indeed, for many young people, their phone is the first thing they look at in the morning, and the last thing they look at before going to sleep (Oulasvirta, Rattenbury, Ma, and Raita, 2012). Often considered “digital natives” (Forgays et al., 2014), 18–25-year-olds are currently the first adult generation that has grown up with mobile phone access. Moreover, findings have shown that university-aged students are the highest users of mobile devices, both in terms of frequency of use, and prevalence of ownership (Forgays et al., 2014; Cheever, Rosen, Carrier, & Chavez, 2014). Not surprisingly, most university students appear to be preoccupied with their mobile phones and report using them to help them feel relaxed, to escape problems, and to lift their moods (Smetaniuk, 2014).

In a study on technology use, Rosen, Cheever, and Carrier (2012) found that more than 60% of university-aged students checked their smartphones every 15 min or less, while this is only true for 40% of middle age adults, and 20% of older adults. Additionally, 50% of university-aged students reported feeling anxious when they could not check their technology, compared to about 25%, and 15% for the older adult generations (Rosen et al., 2012). This feeling of anxiety upon being separated from one's mobile is referred to as nomophobia (a portmanteau for "no more phone"); conceptualized as the fear, anxiety, or discomfort related to being out of touch with one's device (King et al. 2013), and is especially prevalent among university-aged students who regularly rate the possibility of not being able to access their mobile phone as anxiety-provoking (Forgays et al., 2014; Sapacz, Rockman, & Clark, 2016; Weller, et al., 2013).

Moreover, in several studies it was found that women exhibit a higher level of dependence on their mobile phones than men (Geser, 2006; Jenaro, Flores, Gomez-Vela, Gonzalez-Gil & Caballo, 2007). Geser (2006) found that women were nearly three times more likely than men to agree with the statement, "I cannot imagine life without the mobile [phone]". Moreover, research has shown that women utilize their devices more as a social tool (i.e., as a means of maintaining and nurturing relationships) while men utilize them more for functional purposes or as a source of entertainment (Bianchi & Phillips, 2005; Geser, 2006). In further support of this, Junco, Merson, and Salter (2010) found that female university students spent more time socializing (e.g., texting and calling) than their male counterparts. That said, little or no difference in mobile phone dependence across male and female users has been reported in other studies (Bianchi & Phillips, 2005; Junco et al., 2010). Gender and sex differences aside, it is clear that mobile phone use is an increasingly prevalent phenomenon among university

students. Despite this, little research has examined university students' relationships with their devices. Specifically, of the narrow work exploring this area, most studies have looked at university students' relationships with their mobile phones through the lens of addiction. As such, the following section will review the current state of the literature on problematic mobile phone use.

### **1.3 Problematic Mobile Phone Use and Addiction**

As a fairly new and important concept among researchers, overuse and dependence on mobile phones has been studied and classified in a variety of ways, none of which has resulted in a widely accepted terminology (e.g., mobile phone addiction, smartphone addiction, problematic mobile phone use). Broadly defined as the continued use of the mobile phone in spite of negative consequences, leading the individual to compulsively use their device in inappropriate situations such as during class, while driving, or at night when one should be sleeping (Bianchi & Phillips, 2005; Ezoe et al., 2009; Takao et al., 2009; Weller et al., 2013), problematic and excessive mobile phone use has largely been conceptualized as an addictive behaviour. Though mobile phone addiction has not been included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, (DSM-V; American Psychiatric Association, 2013), and so is not a currently accepted diagnostic category, excessive mobile phone use has generally been understood as an addiction since it is believed to include the core components of addictive behaviours, including cognitive salience, loss of control, mood modification, tolerance, withdrawal, conflict, and relapse (Griffiths, 2005; Bilieux, Maurage, Lopez-Fernandez, Kuss, & Griffiths, 2015). As such, it has been classified as a subset of behavioural addictions, such as gambling and overeating, similar to drug addiction where instead of being addicted to a substance the individual is addicted to the behaviour, or the feeling experienced by acting out the



behaviour (Takao et al., 2009; Alavi et al., 2012).

Similar to substance addictions, mobile phone addiction has been theorized to function according to the principles of operant conditioning (Roberts et al., 2014); such that when an individual experiences happiness or enjoyment from an activity with their mobile phone (e.g., watching a funny video), they are more likely to engage in that particular activity again (i.e., positive reinforcement). The same can be said for negative reinforcement (i.e., reducing or removing aversive stimuli), such as when an individual uses their mobile phone to escape an awkward social situation by either checking their phone or pretending to send a text. Seeing as any activity that is rewarded has the potential to become addictive (Alavi et al., 2012; Griffiths, 2005; Roberts et al., 2014), it is theorized that the rewards resulting from engaging in these behaviours with the mobile phone encourage higher involvement with the device and can thus result in more time spent engaging in that particular behaviour. For instance, van Dursen, Bolle, Hegner, and Kommers (2015) described the process of repeatedly checking one's phone as a result of new messages or notifications functioning as a reward (i.e., positive reinforcement) that can lead to the overuse of one's device and, thus, the development of mobile phone addiction. In this way, within an addiction framework, studies suggest that overuse of mobile phones, such as habitual checking, can push users into compulsive usage and lead to problematic use (Augner & Hacker, 2012; van Dursen et al., 2015). Moreover, according to Gökçearsan, Mumcu, Haşlaman, and Çevik (2016) although mobile phone addiction resembles other technological addictions, it can be much more dangerous since modern-day phones offer features such as portability and ease-of-connectivity. As such, described in terms of dangerous use (e.g., while driving), inappropriate or prohibited use (e.g., while in class), use incurring financial problems (e.g., resulting in extremely high mobile phone bills), and overuse or dependence-related

symptoms, problematic mobile phone use, as conceptualized within the lens of addiction, has been associated with low self-esteem (Bianchi & Phillips, 2005), as well as chronic stress and depression (Augner & Hacker, 2012).

Despite the accumulating evidence that mobile phone dependence is associated with negative consequences, its precise incidence, prevalence and symptomology remain a matter of much debate. In their review, Billieux et al. (2015) report that prevalence studies conducted within the last decade have reported highly heterogeneous rates of mobile phone addiction, ranging from around 0% to 35% and that this heterogeneity is mainly due to the lack of an appropriate theoretical rationale guiding most of the research in this area. On the whole, they conclude that there is a lack of evidence supporting problematic mobile phone use as an addictive behaviour. As such, as an alternative to the addiction model, this study aims to examine problematic mobile phone use as a manifestation of object attachment, in which university students' dependence on their mobile phones is conceptualized as a biologically adaptive attachment to their devices. In this vein, the following section will review the literature on attachment theory; first discussing the origins of the theory, Internal Working Models (IWMs), attachment dimensions, and adult attachment. It will then consider conceptualizations of attachment to objects, as well as attachment to the mobile phone specifically.

## **1.4 Attachment Theory**

Attachment theory (Bowlby, 1969) has become one of the leading theoretical frameworks for understanding social development, personality processes, and close relationships (Crowell, Fraley, & Shaver, 2008). Based on Bowlby's (1958) pioneering work "The nature of the child's tie to his mother", attachment theory is traditionally defined as a theory focusing on the bonding quality, and the model of relatedness, between individuals. Thus, conceptualized as a fundamental human need and biological predisposition for individuals to bond with others, Bowlby (1969) described attachment as the human propensity to seek proximity to caregivers that is activated during moments of discomfort or threat. According to Bowlby (1969), the presumed biological function of the attachment system is to protect individuals from danger by assuring that they maintain proximity to caring and supportive others (i.e., attachment figures). As such, attachment is understood as the enduring motivational system designed by natural selection to serve human survival needs through protecting the attached individual from physical and psychological harm.

### **1.4.1 Internal Working Models**

Bowlby (1969) hypothesized that individuals develop representations of the functioning and significance of close relationships and that these representations, referred to as Internal Working Models (IWM), consist of their beliefs and expectations about how attachment relationships operate. More precisely, IWMs are cognitive-affective structures which develop in the course of behavioural interactions between the infant and primary caregiver and reflect expectations about the child's own behaviours and their caregiver's likely response in various situations (Bowlby, 1969). These IWMs form the basis for behaviours in attachment situations and are revised throughout the lifespan as a function of significant attachment-related

experiences (Crowell et al., 2008). That said, they are theorized to be relatively stable, guiding behaviours in both early relationships with parents, and later relationships with significant others (Bretherton, 1985; Crowell et al., 2008). Thus, an individual's attachment dimension arises from their IWMs of attachment relationships (Bretherton, 1985; Crowell et al., 2008); forming a mental representation, complete with experience-based beliefs, expectations, emotions, and action tendencies, that are to some degree influenced by all important relationships throughout their life, especially those with primary attachment targets (Bowlby 1969; Hazan & Shaver, 1994). As such, experiences with the individuals on which one relies the most for comfort and security form the foundation of their model of the world as a place in which comfort and security are reliably available.

#### **1.4.1.1 Attachment Dimensions**

First arising from Ainsworth's (1978) work characterizing patterns of attachment as "secure", "anxious", and "avoidant", an individual's attachment orientation, pattern, or style, is generally conceptualized as their position on two conceptually distinct dimensions: anxiety and avoidance (Chopnik & Peterson, 2012). According to Bowlby (1969), interactions with available and responsive attachment figures facilitate the optimal functioning of the attachment system and promote a sense of attachment security. However, when attachment figures are not reliably available and supportive, defensive secondary attachment strategies develop through the hyper-activation or de-activation of the attachment system. These strategies reflect the dimensions of attachment anxiety (i.e., compulsively seeking proximity and protection, accompanied by a hypersensitivity to signs of possible rejection or abandonment; Mikulincer & Shaver, 2007), and attachment avoidance (i.e., maximizing autonomy and distance from others and avoiding intimacy; Mikulincer & Shaver, 2007) and have been characterized as inner resources that guide

coping behaviours and exert strong effects on an individual's response to life stressors (Bowlby, 1969).

When the attachment system is activated in response to a perceived threat, a heightened level of distress propels one to take action in order to regain a sense of security and reinstate balance. For those high in attachment anxiety, the perceived unreliability of support from close others functions as a perceived threat, leading individuals to exhibit excessive reassurance-seeking and hypervigilance to signs of abandonment and rejection (Mikulincer & Shaver, 2007). To cope with this, they employ strategies that help reduce the uncertainty about close others, such as insistent attempts to establish proximity or elicit support through clinging and controlling responses. In contrast, attachment avoidance is characterized by chronic attempts to inhibit the activation of the attachment system as a means of minimizing emotional distress (Chopnik & Peterson, 2012). Thus, in an effort to protect themselves from the perceived unreliability of close others, individuals high in attachment avoidance tend to avoid intimacy and are less likely to provide emotional support for close others (Chopnik & Peterson, 2012). Both attachment anxiety and attachment avoidance are considered insecure attachment dimensions and are said to develop in response to early attachment behaviours that are met by rejection, inconsistency, or threat, leaving the child to feel uncertain about the caregiver's responsiveness (Crowell et al., 2008). Thus, though behaviorally distinct, individuals are thought to develop both attachment anxiety and avoidance in an attempt to manage chronic concerns about the availability and reliability of close others. By contrast, secure attachment patterns are thought to result from early attachment behaviours in response to stress that are met by protection and reassurance, and are characterized by low attachment anxiety and low attachment avoidance (i.e., a comfort with both intimacy and independence).

#### **1.4.1.2 Attachment Throughout the Lifespan**

Though attachment theory was originally conceptualized to explain the emotional bond between infants and their caregivers, Bowlby (1969) posited that early attachment experiences are prominent and vital components of human experience, from the “cradle to the grave” (p. 208). More specifically, Bowlby (1969) and Ainsworth (1978) asserted that attachment behaviours that emerge in early childhood can be observed throughout the lifespan, especially when an individual faces crises or stressful situations. Seeing as early attachment relationships between children and caregivers form adaptive IWMs, which are key to the quality and nature of future relationships, IWMs developed in early life are said to guide future expectations about the availability and accessibility of support from others, and predict considerable continuity in attachment relationships (Bowlby, 1969). As such, working models of attachment are said to be gradually constructed out of experiences throughout infancy, childhood, and adolescence, at which point they become relatively resistant, though still not impervious to change, and thus influence the beliefs, perceptions, and behaviours that shape individuals’ predictions and management of interactions well into adulthood (Bowlby 1969). For example, frantic attempts to regain security through some environmental source, displayed by children with persistent concerns about the availability of attachment targets, is a behaviour that is likely to persist or resurface later in life (Grossmann, Grossman, Kindler, & Zimmerman, 1999). This is supported by findings from Mikulincer, Shaver and Pereg (2003) that individuals with early insecure attachment patterns have a tendency to demonstrate similar disorganized patterns when faced with distressing situations in adulthood, leading to excessive attempts towards finding an attachment target from which to seek care, support, and attention. Moreover, many studies have observed evidence of a relationship between early life attachment experiences and later life

beliefs and behaviours (e.g., Hazan & Shaver, 1987; Grossman et al., 1999), such that individuals with early inconsistent or rejecting attachment figures appear to be less equipped to cope with stressful situations, perhaps as a result of their negative expectations about the dependability and trustworthiness of others.

## **1.4.2 Adult Attachment**

### **1.4.2.1 Overview**

Although Bowlby (1969) and Ainsworth (1978) had both mentioned the role of attachment in adult romantic relationships, Hazan and Shaver (1987) were the first to identify the kinds of individual differences described by Ainsworth (1978) in the context of adult pair-bonding. Specifically, Hazan and Shaver (1987) were among the first to empirically identify Ainsworth's (1978) attachment patterns (i.e., secure, anxious, avoidant) in adults, in approximately the same percentages of the population, and conceptualized adult romantic love, or pair-bonding, as an attachment process that mirrors the formative steps and individual differences of infant-parent attachment (Hazan and Shaver, 1987). In support of Bowlby's (1969) assertions, they found that working models of attachment continue to guide and shape close relationships throughout the lifespan such that, when building new relationships, individuals rely on previous expectations about how others are likely to behave and feel toward them, and use these models to interpret the goals or intentions of potential attachment targets (Hazan & Shaver, 1987). As such, much of the research on adult attachment has been based on the assumption that there are parallel differences in infant and adult patterns of attachment (e.g., Hazan & Shaver, 1987; Mikulincer & Shaver, 2007).

