INFORMATION TECHNOLOGY ADDICTION:
CONSTRUCT DEVELOPMENT AND MEASUREMENT

Research-in-Progress

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Abstract

Information technology addiction (IT addiction) is a growing threat to quality of life and work performance. Online social networks, computer games and email are among the main culprits of such addiction. Surprisingly, the MIS literature has paid scant attention to this important area of research. A limitation of past research is a focus that is too narrow to study the overall dynamics of IT addiction. This proposed research aims to lay a foundation for understanding these dynamics by developing a measurement instrument using a multi-method approach. Based on theories of rewards and self-control, I will first define IT addiction and develop an initial questionnaire instrument to measure it. I will then conduct interviews, a questionnaire survey, and an experiment to refine and validate the scale. The results should pave the way for further academic inquiry into the nature of this ever-important construct.

Keywords: IT addiction, instrument development, User behavior, Technology use, Psychology, 11. Human Behavior and IS
Introduction

Information Technology (IT) has had a profound impact on human behavior, work habits, and social conflict. Enhanced technical capabilities and better user-oriented designs have led to an ever-increasing reliance on the internet, PCs, and mobile devices for a wide variety of activities. The use of these technologies can be experienced as rewarding, and can engender addiction (Grant et al. 2010), i.e. it can lead to impaired control over a specific behavior (West 2006). Like other addictions, IT addiction can affect quality of life; it leads to depression (Kim et al. 2006), family conflict (Turel et al. 2011a), and poor academic performance (Huang and Leung 2009).

In the workplace, one danger of IT addiction is having frequent interruptions. Temptations to use media at work have shown to be relatively common and difficult to resist (Hofmann et al. 2012). One study found that some office workers glance at their email inbox 30 to 40 times an hour (Renaud et al. 2006). Shifts in attention are mentally taxing and impede memory and learning (Foerde et al. 2006). Many experiments have shown that multitaskers need more time and are less accurate than those who attend tasks sequentially (Jackson et al. 2003; Monsell 2003; Ophir et al. 2009; Trafton and Monk 2007). IT addiction may also affect productivity when attention is diverted to non-work activities. In a survey, 11% of employees said to spend more than an hour per day on non-work related websites at work (Gouveia 2012). Exceeding this amount has shown to affect performance (Coker 2011). These adverse consequences merit inquiry into the growing phenomenon of IT addiction.

But we know little about the exact dynamics by which IT addiction manifests itself, despite researchers’ increasing interest in the topic. Many researchers have narrowly focused on specific activities such as online shopping, gambling, gaming, social networking, emailing, and text messaging. This narrow focus makes it difficult to study the overall relationships of IT addiction with constructs that are not related to just one technology, including personality and job performance. The studies that do incorporate a wider range of IT use, such as those on internet addiction, often rely on a measurement framework with increasingly problematic validity (Byun et al. 2009). In sum, addiction research has contributed little to our understanding of the overall dynamics of IT addiction.

To address this limitation, I aim to elucidate the meaning of IT addiction. I define IT addiction based on theories of reward (Hyman et al. 2006) and self-control (Muraven and Baumeister 2000). I will then develop a scale to measure it. This development should provide researchers with a valuable tool for further inquiry into IT addiction. An improved understanding should be of great value to those concerned with job performance as it may be used to reduce IT addiction on both individual and organizational levels.

Literature Review

Addiction is an individual’s trait of impaired self-control over a specific rewarding behavior (Grant et al. 2010; Redish et al. 2008; West 2006). Addicted individuals cannot easily override impulses to engage in a certain behavior, in spite of their goals or intentions.

No general theory of addiction exists, which has led to confusion and controversy of what it actually is. Historically, the addiction construct has functioned as a psychiatric label for the clinical impairment caused by drug use. This clinical impairment may relate to a wide range of symptoms. Examples include the need for more stimuli to achieve satisfaction (i.e. tolerance), feeling restless or irritable during abstinence (i.e. withdrawal), or having conflicts with others about the behavior. The correlations between such addiction phenomena is low because of confounding factors such as genetics, personality, the social environment, and the pharmacological properties of drugs (Redish et al. 2008). These phenomena remain, however, the basis for psychiatric diagnosis (American Psychiatric Association 2010), and have heavily influenced the measurement of addiction in academia across behavioral domains (Brown 1993; Griffiths 1996).
Fortunately, recent neurological and psychological research on rewards and on self-control has helped to gain a more theory-based understanding of our capacity to refrain from engaging in a rewarding behavior. I use these theories as a basis for my studies on IT addiction. Hence, rather than adopting the psychiatric practice of labeling a collection of interrelated problematic phenomena as a mental disorder, I define addiction as a domain-specific trait of impaired self-control and embed it in theories of reward and self-control. This trait may explain some but not all problems that are commonly associated with addiction.

