Smartphone Presence and Impulsive Decision Making

An Online Experiment Regarding the Effects of Passive Smartphone Presence on the Decision-Making Process

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Abstract

Smartphones have become omnipresent in daily life as they enable their owners to be connected at any time and any place. Intriguingly, previous research on smartphone presence has shown that mere smartphone presence can result in reduced attentional performance. Here it is hypothesized that this is due to smartphones having become reinforced attentional capturers with instant gratification as the positive reinforcer. An online experiment with a between-subjects design was conducted to examine i) whether passive smartphone presence (as compared to smartphone absence) induced more impulsive responding in a smartphone-unrelated decision-making task, and ii) whether this effect was moderated by smartphone addiction. Participants first completed impulsivity and smartphone addiction questionnaires and then participated in an online version of the Iowa Gambling Task. The findings indicate that passive smartphone presence did not affect participants’ impulsivity during smartphone-unrelated decision making, nor was there a moderation effect by participants’ level of smartphone addiction or trait impulsivity. These results are critically discussed and recommendations for future empirical research are provided.

Keywords: smartphone presence, attention, instant gratification, smartphone addiction, impulsivity
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Introduction

Smartphones have become ubiquitous in daily life. Especially in more advanced economies, smartphone ownership has reached up to 95% in adults (Silver, 2019). This rise in smartphone ownership has presented abundant research opportunities on how these devices might positively or negatively affect human behavior and cognition. On the one hand, scholars argue that conscious use of smartphones augments human cognition as the devices can be used to reduce cognitive demands for a multitude of cognitive activities (e.g., phonebooks, calendars, calculators; Barr, Pennycook, Stolz, & Fugelsang, 2015; Wilmer, Sherman, & Chein, 2017). On the other hand, it is argued that smartphone use diminishes human attention and cognition. For example, excessive smartphone use is demonstrated to cause deficits in cognitive capacities, such as shorter attention spans (e.g., Lee, Cho, Kim, & Noh, 2015; Stothart, Mithcum, & Yehnert, 2015) and lower performance on delaying gratification (e.g., Frost et al., 2019; Hadar et al., 2017; Wilmer & Chein, 2016; for a review, see Wilmer et al., 2017), while receiving phone notifications during active smartphone use is shown to reduce performance on attention-demanding tasks (Stothart et al., 2015).

Intriguingly, not only excessive and active smartphone use have been shown to affect performance on cognitively demanding tasks. Research has found that even passive smartphone presence can negatively affect performance on cognitively demanding tasks (e.g., Thornton, Faires, Robbins, & Rollins, 2014; Ward, Duke, Gneezy, & Bos, 2017). For instance, Thornton and colleagues (2014) suggest that even without notifications, the mere presence of a phone might cause attentional and cognitive deficits. In a more recent study, Ward and colleagues (2017) found that passive smartphone presence affects two measures of cognitive capacity (i.e., available working memory capacity and functional fluid intelligence) by occupying the attentional resources that lie at their cores—thus leaving fewer of these attentional resources available to engage with smartphone-unrelated tasks (Ward et al., 2017).
These findings indicate that visibly present smartphones serve as distractors—even when the smartphone is not providing any kind of active stimulation.

However, at the time of the current study, research on why passively present smartphones have the capacity to distract their owners is still fairly limited. The current study proposes a mechanism in which this capacity is due to smartphones becoming reinforced attentional capturers with instant gratification as a motive for positive reinforcement. More specifically, as smartphones are considered to provide instant gratification by offering quick and easy rewards when being used (Lee, Chang, Lin, & Cheng, 2014; Zhang, Chen, Zhao, & Lee, 2014), the devices might become associated with these rewards. Consequently, when a smartphone owner sees a passively present smartphone, the device might capture the owner’s attention and provoke the need for gratification. The owner could then become distracted by the “invisible pull” of the smartphone. So, when the smartphone cannot be used to achieve instant gratification during a smartphone-unrelated task, the need for gratification might shift to the focal task, resulting in more impulsive decision making during this task to yet achieve instant gratification.

Further, it could be reasoned that those who are more susceptible to the “invisible pull” of the smartphone will also decide more impulsively when seeing a smartphone during a smartphone-unrelated task. More particularly, those who suffer from higher levels of smartphone addiction might experience higher cognitive costs from passively present smartphones. Smartphone addiction is a behavioral addiction (e.g., Kim, Lee, Lee, Nam, & Chung, 2014; Lin et al., 2014) that can be explained as a severe form of smartphone dependency that manifests withdrawal symptoms and tolerance, and is often associated with social problems (Kwon, Lee, et al., 2013). The effects of smartphone addiction on the decision-making process were recently examined by Khoury and colleagues (2019). The scholars found that participants who suffered from smartphone addiction showed impairments
in the decision-making process similar to impairments caused by other behavioral and chemical addictions (e.g., alcohol addiction, gambling addiction, pathological buying; Khoury et al., 2019). The scholars argue that especially in those who suffer from smartphone addiction, feelings of craving could be triggered when seeing a smartphone, resulting in increased impulsivity and reduced self-control (Khoury et al., 2019). This is in line with the results of Ward and colleagues (2017), who showed that the influence of passive smartphone presence has higher cognitive costs for people who suffer from smartphone addiction.

Because people engage in decision-making tasks multiple times a day, impairments in the decision-making process could have far-reaching consequences. The possible consequences of distracted attention during decision making are, therefore, an undeniable locus of concern (Wilmer et al., 2017). For example, impaired decision making becomes concerning when a decision is crucial for safety or financial reasons. Thus, knowing about the negative consequences of passive smartphone presence might help in designing approaches to diminish them. Hence, the current study explores whether or not passive smartphone presence leads to more impulsive decision making. Moreover, since smartphone addiction is shown to affect the decision-making process (Khoury et al., 2019), smartphone addiction might moderate the effect smartphone presence has on decision making by strengthening the need for instant gratification and, consequently, reinforcing impulsivity—caused by smartphone presence—during decision making. Therefore, the present study seeks to answer the following research question: Does the visible presence (as compared to absence) of a participant’s smartphone induce more impulsive responding in a smartphone-unrelated decision-making task, and is this moderated by smartphone addiction?
Theoretical Framework

Smartphones can be characterized as physically salient stimuli that are able to involuntarily capture attention (Hadas, 2017). Even when merely present, the devices are shown to capture attention and distract their owners from focal smartphone-unrelated tasks (e.g., Thornton et al., 2014; Ward et al., 2017). This distraction due to passive smartphone presence could have extensive consequences on a daily basis as smartphone ownership has become prevalent. Especially since smartphone owners are likely to carry their devices with them wherever they go due to the smartphone’s “anytime/anywhere connectivity” (MacCormick, Dery, & Kolb, 2012, p. 195). Thus, knowing if and how passively present smartphones have the capacity to capture attention is important to further understand how smartphones interfere with—or even shape—daily life. The impact of passive smartphone presence on daily life should, hence, be further investigated so smartphone owners will become able to carefully consider when their devices should be present and when not. Therefore, the present study will further examine attentional capturing by passive smartphone presence and will propose a potential mechanism based on the notion that smartphones evoke an ongoing need for instant gratification.

Attentional Control

People possess limited attentional resources for processing information (Awh, Belopolsky, & Theeuwes, 2012; Wickens, 1991). Hence, in order to engage in goal-driven perception or activity, attention has to allocate these resources to the task-relevant information (Awh et al., 2012). So, when multiple tasks are performed simultaneously more attentional resources will be required to properly complete both tasks. However, because the resources are limited they will have to be divided among the tasks. This division of attentional resources might result in one or more tasks not having sufficient recourses available (Wickens, 1991).
Consequently, this could result in lower performance on the affected task or tasks (Wickens, 1991). How allocation and division of the limited attentional resources are prioritized, is determined by attentional control.

Attentional control is often considered to be a dichotomy between top-down and bottom-up control (Awh et al., 2012; but also see Corbetta & Schulman, 2002; Hegarty, 2011). Within this dichotomy, top-down control is driven by the current selection goals one has set out, while bottom-up control is driven by the physical salience of the stimulus in question (Awh et al., 2012). However, Awh and colleagues (2012) argue that this dichotomy of top-down and bottom-up control is insufficient, as prioritization of physical salient stimuli over current selection goals cannot entirely be explained by the stimuli’s physical salience, nor by the selection goals. The scholars propose that selection and reward history should be taken into consideration as well (Awh et al., 2012, also see Anderson, Laurent, & Yantis, 2013).

Selection history is defined by Awh and colleagues (2012) as: “the bias to prioritize items that have been previously attended in a given context” (p. 437). Hence, the attentional selection of a specific value of a physical salient stimulus is primed when this value was recently selected. Therefore, the attentional selection of this value might become stronger due to the cumulative priming of the value by previous selections (Awh et al., 2012). Likewise, the researchers explain that reward history is closely related to, or perhaps even intertwined with selection history. Particularly, previously experienced rewards are important antecedents of attentional value selection, as they provide motivational significance for this selection (Anderson et al., 2013; Awh et al., 2012). Moreover, rewards are shown to even provide motivational significance when the attentional selection of the reward is in contrast with the current selection goals (e.g., Anderson, Laurent, & Yantis, 2011; Hickey, Chelazzi, & Theeuwes, 2010). So, not only selection goals and physical salient stimuli can affect selection
priority, history effects caused by both selection and reward history can, too, affect this priority (Awh et al., 2012).

**Smartphones as Direct Attentional Capturers**

Attentional capturing by smartphones can occur either via active smartphone use or passive smartphone presence. When capturing attention via active use, smartphones distract their owners by stimulating the human senses (i.e., hearing, sight, and touch) through sounds, visuals, and vibrations (Wilmer & Chein, 2016). A well-known example of attentional capturing by active smartphone use is due to notifications. Such notifications have been shown to increase task-related inattention and hyperactivity while performing various smartphone-unrelated tasks (Kushlev, Proulx, & Dunn, 2016). Consequently, these notifications can lead to lower productivity and lower psychological well-being in smartphone owners, as they can evoke notification-related thoughts at the expense of task-related thoughts (Kushlev et al., 2016; Stothart et al., 2015). Besides, a related study shows that participants who were separated from their smartphones experienced both negative physiological and psychological effects (i.e., increased blood pressure, heart rate, and anxiety, and decreased cognitive performance) when they heard their smartphones ring during a cognitive task but could not answer them (Clayton, Leshner, & Almond, 2015).

In contrast, when smartphones capture attention via passive presence, no form of actual stimulation is involved. More specifically, merely the visible presence of a smartphone can be sufficient to capture attention (e.g., Thornton et al., 2014; Ward et al., 2017). A study that examined the effects of mere cell phone presence was conducted by Thornton and colleagues (2014). Two experiments examined whether visibly present cell phones were able to distract participants and negatively affect attentional processes and performances on cognitive tasks (Thornton et al., 2014). In both experiments, participants performed two
(simple vs. challenging) digit-cancellation tasks in which they had to eliminate target numbers in multiple rows of single-digit numbers (e.g., 5: 2157843…), and two (simple vs. challenging) trail-making tests in which they had to draw lines to connect numbered circles in the correct order without lifting the pencil from the paper (e.g., 1-2-3-4…; Thornton et al., 2014). For both tasks, higher scores indicated higher attentional capacity and performance (Thornton et al., 2014). The results of both experiments indicated that passive cell phone presence was indeed distracting but only during the more challenging tasks, as participants who had cell phones on their desks during the challenging tasks had significantly lower scores than participants without phones on their desks (Thornton et al., 2014). These findings can be explained by the limited availability of attentional resources (Awh et al., 2012; Wickens, 1991). More specifically, challenging tasks require more attentional resources than simple ones. So, when a cell phone is passively present during a task, attention is directed to the phone as well, leaving sufficient resources available for performing simple tasks but not challenging ones.