Just as childhood changes in attachment patterns are attributed to changes in the quality of parent-child interactions (Bowlby, 1969), Bowlby hypothesized that change in later life

attachment patterns can occur through the influence of new attachment relationships. Specifically, Bowlby (1969) theorized attachment relationships to be hierarchically arranged, with the primary attachment figure at the top (i.e., as the preferred source of security and comfort in times of distress) and other attachment targets serving as alternatives when the primary figure is unavailable (Hazan & Shaver, 1994; Trinke & Bartholomew, 1997). Moreover, it has been theorized that over the course of development, many changes can occur in the content and structure of the attachment hierarchy (Bowlby 1969; Hazan & Shaver, 1994). According to Bowlby (1969), though parental figures tend to be permanent members of the hierarchy, their positions change as children mature, and other targets are added or dropped.

#### **1.4.2.2 Attachment vs. Other Relationships**

Bowlby (1969) differentiated between attachment relationships and other friendships, such that an individual is said to seek the attachment figure when under stress but to seek a friend when in good spirits. Since the two are not incompatible, it is possible for one person to fulfill both roles (Bretherton, 1985). As such, attachment theorists have proposed a variety of features distinguishing attachment relationships from other forms of relationships (Ainsworth, 1985; Bowlby, 1969; Hazan & Shaver, 1994). Most notably, Ainsworth (1985) described four key features that reappear in attachment relationships. First, an attachment bond is marked by proximity maintenance (i.e., the tendency for an individual to remain in close contact with the attachment figure). Second, an attachment target is used as a safe haven for safety, protection, and support, during times of threat or weakness. Third, an attachment target is relied on as a secure base for exploration, such that the presence of the attachment target promotes feelings of security and confidence. Fourth, individuals experience separation anxiety upon parting with the attachment target. These features of attachment relationships appear both in infancy and



adulthood, as individuals across the lifespan show a desire for proximity to attachment figures when stressed, increased feelings of safety and comfort in the presence of attachment figures, and anxiety when attachment figures are inaccessible (Crowell et al., 2008).

### **1.4.3 Object Attachment**

#### **1.4.3.1 Overview**

Building on Bowlby's (1969) assertion that attachment targets exist within a hierarchy with the primary attachment figure at the top, Hazan and Shaver (1994) specified that, though they differ in their importance, people normally become attached to multiple individuals, and even to inanimate objects. In support of this, several studies have demonstrated individuals' attachment to material objects (e.g., clothing, photographs, stuffed animals/dolls; Cipriani & Kreider, 2009; Keefer, Landau, Rothschild, & Sullivan, 2012; Myers, 1985). In line with human attachment figures, attachment objects, representing a source of comfort, become attachment targets through learned association, and provide relief from negative feelings when an individual is distressed (Bretheton, 1985; Passman, 1987). Moreover, object attachment is theorized to reflect the major features of attachment bonds (i.e., the proximity of the attachment object provides a sense of security to the individual and a safe haven in situations of distress, such that separation from the object results in separation anxiety; Ainsworth, 1985; Bowlby, 1969; Hazan & Shaver, 1994).

Though attachment to objects has not been extensively studied, the majority of research on the topic has been conducted within the context of infancy and child development (i.e., childhood attachment to objects such as pacifiers, stuffed animals, or blankets; Litt, 1986; Passman, 1987; Winnicott, 1953; Wolf & Lozoff, 1989). These understandings provide a strong foundation from which object attachment, and thus attachment to mobile phones, can be

conceptualized in adulthood. As such, the following section will review the literature on object attachment in infancy, before discussing object attachment in adulthood and to mobile phones specifically.

#### **1.4.3.2 Object Attachment in Infancy**

The first discussion of object attachment was in relation to transitional objects, put forth by Winnicott (1953), who theorized that young children use transitional objects as a normative part of healthy emotional development. More precisely, Winnicott (1953) theorized that children use objects as a means of facilitating the acceptance of the unfamiliar in their gradual attainment of separateness from their primary caregiver. By contrast, Bowlby (1969) conceptualized object attachment in infancy more broadly, as to include any attachment to a non-human target that is characterized by attachment features (i.e., proximity seeking, secure base, safe haven, and separation anxiety; Ainsworth, 1985). As such, Bowlby (1969) proposed that the presence of object attachment represents the child's redirection of attachment behaviour when the primary attachment target (e.g., the mother) is not available, much like the use of alternative attachment targets descending an individual's attachment hierarchy. In other words, Bowlby (1969) theorized that children form attachments to objects as a means of coping with the perceived unavailability of their primary attachment targets; seeking proximity to them to help buffer feelings of anxiety, and regain a sense of security upon separation. This is supported by findings from Wolf and Lozoff (1989) that physical distance from the primary attachment target was associated with the child's use of attachment objects at bedtime, and that the presence of an attachment object (e.g., the child's blanket) in times of stress, anxiety, or illness, can have a soothing effect (Passman, 1987; Litt, 1986, Winnicott, 1953).

Just as a child's attachment to their primary attachment figure develops through the

understanding that this person will reliably respond and provide reassurance in times of distress; attachment to objects, such as pacifiers or blankets, is thought to develop from a learned association between these and positive outcomes (Passman, 1987). Thus, in the same way that children seek their attachment figures to increase feelings of comfort and security, children reach for their attachment objects to fulfill their attachment needs (Passman, 1987). For example, as children learn to associate their blanket with physical warmth, softness and pleasure, they may develop an attachment to the object, and use the object to substitute the sense of comfort and security usually provided by their primary attachment figure (Bowlby, 1969; Passman, 1987). Thus, when a child forms an attachment to a specific object, the presence of that object provides them with a sense of security in situations of distress, allowing them to develop more effective emotional regulation and coping strategies, and thus experience less anxiety (Bowlby, 1969). Moreover, once the child learns to associate the object with positive outcomes, engaging with it provides a feeling of comfort in general, even in the absence of a stressor (Bowlby, 1969). Thus, children's use of attachment objects appears in a variety of situations, both in and out of the presence of their primary attachment figure, such that attachment objects sometimes seem to be of more importance to the child than their primary attachment target (Litt, 1986). This may be partly due to the fact that, since objects are inanimate, children are able to exert far more control over them than their other attachment targets. As such, though objects are lacking in important human characteristics, they have the advantage of being completely controlled and reliable (Keefer et al., 2014).

## **1.5 Attachment to Mobile Phones**

Though the presence of attachment to childhood objects in adulthood has long been considered pathological (Hooley & Wilson-Murphy, 2012; Winnicott, 1953), there is evidence in support of healthy, well-functioning adults reporting significant emotional attachments to special objects (Free & Goodrich, 1985; Myers, 1985; Keefer 2012). Much like in infancy, the presence of these objects can be soothing in times of stress (Winnicott, 1953) and can contribute to greater psychological health (Free & Goodrich, 1985). In line with this, research has shown that individuals readily form attachments with non-human targets (e.g., companion animals; Archer & Ireland, 2011, places; Scannell & Gifford, 2010, and material objects; Cipriani & Kreider, 2009; Keefer et al., 2012; Konok, Gigler, Bereckzy, & Miklósi 2016; Konok, Pogány, & Miklósi, 2017; Myers, 1985), and that they derive security from these targets by virtue of their perceived reliability. Indeed, though attachment theory (Bowlby, 1969) was originally used to conceptualize bonds that develop between children and their primary caregivers, it has also proven useful in understanding other important relationships, including those between humans and inanimate objects, and thus may offer insight into the experience of mobile phone attachment. In this vein, university students' relationships with their mobile phones could be characterized by the major features of attachment bonds (i.e., proximity seeking, secure base, safe haven, and separation anxiety; Ainsworth, 1985). This has been partly supported by findings from Fowler and Noyes (2015), which showed that young adults characterized their mobile phones as a source of safety, as well as findings about nomophobia from King et al. (2013), which showed that young adults experience separation anxiety upon being separated from their devices. Moreover, the responsiveness of the mobile phone, combined with its ability to be completely controlled, may make it a particularly attractive attachment target for those

concerned with the unreliability of close others (i.e., those high in attachment anxiety). This theorizing converges with accounts of object attachment in infancy (Winnicott, 1953; Bowlby, 1969; Passman, 1987) that posit that children cope with the unavailability of caregivers by virtue of the perceived reliability of their attachment objects (e.g., blankets).

To date, limited research has examined attachment to mobile phones. However, a study by Konok et al. (2016) did find that young adults readily formed attachments to their mobile phones, and that this was particularly true for those high in attachment anxiety. Moreover, Keefer et al. (2012) found that participants who were primed with relationship uncertainty experienced more separation anxiety upon being separated from their mobile phones, suggesting that they may have been using their devices as alternative attachment targets. Further, Konok et al. (2017) found that participants separated from their mobile phones made more attempts to regain proximity to their devices, displayed more self-contact behaviour, and showed increased heart rate responses. Additionally, for this group, self-reported mobile phone attachment was positively associated with self-reported state anxiety, and slower reaction time to separation-related words on an emotional Stroop test (Konok et al., 2017). For this study, upon being separated from their devices, individuals who ranked higher in self-reported attachment to their mobile phones experienced more separation-specific emotions such as loneliness and abandonment, which decreased their performance for similar words on the emotional Stroop test.

Though these studies support the conceptualization of mobile phones as attachment targets, when considering the fact that the mobile phone can be used as both an attachment object itself, and also as a means of accessing human attachment targets, it is possible that mobile phone attachment is a result of the relationship-facilitating function of the device, rather than an attachment to the object itself. To account for this, both Keefer et al. (2012) and Konok et al.

(2016) conducted studies in which they controlled for participants' perceptions of their mobile phone's relationship-facilitating function. Specifically, Keefer et al. (2012) found that increased mobile phone attachment in response to the perceived unreliability of close others remained significant when controlling for participants' ratings of their phone's relationship-facilitating function. Further, Konok et al. (2016) found that young adults form attachments to their mobile phones, independent from their devices' perceived relationship-facilitating function, suggesting that attachment to mobile phones is not merely driven by a desire to reconnect with close others. That said, for individuals high in attachment anxiety, Konok et al. (2016) found that the most important aspect of their mobile phone was its relationship-facilitating function. This may be due to the fact that mobile phones can make it easier to check on the availability of close others; a feature that may be particularly appealing for those with chronic concerns about their relationships (Chopik & Peterson, 2014). Thus, though individuals higher in attachment anxiety appear to be forming attachments to their devices regardless of their phones' perceived relationship-facilitating function; this function, providing the impression that close others are more readily available, may afford them with a sense of security, and help decrease their attachment anxiety.

Additionally, within the context of the more widely applied addiction framework, attachment anxiety has been positively associated with problematic mobile phone use (Ge, 2014). In line with the theorizing of Flores (2001) regarding the influence of attachment dimensions on the development of addictions, it has been proposed that the association between insecure attachment dimensions (i.e., attachment anxiety or attachment avoidance) and mobile phone addiction results from the use of the mobile phone as a means of reducing the pain that results from an inability to properly regulate one's emotions (Kim, Cho, & Kim, 2017). As such,

individuals with insecure attachment dimensions may develop mobile phone addiction as an alternative to overcoming difficulties in their relationships. Specifically, Kim et al. (2017) theorize that the relationship between insecure attachment dimensions and mobile phone addiction results from an individual's use of the mobile phone as an alternative for their lack of a secure attachment. As such, given the link between attachment insecurity and problematic mobile phone use, as well as the potential for the mobile phone to serve as an attachment target, this study provides an alternative framework within which to conceptualize university students' relationships with their mobile phones.

## **1.6 The Current Study**

Contributing to the literature on university student mobile phone use and dependence, in this study university students' relationships with their mobile phones, as well as their experiences of the features typically conceptualized as problematic mobile phone use, were examined through the lens of attachment theory rather than that of addiction. Based in the understanding that dependence on mobile phones should not be considered a pathological phenomenon, but rather the result of a motivational system that can promote autonomous functioning, the use of an attachment theory framework was applied in this work to better understand university students' relationships with their mobile phones. Five research questions guided this study: 1) Are university students forming attachments to their mobile phones and does this vary by gender or ethnicity? 2) Does mobile phone attachment differ by adult attachment dimension (i.e., level of attachment anxiety and attachment avoidance)? 3) How is mobile phone attachment related to the devices' perceived relationship-facilitating function? 4) Is adult attachment dimension related to problematic mobile phone use? 5) Does mobile phone attachment account for the relationship between attachment anxiety and problematic mobile phone use?

## Chapter 2: Methods

### 2.1 Participants

This study involved a total of 403 participants: 202 students recruited from the University of British Columbia (UBC; a large, public, research university in Western Canada, with a diverse population of international and Canadian students) and 201 students recruited from Wilfrid Laurier University (WLU; a large, public, research university in Eastern Canada). The majority of participants (76.6%) self-identified as women and this was not statistically different by school ( $\chi^2 = .41, p = .840$ ). Approximately 10% of participants identified as LGBTQ2S, which was statistically significantly different by university (i.e., more at UBC than WLU,  $\chi^2 = 4.20, p = .040$ ). Just under half of the sample (44.3%) self-reported their ethnicity as White, while 27.6% indicated East Asian, 16.7% indicated South Asian, 3.7% indicated Southeast Asian, 1.7% indicated West Asian, 3.2% indicated Black, .7% indicated Indigenous, and 3.7% indicated an ethnicity classified as 'Other' (e.g., Canadian, European, Middle Eastern, North African). There were statistically significant differences in self-reported ethnicity by school. Specifically, more students identified as South Asian ( $n = 41$ ), White ( $n = 108$ ), or Black ( $n = 10$ ) at WLU than at UBC (South Asian  $n = 26$ ,  $\chi^2 = 4.21, p = .04$ ; White  $n = 70$ ,  $\chi^2 = 15.25, p < .001$ ; Black  $n = 3$ ,  $\chi^2 = 3.97, p = .046$ ). Contrarily, there were more students who identified as East Asian at UBC ( $n = 88$ ) than at WLU ( $n = 23$ ,  $\chi^2 = 41.694, p < .001$ ).



## **2.2 Procedures**

### **2.2.1 UBC Recruitment**

Upon receiving approval from UBC's Behavioural Research Ethics Board (BREB), participants were recruited from UBC's campus in the spring 2018 semester using posters (posted in heavy-traffic areas, such as the UBC bus loops) with a URL link to the online survey (see Appendix A), as well as posts in UBC Facebook groups. Participants were also approached directly by the researchers and asked to immediately complete a self-report questionnaire on an iPad mini, or given flyers with a URL that links to the online survey (see Appendix A). All interested participants from UBC were invited to enter a draw for a \$250 gift card to the bookstore. Participation in the draw was not dependent upon completion of the questionnaire and a winner was selected at random in July 2018.