**Rewards in Addiction**

Rewards play a crucial role in the development of addiction because they strengthen impulses (Redish et al. 2008). In addictions that do not involve intake of substances (also called behavioral addictions), reward is obtained from cognitively processing information that positively alters expectations (Schultz 1998), especially when it relates to something important or relevant (Rihet et al. 2002). This results in the neurotransmission of dopamine in the reward center of the brain, and the experience of a better mood. The function of reward is to facilitate learning and to assign motivational status to the rewarding behavior (Hyman et al. 2006). We quickly learn which cues, contexts, and actions precede reward, such that a subsequent perception of these cues or contexts automatically triggers an impulse to engage in the rewarding behavior. This impulse may lead to the behavior automatically or through consciously experienced desires (Hyman et al. 2006; Kavanagh et al. 2005; Verplanken and Aarts 1999). With repetition, these impulses strengthen and become more difficult to resist. In the addiction context, this process has been called incentive sensitization (Addolorato et al. 2005; Robinson and Berridge 2003). The neural associations between cues, contexts, actions, and rewards are easily acquired but are more difficult to lose; it can take tremendous effort to consistently resist the desires and unlearn the habit of addiction.

**Self-Control**

Research on self-control has helped to understand who becomes addicted, and in which situations people tend to fail resist their impulses. Whether we enact or resist an impulse is conceived as the outcome of a competition between a domain-general self-control force and a domain-specific impulse force (Inzlicht and Schmeichel 2012; Strack and Deutsch 2004). This self-control force can be defined as the capacity to override impulses and to regulate behavior, thoughts, and emotion in favor of goals or plans (De Ridder et al. 2012). This capacity varies between individuals (trait or dispositional self-control) and within individuals, across time and situations (state self-control). People low (vs. high) in trait self-control are poor in impulse control and report more deviant behavior and addiction (Lubman et al. 2004; Tangney et al. 2004). Low trait self-control should hence predispose individuals to develop IT addiction. Many other factors can influence the forces of self-control and impulses (Heatherton and Wagner 2011). For example, people tend to fail at self-control when they are in a bad mood (Heatherton and Baumeister 1991; Sinha 2009), when they have slept poorly (Baumeister 2002), or when they have little intrinsic motivation for self-control (Muraven and Slessareva 2003). One other such factor has received great attention from self-control researchers in the last twenty years: recently exerted self-control. Hundreds of experiments have shown that our self-control performance is better on an initial self-control task than on a subsequent one, irrespective of the kind of impulses that threaten self-control performance (Inzlicht and Schmeichel 2012). The depletion theory of self-control explains this deterioration: we have a limited resource of self-control which depletes when we use it and replenishes we take rest (Muraven and Baumeister 2000). When this resource is depleted, we feel tired and behave more impulsively. Hence, the underlying process of rewards is just one of many factors that determine how well we are able to control the behavior that leads to these rewards. I use this insight in my study of IT addiction.

**IT addiction**

I define IT addiction as an individual’s trait of impaired self-control over the use of an information technology. This means that an individual high in IT addiction has developed a behavioral pattern of frequent failure to override impulses to use IT, in spite of goals or intentions not to use it.
The control people have over their use of IT can become impaired in a similar way as their control over other rewarding behaviors such as gambling. IT use is rewarding when it positively alters expectations about something important. This may relate to social acceptance, such as positive comments from friends on a social network site, or personal achievement, such as reaching a level in a game (see e.g. Weinstein 2010). Rewards obtained from IT use facilitate the acquisition and strengthening of subsequent impulses, which can be triggered by wide variety of cues. For example, an individual may develop the automatic habit of immediately responding to an email notification. In a neurological study, pictures of video games were shown to trigger an urge to play (Ko et al. 2009). These associations are persistent, and may lead individuals to use an IT even when this is in conflict with their goals. For example, one may intent to solely focus on writing a report, but still respond to a new email notification.

When enacting an impulse to use an IT conflicts with a goal, one needs to override this impulse in favor of such an inhibitory goal. But the stronger the conflicted impulse is, the more difficult this is. Self-monitoring one’s behavior and resisting temptations require conscious effort and depletes self-control energy (Muraven and Baumeister 2000). Since the process of acquisition and strengthening of impulses play an important role in the development of addiction (Robinson and Berridge 2003), people high (vs. low) in IT addiction should generally have more and stronger impulses to use IT. In situations with inhibitory goals, they should therefore become more easily depleted, resulting in fatigue and impulsivity. I use this prediction for validating my instrument.