This explanation is in line with Ward and colleagues’ (2017) research on whether passively present smartphones negatively affect cognitive performance by reducing available attentional resources. The researchers manipulated smartphone salience by asking participants to place their phones on their desks, in their pockets or bags, or in another room before participating in two tasks (Ward et al., 2017). Participants first performed the Automated Operation Span Task (OSpan) to assess their domain-general attentional resources (Ward et al., 2017). During this task, participants’ information processing capacities were measured by their performances on math problems while, at the same time, their information maintenance capacities were measured by recalling and revising letter sequences (Ward et al., 2017). Participants next performed a subset of Raven’s Standard Progressive Matrices (RSPM) in which fluid intelligence was assessed by their performances on solving incomplete pattern
matrices (Ward et al., 2017). The researchers found that passive smartphone presence indeed affected attentional resources since participants with smartphones on their desks scored significantly lower on both tasks as compared to participants who left their phones in another room (Ward et al., 2017). Moreover, this effect seemed to be moderated by participants’ levels of smartphone dependency (Ward et al., 2017). However, the body of research on why passive smartphone presence distracts and how this might be affected by smartphone dependency is still fairly limited.

**Reinforced Smartphones**

When the framework of attentional control by Awh and colleagues (2012) is applied to smartphones, actual stimulations during active smartphone use—such as notifications—could be perceived to cause the devices to become physically salient stimuli due to bottom-up control. The attentional selection of a smartphone notification could then be primed when similar notifications are recently selected (Awh et al., 2012). This attentional selection of notifications might become stronger due to the cumulative priming of previous notifications (Awh et al., 2012). Hence, due to bottom-up control and selection history, actively used smartphones might attain an attentional capturing potency that can distract attention from the current selection goals and motivate the prioritization of a smartphone over these goals (Anderson et al., 2011; Awh et al., 2012).

However, when passively present smartphones serve as attentional captures, solely bottom-up control and selection history cannot explain the prioritization of a smartphone over the selection goals (Awh et al., 2012). This is where reward history becomes substantially important for attentional control. More specifically, due to previously experienced rewards that were provided by smartphones, a motivational significance for selection of the
smartphone could arise, even when this is in contrast with the current selection goals (e.g., Anderson et al., 2013; Awh et al., 2012; Hickey et al., 2010).

Because rewards provide a motivational significance for accessing one’s smartphone, they can be considered *positive reinforcement* motives for smartphone use (Chen et al., 2017). Chen and colleagues (2017) describe positive reinforcement as: “the positive motives for substance abuse” (p. 440; also see Zhang, Chen, Zhao, & Lee, 2014). However, in the present study, positive reinforcement refers to the positive motives for engaging in a certain behavior (i.e., smartphone use). Hence, smartphone owners who constantly receive short-term rewards form their smartphones might associate the devices with these previous rewards (Anderson et al., 2013; Awh et al., 2012). Subsequently, the previous rewards will prime attention to the reward-associated smartphone when the device is passively present (Anderson et al., 2013) and the smartphone owner will become motivated to use the device (Chen et al., 2017; Zhang et al., 2014). Thus, when the association between the smartphone and the previous rewards has been established, the device could become a *reinforced stimulus*.

*Instant Gratification as Motive for Positive Reinforcement*

Smartphones can provide instant gratification by offering various functions and applications that provide quick and easy rewards, or *gratifications* (Lee, Chang, Lin, & Cheng, 2014; Zhang et al., 2014). These rewards can take on many forms. For instance, social gratifications such as social networking and messaging can be described as the satisfaction provided by engaging in interpersonal interactions via smartphones (Hallam & Zanella, 2017; Lee et al., 2014). Rewards associated with fun such as mobile gaming can provide satisfaction by deciphering new levels, participating in interpersonal gameplay (Tillman et al., 2012; Sampat & Krishnamoorthy, 2016), or experiencing a positive flow state (e.g., Chen et al., 2017). Informational gratifications such as news can provide satisfaction by presenting new
informational content to smartphone owners (Oulasvirta, Rattenbury, Ma, & Raita, 2012). Hence, the smartphone’s ability to quickly and easily provide rewards motivates smartphone owners to use the devices in a variety of situations and emotional states in order to obtain rewards and achieve instant gratification (e.g., Chen et al., 2017; Oulasvirta et al., 2012; Wilmer & Chein, 2016; Zhang et al., 2014).

Since smartphones are sources of instant gratification that can easily be carried anywhere, smartphone owners are constantly able to engage with their devices. This constant accessibility of smartphones has been argued to provoke the need for instant gratification within their owners (Wilmer & Chein, 2016; Wilmer et al., 2017). Particularly, when smartphone owners access their devices they can obtain various rewards and, hence, they will achieve instant gratification. Instant gratification can thus be perceived as a positive reinforcement motive for smartphone use. As a result, the smartphone could become a reinforced stimulus that provokes the need for instant gratification when visible.

Research on smartphone use and gratifications has, however, given reason to believe that the rising omnipresence of smartphones has led to lower performance on delaying gratification (Frost et al., 2019; Hadar et al., 2017; Wilmer & Chein, 2016; for a review, see Wilmer et al., 2017). For example, Wilmer and Chein (2016) examined the extent to which heavier smartphone use affected participants’ tendency to delay gratification, by making participants perform a delay discounting task. Indeed, the scholars found a reduced tendency to delay gratification in heavy smartphone users, as these users more often chose smaller, but more immediate rewards over larger, but later rewards (Wilmer & Chein, 2016). Moreover, this effect appeared to be mediated by participants’ impulse control rather than participants’ reward sensitivity (Wilmer & Chein, 2016). Similar results were found in a more recent study by Frost and colleagues (2019), in which participants performed various inventories that examined their cognition (e.g., Delay of Gratification Inventory and The Cornell Critical
Thinking Test). Likewise, the scholars argue that heavier smartphone use was correlated with lower performance on delaying gratification (Frost et al., 2019). Thus, heavy smartphone use is not only shown to provoke the need for instant gratification within smartphone owners, but it is also shown to decrease smartphone owners’ tendencies to delay gratification.

**Predictions**

With instant gratification being a positive reinforcement motive for smartphone use (Chen et al., 2017; Zhang et al., 2014) and smartphones becoming reinforced stimuli due to the accessibility of quick and easy rewards, it seems likely that seeing a smartphone could generate the need for instant gratification. Especially within heavy smartphone users. Hence, smartphone owners will be motivated by this need to engage with their smartphones, as using the devices promises to provide them with rewards (Wilmer et al., 2017). So, when the need for gratification arises but the smartphone cannot be immediately accessed (for example, due to instructions during the current experiment), the smartphone-evoked need for gratification has to be delayed in favor of a larger, but later reward (Wilmer & Chein, 2016). However, as heavy smartphone use is showed to be correlated with lower performance on delaying gratification (e.g., Frost et al., 2016; Wilmer & Chein, 2016), the passive presence of a reinforced smartphone might be sufficient to provoke the need for instant gratification and create an unwillingness to delay gratification.

This unwillingness to delay gratification could lead to self-regulatory difficulties (Wulfert, Block, Santa Ana, Rodriguez, & Colsman, 2002). More specifically, if seeing a smartphone could provoke the need for instant gratification but this need has to be delayed, smartphone owners could experience self-regulatory difficulties due to their unwillingness to delay smartphone use. Besides, Wulfert and colleagues (2002) have shown that the unwillingness to delay gratification negatively affects other aspects of life as well (e.g., lower
self-esteem, lower grades, and lack of self-restraint when using cigarettes or alcohol). Therefore, self-regulatory difficulties due to the unwillingness to delay smartphone use could cause self-regulatory deficits in other aspects of a smartphone owner’s daily life (Wulfert et al., 2002), such as more impulsively choosing smaller, but more immediate rewards over larger, but later rewards in smartphone-unrelated decision-making tasks (e.g., Reynolds & Schiffbauer, 2005).

To examine whether participants’ in the current study decided more impulsively in a smartphone-unrelated decision-making task due to passively present smartphones, an online version of the Iowa Gambling Task was used (IGT). The IGT was originally created by Bechara, Damasio, Damasio, and Anderson (1994). In 1999, the computerized version of the IGT was created (Bechara, Damasio, Damasio, & Lee, 1999). The (computerized) IGT is frequently used by scholars to examine decision making (e.g., Brogan, Hevey, & Pignatti, 2010; Goudriaan, Grekin, & Sher, 2007; Xu, 2012). Moreover, the IGT has been previously used by scholars in the context of smartphone technology to successfully capture impulsive decision making (Khoury et al., 2019). In their study, Khoury and colleagues (2019) found that participants who suffered from higher levels of smartphone addiction performed worse on the IGT. The scholars argue that participants who suffered from higher levels of smartphone addiction decided more impulsively during the IGT due to their search for rewards, resulting in preferences for high and immediate rewards during the IGT, even if this was disadvantageous in the long term (Khoury et al., 2019).

This line of reasoning by Khoury and colleagues (2019) is consistent with the proposed mechanism of the present study. Specifically, if smartphones could become reinforced attentional capturers with instant gratification as a positive reinforcer due to smartphones providing quick and easy rewards, then the search for immediate rewards during the IGT would be captured as more impulsive decision making during the IGT. So, if the
current research shows that there is an effect of passive smartphone presence on impulsive decision-making in the smartphone-unrelated decision-making task, then this would provide evidence for the proposed mechanism. Therefore, the first hypothesis is formulated:

**Hypothesis 1A:** Passive smartphone presence leads to more impulsive decision making in a smartphone-unrelated decision-making task as compared to smartphone absence.

Furthermore, greater impulsivity during decision making could perhaps be related to more rapid decision making. Research showed that participants who suffered from an impulse control disorder (e.g., pathological gambling and compulsive shopping) not only decided more impulsively, they also decided more rapidly compared to participants without such a disorder (Voon, 2011). However, Voon’s (2011) research sample solely consisted of patients who suffered from Parkinson’s disease. Hence, no conclusions can be drawn regarding participants who do not suffer from this disease. In another study, reaction time on a task in which gratification had to be delayed by young children, was used as a measure of self-control (Olsen, Bates, & Bayles, 1990). Within the task, shorter (longer) reaction times indicated less (more) self-control (Olsen et al., 1990). Yet another research examined whether more impulsive participants had shorter reaction times during a choice-reaction-time task that was performed by adolescent boys (Edman, Schalling, & Levander, 1983). Accordingly, the researchers found that more impulsive participants made more errors during the task and had shorter reaction times as compared to less impulsive participants (Edman et al., 1983).

Even though the results from these studies do not allow generalization to a broader population, they do give reason to expect that those who respond more impulsively, respond faster as well. Particularly because impulse control is perceived to be an important facet of decision making (Wilmer & Chein, 2016). Thus, it can be reasoned that smartphone owners
who are unwilling to delay gratification due to passive smartphone presence will not only decide more impulsively during a smartphone-unrelated decision-making task but also faster. Based on this expectation, the following hypothesis is formulated:

**Hypothesis 1B:** Passive smartphone presence leads to shorter reaction times during decision making in a smartphone-unrelated decision-making task as compared to smartphone absence.

*Smartphone Addiction*

Previous research on smartphone dependency indicates that smartphone owners who suffer from higher levels of smartphone addiction have more difficulties with delaying gratification as compared to those with lower levels of smartphone addiction (e.g., Frost et al., 2019; Hadar et al., 2017; Wilmer & Chein, 2016). Moreover, Ward and colleagues (2017) found evidence that smartphone dependency moderates the effect of passive smartphone presence on attentional resources. Specifically, participants suffering from medium or high levels of smartphone dependency who placed their smartphones on their desks performed significantly worse on the OSpan than participants with similar levels of smartphone addiction who placed their phones in another room (Ward et al., 2017). This finding is consistent with the results of Khoury and colleagues (2019), who found that participants’ overall scores on the IGT negatively correlated with participants’ levels of smartphone addiction. More particularly, participants who suffered from higher levels of smartphone addiction made more disadvantageous long-term decisions than participants with lower levels of smartphone addiction (Khoury et al., 2019).