### **2.2.2 WLU Recruitment**

Following ethical approval from Wilfrid Laurier University's Research Ethics Board, recruitment took place through the Psychology Research Experience Program (PREP) in the spring 2018 semester. Students who were enrolled in courses that included a PREP component had the option to participate in the study to receive course credit. These participants accessed the online self-report questionnaire through the PREP website.

### **2.2.3 Completing the Questionnaire**

Before commencing the questionnaire, all participants at both UBC and WLU were prompted to consent to participating in the research. The consent form (see Appendix B) outlined the purpose of the research, the eligibility criteria, what will be done with the data, confidentiality concerns, ethical considerations, withdrawal procedures (i.e., the ability to withdraw during and after participation in the study), as well as researcher contact information

for any inquiries about the study. The questionnaire took approximately 15 minutes to complete, at which time participants were thanked for their participation, provided with information about counselling services should any of the content have been triggering (e.g., UBC Wellness Center, Ontario Mental Health), and once again given researcher contact information for further inquiries (see Appendix C).

#### **2.2.4 Sampling Criteria**

Participants were sampled to satisfy three relevant criteria developed from the literature on mobile phone use. First, participants had to be between 18-25 years old as this age group is the first adult generation that has grown up with mobile phone access (i.e., “digital natives”; Fowler & Noyes, 2015). Moreover, findings have shown that university-aged students are the highest users of mobile phones, both in terms of frequency of use, and prevalence of ownership (Forgays et al., 2014), making them a particularly interesting population in which to explore mobile phone attachment. Second, participants had to be university students since university represents an important developmental period in which major changes can occur in an individuals’ hierarchy of attachment targets (i.e., the position of parents as the primary attachment target may shift to that of peers, or romantic relationships, as targets are added and dropped from the attachment hierarchy; Bowlby, 1969; Hazan & Shaver, 1994; Kenny, 1987). Thus, the developmental shift in the ranking of attachment targets that occurs in university may represent an opportune time for individuals to develop attachments to their mobile phones. Third, participants were required to own a mobile phone with internet access (i.e., a smartphone) and currently have at least one active social media account. This criterion reflects previous findings that accessing the internet (i.e., for social media) is one of the primary uses of mobile phones among university students (Gökçearslan, et al. 2016; Roberts, et al., 2014).

## **2.3 Measures**

Demographic information was collected via self-report questionnaires (see Appendix D). Specifically, participants were asked to respond to items about their age, gender, sexual orientation, ethnicity, and student status. There were two items asking participants about the time they spent engaging in mobile phone use. The first asked participants to report the average number of hours they spent on their mobile phone each day, and the other used a 6-grade Likert scale to indicate how much time they spent on their mobile phone (i.e., from 1 = not very much, to 6 = almost always). These two items were highly correlated ( $r(362) = 0.544, p < .001$ ), and functioned similarly in all analyses. As such, only the Likert scale measure was included in further analyses since it was more normally distributed. Finally, participants were asked whether or not they owned a smartphone and had at least one active social media account. Students who did not meet the eligibility criteria outlined above (i.e., currently an undergraduate student, aged between 18-25, owned a smartphone, and had at least one active social media account) were redirected to the last page of the questionnaire and were removed from the data prior to analyses.

### **2.3.1 Adult Attachment**

Adult Attachment was measured using the revised version of the Experience in Close Relationships Scale (ECR-R; Fraley & Shaver, 2000). This scale is one of the most commonly used self-report measures of adult attachment. The original ECR emerged from a principal component analysis of 323 attachment items from 60 self-report measures of attachment, completed by 1086 undergraduates, and produced factors related to Attachment Anxiety and Attachment Avoidance (Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010). The ECR-R was revised by Fraley and Shaver (2000) to improve the item-response metrics of the scale, yielding Cronbach's alpha coefficients near or above  $\alpha = .90$ , and test-retest coefficients between  $\alpha = .5$

and  $\alpha = .75$ , with little correlation between the scales of Attachment Anxiety and Avoidance in most samples (see Ravitz et al., 2010). The ECR-R is a 36-item questionnaire (see Appendix E) that asks participants to rate on a 7-grade Likert-scale how much they agree with each item (i.e., from 1 = strongly disagree to 7 = strongly agree).

For the purpose of this study, in line with the theorizing of Hazan and Shaver (1994), the ECR-R measured adult attachment dimensions in terms of individuals' relationships with a current or past romantic partner. Though adult attachment targets can also include parents and peers (Bowlby, 1979), Hazan and Shaver (1994) asserted that in adulthood, romantic partners almost exclusively assume the role of primary attachment target. As such, for the sake of clarity and consistency, participants were asked to respond to questionnaire items in relation to a current or past romantic relationship. Negatively worded items were reverse-coded and the composite variables for Attachment Anxiety and Attachment Avoidance were computed by taking the mean of the items for each subscale. In this sample, the Cornbach's alpha coefficient was  $\alpha = .88$  for Attachment Anxiety, and  $\alpha = .68$  for Attachment Avoidance (see Table 2.1).

### **2.3.2 Mobile Phone Attachment**

Mobile phone attachment was measured using the Mobile Attachment Questionnaire (MAQ; Konok et al., 2017). This self-report questionnaire was developed by Konok et al (2017) from 48 items that described the main features of attachment relationships (i.e., proximity seeking, secure base, safe haven, and separation anxiety; Ainsworth, 1985) with regards to the mobile phone. After item-response and principal component analyses, the final measure included 15 items loading onto four subscales (Konok et al., 2017; see Appendix F). These subscales were interpreted by Konok et al. (2017) as Safe Haven (i.e., turning to the mobile phone to decrease

anxiety), Separation Anxiety (i.e., an increased feeling of anxiety upon separation from the mobile phone), Secure Base (i.e., being more confident or at ease in the presence of the mobile phone), and Separation Insecurity (i.e., a decreased sense of security when separated from the mobile phone). Konok et al. (2017) found that these components best reflected the features of human attachment bonds in relation to the mobile phone. Together, these subscales explained 70.8% of the total variance. Konok et al. (2017) found that the internal consistency of the final version of the questionnaire was excellent ( $\alpha = .91$ ), and the Cronbach's alphas for the subscales were:  $\alpha = .74$  for Safe Haven;  $\alpha = .76$  for Separation Anxiety;  $\alpha = .83$  for Secure Base; and  $\alpha = .91$  for Separation Insecurity.

In this study, participants were asked to rate each of the 15-items on a 5-grade Likert scale based on how characteristic they were of them (i.e., from 1 = not characteristic at all to 5 = very characteristic). Negatively worded items were reverse-coded and composite variables for each subscale were computed by taking the mean of the items for each scale. In this sample, the internal consistency of the overall questionnaire was  $\alpha = .91$ , and the Cronbach's alphas for each subscale were:  $\alpha = .49$  for Safe Haven;  $\alpha = .73$  for Separation Anxiety;  $\alpha = .43$  for Secure Base; and  $.87$  for Separation Insecurity. To adjust for low reliability, the reverse coded items were removed from the Safe Haven and Secure Base subscales, yielding Cronbach's alphas of  $\alpha = .68$ , and  $\alpha = .81$  respectively (see Table 2.1).

### **2.3.3 Perceived Relationship-Facilitating Function**

Participants' ratings of the relationship-facilitating function of their mobile phones were assessed using a scale (see Appendix G) combining items available from the measure used by Keefer et al. (2012) and items from the "Need to Connect" subscale of Konok et al.'s (2017)

original MAQ measure. In this study, participants were asked to rate each of the 5 items (e.g., “My phone helps maintain my relationships” from Keefer et al., 2012; and “I worry if I cannot be reached on my phone” from Konok et al., 2017) in terms of how much they agreed with each statement (i.e., from 1 = Strongly Disagree to 5 = Strongly Agree). Negatively worded items were reversed coded and a composite variable was created by taking the mean of each item. In this study, the internal consistency for this scale was  $\alpha = .73$  (see Table 2.1).

#### **2.3.4 Problematic Mobile Phone Use**

Problematic mobile phone use was one of the primary outcomes for this study and was measured using the Problematic Mobile Phone Use Scale (PMPUS; Guzeller & Cosguner, 2012). In consultation with five experts, this scale was developed by Guzeller and Cosguner (2012) to reflect the core components of addictive behaviours (i.e., cognitive salience, loss of control, mood modification, tolerance, withdrawal, conflict, and relapse; Griffiths, 2005; Bilieux et al., 2015) as they appeared in other existing measures. The original 34-items had five subscales defined as “losing control and receiving complaints”, “anxiety and craving”, “withdrawal/escape”, “productivity loss”, and “compulsion/persistence” (Guzeller & Cosguner, 2012). Screen plot analyses and Varimax rotation led the authors to the extraction of three main factors which accounted for 55.5% of the variance. These three factors were Negative Effect, explaining 36.6% of the variance, Compulsion-Persistence, explaining 13.0% of the variance, and Withdrawal-Tolerance, explaining 5.9% of the variance with Cronbach’s alpha coefficients for each subscale larger than .70 (Guzeller & Cosguner, 2012).

This scale was selected for this study since it was developed to reflect what had commonly been conceptualized as the key features of addictive behaviours, and thus allowed for

the examination of an attachment theory framework for understanding problematic mobile phone use. In this study, participants were asked to rate each of the resulting 18-items (see Appendix H) in terms of how often it applied to them on a 5-point Likert-scale (i.e., from 1 = never to 5 = always). The negatively worded items were reverse-coded and composite variables were computed for each subscale by taking the mean of the items for each subscale. In this sample, internal consistency for the overall scale was  $\alpha = .87$ , and the Cronbach's alpha was  $\alpha = .77$  for the Withdrawal-Tolerance subscale,  $\alpha = .84$  for the Negative Effects subscale, and  $\alpha = .73$  for Compulsion-Persistence subscale (see Table 2.1).

**Table 2.1 Descriptive Statistics for Measures**

Variables	<i>n</i>	<i>M</i>	<i>SD</i>	Range	$\alpha$
Mobile phone use	378	3.93	.086	1-6	N/A
PRFF	383	3.6997	.7459	1-5	.732
Attachment Anxiety	377	3.7408	1.0553	1-6.72	.879
Attachment Avoidance	376	2.8864	1.01164	1-5	.683
<i>Mobile Phone Attachment</i>	374	3.0987	.70034	1-5	.907
Safe Haven	374	3.2353	.97460	1-5	.681
Separation Anxiety	374	3.2464	.88684	1-5	.732
Secure Base	374	2.6765	1.03731	1-5	.806
Separation Insecurity	374	3.0731	.93475	1-5	.868
<i>Problematic Mobile Phone Use</i>	375	2.8513	.56505	1-4.56	.863
Withdrawal-Tolerance	375	2.4869	.79360	1-5	.774
Negative Effects	375	2.5829	.69852	1-4.50	.836
Compulsion-Persistence	375	3.6481	.68610	1-5	.729

*Note.* PRFF = perceived relationship-facilitating function.

## Chapter 3: Results

Of the 542 participants who participated in this study, 105 did not meet the inclusion criteria (i.e., between the ages of 18-25, currently an undergraduate student and own a smartphone with at least one active social media account) and were thus removed from the analysis. An additional 35 participants only completed the demographics sections (i.e., less than 50% progress as defined by Qualtrics) and were also excluded from the analysis. Independent samples t-tests indicated that there were no significant differences for age, gender or ethnicity, between those who completed the study and those who only completed the socio-demographic questions. For all key measures, the majority of cases had no missing values. Version 23 of SPSS (IBM Corp., 2015) and Version 3 of the PROCESS macro for SPSS (Hayes & ProQuest Firm, 2018), which employs a regression-based approach to mediation, were used to conduct the data analyses for this study. Missing values were accounted for using the pairwise/listwise function in IBM SPSS Software and assumptions for multiple regression were conducted via statistical tests (e.g., linearity, homoscedasticity, normality of estimation error, multicollinearity and independence of observations).

### 3.1 Correlations

Bivariate analyses of socio-demographics and attachment dimensions revealed that age was negatively correlated with Attachment Anxiety ( $r(375) = -.136, p = .008$ ) and Attachment Avoidance ( $r(374) = -.102, p < .019$ ). This suggests that older participants were more likely to have secure attachments (as defined by a lack of attachment anxiety and avoidance). In line with this, being further along in terms of years of undergraduate education was negatively associated with Attachment Avoidance ( $r(373) = -.116, p = 0.025$ ). Additionally, self-identifying as White was negatively correlated with Attachment Avoidance ( $r(374) = -.126, p = .015$ ) and Attachment



Anxiety ( $r(375) = -.155, p = .003$ ), suggesting that these participants were more likely to have secure attachments. These characteristics were not significantly associated with the outcome variables (i.e., subscales of the Mobile Attachment Questionnaire and the Problematic Mobile Phone Use Scale subscales) and so were not included in further analyses. Table 3.1 summarizes the correlations between gender, mobile phone use, attachment dimensions, the device's perceived relationship facilitating function, and the outcome variables (i.e., the subscales of the Mobile Attachment Questionnaire, and the Problematic Mobile Phone Use Scale subscales).

**Table 3.1 Correlations Among Variables of Interest**

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Gender		.116*	.053	.018	.055	.120*	.140*	.120*	.170**	-.001	-.019	.107*
2. Mobile phone use			.192***	.026	.339***	.368***	.336***	.384***	.349***	.435***	.389***	.389***
3. Attachment Anxiety				.281***	.262***	.293***	.277***	.223***	.375***	.323***	.226***	.078
4. Attachment Avoidance					-.099	.001	-.008	-.010	.055	.056	.093	-.219***
5. PRFF						.340***	.450***	.338***	.357***	.302***	.206***	.443***
6. MAQ_SH							.485***	.609***	.582***	.458***	.422***	.337***
7. MAQ_SA								.511***	.678***	.332***	.227***	.381***
8. MAQ_SB									.616***	.598***	.444***	.278***
9. MAQ_SI										.514***	.374***	.299***
10. PMPUS_WT											.705***	.227***
11. PMPUS_NE												.186***
12. PMPUS_CP												

*Note.* For gender, women = 1, men = 0. PRFF = perceived relationship-facilitating function. Mobile Attachment Questionnaire (MAQ) subscales: MAQ\_SH = Safe Haven, MAQ\_SA = Separation Anxiety, MAQ\_SB = Secure Base, MAQ\_SI = Separation Insecurity. Problematic Mobile Phone Use Scales: PMPUS\_WT = Withdrawal-Tolerance, PMPUS\_NE = Negative Effects, PMPUS\_CP = Compulsion-Persistence. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

### **3.2 Mobile Phone Attachment**

To address the first research question, which looked at whether or not students were forming attachments to their mobile phones, and whether this differed by gender or ethnicity, the means of the Mobile Attachment Questionnaire subscales were computed and examined using an independent t-test grouped by gender, as well as category of ethnicity. On average, those who identified as women scored significantly higher than those who identified as men in terms of each of the Mobile Attachment Questionnaire subscales, i.e., Safe haven ( $t(368) = -2.322, p = .021$ ), Separation Anxiety ( $t(368) = -2.711, p = .007$ ), Secure Base ( $t(368) = -2.326, p = .021$ ), and Separation Insecurity ( $t(368) = -3.310, p = .001$ ). Moreover, independent t-tests by category of ethnicity indicated a significant difference for the Separation Insecurity subscale for those who identified as Asian ( $t(371) = -2.600, p = .010$ ) and White ( $t(372) = 3.187, p = .002$ ). This suggests that, on average, participants who identified as Asian scored significantly higher on the Separation Insecurity subscale, while those who identified as White scored significantly lower.

### **3.3 Regression Analyses**

#### **3.3.1 Attachment Dimensions & Attachment to Mobile Phones**

To address the second research question about whether mobile phone attachment varied by adult attachment dimension, Hierarchical Linear Regression was used to examine the relationship between Attachment Anxiety, and Attachment Avoidance, and the Mobile Attachment Questionnaire subscales (i.e., Safe Haven, Separation Anxiety, Secure Base, and Separation Insecurity), while considering gender, mobile phone use, and the devices' perceived relationship-facilitating function as covariates. First, the analyses for Attachment Anxiety were conducted. As shown in Table 3.2, gender and mobile phone use were included in Block 1 and mobile phone use was significantly associated with higher scores on each of the Mobile

Attachment Questionnaire subscales. Not surprisingly, participants' reports of more time spent using mobile phones was associated with more attachment to their devices. Moreover, those who identified as women reported higher levels of mobile phone attachment in terms of the Separation Anxiety and Separation Insecurity subscales of the Mobile Attachment Questionnaire, but not the Safe Haven and Secure Base subscales. Perceived relationship-facilitating function and Attachment Anxiety, included in Block 2, were significantly associated with each of the Mobile Attachment Questionnaire subscales. This suggests that, over and above identifying as women, and time spent engaging in mobile phone use, those higher in Attachment Anxiety were also more likely to be attached to their mobile phones, when controlling for their devices' perceived relationship-facilitating function.

Following this, regression models were run for Attachment Avoidance. As can be seen in Table 3.3, gender and mobile phone use were included in Block 1 and once again, mobile phone use was significantly associated with higher scores on each of the Mobile Attachment Questionnaire subscales while gender was only significantly associated with the Separation Anxiety and Separation Insecurity subscales. Perceived relationship-facilitating function and Attachment Avoidance were included in Block 2. Though perceived relationship-facilitating function was significantly associated with each of the Mobile Attachment Questionnaire subscales, Attachment Avoidance was not. This suggests that, over and above identifying as women, and time spent engaging in mobile phone use, those higher in Attachment Avoidance were not more likely to be attached to their mobile phones, when controlling for their devices' perceived relationship-facilitating function.

**Table 3.2 Summary of Hierarchal Regressions Examining the Relationships between Attachment Anxiety and the Mobile Attachment Questionnaire Subscales**

Variables	Mobile Attachment Questionnaire – Safe Haven				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.138	
Gender	.199	.114	.086		
Mobile phone use	.307	.043	.352***		
<i>Block 2</i>				.232	.094***
Gender	.181	.108	.078		
Mobile phone use	.207	.044	.238***		
PRFF	.296	.067	.226***		
Attachment Anxiety	.167	.045	.182***		
Mobile Attachment Questionnaire – Separation Anxiety					
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.125	
Gender	.224	.106	.106*		
Mobile phone use	.260	.040	.325***		
<i>Block 2</i>				.271	.146***
Gender	.206	.097	.097*		
Mobile phone use	.141	.039	.176***		
PRFF	.427	.060	.355***		
Attachment Anxiety	.109	.040	.130**		
Mobile Attachment Questionnaire – Secure Base					
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.090	
Gender	.215	.121	.087		
Mobile phone use	.338	.046	.364***		
<i>Block 2</i>				.155	.065***
Gender	.200	.117	.081		
Mobile phone use	.247	.047	.266***		
PRFF	.308	.072	.221***		
Attachment Anxiety	.104	.048	.106*		
Mobile Attachment Questionnaire – Separation Insecurity					
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.138	
Gender	.296	.110	.134**		
Mobile phone use	.278	.041	.333***		
<i>Block 2</i>				.269	.131***
Gender	.275	.101	.124**		
Mobile phone use	.173	.041	.207***		
PRFF	.272	.063	.216***		
Attachment Anxiety	.230	.042	.261***		

*Note.* For gender, women = 1, men = 0. PRFF = perceived relationship-facilitating function.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Table 3.3 Summary of Hierarchal Regressions Examining the Relationships between Attachment Avoidance and the Mobile Attachment Questionnaire Subscales**

Variables	Mobile Attachment Questionnaire – Safe Haven				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.133	
Gender	.199	.114	.086		
Mobile phone use	.307	.043	.352***		
<i>Block 2</i>				.202	.064***
Gender	.190	.110	.082		
Mobile phone use	.223	.044	.255***		
PRFF	.358	.067	.273***		
Attachment Avoidance	.022	.046	.023		
	Mobile Attachment Questionnaire – Separation Anxiety				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.125	
Gender	.224	.106	.106*		
Mobile phone use	.260	.040	.325***		
<i>Block 2</i>				.256	.131***
Gender	.212	.098	.100*		
Mobile phone use	.151	.039	.189***		
PRFF	.467	.059	.388***		
Attachment Avoidance	.012	.041	.013		
	Mobile Attachment Questionnaire – Secure Base				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.147	
Gender	.215	.121	.087		
Mobile phone use	.338	.046	.364***		
<i>Block 2</i>				.200	.053***
Gender	.206	.118	.084		
Mobile phone use	.257	.047	.277***		
PRFF	.345	.071	.247***		
Attachment Avoidance	.006	.049	.006		
	Mobile Attachment Questionnaire – Separation Insecurity				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.138	
Gender	.296	.110	.134**		
Mobile phone use	.278	.041	.333***		
<i>Block 2</i>				.212	.073***
Gender	.285	.105	.128**		
Mobile phone use	.192	.042	.230***		
PRFF	.363	.064	.288***		
Attachment Avoidance	.063	.044	.068		

*Note.* For gender, women = 1, men = 0. PRFF = perceived relationship-facilitating function.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

### **3.3.2 Perceived Relationship-Facilitating Function**

To address the third research question, about the relationship between the devices' perceived relationship-facilitating function and mobile phone attachment, findings reported in Tables 3.2 and 3.3 indicated that the device's perceived relationship-facilitating function was significantly associated with each subscale of the Mobile Attachment Questionnaire. This suggests that participants' who perceived their devices to be important to the maintenance of their relationships were also more likely to be attached to their devices. Moreover, an interaction term for Attachment Anxiety and the device's perceived relationship-facilitating function was computed to determine whether participants' perceptions of their devices' relationship-facilitating function amplified the relationships between Attachment Anxiety and the Mobile Attachment Questionnaire subscales. This interaction term was not statistically significant, suggesting that the relationships between Attachment Anxiety and the Mobile Attachment Questionnaire subscales did not vary as a function of the devices' perceived relationship-facilitating function. Note that an interaction term was not explored for Attachment Avoidance as it was not significantly associated with the outcome variables.

### **3.3.3 Attachment Dimensions & Problematic Mobile Phone Use**

To address the fourth research question about the relationship between attachment dimensions and mobile phone dependence, the relationships between Attachment Anxiety, and Attachment Avoidance, and the Problematic Mobile Phone Use Scale subscales were examined in a series of regressions, while taking into account the impact of gender, mobile phone use, and the devices' perceived relationship-facilitating function. First, the relationship between Attachment Anxiety and the Problematic Mobile Phone Use Scale subscales (i.e., Withdrawal-Tolerance, Negative Effects, and Compulsion-Persistence) were examined. Gender and mobile

phone use were included in Block 1 for each of these regressions. As shown in Table 3.4, only mobile phone use was significantly associated with each of the outcome variables, suggesting that reports of problematic mobile phone use were not influenced by gender. Next, perceived relationship-facilitating function and Attachment Anxiety were included in Block 2. Findings indicated that Attachment Anxiety was significantly associated with the Withdrawal-Tolerance and Negative Effects subscales of the Problematic Mobile Phone Use Scale, but not with the Compulsion-Persistence subscale. Moreover, the device's perceived relationship-facilitating function was associated with the Withdrawal-Tolerance and Compulsion-Persistence subscales of the Problematic Mobile Phone Use Scale, but not with the Negative Effects subscale.

Following this, the relationship between Attachment Avoidance and the subscales of the Problematic Mobile Phone Use Scale were examined. As shown in Table 3.5, gender and mobile phone use were included in Block 1, and only mobile phone use was significantly associated with the outcome variable. Perceived relationship-facilitating function and Attachment Avoidance were included in Block 2. Though the device's perceived relationship-facilitating function was associated with each of the subscales of the Problematic Mobile Phone Use Scale, Attachment Avoidance was only significantly associated with the Compulsion-Persistence subscale. Moreover, the relationship between Attachment Avoidance and the Compulsion-Persistence subscale was negative, suggesting that participants who reported higher rates of Attachment Avoidance also reported less experiences of the Compulsion-Persistence features of problematic mobile phone use.



**Table 3.4 Summary of Hierarchical Regressions Examining the Relationships between Attachment Anxiety and Problematic Mobile Phone Use Scale Subscales**

Variables	Problematic Mobile Phone Use – Withdrawal-Tolerance				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.192	
Gender	-.063	.090	-.033		
Mobile phone use	.312	.034	.441***		
<i>Block 2</i>				.270	.078***
Gender	-.077	.085	-.041		
Mobile phone use	.247	.035	.349***		
PRFF	.153	.052	.144**		
Attachment Anxiety	.164	.035	.221***		
	Problematic Mobile Phone Use – Negative Effects				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.152	
Gender	-.075	.082	-.045		
Mobile phone use	.246	.031	.392***		
<i>Block 2</i>				.182	.030**
Gender	-.083	.080	-.050		
Mobile phone use	.212	.032	.337***		
PRFF	.077	.049	.082		
Attachment Anxiety	.093	.033	.141**		
	Problematic Mobile Phone Use – Compulsion-Persistence				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.158	
Gender	.097	.079	.060		
Mobile phone use	.237	.030	.386***		
<i>Block 2</i>				.258	.108***
Gender	.095	.074	.059		
Mobile phone use	.169	.030	.276***		
PRFF	.330	.045	.360***		
Attachment Anxiety	-.048	.031	-.075		

*Note.* For gender, women = 1, men = 0. PRFF = perceived relationship-facilitating function.

\*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

**Table 3.5 Summary of Hierarchal Regressions Examining the Relationships between Attachment Avoidance and Problematic Mobile Phone Use Scale Subscales**

Problematic Mobile Phone Use Scale – Withdrawal-Tolerance					
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.192	
Gender	-.063	.090	-.033		
Mobile phone use	.312	.034	.441***		
<i>Block 2</i>				.229	.037***
Gender	-.068	.088	-.036		
Mobile phone use	.262	.035	.370***		
PRFF	.213	.053	.202***		
Attachment Avoidance	.043	.037	.055		
Problematic Mobile Phone Use Scale – Negative Effects					
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.152	
Gender	-.075	.082	-.045		
Mobile phone use	.246	.031	.392***		
<i>Block 2</i>				.172	.020*
Gender	-.080	.081	-.048		
Mobile phone use	.218	.033	.346***		
PRFF	.118	.049	.125*		
Attachment Avoidance	.063	.034	.090		
Problematic Mobile Phone Use Scale – Compulsion-Persistence					
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.158	
Gender	.097	.079	.060		
Mobile phone use	.237	.030	.386***		
<i>Block 2</i>				.300	.142***
Gender	.099	.073	.061		
Mobile phone use	.172	.029	.281***		
PRFF	.293	.044	.320***		
Attachment Avoidance	-.135	.030	-.199***		

*Note.* For gender, women = 1, men = 0. PRFF = perceived relationship-facilitating function.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

### **3.3.4 Attachment Anxiety, Mobile Phone Attachment, & Problematic Mobile Phone Use**

To answer the final research question, which examined the relationships between Attachment Anxiety and problematic mobile phone use, while taking into account the influence of mobile phone attachment, a series of hierarchical linear regressions were conducted. Gender and mobile phone use were included in Block 1. Then, Attachment Anxiety and the device's perceived relationship-facilitating function were included in Block 2. The Mobile Attachment Questionnaire subscales (i.e., Safe Haven, Separation Anxiety, Secure Base, and Separation Insecurity) were included in Block 3. As shown in Table 3.6, Table 3.7, and Table 3.8, the association between the Mobile Attachment Questionnaire subscales and problematic mobile phone use differed for each of the Problematic Mobile Phone Use Scale subscales examined. Specifically, the Mobile Attachment Questionnaire subscales for Separation Anxiety, Secure Base and Separation Insecurity were significantly associated with the Withdrawal-Tolerance subscale of the Problematic Mobile Phone Use Scale, over and above gender, mobile phone use, Attachment Anxiety, and the device's perceived relationship-facilitating function, while the Safe Haven subscale was not (see Table 3.6). Separation Anxiety was negatively associated with the Withdrawal-Tolerance subscale in this regression, suggesting that those who rated higher in terms of Separation Anxiety also reported less of the Withdrawal-Tolerance features of the Problematic Mobile Phone Use Scale.