Hence, it is conceivable that higher levels of smartphone addiction lead to more self-regulatory difficulties due to the unwillingness to delay smartphone use that could be provoked by the need for immediate rewards. Consequently, this could lead to even more
impulsive decision making in smartphone addicts as they are more susceptible to the “invisible pull” of the smartphone. Specifically, it seems likely that smartphone addiction moderates the effect that passive smartphone presence has on impulsive decision making in such a way that smartphone owners who suffer from higher levels of smartphone addiction will experience more cognitive costs due to passive smartphone presence than smartphone owners who suffer from lower levels of smartphone addiction. Therefore, the following hypotheses are formulated:

**Hypothesis 2A:** Participants who suffer from higher levels of smartphone addiction will engage in more impulsive decision making in a smartphone-unrelated decision-making task as compared to participants who suffer from lower levels of smartphone addiction.

**Hypothesis 2B:** Participants who suffer from higher levels of smartphone addiction will have shorter reaction times during decision making in a smartphone-unrelated decision-making task as compared to participants who suffer from lower levels of smartphone addiction.

**Hypothesis 3A:** The effect of passive smartphone presence as compared to smartphone absence on decision making is moderated by smartphone addiction, such that passive smartphone presence leads to more impulsive decision making in a smartphone-unrelated decision-making task among participants who suffer from higher levels of smartphone addiction than participants who suffer from lower levels of smartphone addiction.

**Hypothesis 3B:** The effect of passive smartphone presence as compared to smartphone absence on decision making is moderated by smartphone addiction, such that passive smartphone presence leads to shorter reaction times during decision making in a smartphone-
unrelated decision-making task among participants who suffer from higher levels of smartphone addiction than participants who suffer from lower levels of smartphone addiction.

*Trait Impulsivity*

Impulsivity as a construct can be viewed from a cognitive, behavioral, and characterological perspective (for a review, see Arce & Santisteban, 2006). Cognitive impulsivity can be described as the inability or unwillingness to delay gratification due to the incapacity to properly evaluate the impact of choosing between immediate and later rewards (Arce & Santisteban, 2006). This type of impulsivity can thus be explained as impulsive decision-making, which can be captured in decision-making tasks such as the IGT (Bechara et al., 1994). Behavioral impulsivity can be explained as response inhibition (Arce & Santisteban, 2006), which can be captured in, for example, go/no-go tasks (e.g., Horn, Dolan, Elliot, Deakin, & Woodruff, 2003) or stop tasks (e.g., Ávila, Cuenca, Félix, Parcet, & Miranda, 2004). Characterological impulsivity, however, can be perceived as a personality trait of which taking more risk, planning poorly, and deciding quickly are common aspects (Arce & Santisteban, 2006). Based on these perspectives, impulsive-decision making, response inhibition, and trait impulsivity can be viewed as three distinct types of impulsivity.

In the present research, participants’ cognitive impulsivity is examined as this research assesses whether passive smartphone presence affects impulsivity during decision making. However, research on impulsivity as a personality trait showed that trait impulsivity affects decision making as well (Upton, Bishara, Ahn, & Stout, 2011). Upton and colleagues (2011) researched whether participants’ performances on the IGT were affected by their propensity for risk-taking by having them perform the IGT and the Balloon Analogue Risk Task (BART). The scholars found that participants’ performances on the IGT correlated with their performances on the BART (Upton et al., 2011). However, this effect seemed to be moderated
by participants’ levels of trait impulsivity, as the relation between the IGT and the BART was only found in participants’ with lower levels of trait impulsivity (Upton et al., 2011). More specifically, participants with lower levels of trait impulsivity took less risk during the BART and made more long-term advantageous decisions during the IGT (Upton et al., 2011).

The results by Upton and colleagues (2011) indicate that impulsivity as a personality trait has a substantial influence on impulsive decision making. Therefore, it seems likely that participants with higher levels of trait impulsivity will also engage in more impulsive decision making as participants with higher levels of trait impulsivity are more likely to take more risk and decide more quickly (Arce & Santisteban, 2006). Moreover, as passive smartphone presence is expected increase impulsive decision making during a smartphone-unrelated task, trait impulsivity might moderate the effect of passively present smartphones on decision making in such a way that participants with higher levels of trait impulsivity will engage in more impulsive decision making when seeing a smartphone as compared to participants with lower levels of trait impulsivity. Hence, the following hypotheses are formulated:

**Hypothesis 4A**: Participants with higher levels of trait impulsivity will engage in more impulsive decision making in a smartphone-unrelated decision-making task as compared to participants with lower levels of trait impulsivity.

**Hypothesis 4B**: Participants with higher levels of trait impulsivity will have shorter reaction times during decision making in a smartphone-unrelated decision-making task as compared to participants with lower levels of trait impulsivity.

**Hypothesis 5A**: The effect of passive smartphone presence as compared to smartphone absence on decision making is moderated by trait impulsivity, such that passive smartphone
presence leads to more impulsive decision making in a smartphone-unrelated decision-making task among participants with higher levels of trait impulsivity than participants with lower levels of trait impulsivity.

**Hypothesis 5B:** The effect of passive smartphone presence as compared to smartphone absence on decision making is moderated by trait impulsivity, such that passive smartphone presence leads to shorter reaction times during decision making in a smartphone-unrelated decision-making task among participants with higher levels of trait impulsivity than participants with lower levels of trait impulsivity.

Based on the hypotheses that are formulated in the present study, a conceptual model of the pathways is created. This conceptual model can be found in Figure 1.

*Figure 1. Conceptual model of the pathways based on the hypotheses formulated in the present study. Smartphone addiction and trait impulsivity moderate the relationship between smartphone presence and decision making.*
Method

Participants

A set of 87 participants between 18 and 35 years old was recruited from 15 May 2020 until 4 June 2020. Only participants who had access to either a PC or laptop and who owned a smartphone were eligible for the present study. Within the total sample, seven participants did not complete the experiment as six participants only completed the first part of the study but not the second part, and one participant did not finish the trials on the IGT. Further, six participants indicated to not have followed the researcher’s instructions during the experiment, as they afterward reported that they did not finish the IGT in one sitting and/or there were other people present in the same room as them during the IGT. The data of these 13 participants were therefore excluded from the study, resulting in a final sample of 74 participants.

Within the final sample ($N = 74$), 16 participants were recruited from the Tilburg University Human Participant Pool. Another 58 participants were recruited via convenience sampling. Of the participants, 40.5% was male ($n = 30$) and 59.5% was female ($n = 44$). Participants’ ages ranged from 18 to 34 years with a mean age of 25.14 years ($SD = 3.58$). Furthermore, 24.3% ($n = 18$) of the participants indicated they completed or still followed a master’s program at a university, 17.6% ($n = 13$) completed or followed a bachelor’s program at a university, and 40.5% ($n = 30$) completed or followed a program at a university for applied sciences. Besides, 17.6% ($n = 13$) indicated they completed or still followed another form of education.

All procedures were approved by the Research Ethics and Data Management Committee of Tilburg School of Humanities and Digital Sciences. Participants who completed the experiment via the Tilburg University Human Participant Pool received course
credit. No compensation was provided to participants recruited via convenience sampling. Prior to the study, all participants had to provide informed consent.

**Design**

The present study was conducted as an online experiment with a between-subjects variable (Smartphone Presence: present versus absent) and with Smartphone Addiction and Trait Impulsivity as moderators. In this experiment, the manipulation of Smartphone Presence was the independent variable, while Smartphone Addiction and Trait Impulsivity were quasi-experimental independent variables because they were not manipulated. The participants were randomly and equally divided over the two Smartphone Presence conditions at the start of the experiment: Smartphone Present ($n = 38$) and Smartphone Absent ($n = 36$). Participants were not aware of what conditions were used in the present study. The dependent variables were measured as two different operationalizations of Impulsive Decision Making during the IGT.

**Materials**

The present study was divided into two parts that are elaborated on below. Both parts of the study were conducted online. To match the participants’ data from Part I with their data from Part II, all participants received a unique participant number. Each participant was requested to provide this participant number once in Part I and twice in Part II. The study was conducted in English ($n = 7$) or Dutch ($n = 67$), depending on the participant’s preference.

**Part I**

In Part I, participants were asked to fill out an online questionnaire that was created with the software Qualtrics. First, participants were asked to answer several demographic questions and to enter their participant number. Next, participants’ Smartphone Addiction and
Trait Impulsivity were assessed. Lastly, participants were asked whether they preferred to engage in a video call via Skype or Zoom prior to Part II for clarification of the instructions.

**Demographics.** Participants were asked to answer three demographic questions. These questions concerned the participants’ gender (i.e., “What gender do you identify as?”), age (i.e., “What is your age in years?”), and level of education (i.e., “What is your highest or current level of education?”).

**Trait Impulsivity.** Participants’ level of Trait Impulsivity was examined with the Barrett Impulsiveness Scale-11 (BIS-11). The BIS-11 was developed by Patton, Stanford, and Barrett (1995) to measure participants’ personality/behavioral construct of impulsiveness (Aichert et al., 2012; Stanford et al., 2009). The BIS-11 consists of 30 items (e.g., “I plan tasks carefully”) which were measured on a four-point Likert Scale (1 = rarely/never; 4 = almost always/always). Participants’ scores on the BIS-11 were summed up (BIS Scores); total scores could range from 30 to 120 with higher scores implying greater impulsivity. The reliability of the BIS-11 was acceptable (α = .79). An overview of the English and Dutch versions of the BIS-11 can be found in Appendix A1 and Appendix A2, respectively.

**Smartphone Addiction.** Participants’ level of Smartphone Addiction was measured with the Smartphone Addiction Scale Short Version (SAS-SV; Kwon, Kim, Cho, & Yang, 2013a). The SAS-SV was developed by Kwon and colleagues (2013a) as a shorter and more efficient version of the original Smartphone Addiction Scale (SAS; Kwon et al., 2013b). The SAS-SV has become an established self-report instrument for measuring smartphone addiction as it is widely used by scholars in a variety of countries (e.g., De Pasquale, Sciacca, & Hichy, 2017; Lopez-Fernandez, 2017). Besides, the SAS-SV has been shown to have a strong internal validity (Cronbach’s α = .91; Kwon et al., 2013a).

The SAS-SV consists of 10 items (e.g., “Missing planned work due to smartphone use”). All items were measured on a six-point Likert scale (1 = strongly disagree; 6 = strongly...
agree). Participants’ scores on the SAS-SV were summed up (SAS Scores); total scores could range from 10 to 60 with higher scores indicating greater levels of smartphone addiction. The reliability of the SAS-SV was good ($\alpha = .80$). An overview of the English and Dutch versions of the SAS-SV can be found in Appendix B1 and Appendix B2, respectively.

Part II

In Part II, participants were asked to engage in an online decision-making task: the Iowa Gambling Task (IGT). In this part, Smartphone Presence (present versus absent) was manipulated. Furthermore, Impulsive Decision Making was assessed in this part of the study, and participants were asked follow-up questions.

Decision-Making Task. Participants’ Impulsive Decision Making during a smartphone-unrelated decision-making task was measured with an online version of the IGT. For the current study, an online version of the computerized IGT was created via the software PsyToolkit (Stoet, 2010, 2017). Participants were shown buttons that were labeled: A, B, C, and D. Buttons A and B were disadvantageous in the long term, as they each provided a €100 win, but also held a 50% chance of paying a €250 penalty. Buttons C and D were advantageous in the long term, as they each provided a €50 win, but held a 50% chance of paying only a €50 penalty. All participants started the task with a €2,000 “loan” and were asked to make a profit by choosing one of the four buttons. Participants had to select one button at the time, with a total of 100 buttons. After selecting a button, participants got feedback about whether they won or lost money, and after clicking 100 buttons, the task ended. Participants did not know in advance which buttons were profitable and which ones were not.

The IGT in the present research was used to measure two different operationalizations of Impulsive Decision Making. The first dependent variable is $IGT$ Scores, which was
measured as participants’ number of clicks (out of the total 100 clicks) on one of the long-term disadvantageous buttons (i.e., A and B), with higher scores indicating greater impulsivity during decision making. The second dependent variable is *IGT Times*, which was measured as participants’ total reaction times for clicking the buttons during the task, with faster reaction times indicating more impulsive decision making as well.

The current version of the IGT was based on an online version that was already included in the PsyToolkit Library. This online PsyToolkit version differed from the original IGT by Bechara and colleagues (1994) as the online version showed participants four buttons instead of the four decks of cards that were used in the original IGT. The online PsyToolkit version was slightly adapted for current purposes. As the present study was conducted in the Netherlands, the currency signs in the stimuli that showed the wins and penalties were changed from “$” to “€”. Besides, a Dutch version of the online IGT was created. The amounts of the rewards and the penalties in the adapted versions were kept similar to those in the PsyToolkit version, as were the rules and instructions. For an overview of the stimuli that were used to create the online versions of the IGT for the present study, see Appendix C1 (English) and Appendix C2 (Dutch).

**Follow-up Questions.** After completing the IGT, participants indicated *correct* or *incorrect* for three follow-up questions: 1) “At no time during my participation in the study, there were other people present in the same room as me”; 2) “After finishing the video call with the researcher, I did not touch my smartphone at any time until the end of my participation”; and 3) “I completed the study without any interruptions (i.e., without doing something else in the meantime)”. The follow-up questions were asked to verify whether the researcher’s instructions were followed correctly during the IGT.
Procedure

The entire study took around 30 minutes, as Part I took approximately 10 minutes and Part II took approximately 20 minutes. In order to recruit participants, the present study was published on the website of the Tilburg University Human Participant Pool where students from Tilburg University could register for a timeslot to participate in the study. Besides, the researcher’s social media (i.e., WhatsApp, Facebook, and Instagram) were used to recruit participants via convenience sampling. Participants who registered for the study received an email with a participant number and an information letter in which was explained what participation entailed (see Appendix D1 and D2 for the email and Appendix E1 and E2 for the information letter, both in English and Dutch respectively).

Part I

Approximately one day before the planned timeslot (which was effectively used for Part II, see below), participants received a second email with a link to Part I (see Appendix F1 and F2 for the English and Dutch email, respectively). In this email, participants were instructed to fill out the online questionnaire at a time and place of their convenience, but before participating in Part II of the study. Moreover, participants were asked to complete the questionnaire in one sitting. After clicking the link, participants had to provide informed consent for participating in the study and for engaging in a video call with the researcher (see Appendix G1 for English and G2 for Dutch). This video call was essential for the present research, as this allowed the researcher to explain the rules of the experiment to the participant prior to Part II. Participants who did not agree with the informed consent were immediately redirected to the end of the questionnaire. Participants who agreed could proceed with the questionnaire. Subsequently, participants who completed the questionnaire were
thanked and given instructions to prepare for Part II of the study (see Appendix H1 and Appendix H2 for the English and Dutch survey termination texts, respectively).

Part II

Participants who completed Part I were invited to engage in the online IGT via email approximately 10 minutes before the start of the administered timeslot (see Appendix I1 and Appendix I2 for the English and Dutch email, respectively). In this e-mail, participants were explained that Part II was not smartphone compatible and, therefore, participation was only possible via a computer or laptop. Besides, the email contained a link to start the video call with the researcher. The researcher engaged in video calls with all participants separately prior to the IGT to successfully manipulate Smartphone Presence in Part II. Also, this video call allowed the researcher to inspect whether instructions were followed by the participants.

Participants in the Smartphone Absent condition were asked to place their smartphones in another room (e.g., bedroom) and to mute their smartphones (including vibrations; Ward et al., 2017). Besides, they were told that they needed a pen and a piece of paper at the end of the task. Hence, they were asked to place their pen and paper in the left corners of their tables or desks (Thornton et al., 2014). Participants in the Smartphone Present condition were told that they needed their smartphones at the end of the task. Therefore, they were asked to mute their smartphones (including vibrations) and to place their smartphones with the screen down in the left corners of their tables of desks (Ward et al., 2017). To keep both conditions as similar as possible, participants in the Smartphone Present condition were asked to place a pen and a piece of paper in another room (e.g., bedroom), and they were told that they would need this at the end of the task.

After the instructions, a link to Part II was sent to the participants via the Skype or Zoom chat and the video call was ended. At the start of Part II, participants were asked for
their participant numbers after which they could start with the IGT. Participants who finished the IGT were redirected and asked to answer the three follow-up questions and to enter their participant number. Lastly, participants were thanked for their participation and debriefed (see Appendix J1 and Appendix J2 for the English and Dutch debriefing, respectively).

Results

To test for the hypotheses outlined in the Introduction, four moderation analyses were performed. The analyses were conducted with Smartphone Presence (present versus absent) as the predictor variable, the proportion of times participants clicked on long-term disadvantageous buttons A and B during the IGT (IGT Scores) or participants’ total reaction times for clicking the buttons during the IGT (IGT Times) as the outcome variable, and participants’ levels of Smartphone Addiction (SAS Scores) or Trait impulsivity (BIS Scores) as moderator of the relationship between Smartphone Presence and IGT Scores or IGT Times. This allowed examination of changes in the relationship between Smartphone Presence and participants’ IGT Scores or IGT Times for different levels of Smartphone Addiction or Trait Impulsivity.

Descriptive Statistics

Casewise diagnostics for the models with IGT Times as outcome variable showed one case with a standardized residual $<-3$ that caused concern, as it is not probable for the value of this case to occur in an average sample (Field, 2013). Hence, this case was perceived as an outlier and excluded from the analyses, leaving the data of 73 participants. An overview of the descriptive statistics for the remaining participants can be found in Table 1. Spearman’s correlation coefficients between the variables showed that participants’ IGT Scores significantly correlated with participants’ IGT Times, $r_s = .25, p = .032$ (see Table 2 for all
Table 1

Means, Standard Deviations, and Sample Sizes of the Moderator and Outcome Variables Used in the Models for the Conditions of the Predictor Variable

<table>
<thead>
<tr>
<th>Smartphone Presence</th>
<th>Absent</th>
<th>Present</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>n</td>
</tr>
<tr>
<td>BIS Scores</td>
<td>62.03</td>
<td>8.69</td>
<td>36</td>
</tr>
<tr>
<td>SAS Scores</td>
<td>30.69</td>
<td>7.23</td>
<td>36</td>
</tr>
<tr>
<td>IGT Scores</td>
<td>46.22</td>
<td>17.88</td>
<td>36</td>
</tr>
<tr>
<td>IGT Times</td>
<td>96.32</td>
<td>33.77</td>
<td>36</td>
</tr>
</tbody>
</table>

Table 2

Spearman’s Correlation Coefficients Between the Outcome and Moderator Variables Used in the Models

<table>
<thead>
<tr>
<th></th>
<th>BIS scores</th>
<th>SAS scores</th>
<th>IGT scores</th>
<th>IGT times</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIS scores</td>
<td>1.000</td>
<td>.218</td>
<td>.188</td>
<td>-.039</td>
</tr>
<tr>
<td>SAS scores</td>
<td>.218</td>
<td>1.000</td>
<td>.068</td>
<td>.198</td>
</tr>
<tr>
<td>IGT scores</td>
<td>.188</td>
<td>.068</td>
<td>1.000</td>
<td>.252*</td>
</tr>
<tr>
<td>IGT times</td>
<td>-.039</td>
<td>.198</td>
<td>.252*</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*p < .05

correlation coefficients). However, as these are both outcome variables that were not used in the same models, this correlation was no cause for concern. Furthermore, the standardized residuals deviated significantly from normal. The Kolmogorov-Smirnov statistics were significant for the model with IGT Scores as outcome variable and SAS Scores as moderator,
SMARTPHONE PRESENCE AND IMPULSIVE DECISION MAKING

$D(73) = 0.12, p = .018$, and for the model with IGT Scores as outcome variable and BIS Scores as moderator, $D(73) = 0.11, p = .021$. Moreover, the Shapiro-Wilk statistic was significant for the model with IGT Times as outcome variable and BIS Scores as moderator $W(73) = 0.96, p = .027$. Thus, the assumption of normally distributed residuals was not assumed and more weight was placed on the bootstrapped 95% confidence intervals using 10,000 bootstrap resamples that are provided.

Analyses

Model 1: Smartphone Presence, IGT Scores, and SAS Scores

To test the hypotheses that (1A) passive smartphone presence leads to more impulsive decision making in a smartphone-unrelated decision-making task as compared to smartphone absence, that (2A) participants who suffer from higher levels of smartphone addiction will engage in more impulsive decision making in a smartphone-unrelated decision-making task as compared to participants who suffer from lower levels of smartphone addiction, and that (3A) the effect of passive smartphone presence as compared to smartphone absence on decision making is moderated by smartphone addiction, such that passive smartphone presence leads to more impulsive decision making in a smartphone-unrelated decision-making task among participants who suffer from higher levels of smartphone addiction than participants who suffer from lower levels of smartphone addiction, a moderation analysis was performed using Hayes’ PROCESS macro (Hayes, 2012) within statistical package SPSS version 25 (IBM Corporation, Rochester, MN).

The model with Smartphone Presence, SAS Scores, and the interaction between Smartphone Presence and SAS Scores to predict IGT Scores was not significant, $R^2 = .017, F(3, 69) = 0.39, p = .76$. There was no significant main effect of Smartphone Presence on IGT Scores, $b = -3.99, SE = 4.55, p = .38, 95\% \text{ BCI} [-12.54, 5.03]$. On average, participants in the
Smartphone Absent condition had higher IGT Scores ($M = 46.22, SD = 17.88$) than participants in the Smartphone Present condition ($M = 41.97, SD = 19.94$), but this was not significant. Hence, passive Smartphone Presence did not lead to more impulsive decision making than Smartphone Absence. There was also no significant main effect of SAS Scores on IGT Scores, $b = 0.11, SE = 0.29, p = .71, 95\%\text{ BCI} [-0.47, 0.70]$. Thus, the analysis showed no significant differences in IGT Scores between participants who suffered from different levels of Smartphone Addiction. In addition, there was no significant interaction effect between Smartphone Presence and SAS Scores on IGT Scores, $b = 0.19, SE = 0.58, p = .75, 95\%\text{ BCI} [-0.91, 1.43]$. Based on these data, hypotheses 1A, 2A, and 3A are not supported.

Because the residuals were not normally distributed, a nonparametric two independent samples Mann-Whitney $U$ test was conducted to further examine possible differences between participants’ IGT Scores in the Smartphone Present and Smartphone Absent conditions. This test showed that participants in the Smartphone Absent condition ($Mdn = 50.50$) did not have significantly different IGT Scores than participants in the Smartphone Present condition ($Mdn = 48.00$), $U = 598.00, z = -0.75, p = .45, r = -.09$. This nonparametric test confirms the above outcomes of the moderation analysis conducted with Hayes’ PROCESS macro. Furthermore, the Bayes Factor $BF_{01}$ was determined by conducting a Bayesian independent samples Mann-Whitney $U$ test using the statistical software JASP version 0.12.2 (JASP Team, 2020), to inspect whether there was evidence for the null hypothesis (i.e., passive smartphone presence does not lead to more impulsive decision making in a smartphone-unrelated decision-making task as compared to smartphone absence). The test showed that there was moderate evidence for the null hypothesis as compared to hypothesis 1A, $BF_{01} = 3.26$. 
Model 2: Smartphone Presence, IGT Scores, and BIS Scores

To test the hypotheses that (4A) participants with higher levels of trait impulsivity will engage in more impulsive decision making in a smartphone-unrelated decision-making task as compared to participants with lower levels of trait impulsivity, and that (5A) the effect of passive smartphone presence as compared to smartphone absence on decision making is moderated by trait impulsivity, such that passive smartphone presence leads to more impulsive decision making in a smartphone-unrelated decision-making task among participants with higher levels of trait impulsivity than participants with lower levels of trait impulsivity, a moderation analysis was performed using Hayes’ PROCESS macro (Hayes, 2012) within statistical package SPSS version 25 (IBM Corporation, Rochester, MN).