**Table 3.6 Summary of Hierarchical Regressions Examining the Relationships between Attachment Anxiety, Mobile Attachment Questionnaire Subscales, and the Withdrawal-Tolerance Subscale of the Problematic Mobile Phone Use Scale**

	Problematic Mobile Phone Use – Withdrawal-Tolerance				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.193	
Gender	-.060	.090	-.032		
Mobile phone use	.313	.034	.442***		
<i>Block 2</i>				.271	.078***
Gender	-.074	.086	-.040		
Mobile phone use	.249	.035	.351***		
PRFF	.144	.053	.135**		
Attachment Anxiety	.168	.035	.225***		
<i>Block 3</i>				.468	.197***
Gender	-.163	.074	-.087*		
Mobile phone use	.156	.031	.220***		
PRFF	.051	.049	.048		
Attachment Anxiety	.104	.032	.139*		
MAQ_SH	.016	.043	.019		
MAQ_SA	-.138	.050	-.156**		
MAQ_SB	.306	.042	.400***		
MAQ_SI	.195	.052	.231***		

*Note.* For gender, women = 1, men = 0. PRFF = perceived relationship-facilitating function. Mobile Attachment Questionnaire (MAQ) subscales: MAQ\_SH = Safe Haven, MAQ\_SA = Separation Anxiety, MAQ\_SB = Secure Base, MAQ\_SI = Separation Insecurity. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

Moreover, each of the subscales of the Mobile Attachment Questionnaire (i.e., Safe Haven, Separation Anxiety, Secure Base, and Separation Insecurity) were significantly associated with the Negative Effects subscale of the Problematic Mobile Phone Use Scale, over and above gender, mobile phone use, Attachment Anxiety, and the device's perceived relationship-facilitating function (see Table 3.7). Separation Anxiety was also negatively associated with the outcome in this regression, suggesting that those who rated higher in terms of Separation Anxiety reported less Negative Effects of the Problematic Mobile Phone Use Scale. Lastly, only the Mobile Attachment Questionnaire subscales for Safe Haven and Separation Anxiety were significantly associated with the Compulsion-Persistence subscale of the

Problematic Mobile Phone Use Scale, over and above the influence of gender, mobile phone use, Attachment Anxiety, and the device's perceived relationship-facilitating function (see Table 3.8). Separation Anxiety was positively associated with the outcome in this regression.

**Table 3.7 Summary of Hierarchal Regressions Examining the Relationships between Attachment Anxiety, Mobile Attachment Questionnaire Subscales, and the Negative Effects Subscale of the Problematic Mobile Phone Use Scale**

	Problematic Mobile Phone Use – Negative Effects				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.151	
Gender	-.076	.082	-.045		
Mobile phone use	.246	.031	.391***		
<i>Block 2</i>				.181	.030**
Gender	-.084	.081	-.050		
Mobile phone use	.211	.033	.336***		
PRFF	.075	.050	.079		
Attachment Anxiety	.094	.033	.143**		
<i>Block 3</i>				.296	.115***
Gender	-.141	.076	-.085		
Mobile phone use	.146	.032	.233***		
PRFF	.015	.050	.016		
Attachment Anxiety	.047	.033	.071		
MAQ_SH	.116	.044	.161**		
MAQ_SA	-.123	.051	-.156*		
MAQ_SB	.157	.043	.232***		
MAQ_SI	.111	.053	.148*		

*Note.* For gender, women = 1, men = 0. PRFF = perceived relationship-facilitating function. Mobile Attachment Questionnaire (MAQ) subscales: MAQ\_SH = Safe Haven, MAQ\_SA = Separation Anxiety, MAQ\_SB = Secure Base, MAQ\_SI = Separation Insecurity. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Table 3.8 Summary of Hierarchical Regressions Examining the Relationships between Attachment Anxiety, Mobile Attachment Questionnaire Subscales, and the Compulsion-Persistence Subscale of the Problematic Mobile Phone Use Scale**

	Problematic Mobile Phone Use – Compulsion-Persistence				
	<i>b</i>	<i>SE</i>	$\beta$	$R^2$	$\Delta R^2$
<i>Block 1</i>				.160	
Gender	.100	.079	.061		
Mobile phone use	.238	.030	.389***		
<i>Block 2</i>				.269	.109***
Gender	.095	.074	.059		
Mobile phone use	.170	.030	.277***		
PRFF	.334	.046	.362***		
Attachment Anxiety	-.051	.031	-.078		
<i>Block 3</i>				.309	.040**
Gender	.054	.074	.033		
Mobile phone use	.136	.031	.221***		
PRFF	.259	.048	.281***		
Attachment Anxiety	-.080	.031	-.124*		
MAQ_SH	.096	.043	.136*		
MAQ_SA	.113	.049	.147*		
MAQ_SB	-.016	.041	-.024		
MAQ_SI	.013	.051	.018		

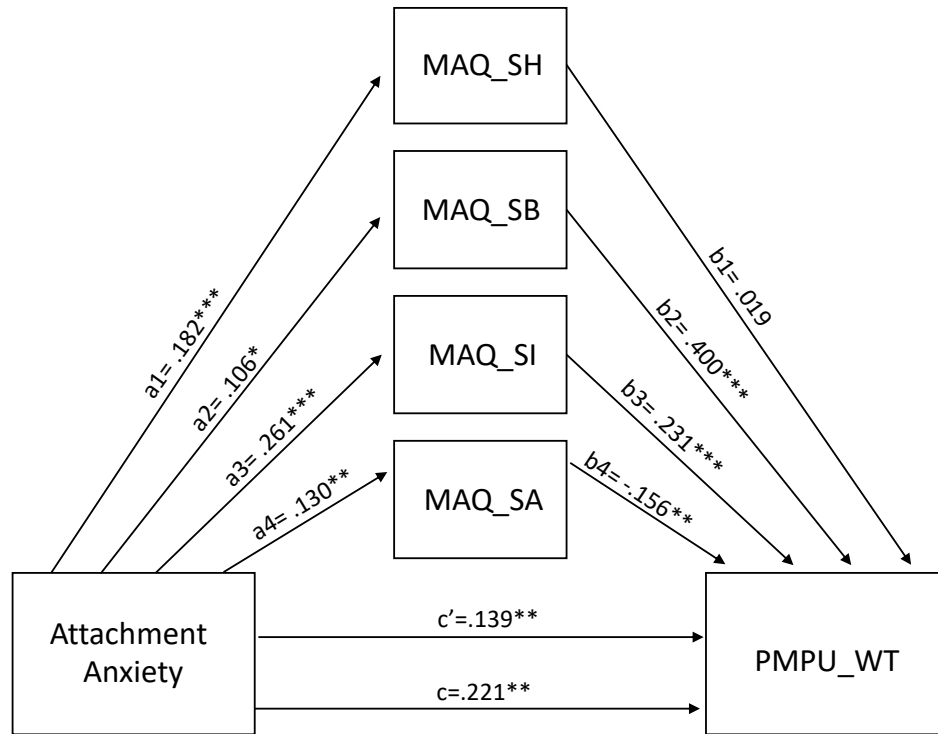
*Note.* For gender, women = 1, men = 0. PRFF = perceived relationship-facilitating function. Mobile Attachment Questionnaire (MAQ) subscales: MAQ\_SH = Safe Haven, MAQ\_SA = Separation Anxiety, MAQ\_SB = Secure Base, MAQ\_SI = Separation Insecurity. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

### 3.4 Mediation Models

To further explore the relationship between Attachment Anxiety and problematic mobile phone use, the Mobile Attachment Questionnaire subscales were examined as possible mediators of the relationships between Attachment Anxiety and the Problematic Mobile Phone Use Scale subscales, while taking into account the influence of gender, mobile phone use, and the devices' perceived relationship-facilitating function. First, to determine which subscales of the Mobile Attachment Questionnaire influenced the relationship between Attachment Anxiety and the Withdrawal-Tolerance subscale of the Problematic Mobile Phone Use Scale, while controlling for the influence of gender, mobile phone use, and the device's perceived relationship-facilitating

function, a parallel mediation analysis was conducted. As shown in Table 8, bootstrapped estimation using 10,000 samples indicated that the Separation Anxiety, Secure Base, and Separation Insecurity subscales of the Mobile Attachment Questionnaire significantly mediated the relationship between Attachment Anxiety and the Withdrawal-Tolerance subscale of the Problematic Mobile Phone Use Scale, while the Separation Insecurity subscale did not. The mediation effect of Separation Anxiety was negative, while the effects of Secure Base and Separation Insecurity were positive, suggesting an inconsistent mediation (Mackinnon, Fairchild, & Fritz, 2007) of the relationship between Attachment Anxiety and the Withdrawal-Tolerance subscale of the Problematic Mobile Phone Use Scale, in which the Separation Anxiety subscale acted as a suppressor (see Table 3.9). Moreover, in line with partial mediation (Baron & Kenny, 1989), the relationship between Attachment Anxiety and the Withdrawal-Tolerance subscale remained statistically significant when taking into account the impact of the mediators, and controlling for the Separation Insecurity subscale, gender, mobile phone use, and the devices' perceived relationship-facilitating function (see Figure 3.4.1). In this model, the predictors accounted for approximately 47% of the variance in the Withdrawal-Tolerance subscale of the Problematic Mobile Phone Use Scale ( $f(4, 351) = 32.424, p < .001, R^2 = .468$ ).

**Figure 3.4.1 Standardized Coefficients for the Relationship between Attachment Anxiety and the Withdrawal-Tolerance Subscale of the Problematic Mobile Phone Use Scale through the Mobile Attachment Questionnaire Subscales**



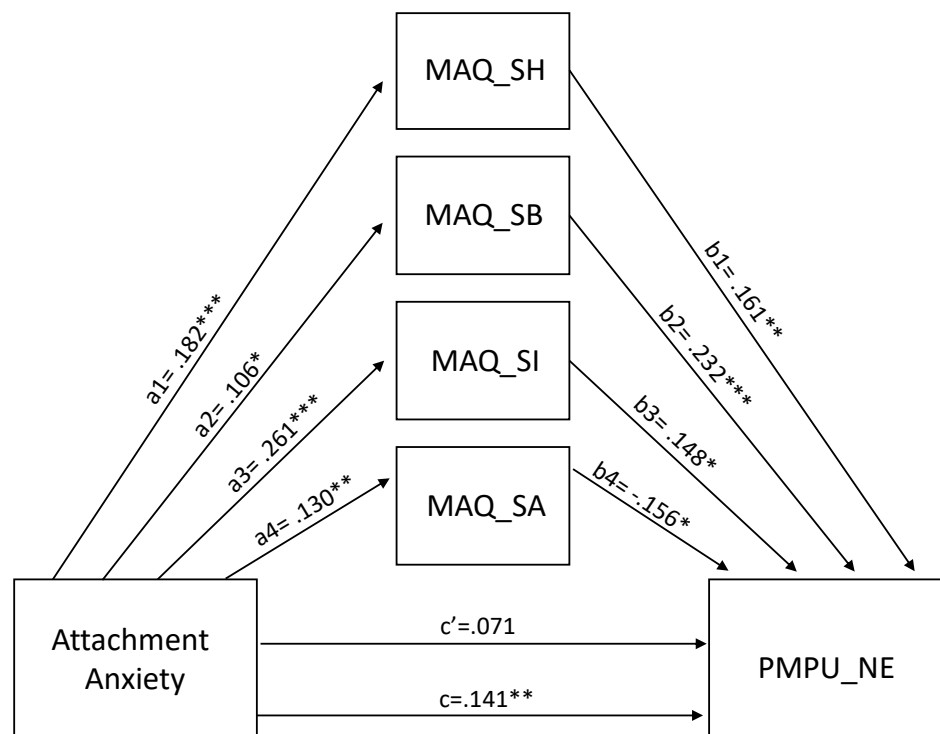
*Notes.* Mobile Attachment Questionnaire (MAQ) subscales: MAQ\_SH = Safe Haven, MAQ\_SA = Separation Anxiety, MAQ\_SB = Secure Base, MAQ\_SI = Separation Insecurity. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

A second parallel mediation analysis using a bootstrapped estimate with 10,000 samples, indicated that the relationship between Attachment Anxiety and the Negative Effects subscale of the Problematic Mobile Phone Use Scale was mediated by each of the subscales of the Mobile Attachment Questionnaire (i.e., Safe Haven, Separation Anxiety, Secure Base, and Separation Insecurity), while considering the impact of gender, mobile phone use, and the device's perceived relationship-facilitating function (see Table 3.9). In line with complete mediation (Baron & Kenny, 1989), the relationship between Attachment Anxiety and the Negative Effects subscale of the Problematic Mobile Phone Use Scale was no longer significant when taking into



account the influence of the mediators (see Figure 3.4.2). Since the mediation effect of Separation Anxiety was negative, while that of Safe Haven, Secure Base, and Separation Insecurity was positive, this model suggests an inconsistent mediation (Mackinnon et al., 2007) of the relationship between Attachment Anxiety and the Negative Effects subscale of the Problematic Mobile Phone Use Scale, in which the Separation Anxiety subscale acts as a suppressor. In this model, the predictors accounted for approximately 30% of the variance in the Negative Effects subscale of the Problematic Mobile Phone Use Scale ( $f(4, 351) = 14.338, p < .001, R^2 = .296$ ).

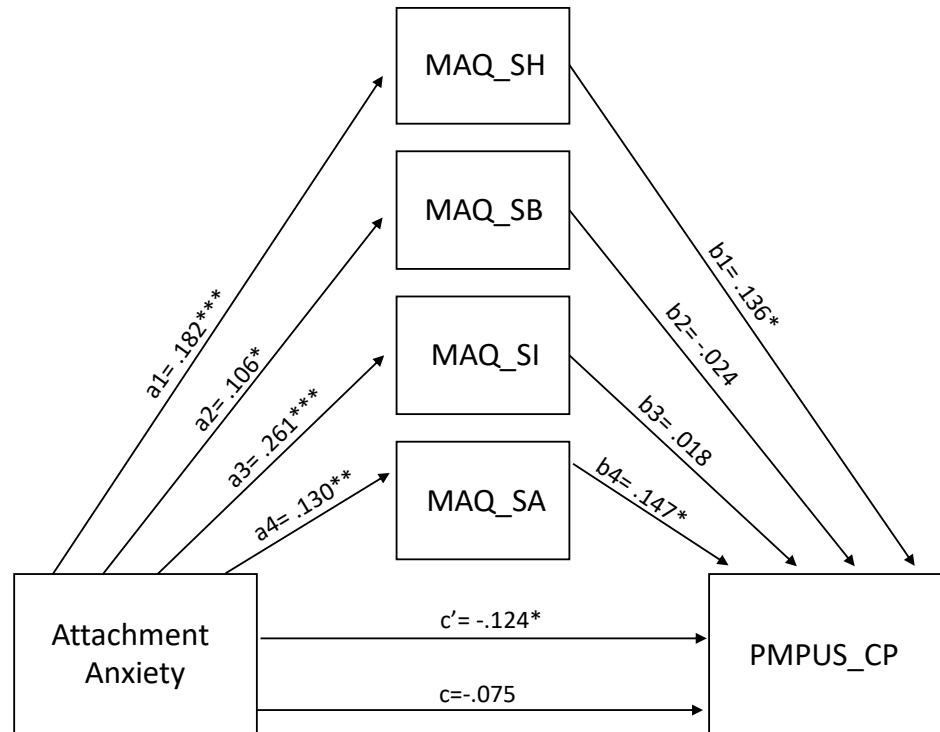
**Figure 3.4.2 Standardized Coefficients for the Relationship between Attachment Anxiety and the Negative Effects Subscale of the Problematic Mobile Phone Use Scale through the Mobile Attachment Questionnaire Subscales**



*Note.* Mobile Attachment Questionnaire (MAQ) subscales: MAQ\_SH = Safe Haven, MAQ\_SA = Separation Anxiety, MAQ\_SB = Secure Base, MAQ\_SI = Separation Insecurity. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

Finally, in line with the guidelines presented by Zhao, Lynch and Chen (2010), despite the absence of a direct association between Attachment Anxiety and the Compulsion-Persistence subscale of the Problematic Mobile Phone Use Scale, a parallel mediation analysis using a bootstrapped estimate with 10,000 samples was conducted to determine whether there was an indirect association between these two variables through the subscales of the Mobile Attachment Questionnaire, while considering the influence of gender, mobile phone use, and the device's perceived relationship-facilitating function (see Figure 3.4.3). As shown in Table 3.9, results indicated that the relationship between Attachment Anxiety and the Compulsion-Persistence subscale of the Problematic Mobile Phone Use Scale was completely mediated (Zhao et al., 2010) by the Mobile Attachment Questionnaire subscales of Safe Haven and Separation Anxiety. Moreover, seeing as the mediation effect of both Safe Haven and Separation Anxiety were positive, this model is considered a consistent mediation (Mackinnon et al., 2007). In this model, the predictors accounted for approximately 31% of the variance in the Compulsion-Persistence subscale of the Problematic Mobile Phone Use Scale ( $f(4, 351) = 5.057, p = .001, R^2 = .309$ ).

**Figure 3.4.3 Standardized Coefficients for the Relationship between Attachment Anxiety and the Compulsion-Persistence Subscale of the Problematic Mobile Phone Use Scale through the Mobile Attachment Questionnaire Subscales**



*Note.* Mobile Attachment Questionnaire (MAQ) subscales: MAQ\_SH = Safe Haven, MAQ\_SA = Separation Anxiety, MAQ\_SB = Secure Base, MAQ\_SI = Separation Insecurity. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

**Table 3.9 Summary of Mediation Effects of the Mobile Attachment Questionnaire Subscales on the Relationship between Attachment Anxiety and the Problematic Mobile Phone Use Scale Subscales**

Problematic Mobile Phone Use Scale – Withdrawal-Tolerance						
	<i>b</i>	<i>SE</i>	95% <i>C. I.</i>	$\beta$	<i>SE</i>	95% <i>C. I.</i>
MAQ_SH	.0026	.0076	-.0133 - .0181	.0035	.0103	-.0177 - .0240
MAQ_SA	<b>-.0151</b>	<b>.0080</b>	<b>-.0337 - -.0026</b>	<b>-.0203</b>	<b>.0113</b>	<b>-.0450 - -.0035</b>
MAQ_SB	<b>.0317</b>	<b>.0164</b>	<b>.0009 - .0657</b>	<b>.0425</b>	<b>.0150</b>	<b>.0012 - .0868</b>
MAQ_SI	<b>.0448</b>	<b>.0153</b>	<b>.0181 - .0780</b>	<b>.0601</b>	<b>.0232</b>	<b>.0245 - .1030</b>
Problematic Mobile Phone Use Scale – Negative Effects						
	<i>b</i>	<i>SE</i>	95% <i>C. I.</i>	$\beta$	<i>SE</i>	95% <i>C. I.</i>
MAQ_SH	<b>.0193</b>	<b>.0099</b>	<b>.0033 - .0419</b>	<b>.0293</b>	<b>.0147</b>	<b>.0050 - .0627</b>
MAQ_SA	<b>-.0134</b>	<b>.0081</b>	<b>-.0324 - -.0009</b>	<b>-.0203</b>	<b>.0121</b>	<b>-.0483 - -.0013</b>
MAQ_SB	<b>.0163</b>	<b>.0096</b>	<b>.0004 - .0379</b>	<b>.0246</b>	<b>.0147</b>	<b>.0007 - .0579</b>
MAQ_SI	<b>.0255</b>	<b>.0135</b>	<b>.0006 - .0538</b>	<b>.0385</b>	<b>.0201</b>	<b>.0009 - .0803</b>
Problematic Mobile Phone Use Scale – Compulsion-Persistence						
	<i>b</i>	<i>SE</i>	95% <i>C. I.</i>	$\beta$	<i>SE</i>	95% <i>C. I.</i>
MAQ_SH	<b>.0160</b>	<b>.0085</b>	<b>.0019 - .0348</b>	<b>.0247</b>	<b>.0131</b>	<b>.0030 - .0542</b>
MAQ_SA	<b>.0124</b>	<b>.0069</b>	<b>.0012 - .0278</b>	<b>.0192</b>	<b>.0107</b>	<b>.0019 - .0427</b>
MAQ_SB	-.0017	.0047	-.0116 - .0082	-.0026	.0074	-.0182 - .0125
MAQ_SI	.0031	.0117	-.0197 - .0270	.0048	.0181	-.0309 - .0421

*Note.* Mobile Attachment Questionnaire (MAQ) subscales: MAQ\_SH = Safe Haven, MAQ\_SA = Separation Anxiety, MAQ\_SB = Secure Base, MAQ\_SI = Separation Insecurity.

## **Chapter 4: Discussion**

### **4.1 Mobile Phone Attachment**

The principal objective of this study was to determine whether university students' relationships with their mobile phones could be conceptualized within an attachment theory framework, and whether this contributed to a better understanding of the patterns and characteristics of problematic mobile phone use. Specifically, this study examined whether university students were using their mobile phones as attachment targets, and whether this accounted for their experiences of what has been typically conceptualized as mobile phone addiction. Thus, in this work mobile phones were conceptualized as attachment objects and theorized to reflect the major features of attachment bonds (i.e., separation anxiety, safe haven, secure base, and proximity maintenance; Ainsworth, 1985). As such, the Mobile Attachment Questionnaire subscales (i.e., Safe Haven, Separation Anxiety, Secure Base, and Separation Insecurity), determined by Konok et al. (2017) to best reflect the major features of human attachment bonds in relation to the mobile phone, were used to assess mobile phone attachment. In line with previous work from Keefer et al. (2012) and Konok et al. (2016; 2017), findings from this study indicated that, overall, university students were forming some degree of attachment to their mobile phones (i.e., mean scores of around 3, "somewhat characteristic of me", on a 5-point Likert scale), and that this was particularly true for those who identified as women.

Moreover, supported by the understanding that a typical response to attachment anxiety is the investment in an alternative, potentially non-human, source of security (Bowlby, 1969), this study found that mobile phone attachment was associated with attachment anxiety, such that those who struggled with the perceived unreliability of close others were more likely to feel

confident in the presence of their mobile phone and turn to it to decrease anxiety. These individuals also experienced anxiety, and felt less secure, upon being separated from their device. In line with notions of attachment theory (Bowlby, 1969), the perceived unreliability of support from close others, experienced by those high in attachment anxiety, functions as a perceived threat which leads to excessive reassurance-seeking behaviours. In this case, these behaviours were redirected towards the mobile phone, an object to which most people are constantly connected (Levitas, 2013), resulting in increased feelings of comfort, security, and decreased anxiety. Thus, it appears that mobile phones can function similarly to human attachment targets, being added or dropped from an individual's attachment hierarchy through learned association (Bowlby, 1969). As suggested by Keefer et al. (2014) and Konok et al. (2016) the complete controllability, and thus reliability, of the mobile phone may make it a particularly attractive attachment target for those higher in attachment anxiety.

Further, not surprisingly, attachment avoidance was not associated with mobile phone attachment. Seeing as attachment avoidance is characterized by chronic attempts to inhibit the activation of the attachment system as a means of minimizing emotional distress (Chopnik & Peterson, 2012), individuals higher in attachment avoidance tend to avoid forming new attachment bonds in general as a means of protecting themselves from the perceived unreliability of close others and thus minimizing experiences of rejection (Chopnik & Peterson, 2012). Hence, taken together, these findings support the conceptualization of university students' relationships with their mobile phones within an attachment theory framework, and thus have important implications for the development of theory in the area of university student mobile phone use. Moreover, the understanding of students' device use within this well-established relationship

model has the potential to inform more nuanced and targeted intervention, prevention and education strategies.

## **4.2 Perceived Relationship-Facilitating Function**

Results from this study indicated that individuals higher in attachment anxiety were using their mobile phones as attachment targets, independent of their devices' perceived relationship-facilitating function, in line with findings from Keefer et al. (2012) and Konok et al. (2016). Specifically, though participants who rated their mobile phones as being more important in the maintenance of their relationships were also more likely to report attachment to their mobile phones, ratings of the devices' perceived relationship-facilitating function did not influence the relationship between attachment anxiety and mobile phone attachment (i.e., attachment anxiety remained significant when controlling for the device's perceived relationship-facilitating function, and the interaction term for attachment anxiety and perceived relationship-facilitating function was not significant). This suggests that, for those higher in attachment anxiety, mobile phone attachment did not merely result from the use of their device as a means of restoring or strengthening relationships with human attachment targets. Rather, it appeared that participants' attachments to their mobile phones were to the objects themselves, and not solely to the objects as a means of accessing other relationships. This finding is supported by a recent report from BC Hydro (2018) in which 25% of adults in British Columbia said that they would rather give up seeing their partner for a day then give up their device for 24 hours. In this way, it is clear that attachment behaviours directed towards the mobile phone are not simply the result of a misattribution of attachment behaviours intended for human targets. This has important implications for theory development as it supports the conceptualization of mobile phones as attachment objects.

### **4.3 Problematic Mobile Phone Use**

Furthermore, findings from this study have contributed to the understanding of the features of problematic mobile phone use within an attachment theory framework. Problematic mobile phone use has to date been conceptualized as a form of behavioural addiction involving the continued use of the mobile phone in spite of negative consequences, leading the individual to compulsively use their device in inappropriate situations (Bianchi & Phillips, 2005; Ezoe et al., 2009; Takao et al., 2009; Weller et al., 2013). In this study, problematic mobile phone use was examined using subscales of the Problematic Mobile Phone Use Scale (i.e., Withdrawal-Tolerance, Negative Effects, and Compulsion-Persistence; Guzeller & Cosguner, 2012), designed to reflect the core components of addictive behaviours (i.e., cognitive salience, loss of control, mood modification, tolerance, withdrawal, conflict, and relapse; Griffiths, 2005; Bilieux et al., 2015) to determine whether these features could be better conceptualized as a manifestation of mobile phone attachment. In line with previous work from Ge (2014) linking attachment anxiety with mobile phone addiction, findings from this study indicated that participants higher in attachment anxiety reported more experiences of the characteristics typically conceptualized as mobile phone addiction, particularly in terms of the features of withdrawal-tolerance and negative effects. This suggests that individuals with chronic concerns about the availability of close others were more likely to engage with their mobile phone in a problematic way, and thus experience more of the problematic mobile phone use characteristics of withdrawal and tolerance (e.g., an inability to limit mobile phone use), and/or negative outcomes (e.g., disruptions to school work, relationships, and concentration). Moreover, participants ratings of their device's perceived relationship-facilitating function were not associated with the negative outcomes related to problematic mobile phone use, suggesting that



participants were experiencing these outcomes irrespective of their ratings of their devices' importance in the maintenance of their relationships.

Interestingly, while attachment anxiety was not associated with the compulsion-persistence features of problematic mobile phone use, attachment avoidance was negatively associated with this outcome. This suggests that those who were more likely to cope with the perceived unreliability of close others by avoiding intimacy, and hence minimizing activation of the attachment system (Bowlby, 1969), were less likely to report impulsive behaviours towards their mobile phones. Seeing as this aspect of problematic mobile phone use relates to being constantly connected, responsive, and available through one's mobile phone, it was not surprising that those theorized to want to avoid intimacy scored lower in terms of this aspect of problematic mobile phone use. In contrast, the fact that attachment anxiety was not associated with this outcome was somewhat surprising since attachment anxiety is characterized by a hyperactivation of the attachment system leading to excessive reassurance-seeking behaviours. As such, it would be expected that these individuals would report higher rates of compulsive use of their mobile phones (i.e., through acts such as immediately responding to messages, and always having their phones on) as a means of maintaining and nurturing their relationships. That said, the lack of an association between attachment anxiety and the compulsive-persistence features of problematic mobile phone use provides further support for the notion that mobile phones function as attachment objects, and not solely as a means of accessing other human attachment relationships.

#### **4.4 An Attachment Theory Model for Understanding Problematic Mobile Phone Use**

Finally, findings from this study provide the basis for understanding what has commonly been conceptualized as mobile phone addiction as a manifestation of mobile phone attachment. Specifically, findings indicated an indirect relationship between attachment anxiety and problematic mobile phone use through participants' attachments to their mobile phones. This indirect relationship was examined in terms of the major features of attachment bonds in relation to the mobile phone (i.e., safe haven, separation anxiety, secure base, and separation insecurity), and differed for each aspect of problematic mobile phone use examined, thus providing a more detailed account of the features and characteristics underlying the relationships between attachment anxiety and problematic mobile phone use and attachment. As such, these findings have important implications for future research examining university student mobile phone use by providing an alternative, biologically adaptive, framework for understanding what have typically been conceptualized as addictive behaviours directed towards the mobile phone. Thus, insights from this work afford the development of more nuanced and targeted intervention and prevention programs to address what may be considered maladaptive patterns of mobile phone use.

First, what have commonly been conceptualized as the withdrawal-tolerance features of addictive behaviours towards the mobile phone were associated with higher ratings of attachment anxiety via participants' use of their mobile phones as a source of confidence, but not as a source of anxiety reduction, from which separation resulted in decreased feelings of anxiety and security. Second, the relationship between attachment anxiety and the negative outcomes typically associated with problematic mobile phone use was accounted for by the use of the mobile phone as a source of safety and confidence, from which separation resulted in decreased

feelings of anxiety and security. In this case, it was the use of the device as an attachment target that completely accounted for the association between being higher in attachment anxiety and participants' experiences of the negative outcomes typically associated with mobile phone addiction. Third, what have commonly been conceptualized as the compulsion-persistence addictive behaviours towards the mobile phone were associated with attachment anxiety via participants' use of their device as a source of anxiety reduction, but not as a source of confidence, that resulted in anxiety upon separation, but not in a decreased sense of security.