The model with Smartphone Presence, BIS Scores, and the interaction between Smartphone Presence and BIS Scores to predict IGT Scores was not significant, $R^2 = .051$, $F(3, 69) = 1.24, p = .30$. There was no significant main effect of Smartphone Presence on IGT Scores, $b = -4.76, SE = 4.42, p = .29$, 95% BCI [-13.18, 3.68]. There was also no significant main effect of BIS Scores on IGT Scores, $b = 0.38, SE = 0.25, p = 0.13$, 95% BCI [-0.09, 0.93]. Thus, the analysis showed no significant differences in IGT Scores between participants with different levels of Trait Impulsivity. Lastly, there was no significant interaction effect of Smartphone Presence and BIS Scores on IGT Scores, $b = -0.39, SE = 0.51, p = .45$, 95% BCI [-1.38, 0.69]. Hence, hypotheses 4A and 5A are not supported by the data.

Model 3: Smartphone Presence, IGT Times, and SAS Scores

To test the hypotheses that (1B) passive smartphone presence leads to shorter reaction times during decision making in a smartphone-unrelated decision-making task as compared to smartphone absence, that (2B) participants who suffer from higher levels of smartphone
addiction will have shorter reaction times during decision making in a smartphone-unrelated decision-making task as compared to participants who suffer from lower levels of smartphone addiction, and that (3B) the effect of passive smartphone presence as compared to smartphone absence on decision making is moderated by smartphone addiction, such that passive smartphone presence leads to shorter reaction times during decision making in a smartphone-unrelated decision making task among participants who suffer from higher levels of smartphone addiction than participants who suffer from lower levels of smartphone addiction, a moderation analysis was performed using Hayes’ PROCESS macro (Hayes, 2012) within statistical package SPSS version 25 (IBM Corporation, Rochester, MN).

The model with Smartphone Presence, SAS Scores, and the interaction between Smartphone Presence and SAS Scores to predict IGT Times was not significant, $R^2 = .040$, $F(3, 69) = 0.95, p = .42$. There was no significant main effect of Smartphone Presence on IGT Times, $b = -6.60, SE = 7.65, p = .39, 95\%\text{ BCI} [-21.46, 7.93]$. On average, participants in the Smartphone Present condition had shorter IGT Times ($M = 88.24, SD = 30.60$) than participants in the Smartphone Absent condition ($M = 96.32, SD = 33.77$). However, passive smartphone presence did not significantly lead to shorter IGT Times than smartphone absence. There was also no significant main effect of SAS Scores on IGT Times, $b = 0.59, SE = 0.49, p = .23, 95\%\text{ BCI} [-0.28, 1.80]$. Hence, the analysis showed no significant differences in IGT Times between participants who suffered from different levels of Smartphone Addiction. Furthermore, there was no significant interaction effect between Smartphone Presence and SAS Scores on IGT Times, $b = -0.71, SE = 0.98, p = .47, 95\%\text{ BCI} [-2.90, 1.32]$. Therefore, hypotheses 1B, 2B, and 3B are not supported by the data.

Because the residuals were not normally distributed, a nonparametric two independent samples Mann-Whitney $U$ test was conducted to further examine possible differences between participants’ IGT Times in the Smartphone Present and Smartphone Absent
conditions. This test showed that participants in the Smartphone Absent condition (
\(Mdn = 88.90\)) did not have significantly different IGT Scores than participants in the
Smartphone Present condition (\(Mdn = 83.00\)), \(U = 574.00, z = -1.02, p = .31, r = -.12\). This
nonparametric test confirms the above outcomes of the moderation analysis conducted with
Hayes’ PROCESS macro. Furthermore, the Bayes Factor \(BF_{01}\) was determined by conducting
a Bayesian independent samples Mann-Whitney \(U\) test using the statistical software JASP
version 0.12.2 (JASP Team, 2020), to inspect whether there was evidence for the null
hypothesis (i.e., passive smartphone presence does not lead to shorter reaction times during
decision making in a smartphone-unrelated decision-making task as compared to smartphone
absence). The test showed that there was anecdotal evidence for the null hypothesis as
compared to hypothesis 1B, \(BF_{01} = 2.41\).

Model 4: Smartphone Presence, IGT Times, and BIS Scores

To test the hypotheses that (4B) participants with higher levels of trait impulsivity will
have shorter reaction times during decision making in a smartphone-unrelated decision-
making task as compared to participants with lower levels of trait impulsivity, and that (5B)
the effect of passive smartphone presence as compared to smartphone absence on decision
making is moderated by trait impulsivity, such that passive smartphone presence leads to
shorter reaction times during decision making in a smartphone-unrelated decision-making
task among participants with higher levels of trait impulsivity than participants with lower
levels of trait impulsivity, a moderation analysis was performed using Hayes’ PROCESS
macro (Hayes, 2012) within statistical package SPSS version 25 (IBM Corporation,
Rochester, MN).

The model with Smartphone Presence, BIS Scores, and the interaction between
Smartphone Presence and BIS Scores to predict IGT Times was not significant, \(R^2 = .027,\)
There was no significant main effect of Smartphone Presence on IGT Times, $b = -0.75, SE = 0.63, p = 0.31, 95\% \text{ BCI \([-22.18, 7.04]\).}$ There was also no significant main effect of BIS Scores on IGT Times, $b = -0.25, SE = 0.44, p = 0.56, 95\% \text{ BCI \([-1.05, 0.64]\).}$ Thus, the analysis showed no significant differences in IGT Times between participants with different levels of Trait Impulsivity. Lastly, there was no significant interaction effect of Smartphone Presence and BIS Scores on IGT Times, $b = -0.56, SE = 0.87, p = 0.53, 95\% \text{ BCI \([-1.98, 1.30]\).}$ Based on these data, hypotheses 4B and 5B are not supported.

**Discussion**

**Smartphone Presence**

The present study explored if and how the visible presence (as compared to absence) of a participant’s smartphone modulates impulsive decision making in a smartphone-unrelated decision-making task, and whether this effect is moderated by smartphone addiction or trait impulsivity. Contrary to the hypotheses, no significant main effects were found for Smartphone Presence on IGT Scores and IGT Times. More specifically, seeing a passively present smartphone did not evoke more impulsive decision making as compared to not seeing a smartphone during a smartphone-unrelated decision-making task. Hence, no support is found for hypotheses 1A and 1B, which proposed that passive smartphone presence leads to (1A) more impulsive decision making, and (1B) shorter reaction times during decision making in a smartphone-unrelated decision-making task as compared to smartphone absence.

These findings are inconsistent with previous findings by Thornton and colleagues (2014), who showed that passively present cell phones captured participants’ attention and distracted them from the focal task, which subsequently led to diminished performances on cognitive tasks. Furthermore, the present findings do also not concur with Ward and
colleagues’ (2017) research on smartphone presence, which found that passive smartphone presence (as compared to smartphone absence) negatively affected participants’ available attentional resources during smartphone-unrelated tasks, resulting in lower performances on these tasks. This contrast between the present results and those of previous research (i.e., Thornton et al., 2014; Ward et al., 2017) might indicate that the mechanism proposed in the current study—which suggests that passively present smartphones can become reinforced attentional capturers with instant gratification as a motive for positive reinforcement—is incorrect. However, the Bayes Factors showed only moderate (hypothesis 1A) and anecdotal (hypothesis 1B) evidence for the null hypotheses. Hence, the present findings could also indicate that passive smartphone presence does affect impulsivity during decision making, but that the IGT was not able to capture these effects.

A possible explanation for the IGT not capturing more impulsive decision making during a smartphone-unrelated decision-making task when a smartphone was passively present could be due to the IGT’s complexity. Thornton and colleagues (2012) found that passively present cell phones only led to lower performances on complex digit-cancellation tasks and trail-making tests, but not on simple ones. The scholars explain that the cognitive and attentional resources required for a task are determined by the task’s complexity; complex tasks require abundant cognitive and attentional resources, while simple tasks require little or even no attentional resources at all (Thornton et al., 2014). Hence, as the availability of attentional resources is limited (Awh et al., 2012; Wickens, 1991), it seems possible that passive smartphone presence leaves sufficient attentional resources available for performing simple tasks but not complex ones, leading to diminished performances on complex tasks but not on simple ones (Thornton et al., 2014). Similarly, Ward and colleagues (2017) found that passive smartphone presence negatively affected participants’ available attentional resources during complex tasks (i.e., OSpan and RSPM), even when sustained attention was
maintained. Thence, the IGT in the present study might have been not sufficiently complex for participants to experience any detrimental effects of passive smartphone presence on the decision-making process.

Further, the present study did not consider the explicit attention that was drawn to the smartphones prior to the IGT. As opposed to the procedure followed by Thornton and colleagues (2014; who did not ask participants to turn off their notifications or cell phones), participants in both the Smartphone Present and Smartphone Absent conditions of the current study were explicitly asked to mute their smartphones (including vibrations) and to place their devices on a designated location. Hence, participants’ attention was drawn to the smartphones in both conditions, even when the devices were no longer visibly present. Therefore, it could have been possible that participants in the Smartphone Absent condition still had smartphone-related thoughts when they were performing the IGT. This may have resulted in more impulsive decision making during the IGT by participants in the Smartphone Absent condition, as the smartphone-related thoughts could have been present at the expense of task-related thoughts (e.g., Stothart et al., 2015).

Besides, unexpectedly separating participants from their smartphones in the Smartphone Absent condition might have been detrimental for these participants’ performances on the IGT. Clayton and colleagues (2005) found that participants who were unexpectedly separated from their smartphones experienced, amongst other things, increased anxiety and decreased cognitive performances. Thus, participants in the current study who were separated from their smartphones might have experienced these negative effects as well, resulting in more impulsive decision making during IGT. However, Clayton and colleagues found these negative effects when participants were separated from their smartphones and heard their devices ring during the task but were not able to answer them. Future research should thus further examine to what extent smartphone owners experience negative effects—
such as decreased cognitive performance and increased impulsive decision making—from smartphone separation when no active stimulation of the smartphone is involved.

**Smartphone Addiction**

As there were no significant main effects of Smartphone Addiction on IGT Scores and IGT Times, no support was observed for hypotheses 2A and 2B. These hypotheses stated that participants who suffer from higher levels of smartphone addiction will (2A) engage in more impulsive decision making, and (2B) have shorter reaction times during decision making in a smartphone-unrelated decision-making task as compared to participants who suffer from lower levels of smartphone addiction. Thus, participants who suffered from higher levels of smartphone addiction did not engage in more impulsive decision making than participants with lower addiction levels. These findings are opposed to those by Khoury and colleagues (2019), who found that participants with higher levels of smartphone addiction performed significantly worse on the IGT than participants who suffered from lower levels of this addiction. Particularly, participants who scored high on smartphone addiction more often choose a greater immediate reward despite the possibility of a greater accompanied loss (Khoury et al., 2019). In addition, the findings of the current research were not in line with a study by Wilmer and Chein (2016), who found that participants who more often engaged with mobile devices showed greater impairments in impulse control (i.e., a facet of decision making) as compared to less engaging participants.