In terms of the features of mobile phone attachment, for those higher in attachment anxiety, the use of the mobile phone as a source of anxiety reduction (i.e., safe haven) accounted for higher rates of both the negative outcomes and compulsion-persistence features of problematic mobile phone use. Thus, for these participants the adaptive use of their device, to help reduce feelings of anxiety, was related to increased reports of wanting to be constantly connected, responsive, and available through their mobile phone (i.e., compulsion-persistence) as well as experiences of the negative outcomes typically associated with mobile phone addiction. The use of the mobile phone as a source of confidence and security (i.e., secure base) also accounted for participants higher in attachment anxiety's experiences of the negative outcomes related to mobile phone addiction, even though this feature was not related to participants' compulsive use of their device. Rather, using their mobile phone as a source of confidence and security was associated with increased experiences of what have been commonly conceptualized as the withdrawal-tolerance features of mobile phone addiction. Specifically, participants' reports of difficulty controlling or limiting the use of their device were associated with higher ratings of attachment anxiety via the use of their device as a source of confidence and security. Similarly, the experience of separation insecurity upon being separated from their device also

accounted for the relationships between attachment anxiety and the features of withdrawal-tolerance and the negative effects typically associated with mobile phone addiction. Thus, for those higher in attachment anxiety, difficulty with managing their device use, as well as their experiences of the negative outcomes of mobile phone use, were accounted for by a decreased sense of security upon being separated from their device.

Lastly, the experience of separation anxiety upon being separated from their mobile phone positively accounted for the link between being higher in attachment anxiety and increased reports of what have been commonly conceptualized as the compulsion-persistence features of mobile phone addiction. This is not surprising since this aspect of mobile phone addiction has been characterized by increased experiences of wanting to be connected, responsive, and available through the mobile phone. Interestingly, separation anxiety negatively accounted for the relationships between attachment anxiety and the negative effects and withdrawal-tolerance features typically associated with mobile phone addiction. As such, those higher in attachment anxiety reported more experiences of separation anxiety, but this, in turn, was associated with less experiences of the negative outcomes and withdrawal-tolerance features of problematic mobile phone use. Though this finding is counterintuitive, it has important implications for the conceptualization of mobile phone attachment. Specifically, as a growing body of evidence indicates an increasingly universal degree of constant connectivity to mobile phones among young adults (Levitas, 2013; Forgays et al., 2014), separation anxiety in relation to the mobile phone may represent a quasi-normalized phenomenon. This is in line with Konok et al. (2016)'s findings regarding a ceiling effect for items pertaining to proximity maintenance towards the mobile phone, as well as findings from a recent report from BC Hydro (2018) that 70% of those aged 18 to 24 reported sleeping with their mobile phones. Thus, considering the

widespread prevalence of constant connectivity to mobile phones within this population, it is possible that, for university students, separation anxiety may not actually represent an attachment feature of their relationships with their mobile phones. More precisely, though separation anxiety is considered a major feature of attachment bonds (Ainsworth, 1985), this criterion may not be relevant to conceptualizations of mobile phone attachment, particularly within this population. In this way, the negative relationship between separation anxiety and experiences of the negative outcomes and withdrawal-tolerance features typically associated with mobile phone addiction, reported by those higher in attachment anxiety, may be the result of an alternative underlying mechanism that functions independently from mobile phone attachment. For instance, experiences of separation anxiety may be better conceptualized within an emerging body of evidence regarding nomophobia (King et al., 2013; Sharma et al., 2015), in which the anxiety or fear of being without one's mobile phone is conceptualized in terms of a situational phobia (Yildirim & Correia, 2015). Thus, unlike the conceptualization of mobile phone attachment in terms of using the device as a source of safety, confidence, and security, from which separation results in a decreased sense of confidence, the experience of separation anxiety upon being separated from one's device may not be related to the use of the mobile phone as an attachment target. Hence, future research is needed to better understand, and conceptualize, the attachment feature of separation anxiety in relation to the mobile phone.

## **Chapter 5: Conclusion**

### **5.1 Strengths, Limitations, & Future Directions**

There are several strengths to this work, including a large ethnically and geographically diverse sample, a strong theoretical framework, and the use of empirically developed measures and theoretically informed control variables and inclusion criteria. Specifically, the ethnic diversity of this sample, recruited from two large Canadian universities in different provinces, increases the generalizability of the study's findings. Moreover, the lack of significant differences in responses across the samples from each university suggests that findings from this study are not limited to a particular university setting. Rather, seeing as no significant differences, beyond demographics, were found between the data collected from the two universities, findings from this study appear to extend beyond a specific university context, and may be generalizable to the experience of Canadian undergraduate students as a whole. Additionally, this study is rooted in a well-established, biologically driven, and empirically-validated, theoretical framework for understanding human bonds and behaviours (i.e., attachment theory; Bowlby, 1969). Thus, implications arising from this work will build on existing knowledge of attachment theory to help inform intervention and prevention efforts. Further, the measures used in this study were empirically developed in consultation with experts in the fields of behavioural addictions, and attachment theory. Also, the inclusion criteria (i.e., being between the ages of 18-25, currently an undergraduate student, and owning a smartphone with at least one active social media account) and covariates (i.e., gender, mobile phone use, and device's perceived relationship-facilitating function) used in this study were theoretically informed by previous work in the area of mobile phone use.

Several limitations of this study also need to be acknowledged. First, this study used cross-sectional data, which limits the ability to make causal claims and leaves open the possibility that other factors contributed to the relationships found. That said, the variables selected for this study were rooted in a strong theoretical framework and measured using empirically developed scales. As such, the models examined in this study were conceptualized to represent theoretically grounded relationships between constructs and assessed using items constructed, and tested, to reflect the key features of attachment relationships, as well as the main characteristics of behavioural addictions. Despite this, the use of cross-sectional data remains a major limitation of this study. Ideally, future work in this area will utilize longitudinal designs to allow for validation of within-person comparisons of fluctuations in mobile phone attachment and dependence, along with changes in the stability of attachment dimensions. Specifically, though attachment dimensions are understood to be mostly stable over time, they are not impervious to change, particularly during periods of major developmental adjustment (Bowlby, 1969). Thus, future work should examine changes in attachment dimensions, mobile phone attachment, and problematic mobile phone use over time. This would be especially interesting during the transition from high school to university as this developmental period is often characterized by a reorganization of the attachment hierarchy in which parents, who are usually at the top of the hierarchy, are replaced by other attachment targets (e.g., romantic partners; Bowlby, 1969; Hazan & Shaver, 1994). This change, coupled with youth's increased control over their mobile phone use (e.g., less parental restrictions and surveillance at school) may make it an ideal time to develop attachments to their mobile phones. As such, future longitudinal research examining mobile phone attachment and addiction throughout this developmental transition may provide insight into the issue of causality in this area.

Another related concern is the fact that this data was collected using self-report measures and was thus susceptible to misclassification due to recall bias and participants' biased use of rating scales. Specifically, research has shown that people have different ways of filling out rating scales which naturally produces differences in scores between participants that reflect something other than what the questionnaire was designed to measure (Austin, Gibson, Deary, McGregor, & Dent, 1998). Though this remains a limitation for this study, the sample was relatively large and data for all key measures was normally distributed, suggesting that this was not a major concern for this sample. Further, it is important to note the initial low reliability ratings for the Safe Haven and Secure Base subscales of the Mobile Attachment Questionnaire as another potential limitation. Though the removal of the negatively worded items resulted in acceptable Cronbach's alpha ratings for these subscales, future studies are needed to further validate their reliability. Specifically, seeing as the Mobile Attachment Questionnaire has only been tested by Konok et al. (2017), who identified the four-factor model through principal component analysis, future studies are needed to further explore and validate the factor structure of this measure. Finally, although the sample was ethnically diverse, there was a clear dominance of participants who identified as women, and the sample from Wilfred-Laurier University was entirely made up of students' taking psychology courses, both of which may influence the generalizability of the study's findings. Moreover, students were recruited from both universities during the spring semester and so may differ from a typical undergraduate population. As such, there is a need for future work with a more gender-balanced sample with students taking courses in different subject areas during the fall and winter semesters.



## 5.2 Significance & Conclusion

This is the first study to empirically examine what has typically been conceptualized as problematic mobile phone use as a manifestation of mobile phone attachment rather than a form of behavioural addiction. In this way, this work contributes to the literature on object attachment and problematic mobile phone use, while empirically validating an alternative conceptualization to mobile phone addiction. Thus, this research provides insight into university students' relationships with their mobile phones and, in parallel to a growing literature on mobile phone addiction, provides an alternative to pathologizing behaviours that have become largely normative (Forgays et al., 2014; Levitas, 2013, Roberts, 2014). Moreover, through evaluating the influence of mobile phone attachment on the relationship between adult attachment dimensions and what has typically been conceptualized as mobile phone addiction, this study provides an alternative framework for understanding university students' experiences of problematic mobile phone use, thus offering insight into some of the alarming behaviours that have emerged alongside increasing mobile phone use (e.g., texting while driving; Bianchi & Philips, 2005; Weller et al., 2013). The conceptualization of these issues within a well-understood relationship-model, with a clear biological basis and function (i.e., an enduring motivational system designed by natural selection to serve human survival needs through protecting the attached individual from physical and psychological harm; Bowlby, 1969), provides research, practice, schools, and families with the language and opportunity to reflect on university students' relationships with their mobile phones in rational ways. For example, understanding that using objects as attachment targets can help reduce anxiety and promote effective emotional regulation and coping strategies (Bowlby, 1969), university students' dependence on mobile phones can be conceptualized as resulting from having formed a behaviorally adaptive attachment to their

device. In this way, this understanding can help inform the development of interventions, educational programming, and even marketing campaigns aimed at promoting healthy and responsible use of mobile phones that maximize their benefits and minimize their potentially detrimental impacts.

In sum, as the first conceptualization of problematic mobile phone use as a manifestation of mobile phone attachment, this study provides the foundation for a more complete understanding of university student mobile phone use. Seeing as this remains a rapidly evolving and novel area of research, future studies should expand on this model to explore the role of other factors theorized to contribute to mobile phone engagement, such as impulsivity (Bilieux et al., 2008), nomophobia (King et al., 2013; Sharma et al., 2015), and FoMO (Elhai, Levine, Dvorak, & Hall, 2016; Oberst, Wegmann, Stodt, & Chamarro, 2017), alongside mobile phone attachment, to further contribute to a more comprehensive model of university student's use of, and relationships with, their mobile phones.

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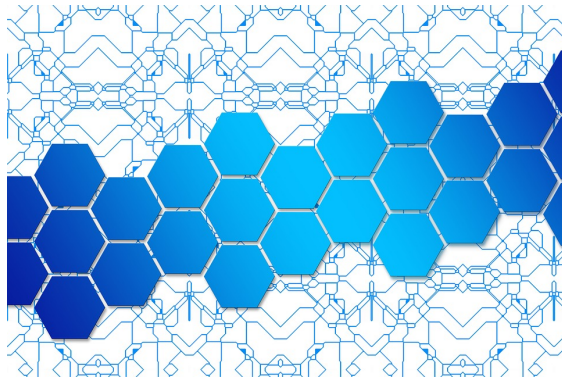
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## Appendices

### Appendix A Participant Recruitment Poster and Flyer



**Participate in research  
about university  
students' social media  
and smartphone use for  
a chance to win \$250 to  
the UBC Bookstore!**

Visit: [goo.gl/ABqoKx](https://goo.gl/ABqoKx)  
Or scan this QR Code  
with your Smartphone  
camera to participate  
in our online survey



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UBC BREB ID # H18-00752

Smartphones & Social  
Media Study

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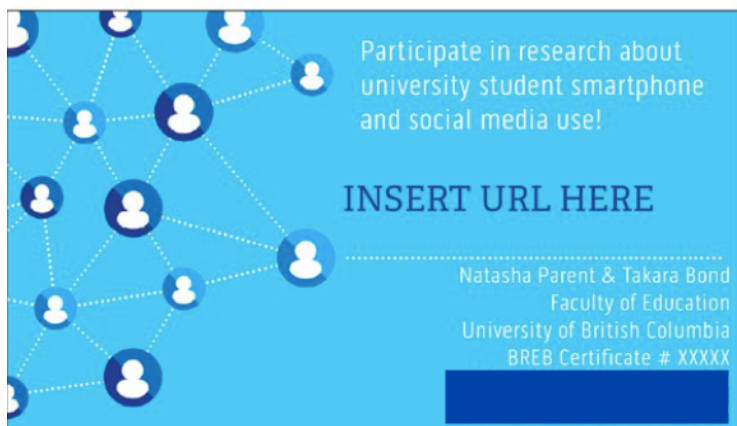
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## **Appendix B Informed Consent Form**

**Title of Study:** *Smartphones and Social Media: An Examination of College Students' Use of Smartphones and Social Media*

### **Principal Investigators:**

Takara Bond and Natasha Parent are conducting this research for their Master of Arts in Human Development Learning and Culture, in the Department of Educational and Counselling Psychology and Special Education at the University of British Columbia, under the supervision of Dr. Jennifer Shapka (XXX-XXX-XXXX, XXXXX@XXX). If you have any questions you can contact the principal investigators by emailing XXXXX@XXXX and XXXXX@XXX.

### **This Study:**

You invited to take part in this research study if you are a university student between the ages of **18 years old to 25 years old**, own a smartphone, and have at least one social media account. Your participation is **voluntary**. If you wish to participate in this study, you will be asked to sign this form. Before you decide, it is important for you to understand what the research involves. This consent letter will tell you about the study, why the research is being done, and what is involved with being part of the study.

### **What's the purpose?**

The purpose of this study is to learn about how university students' use smartphones and social media. From past studies, we know that university students are the highest users of smartphones and social media both in terms of prevalence and frequency. As such, this research aims to examine UBC students' relationships with their smartphones and use of social media.

### **What happens in this study?**

To participate in this study, you can complete the survey on an iPad provided by the researchers, or through a personal device by accessing a secure survey website. The survey will take approximately 30 minutes. No further participation will be required upon completion of the survey.

### **What are the benefits of participating in this study?**

By participating in this study, you will be contributing to the scientific literature on university students' use of smartphones and social media. This information may contribute to the development of student support services, educational programming, and marketing campaigns promoting healthy social media and smartphone use.