A possible explanation for the current results contradicting those of Khoury and colleagues (2019) and Wilmer and Chein (2016) can be due to the self-reported data used for determining participants’ levels of smartphone addiction in the current study. Previous research has shown that participants do not always accurately report their behaviors (Frost et al., 2019). For instance, a study by Andrews, Ellis, Shaw, and Piwek (2015) found that the
data regarding actual smartphone use obtained with tracking software over a period of two weeks significantly differed from participants’ self-reported data on how often and how long one’s smartphone was used during an average day. These scholars concluded that data about smartphone use collected via self-report measures should, therefore, be interpreted with caution, as it can only be perceived as an estimate of actual smartphone use (Andrews et al., 2015). Thus, participants’ self-reported data on smartphone addiction in the current research might not be completely accurate. Hence, future research should consider using tracking applications on participants’ smartphones to gain more accurate insights on their actual smartphone use and its possible influence on cognitive processes such as decision making.

The current study also showed no significant interaction effects of Smartphone Presence and Smartphone addiction on IGT Scores or IGT Times. Therefore, the present findings do not support hypotheses 3A and 3B, which suggested that the effect of passive smartphone presence as compared to smartphone absence on decision making is moderated by smartphone addiction, such that passive smartphone presence leads to (3A) more impulsive decision making, and (3B) shorter reaction times during decision making in a smartphone-unrelated decision-making task among participants who suffer from higher levels of smartphone addiction than participants who suffer from lower levels of smartphone addiction. These findings do not concur with previous research by Ward and colleagues (2017), who found that the cognitive costs of passive smartphone presence were moderated by smartphone dependency. Moreover, the researchers found this effect to be significant regardless of the phone’s power (i.e., sound/smartphone on/off) or the screen’s visibility (Ward et al., 2017). Hence, the scholars concluded that those who depend more on their smartphones also experience more cognitive costs due to passive smartphone presence, even when the device is turned off or placed with the screen down (Ward et al., 2017).
However, Ward and colleagues (2017) solely examined the moderating effects of smartphone dependency during participants’ performance of the OSpan. As elaborated on above, this OSpan might have been more complex than the IGT participants performed in the present study. So, perhaps passive smartphone presence leaves sufficient attentional resources available for performing the IGT, but not the OSpan. Besides, Ward and colleagues state that their participants expected to be separated from their smartphones during the study since this separation is common in laboratory studies. This was not the case for the present study. Participants in the present study were instructed to perform the IGT at a place of their own convenience and told that they needed a smartphone to participate. Hence, smartphone separation in the Smartphone Absent condition of the current research might have been unexpected, resulting in decreased cognitive performances (Clayton et al., 2005).

**Trait Impulsivity**

The present study found no significant main effects of Trait Impulsivity on IGT Scores and IGT Times. Thus, the data showed no considerable differences in either of the measures of impulsive decision making during the IGT between participants with high and low levels of trait impulsivity. Hypotheses 4A and 4B, which stated that participants with higher levels of trait impulsivity will (4A) engage in more impulsive decision making, and (4B) have shorter reaction times during decision making in a smartphone-unrelated decision-making task as compared to participants with lower levels of trait impulsivity, were, therefore, not supported by the data. These findings are opposed to those of Burdick, Roy, & Raver (2013), who found that the BIS-11 significantly predicted a negative relationship between trait impulsivity and IGT performances in children. Hence, the scholars concluded that the (computerized) IGT is an acceptable measure for impulsivity in the field (Burdick et al., 2013). However, Burdick and colleagues’ used a shortened version of the BIS-11 that consisted of only seven items of
the original BIS-11. Besides, the scholars’ sample consisted of children between 8 and 11 years old, so no direct conclusions can be drawn regarding adult samples (Burdick et al., 2013). Moreover, the results of the present study do concur with those of Goudriaan and colleagues (2007) as they found no significant correlations between levels of trait impulsivity and performances on the IGT in binge-drinking participants. This correspondence of results might perhaps indicate that trait impulsivity does not affect impulsive decision making in adults, or that the effects of trait personality on impulsive decision making in adults cannot be captured with the IGT.

Lastly, no significant interaction effects of Smartphone Presence and Trait Impulsivity on IGT Scores and IGT Times were found. So, no support was found for hypotheses 5A and 5B, which proposed that the effect of passive smartphone presence as compared to smartphone absence on decision-making is moderated by trait impulsivity, such that passive smartphone presence leads to (5A) more impulsive decision making, and (5B) shorter reaction times during decision making in a smartphone-unrelated decision-making task among participants with higher levels of trait impulsivity than participants with lower levels of trait impulsivity. These findings are not in line with those of Upton and colleagues (2011), who found a significant relationship between that risk-taking and IGT performances in participants with low levels of trait impulsivity (Upton et al., 2011). Upton and colleagues argue that their results show that trait impulsivity has a substantial part in risky decision making during the IGT. The scholars also argue that previous research on the relationship between risk-taking and IGT performances were not significant because the samples included participants with high levels of trait impulsivity (Upton et al., 2011). So, participants’ levels of trait personality in the current research sample might not have been sufficiently diverse for finding a moderating effect of trait impulsivity on the relationship between passively present smartphones and participants’ impulsive decision making during the IGT.
Limitations and Future Research

The current study has several potential limitations and recommendations for future research that should be considered. First, the method and design for the present study were initially set up for a lab study. Nevertheless, the critical developments around COVID-19 and the corresponding measures taken by Tilburg University rendered it necessary to adjust some aspects of the initial method and design, which resulted in conducting an online experiment in which participants were given instructions via a video call with the researcher. Even though this video call allowed the researcher to monitor whether participants followed the instructions during the call, the researcher was not able to check whether instructions were still being followed after the call. For this, the researcher was completely dependent on participants’ self-reported answers to the follow-up questions. This could be perceived as a limitation because it could be argued that participants in the Smartphone Present condition checked their smartphones during the IGT, or that participants in the Smartphone Absent condition retrieved their smartphones immediately after the video call ended. So, future research should replicate the present study in a laboratory setting to examine whether results similar to those in the current study will be obtained when participants are monitored more closely during their participation.

Second, the present study provided participants with a fake €2,000 “loan” at the start of the IGT. Hence, participants might have decided more careless during the IGT than they would have when real money was involved (Khoury et al., 2019). Future research might address potential negative effects of using fake money by offering a reward (e.g., gift card or monetary compensation) to the participant with the highest overall monetary score on the IGT, as this could induce participants to respond more attentively during the task.

Third, the present study proposed a mechanism which suggests that passively present smartphones could become reinforced attentional capturers with instant gratification as a
motive for positive reinforcement. Even though the data did not support the present hypotheses, there was only moderate (hypothesis 1A) and anecdotal (hypothesis 1B) evidence found for supporting the null hypotheses. As mentioned before, this might indicate that the need for instant gratification does play a role in smartphones capturing attention when passively present, but that the IGT could not capture this need. More specifically, it is possible that passive smartphone presence does affect impulsive decision making, but that the need for instant gratification did not shift to the IGT in the present study because this task was not smartphone-related, or not sufficiently complex for experiencing cognitive costs from passive smartphone presence. Because smartphone owners are becoming more and more likely of having their devices closely or passively present (Ward et al., 2017), it is also becoming more likely for smartphone owners to experience potentially cognitive costs from their devices. Future research should, therefore, further investigate the proposed mechanism to examine whether the smartphone-evoked need for gratification can shift to other—smartphone-related and smartphone-unrelated—decision-making tasks when seeing a passively present smartphone.

Conclusion

The present study found no significant effects of passive smartphone presence on two distinct measures of impulsive decision making during a smartphone-unrelated decision-making task, nor were these effects moderated by participants’ levels of smartphone addiction or trait impulsivity. However, the present research still contributes to a fairly limited, but growing literature on the mere presence of smartphone technology and its potential influence on cognitive processes by providing new directions and important considerations for future research on passive smartphone presence and decision making.
References


JASP Team (2020). JASP (Version 0.12.2) [Computer software]. Retrieved from https://jasp-stats.org/


Appendices

Appendix A1: Barrett Impulsiveness Scale-11 English

English version of the Barrett Impulsiveness Scale-11 (Stanford et al., 2009).

<table>
<thead>
<tr>
<th>Items</th>
<th>Rarely/</th>
<th>Occasionally</th>
<th>Often</th>
<th>Almost always/ Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 I plan tasks carefully (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2 I do things without thinking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3 I make-up my mind quickly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4 I am happy-go-lucky</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5 I don’t “pay attention”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6 I have “racing” thoughts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7 I plan trips well ahead of time (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8 I am self-controlled (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9 I concentrate easily (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10 I save regularly (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11 I “squirm” at plays or lectures</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12 I am a careful thinker (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13 I plan for job security (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14 I say things without thinking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15 I like to think about complex problems (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16 I change jobs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17 I act “on impulse”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18 I get easily bored when solving thought problems</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19 I act on the spur of the moment</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20 I am a steady thinker (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21 I change residences</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22 I buy things on impulse</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23 I can only think about one thing at a time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24 I change hobbies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25 I spend or charge more than I earn</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26 I often have extraneous thoughts when thinking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27 I am more interested in the present than the future</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28 I am restless at the theater or lectures</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29 I like puzzles (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30 I am future oriented (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix A2: Barrett Impulsiveness Scale-11 Dutch

Dutch version of the Barrett Impulsiveness Scale-11 (Lijffijt, M., & Barrett, E. S., 2005).

<table>
<thead>
<tr>
<th>Items</th>
<th>Zelden/Nooit</th>
<th>Soms</th>
<th>Vaak</th>
<th>Bijna altijd/Altijd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Ik plan taken zorgvuldig (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2  Ik doe dingen zonder na te denken</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3  Ik neem snel een beslissing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4  Ik leef zorgeloos</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5  Ik houd mijn aandacht er niet bij</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6  Mijn gedachten razen door mijn hoofd</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7  Ik plan uitjes ruim van te voren (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8  Ik heb mezelf onder controle (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9  Ik kan mij gemakkelijk concentreren (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10 Ik spaar regelmatig (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11 Ik kan niet stil blijven zitten tijdens toneelstukken en lezingen</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12 Ik denk zorgvuldig na (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13 Ik zorg dat ik een baan behoud (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14 Ik zeg dingen zonder eerst na te denken</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15 Ik houd ervan om over ingewikkelde dingen na te denken (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16 Ik verander van baan</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17 Ik handel impulsief</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18 Ik verveel mij snel als ik in gedachten iets moeilijks moet oplossen</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19 Ik doe dingen in een opwelling</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20 Ik verander van gedachten</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21 Ik verhuis</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22 Ik koop dingen in een opwelling</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23 Ik kan maar over één ding tegelijk nadenken</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24 Ik verander van hobby</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25 Ik geef meer uit dan ik verdien</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26 Mijn gedachten worden onderbroken door andere gedachten</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27 Ik ben meer geïnteresseerd in het heden dan in de toekomst</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28 Ik ben rusteloos tijdens lezingen en praatjes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29 Ik ben gek op lastige problemen (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30 Ik plan voor de toekomst (reversed)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix B1: Smartphone Addiction Scale Short Version English

English version of the Smartphone Addiction Scale Short Version (Kwon, Kim, et al., 2013).

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Weakly disagree</th>
<th>Weakly agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Missing planned work due to smartphone use</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2 Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3 Feeling pain in the wrists or at the back of the neck while using a smartphone</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4 Won’t be able to stand not having a smartphone</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5 Feeling impatient and fretful when I am not holding my smartphone</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6 Having my smartphone in my mind even when I am not using it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7 I will never give up using my smartphone even when my daily life is already greatly affected by it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>8 Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9 Using my smartphone longer than I had intended</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10 The people around me tell me that I use my smartphone too much</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
### Appendix B2: Smartphone Addiction Scale Short Version Dutch

Dutch version of the Smartphone Addiction Scale Short Version (translation was done by the researchers of the present study).