You are invited to participate in a draw for a \$250 gift card to the bookstore. To enter this draw, please click [here](#) or email XXXXX@XXX with the subject line “Smartphones and Social Media Study”, and include your name and email.

### **What are the risks of participating in this study?**

There are no serious risks to this study and you may withdraw from this study at any point with no penalty or consequence. If you would like to discuss anything about this study, you may contact the researchers via the contact information at the top of this page.

If you feel any discomfort as a result of this study, please consult the resources listed below:

**-University Counselling Services** (on campus counselling services)

**-UBC Counselling Services:** <https://students.ubc.ca/health-wellness/counselling-services>

**-Wilfrid Laurier University Counselling Services:**

<https://students.wlu.ca/wellness-and-recreation/health-and-wellness/services/mental-health.html>

**-Help Lines** (online and phone counselling)

**-BC Crisis Centre** <https://crisiscentre.bc.ca>

**-Ontario Mental Health:** <http://www.mentalhealthhelpline.ca>

### **What will happen with my information?**

The results of this study will be reported in two students' graduate thesis, and may also be published in academic journal articles and conference presentations. If you are interested in receiving these results, please contact the researchers at the email addresses listed above.

### **Is my information private and confidential?**

No information or records that disclose your identity will be published. You, like all participants in this study, will not be identified by name in any reports of the completed study. To make sure this is the case, you will be assigned a unique study number as a participant in this study. Only this number will be used on any research-related information collected about you during the course of this study, so that your identity as a participant in this study will be kept confidential. All of the information we collect will be securely stored on a secure computer server at UBC. We will be using a UBC Survey Tool provided by Qualtrics to collect data, which complies with the BC and Ontario Freedom of Information and Protection of Privacy Act since the survey data is kept secure and is stored and backed up in Canada. This data server is located in Canada and subject to Canadian laws. If you choose to participate in the survey, you understand that your responses to the survey questions will be stored and accessed in Canada and that your rights to privacy are legally protected by federal and provincial laws that require safeguards to insure that your privacy is respected.

### **How can I withdraw from this study?**

Participation in this study is completely voluntary and you are free to withdraw at any time for any reason, without any negative impact. If there are certain questions that you do not want to answer that is okay – you don't have to answer them. *You do not have to give a reason for not answering questions or withdrawing from the study.* Please contact the researchers if you decide to withdraw after submitting your survey responses.

### **What if I have questions about the study?**

If you have any questions or would like further information with respect to this study, you may contact, Takara Bond (XXXXX@XXX) and Natasha Parent (XXXXX@XXX).

### **Who can you contact if you have complaints or concerns about the study?**

If you are a UBC student with any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or e-mail [RSIL@ors.ubc.ca](mailto:RSIL@ors.ubc.ca) or call toll free 1-877-822-8598. The UBC Behavioural Research Ethics Board has issued certificate **H18-00752** for this study.

If you are a Wilfrid Laurier University student with any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact Robert Basso, PhD, Chair, University Research Ethics Board, Wilfrid Laurier University, (519) 884-1970, extension 4994 or [rbasso@wlu.ca](mailto:rbasso@wlu.ca). The Wilfrid Laurier University Research Ethics Board has issued certificate **5719** for this study.

**I have read the contents of this form and understand what participation in this study involves. I have been provided the opportunity to ask any questions related to my participation and have had them answered to my satisfaction. I understand that participation in this study is completely voluntary and that I have the right to refuse to participate in this study or withdraw at any point, without any negative impact.**

Please check **one** of the following:

- I *consent* to participate in the study by completing the questionnaire
- I *do not* consent to participating in any part of this study

## **Appendix C Participant Thank You Letter**

Thank you for participating in this study!

You are invited to participate in a draw for a \$250 gift card to the bookstore. To enter this draw, please click here or email XXXXX@XXX with the subject line “Smartphones and Social Media Study”, and include your name and email.

If you have any questions or would like more information about this study please contact Takara Bond XXXXX@XXX and/or Natasha Parent XXXXX@XXX.

Participation in this study is completely voluntary and you are free to withdraw at any time for any reason. Please contact the researchers if you decide to withdraw.

By participating in this study, you are contributing to the scientific literature on college students' use of smartphones and social media. If you would like to receive information about the results of this study, please contact the researchers.

If you feel any discomfort as a result of this study, please consult the resources listed below:

- University Counselling Services** (on campus counselling services)

- UBC Counselling Services: <https://students.ubc.ca/health-wellness/counselling-services>

- Wilfrid Laurier University Counselling Services:

- <https://students.wlu.ca/wellness-and-recreation/health-and-wellness/services/mental-health.html>

- Help Lines** (online and phone counselling)

- BC Crisis Centre <https://crisiscentre.bc.ca>

- Ontario Mental Health: <http://www.mentalhealthhelpline.ca>

**If you are a UBC student with concerns or complaints** about your rights as a research participant and/or your experiences while participating in this study, please contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail [RSIL@ors.ubc.ca](mailto:RSIL@ors.ubc.ca) or call toll free 1-877-822-8598. The UBC Behavioural Research Ethics Board has issued certificate **H18-00752** for this study.

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## **Appendix D Demographic Questionnaire**

Please answer the following questions:

1. Are you currently an undergraduate student? (Forced response)
  - a. Yes
  - b. No
2. Do you have a smartphone? (Forced response)
  - a. Yes
  - b. No
3. Do you use social media? (Forced response)
  - a. Yes
  - b. No
4. What is your age (in years)? (Forced response)
  - a. Under 18
  - b. 18
  - c. 19
  - d. 20
  - e. 21
  - f. 22
  - g. 23
  - h. 24
  - i. 25
  - j. Over 25
  - k. Prefer not to answer
5. What is your gender?
  - a. Male
  - b. Female
  - c. Other
  - d. Prefer not to answer
6. Do you identify as LGBTQ?
  - a. Yes
  - b. No
  - c. I don't know
  - d. Prefer not to answer

7. Which ethnic group(s) do you identify with? (select more than one if needed)
  - a. Indigenous (e.g., First Nations, Inuit, Metis)
  - b. South Asian (e.g., East Indian, Sri Lankan, Pakistani)
  - c. East Asian (e.g., Chinese, Japanese, Korean)
  - d. Southeast Asian origins (e.g., Filipino, Thai, Vietnamese, Malaysian)
  - e. West Asian (e.g., Iranian, Afghan)
  - f. White (e.g., Caucasian, European)
  - g. Black (e.g., Haitian, Trinidadian, Caribbean, African)
  - h. Latin American (e.g., Mexican, Brazilian, Colombian)
  - i. I don't know
  - j. Other (please list):
  - k. Prefer not to answer
8. Are you an international student?
  - a. Yes
  - b. No
9. How long have you lived in Canada?
  - a. Over 10 years
  - b. Over 5 years
  - c. Under 3 years
  - d. Less than a year
10. Did you move to attend university?
  - a. I did not move
  - b. I moved a short drive away
  - c. I moved a long drive away
  - d. I moved a short flight away
  - e. I moved a long flight away
11. Are you satisfied with how often you get to see your family in person?
  - a. Not at all satisfied
  - b. Slightly dissatisfied
  - c. Neutral
  - d. Slightly satisfied
  - e. Very satisfied
12. Are you satisfied with how often you talk with your family?
  - a. Not at all satisfied
  - b. Slightly dissatisfied
  - c. Neutral
  - d. Slightly satisfied
  - e. Very satisfied
13. Are you satisfied with how supported you feel by your family?
  - a. Not at all satisfied
  - b. Slightly dissatisfied
  - c. Neutral
  - d. Slightly satisfied
  - e. Very satisfied
14. Are you satisfied with how often you get to see your close friends in person?

- a. Not at all satisfied
  - b. Slightly dissatisfied
  - c. Neutral
  - d. Slightly satisfied
  - e. Very satisfied
15. Are you satisfied with how often you talk with your close friends?
- a. Not at all satisfied
  - b. Slightly dissatisfied
  - c. Neutral
  - d. Slightly satisfied
  - e. Very satisfied
16. Are you satisfied with how supported you feel by your close friends?
- a. Not at all satisfied
  - b. Slightly dissatisfied
  - c. Neutral
  - d. Slightly satisfied
  - e. Very satisfied
17. What year of university are you in?
- a. First
  - b. Second
  - c. Third
  - d. Fourth
  - e. Fifth or Higher
18. What is your current overall grade average?
- a. \_\_\_ % (fill in the blank with percentage)
  - b. (drop down menu containing letter grades)
    - i. A+
    - ii. A
    - iii. A-
    - iv. B+
    - v. B
    - vi. B-
    - vii. C+
    - viii. C
    - ix. C-
    - x. D
    - xi. F
19. Approximately how much time a day do you spend on your smartphone?
- a. Almost never
  - b. Not very much
  - c. A little
  - d. A moderate amount
  - e. A lot
  - f. Very much
  - g. Almost always

20. Approximately how much time a day do you spend on social media?
- a. Almost never
  - b. Not very much
  - c. A little
  - d. A moderate amount
  - e. A lot
  - f. Very much
  - g. Almost always
21. Though it is difficult to estimate, approximately how much time do you spend on your smartphone daily?
22. \_\_\_\_ hours
23. Though it is difficult to estimate, approximately how much time do you spend connected to social media (on a computer, mobile phone, or tablet) daily?
- a. \_\_\_\_ hours

## Appendix E Experience in Close Relationships Scale

The statements below concern how you feel in emotionally intimate relationships. We are interested in how you *generally* experience relationships, not just in what is happening in a current relationship. Respond to each statement by circling a number to indicate how much you agree or disagree with the statement.

1. I'm afraid that I will lose my partner's love.
2. I feel comfortable depending on romantic partners. (-)
3. I worry that romantic partners won't care about me as much as I care about them.
4. I find it easy to depend on romantic partners. (-)
5. I prefer not to show a partner how I feel deep down.
6. I often wish that my partner's feelings for me were as strong as my feelings for him or her.
7. I tell my partner just about everything. (-)
8. Sometimes romantic partners change their feelings about me for no apparent reason.
9. It helps to turn to my romantic partner in times of need. (-)
10. I am nervous when partners get too close to me.
11. I find it difficult to allow myself to depend on romantic partners.
12. It makes me mad that I don't get the affection and support I need from my partner.
13. I find it relatively easy to get close to my partner. (-)
14. My partner really understands me and my needs. (-)
15. It's easy for me to be affectionate with my partner. (-)
16. When I show my feelings for romantic partners, I'm afraid they will not feel the same about me.
17. I worry a lot about my relationships.
18. My romantic partner makes me doubt myself.
19. I do not often worry about being abandoned. (-)
20. It's not difficult for me to get close to my partner. (-)
21. My partner only seems to notice me when I'm angry.
22. My desire to be very close sometimes scares people away.
23. I find that my partner(s) don't want to get as close as I would like.
24. I talk things over with my partner. (-)
25. I often worry that my partner will not want to stay with me.
26. I worry that I won't measure up to other people.
27. I prefer not to be too close to romantic partners.
28. I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am.
29. I feel comfortable sharing my private thoughts and feelings with my partner. (-)
30. I don't feel comfortable opening up to romantic partners.
31. I usually discuss my problems and concerns with my partner. (-)
32. I get uncomfortable when a romantic partner wants to be very close.
33. I often worry that my partner doesn't really love me.
34. I rarely worry about my partner leaving me. (-)
35. When my partner is out of sight, I worry that he or she might become interested in someone else.

36. I am very comfortable being close to romantic partners. (-)

Note: (-) indicates reversed scores

Response format: (1) Strongly Disagree, (2) Disagree, (3) Slightly Disagree (4) Neutral (5) Slightly Agree (6) Agree (7) Strongly Agree

## Appendix F Mobile Attachment Questionnaire

Rate how characteristic of you each of the following items is:

1. In a tense situation, I take out my phone.
2. I am nervous/tense when I leave my phone at home.
3. If my phone is in my hand, I can behave more easily/unreserved.
4. I am nervous/tense when my phone runs out of battery.
5. If I am stressed I take out my phone to calm down.
6. If my phone is in my hand, I feel more confident.
7. If I left my phone at home, I would be willing to go home for it even from a distance (more than 5 min away from home).
8. If I do not have my phone on me, I do not feel safe.
9. If my phone runs out of battery, I do not feel safe.
10. If I feel uneasy/tense in company, I take out my phone.
11. If I leave my phone at home, I do not feel safe.
12. If I am nervous, dealing with my phone does not calm me down. (-)
13. If I lost my phone, I would not feel really safe for long.
14. It does not bother me when I leave my phone at home/it runs out of battery. (-)
15. I am not more confident/easygoing if I have my phone with me. (-)

Note: (-) indicates reversed scores

Response format: (1) Not at all characteristic of me, (2) Not characteristic of me (3) Somewhat Characteristic of me (4) Characteristic of me (5) Very characteristic of me

## **Appendix G Measure of Perceived Relationship-Facilitating Function**

Rate how much you agree with the following statements:

1. My phone helps maintain my relationships
2. My phone brings me closer to others
3. I like to be constantly available for other people
4. I worry if I cannot be reached on my phone
5. I worry if I cannot get through to somebody

Response format: (1) Strongly Disagree (2) Disagree (3) Neither agree or disagree (4) Agree (5) Strongly Agree



## **Appendix H Problematic Mobile Phone Use Scale**

Rate how frequently each item applies to you:

1. I can't do my homework or study because of mobile phone use.
2. I am often late for appointments because I'm engaged on the mobile phone when I shouldn't be.
3. I find myself occupied on my mobile phone when I should be doing other things, and it causes problems.
4. Using a mobile phone causes a decline in my school success.
5. I can't concentrate on learning because of sending and receiving text messages, or playing games with my mobile phone.
6. I worry about mobile phone charges.
7. There are times when I would rather use the mobile phone than deal with other more pressing issues.
8. I feel pain in my head, eyes, thumbs, and hands because of using my mobile phone.
9. I immediately answer calls and reply to text messages.
10. I always carry my mobile phone.
11. I never turn off my mobile phone during the day.
12. I frequently check my missed calls and text messages.
13. I use my mobile phone any time I can.
14. I tried to cut down on mobile phone use, but failed.
15. Others complain about my using my mobile phone too much.
16. I think life without mobile phones is boring and futile.
17. I say to myself "just a few more minutes" when using my mobile phone. (talking, sending, or receiving text messages, playing games, watching TV, and so on).
18. When I can't use a mobile phone, I am exasperated.

Response format: (1) Never, (2) Almost Never, (3) Sometimes, (4) Almost Always, (5) Always