<table>
<thead>
<tr>
<th>Items</th>
<th>Sterk mee eens</th>
<th>Oneens mee eens</th>
<th>Enigszins mee eens</th>
<th>Enigszins mee eens</th>
<th>Eens mee eens</th>
<th>Sterk mee eens</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Voorgenomen werk niet voltooien door smartphonegebruik</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Moeite met concentreren in de les, tijdens opdrachten, of tijdens werk, door mijn smartphonegebruik</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Pijn voelen in de polsen of aan de achterkant van de nek gedurende smartphone gebruik</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Zou er niet tegen kunnen om geen smartphone te hebben</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Ongeduldig en zenuwachtig voelen als ik mijn smartphone niet in de hand vasthoud</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Denken aan mijn smartphone, zelfs wanneer ik hem niet aan het gebruiken ben</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Ik zal het gebruiken van mijn smartphone nooit opgeven, ook al wordt mijn dagelijks leven er al sterk door beïnvloed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Voortdurend checken van mijn smartphone om geen gesprekken te missen tussen andere mensen op social media zoals Twitter, Instagram of Facebook</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>Mijn smartphone langer gebruiken dan in eerste instantie de bedoeling was</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>De mensen om me heen zeggen tegen me dat ik mijn smartphone te veel gebruik</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix C1: Stimuli English

English stimuli used to create an online version of the Iowa Gambling Task based on the original task created by Bechara and colleagues (1994).

**Instructions**

In this task, you play a "gambling" game. You need to choose one of 4 buttons (A, B, C, or D) with the mouse.

Each time, you can win some money, but you may sometimes also have to pay a fee to the bank. After each trial, you need to collect your money, which will adjust your pot of money.

You start with a loan of €2000.

There are 100 trials (taking 5 minutes or so).

Go on until it stops and see how much you can make on top the loan of €2000.

*Press space bar to start. Good luck!*

*Figure 2.* Instructions given to the participants at the start of the online Iowa Gambling Task.

*Figure 3.* Screen at the start of the online Iowa Gambling Task.
Figure 4. Feedback showing the participant a €50 win after choosing A, B, C, or D.

Figure 5. Feedback showing the participant a €50 win and a €50 loss after choosing A, B, C, or D.
Appendix C1: Stimuli Dutch

Dutch stimuli used to create an online version of the Iowa Gambling Task based on the original task created by Bechara and colleagues (1994).

![Instructies](image)

Figure 6. Instructions given to the participants at the start of the online Iowa Gambling Task.

![Figure 7](image)

Figure 7. Screen at the start of the online Iowa Gambling Task.
Figure 8. Feedback showing the participant a €50 win after choosing A, B, C, or D.

Figure 9. Feedback showing the participant a €50 win and a €50 loss after choosing A, B, C, or D.
Appendix D1: Participant Email 1 English

Dear participant.

Thank you for your interest in our study! Your participant number is [NR]. Please hold on to this participant number. You will need to enter this number at various moments during the study.

Below you will find the information letter that applies for this study. We would like to ask you to read this letter carefully before you start with the study.

One day prior to the chosen time slot, you will receive an email with a link to Phase I of this study. It is important that Phase I is completed before participating in Phase II.

If you have any questions regarding this research, please send an email to m.v.beijer@tilburguniversity.edu.

Kind regards,

Mayra Beijer
Appendix D2: Participant Email 1 Dutch

Beste participant,

Hartelijk dank voor jouw interesse in ons onderzoek! Jouw participenten nummer is [NR].

**Bewaar dit participenten nummer goed.** Dit nummer dient op verschillende momenten tijdens het onderzoek ingevuld te worden.

Hieronder vind je de informatiebrief die van toepassing is voor dit onderzoek. **We willen je vragen om deze brief goed door te lezen voordat je start met het onderzoek.**

Een dag voorafgaand aan het gekozen tijdslot, ontvang je een e-mail met een link voor het Fase I van dit onderzoek. **Het is van belang dat Fase I wordt afgerond, voordat er aan Fase II wordt deelgenomen.**

Mocht je vragen hebben over dit onderzoek, dan kan je een e-mail sturen naar m.v.beijer@tilburguniversity.edu.

Met vriendelijke groet,

Mayra Beijer
Appendix E1: Information Letter English

The “Iowa Gambling Task”

You are asked to engage in two sessions on two separate days (approximately one day apart) at a place of your own convenience. In total, you obtain 0.5 credit for full participation in the study.

What does the study entail?

*The total study duration is 30 minutes* divided into two sessions: a 10-minute online questionnaire and a 20-minute online experiment. Prior to the second session, a video conversation (i.e., Skype or zoom) with one of the researchers is implemented.

*Where?* The sessions will take place at a place of the participant’s convenience. However, the participant should seek out a place where the participant may sit quietly at a table or desk and without being distracted by other people (i.e., no other people may be in the same room during both phases of the study).

*When?* The study starts on 15 May 2020. Depending on the number of participants applying, time slots will be created between 15 May 2020 and 1 July 2020.

*What does participating in the study entail?*

*If you participate, you will...*

1) Fill out an online questionnaire for which you answer multiple questions.

2) Engage in a video conversation with one of the researchers to ensure that instructions for the online task are properly followed.
3) Perform an online task.

4) In total, we expect that the aforementioned questionnaire, videocall, and task will cost (approximately) 30 minutes of your time.

Disadvantages/advantages/consequences/risks

- A potential disadvantage of participating is that you might find it uncomfortable to engage in a Skype video conversation with one of the researchers. Furthermore, it may be annoying that the study needs to be performed at a place of own convenience. However, due to COVID-19 the facilities in the lab cannot be used and we created an online solution that was as suitable as possible.

Information about the participation

- Participation is fully voluntary. You have the right to decline to participate and withdraw from the research once participation has begun, without any negative consequences, and without providing any explanation.

- When you enter this study, you will receive a participant number that is linked to your name and email address, so we can contact you for checking compliance, for credit allocation, or for solving technical issues. We store the file that connects your email address and unique participant number separately from all other data and on an encrypted server. The file will be destroyed after the experiment.

- All data will be handled confidentially and anonymously, and be stored on an encrypted server for 10 years.

- During data collection, data will be stored on the PsyToolkit webserver. After data collection, these data will be downloaded and stored on an encrypted server. The data
will then be deleted from the PsyToolkit webserver. These data are, however, never personally identifiable.

- We will never publish any personally identifiable data.

- We will analyze all data for scientific publications. For these publications, measures may be published in anonymous format on the Open Science Framework to facilitate future research. This file will be encrypted and can only be accessed by researchers who state legitimate reasons for re-using the data.

- If you agree to participate, we will ask you to digitally sign an informed consent form. Your informed consent applies until you have finished the second session, starting on the day you decide to participate, and can be withdrawn at any time. You will then not receive any participation hours, as 0.5 credit is the least amount that can be awarded.

**Compensation for participating**

Your participation will be rewarded as follows:

- Completing session 1 and 2 of this study is worth 0.5 credit.

**Ethics approval and contact details**

This study has been reviewed and approved by the Research Ethics and Data Management Committee of Tilburg School of Humanities and Digital Sciences. Would you like to participate in our study? You are more than welcome! If you have any remarks or complaints regarding this research, you may contact the Research Ethics and Data Management Committee of Tilburg School of Humanities and Digital Sciences (tshd.redc@uvt.nl). Please feel free to contact the study leader in case of any questions or to request extra information: Mayra Beijer (m.v.beijer@tilburguniversity.edu).
Note that the study requires use of a desktop or laptop and either Google Chrome or Firefox. For this reason, only persons with access to a desktop or laptop with the correct internet browser(s) installed are eligible.
Appendix E2: Information Letter Dutch

De “Iowa Gambling Task”

Je wordt gevraagd om deel te nemen aan twee sessies op twee verschillende dagen (ongeveer een dag uit elkaar) op een plaats naar eigen voorkeur. In totaal krijg je 0.5 credit voor volledige deelname aan de studie.

Wat houdt de studie in?

De totale duur van studie is 30 minuten verdeeld over twee sessies: een 10-minuten durende online vragenlijst en een 20-minuten durend online experiment. Voorafgaand aan de tweede sessie zal een videogesprek (i.e., Skype of Zoom) met een van de onderzoekers plaatsvinden.

Waar? De sessies zullen plaatsvinden op een plek gekozen door de participant. Echter dient de participant een plek te kiezen waar de participant rustig aan een tafel of bureau kan zitten, zonder daarbij afgeleid te worden door andere mensen (i.e., er mogen geen andere mensen in dezelfde ruimte zijn als de participant tijdens deelname aan de sessies van het onderzoek).


Wat houdt deelname aan de studie in?

Als je deelneemt zal je...

1) Een online vragenlijst invullen waarvoor je meerdere vragen beantwoordt.
2) Deelnemen aan een Skype videogesprek met een van de onderzoekers om er zeker van te zijn dat instructies voor de online taak goed worden opgevolgd.

3) De online taak uitvoeren.

4) We verwachten dat de bovengenoemde vragenlijst, het videogesprek, en de taak (ongeveer) 30 minuten van je tijd in beslag nemen.

**Nadelen/voordelen/consequenties/risico’s**

- Een mogelijk nadeel van deelname is dat je het ongemakkelijk kan vinden om deel te nemen aan een Skype videogesprek met een van de onderzoekers. Daarnaast kan je het vervelend vinden dat de studie plaatsvindt op een plek naar jouw voorkeur. Echter, door COVID-19 zijn de voorzieningen in het lab niet beschikbaar en hebben we een zo goed mogelijk online alternatief bedacht.

**Informatie over de deelname**

- Deelname is volledig vrijwillig. Je hebt het recht om deelname te weigeren en om je terug te trekken na de start van het onderzoek, zonder negatieve consequenties, en zonder het opgeven van enige reden.

- Als je deelneemt aan deze studie, ontvang je een participanten nummer dat gelinkt wordt aan je naam en e-mailadres zodat we contact op kunnen nemen om nakoming te controleren, om credits toe te kennen, of voor het oplossen van technische problemen. Het bestand dat jouw e-mail adres en het unieke participanten nummer koppelt, wordt apart opgeslagen van alle andere data en op een versleutelde server. Het bestand wordt vernietigd nadat het experiment is afgelopen.

- Alle data wordt vertrouwelijk en anoniem verwerkt en opgeslagen op een versleutelde server voor de duur van 10 jaar.
Tijdens het verzamelen van de data, wordt de data opgeslagen op de PsyToolkit webserver. Nadat de data is verzameld, wordt de data gedownload en opgeslagen op een versleutelde server. De data wordt hierna verwijderd van de PsyToolkit webserver. Deze data zijn echter nooit persoonlijk identificeerbaar.

We zullen nooit persoonlijk identificeerbare data publiceren.

We zullen de data analyseren voor wetenschappelijke publicaties. Voor deze publicaties kunnen metingen worden gepubliceerd in een geanonimiseerd formaat op het Open Science Framework om toekomstig onderzoek te faciliteren. Dit bestand zal worden versleuteld en kan alleen worden geopend door wetenschappers die aangeven een gerechtvaardigd belang te hebben voor het hergebruiken van de data.

Als je akkoord gaat met deelname, zullen we je vragen om digitaal een formulier voor geïnformeerde toestemming te ondertekenen. Jouw formulier voor geïnformeerde toestemming geldt tot en met de tweede sessie, en gaat in op het moment dat je besluit deel te nemen. De geïnformeerde toestemming kan te allen tijde worden ingetrokken. In dat geval ontvang je geen uren voor deelname, aangezien 0.5 credit het minste aantal credits is dat kan worden toegekend.

Compensatie voor deelname

Jouw deelname zal als volgt worden beloond:

- Het afronden van sessie 1 en 2 van deze studie is 0.5 credit waard.

Ethische goedkeuring en contactgegevens

Deze studie is beoordeeld en goedgekeurd door het Research Ethics and Data Management Committee van de Tilburg School of Humanities and Digital Sciences. Wil jij deelnemen aan onze studie? Je bent meer dan welkom! Als je opmerkingen of klachten hebt over dit
onderzoek, kan je contact opnemen met het Research Ethics and Data Management Committee van de Tilburg School of Humanities and Digital Sciences (tshd.redc@uvt.nl). Voel je alsjeblieft vrij om de studieleider te benaderen in het geval van vragen of het verzoek om extra informatie: Mayra Beijer (m.v.beijer@tilburguniversity.edu).

Let op dat voor het onderzoek een computer of laptop met Google Chrome of Firefox is vereist. Om deze reden kunnen alleen personen met toegang tot een computer of laptop met de correcte internet browser(s) daarop geïnstalleerd worden toegelaten tot het onderzoek.
Dear participant,

You are receiving this email because of your participation in our study.

We would like to ask you to start with Phase I of this study by clicking on the link below and to complete Phase I in one sitting. Please have your participant number ready. **It is important that Phase I is completed before participating in Phase II.**

**English:** https://tilburghumanities.eu.qualtrics.com/jfe/form/SV_6s5Npkevea4szKl

If you have any questions regarding this research, please send an email to m.v.beijer@tilburguniversity.edu.

Kind regards,

Mayra Beijer
Appendix F2: Participant Email 2 Dutch

Beste participant,

Je ontvangt deze e-mail in verband met jouw deelname aan ons onderzoek.

We willen je vragen om Fase I van dit onderzoek te starten via onderstaande link en om Fase I in één zitting af te ronden. Houd hiervoor jouw participanten nummer bij de hand. **Het is van belang dat Fase I wordt afgerond, voordat er aan Fase II wordt deelgenomen.**

**Nederlands:** https://tilburghumanities.eu.qualtrics.com/jfe/form/SV_4JhUakqW3fCag73

Mocht je vragen hebben over Fase I van dit onderzoek, dan kan je een e-mail sturen naar m.v.beijer@tilburguniversity.edu.

Met vriendelijke groet,

Mayra Beijer
Appendix G1: Informed Consent English

Welcome to Phase I of our study!

Filling out this questionnaire will take approximately 10 minutes. It is important that the entire questionnaire will be completed in one sitting.

The data for this questionnaire will be processed and stored anonymously. Only the researchers will have access to the data. The data will be used to write a thesis for the Master’s program Communication and Information Sciences.

Declaration of Consent

I have read the description of the study and I understand the goal of the study. I give my permissions for the researcher to collect and process my data. I know that these data, together with my answers on the questionnaire, will be used for research and educational purposes. I understand that no identifying information will be tied to the data. Instead of identifying information, the researchers will use a participant number.

I am aware that all data collected through the questionnaire and task will be treated confidentially; in reports or other publications following from this study, I will remain anonymous at all times.

I have been informed about possible discomforts caused by this study, and all of my questions have been sufficiently answered. If I have any more questions, I am guaranteed that the researcher will answer them. I participate voluntarily, and I understand that I can stop
participation at any time, without having to give a reason. In addition, I understand that I can refuse the usage of data collected about me without this having any consequences for me. I am aware that data will be stored for at least ten years on a password-protected computer. Only the researchers and the students directly involved in this project will have access to this data.

I took time to read this form and I understand what is written on it.

I agree to participate in the study which will take place, which means that I agree to:

• completing the questionnaire in Phase I of the study;
• engaging in a video conversation (i.e., Skype or Zoom) with one of the researchers prior to Phase II of the study; and
• completing the online gambling task in Phase II of the study.

I give permission for the results to be used for research and educational purposes.

If you would like to know more about this questionnaire or this study, please send an email to m.v.beijer@tilburguniversity.edu.

Thank you in advance for your time!

Kind regards,

Mayra Beijer
Do you agree to participate in this study?

0 Yes, I agree

0 No, I do not agree
Appendix G2: Informed Consent Dutch

Welkom bij Fase I van ons onderzoek!

Het invullen van deze vragenlijst zal ongeveer 10 minuten duren. Het is van belang dat de gehele vragenlijst in één keer wordt afgerond.

De data voor deze vragenlijst wordt anoniem verwerkt en opgeslagen. Alleen de onderzoekers hebben toegang tot de data. De data wordt uitsluitend gebruikt voor het schrijven van een thesis voor de Master Communicatie en Informatie Wetenschappen.

Akkoordverklaring
Ik heb de beschrijving van het onderzoek gelezen en ik begrijp het doel van het onderzoek. Ik geef toestemming aan de onderzoekers om mijn data te verzamelen en te verwerken. Ik weet dat deze data, samen met mijn antwoorden op de vragenlijst, gebruikt worden voor onderzoeks- en educatiedoelstellingen. Ik begrijp dat er geen identificerende informatie verbonden zal zijn aan de data. In plaats van identificerende informatie, maken de onderzoekers gebruik van een participanten nummer.

Ik ben me ervan bewust dat alle data verzameld via de vragenlijst en de taak vertrouwelijk behandeld zullen worden; in rapporten en andere publicaties die voortkomen uit deze studie, zal ik ten alle tijden anoniem blijven.

Ik ben geïnformeerd over het mogelijke ongevoegens veroorzaakt door deze studie, en al mijn vragen zijn voldoende beantwoord. Ik neem vrijwillig deel en ik begrijp dat ik mijn deelname
ten alle tijden kan beëindigen, zonder opgave van enige reden. Daarnaast begrijp ik dat ik kan weigeren dat de data die over mij zijn verzameld worden gebruikt, zonder dat daar consequenties voor mij aan verbonden zijn. Ik begrijp dat de data zal worden opgeslagen voor ten minste tien jaar op een met een wachtwoord beveiligde computer. Alleen de onderzoekers en de direct betrokken studenten hebben toegang tot deze data.

Ik heb de tijd genomen om dit formulier te lezen en ik begrijp wat erop geschreven staat.

Ik ga akkoord met deelname aan het onderzoek dat zal plaatsvinden, wat betekent dat ik akkoord ga met:

- het afronden van de vragenlijst in Fase I van het onderzoek;
- het deelnemen aan een videogesprek met een van de onderzoekers voorafgaand aan Fase II van het onderzoek; en
- het afronden van de online gok-taak in Fase II van het onderzoek.

Ik geeft toestemming voor het gebruik van de resultaten voor onderzoeks- en educatiedoeleinden.

Als je meer wilt weten over deze vragenlijst of over dit onderzoek, dan kan je een e-mail sturen naar m.v.beijer@tilburguniversity.edu.

Alvast veel dank voor jouw tijd!

Hartelijke groet,
Ga je akkoord met de deelname aan dit onderzoek?

0 Ja, ik ga akkoord

0 Nee, ik ga niet akkoord
Appendix H1: Survey Termination Text English

Thank you for your participation!

Phase I of this study is now completed. Phase II will take place during the scheduled time slot.

For Phase II, it is important that you have access to a laptop or PC. To prepare for Phase II, we will send you an email with instructions. Please read this email carefully and be prepared and ready to start with the study at the scheduled time.

If you have any questions regarding Phase II of this study, please send an email to m.v.beijer@tilburguniversity.edu.

Please click the arrow below to exit this survey.
Appendix H2: Survey Termination Text Dutch

Bedankt voor jouw deelname!

Fase I van het onderzoek is nu afgerond. Fase II zal plaatsvinden tijdens het geplande tijdslot.

Voor Fase II is het van belang dat je beschikt over een laptop of PC. Ter voorbereiding op Fase II, sturen wij je een e-mail met instructies. Lees deze e-mail zorgvuldig en zorg dat je voorbereid en klaar bent om te starten met het onderzoek op het afgesproken tijdstip.

Voor vragen over Fase II van dit onderzoek, kan je mailen naar m.v.beijer@tilburguniversity.edu.

Klik alsjeblieft op onderstaande pijl om deze vragenlijst te af te sluiten.
Appendix I: Participant Email 3 English

Dear participant,

We hereby confirm that you are registered with participant number [NR] to participate in Phase II of our study on [DATE] at [TIME].

To prepare for Phase II, we would like to ask you to be prepared and ready to start with the study at the scheduled time. This means that you:

- Have access to a laptop or PC with either Google Chrome or Firefox installed on it;
- Have a pen and a piece of paper ready;
- Are sitting at an empty table or desk;
- Are sitting alone in a quiet room; and
- At the scheduled time, click on this link to participate in a video conversation (i.e., Skype or Zoom):
  [LINK]

If you have any questions regarding Phase II of this study, please send an email to m.v.beijer@tilburguniversity.edu.

Kind regards,

Mayra Beijer
Appendix I2: Participant Email 3 Dutch

Beste participant,

Hierbij bevestigen wij dat je met participanten nummer [NR] bent ingeschreven om deel te nemen aan Fase II van ons onderzoek op [DATUM] om [TIJD].

Ter voorbereiding op Fase II, willen wij je vragen om op het afgesproken tijdstip voorbereid en klaar te zijn om te beginnen met het onderzoek. Dit houdt in dat je:

- Een laptop of PC ter beschikking hebt met daarop Google Chrome of Firefox geïnstalleerd;
- Een pen en een stukje papier klaar hebt liggen;
- Aan een lege tafel of aan een leeg bureau zit;
- Alleen in een rustige ruimte gaat zitten; en
- Op het afgesproken tijdstip op deze link klikt om deel te nemen aan een videogesprek (i.e., Skype of Zoom):
  [LINK]

Voor vragen over Fase II van dit onderzoek, kunt u mailen naar

m.v.beijer@tilburguniversity.edu.

Met vriendelijke groet,

Mayra Beijer
Appendix J1: Debriefing English

Thank you for your participation in our study!

The experiment is completely finished. You will not have to use your smartphone/piece of paper that you placed on your desk or table earlier. We asked you to place your smartphone/piece of paper there, in order to examine whether visibly present smartphones induce more impulsive behavior during a smartphone-unrelated decision-making task, as compared to absent smartphones. Furthermore, we examine whether this is moderated by a person’s level of smartphone addiction.

Because data for the present study will be collected until 1 July 2020, we want to ask you to not discuss this study or its goal with other students or participants until 1 July 2020, as discussing this study could lead to biased results from other participants.

If you have any remarks or complaints regarding this research, you may contact the Research Ethics and Data Management Committee of Tilburg School of Humanities and Digital Sciences (tshd.redc@uvt.nl). Please feel free to contact the study leader in case of any questions or to request extra information: Mayra Beijer (m.v.beijer@tilburguniversity.edu).

You may now close this webpage.
Hartelijk dank voor het deelnemen aan ons onderzoek!

Het experiment is nu volledig afgerond. Je hoeft jouw smartphone/stukje papier welke je eerder op de tafel/het bureau hebt geplaatst niet meer te gebruiken. Wij vroegen jou om jouw smartphone/stukje papier daar te plaatsen, zodat we konden onderzoeken of zichtbaar aanwezige smartphones meer impulsief gedrag teweegbrengen tijdens een niet smartphone-gerelateerde taak, vergeleken met afwezige smartphones. Daarnaast onderzoeken we of dit effect wordt beïnvloed door iemands mate van smartphone verslaving.

Omdat de data voor het huidige onderzoek wordt verzameld tot 1 juli 2020, willen wij vragen om dit onderzoek of het onderzoeksdoel niet met andere studenten of participanten te bespreken tot 1 juli 2020. Het bespreken van deze studie kan namelijk leiden tot bevooroordeelde resultaten van andere participanten.

Als je opmerkingen of klachten hebt over dit onderzoek, kan je contact opnemen met het Research Ethics and Data Management Commitee van de Tilburg School of Humanities and Digital Sciences (tshd.redc@uvt.nl). Voel je alsjeblieft vrij om de studieleider te benaderen in het geval van vragen of het verzoek om extra informatie: Mayra Beijer (m.v.beijer@tilburguniversity.edu).

Je mag deze pagina nu afsluiten.