The outcome of a conflicted impulse to use an IT – inhibition or disinhibition – can be thought of as dependent on the strength of self-control relative to that of the impulse (Strack and Deutsch 2004). Disinhibition occurs because of a strong impulse, weak self-control, or a combination of both. As self-control strength is dependent on a wide range of variables, including brain injury (Wagner and Heatherton 2010), sleep (Baumeister 2002), blood sugar (Gailliot et al. 2007), and recent exertion of self-control (Muraven and Baumeister 2000), these factors should also help explain a pattern of IT disinhibitions. Indeed, studies on specific forms of IT addiction have already demonstrated various factors, including specific genetic aberrations (Han et al. 2007), trait self-control (Mehroof and Griffiths 2010), and conscientiousness (Kuss et al. 2013). As these factors are domain-general, they should predict IT addiction irrespective of the specific IT artifact. A valid general scale of IT addiction should therefore be able to demonstrate these relationships. This is another prediction I use for validating my instrument.

Object of Addiction

Past studies on addiction have studied many uses of IT, including using the internet (Davis 2001; Young 1996), using email (Turel and Serenko 2010), instant messaging (Huang and Leung 2009), playing video games (Ko et al. 2009; Xu et al. 2012), online shopping and auctioning (LaRose and Eastin 2002; Turel et al. 2011b), and using online social networks (Andreassen et al. 2012; Turel and Serenko 2012). People can become addicted to any IT which use is repeatedly experienced as rewarding. IT is addictive to the extent it repeatedly and positively alters expectations about something important (Rihet et al. 2002; Schultz 1998). This depends not just on the type of the technology that is used, but also on the information it communicates, and on the expectations and attitudes of the user.

For this reason, the concept of IT addiction overlaps with other forms of addiction, such as gambling addiction. Cases of gambling addiction may vary with respect to the involvement of IT. One blackjack addict, for example, may have impaired control over playing at both real and virtual blackjack tables. Another blackjack addict, however, may only suffer from impaired control over playing at multiple virtual tables simultaneously, which may be more rewarding compared to playing at just one real table. Hence, the inherent features of an IT do not fully determine the addictiveness of its use but they can considerably contribute to it.

In the proposed study, I consider a wide range of uses of IT, rather than a specific one. This focus supports the study of the overall relationships of IT addiction, because of the many commonalities across forms of IT addiction, such as email addiction or Facebook addiction. Today, individuals can play a video game, check email, shop for clothes, get the latest updates from friends, or read news using the same devices nearly anytime and anywhere. How self-control over such activities can become impaired is common as well, involving the reward pathway in the brain (Grant et al. 2010). Self-control research has shown that our ability to override impulses over time and its relationship with many other psychological constructs is
the same across behavioral domains (De Ridder et al. 2012). Furthermore, across types of activities, IT addiction has detrimental effects on work performance; as a whole, IT addiction corresponds to heavier loss of productive time. Some workers may be addicted to email, others to social network sites, and again others to both email and social network sites. They have in common a lack of sustained focus on work tasks. A generic lens should therefore ease the study of IT addiction and its relationships with a range of other variables.

**Manifestations**

Based on self-control theory, a trait of impaired self-control over a rewarding behavior should manifest in frequent disinhibitions over an extended period of time (De Ridder et al. 2012). Disinhibitions here refer to engaging in an activity in spite of goals or intentions not to do so. Instruments that have been developed to measure such forms of impaired control indeed rely on the frequency of disinhibitions, in contexts of both gambling (O’Connor and Dickerson 2003) and consuming alcohol (Heather et al. 1993; Stockwell et al. 1994). Similarly, IT addiction manifests in frequent IT disinhibitions over an extended period of time. This symptom, also called loss of control or impaired control, is widely adopted in extant measurement instruments of forms of IT addiction.

Most of these instruments also include other symptoms, which are not universally valid indicators of addiction. They rely on the similarities between gambling and substance addiction, using a specific set of symptoms: salience, tolerance, withdrawal, conflict, mood modification, and relapse (Brown 1993; Griffiths 1996). These phenomena are relatively weakly associated with the construct of addiction, as they are neither necessary nor sufficient for measurement (American Psychiatric Association 2000). In various addiction contexts this is a minor shortcoming. But these addiction indicators are more problematic when they are applied to behavior that plays important social and occupational roles, such as using email and using the mobile phone. For example, consider someone who has just assumed a busy job, in which timely responses to client’s emails are essential for good performance. This person now needs to use email more than before; checking email comes to dominate thoughts and behavior throughout the day. This in turn leads to tensions and conflicts with family members. Losing technical access to the internet causes this person to feel restless and preoccupied with regaining access, since important emails may be missed. Once access is regained, this person feels excited to check for new emails. This person meets most if not all of the above addiction symptoms, depending on their exact measurement. But it is far from clear that this person has indeed impaired self-control over the use of email. This hypothetical example illustrates the limitations of this set of symptoms for measuring addictions which object plays important societal roles in everyday life. Valid measurement of impaired self-control over such an IT should therefore avoid relying on this set of symptoms.

**Method**

I employ a multi-method approach to develop a measurement instrument of IT addiction, which I term the Information Technology Addiction Scale (ITAS). This development involves interviews to test an initial operationalization, questionnaire surveys to refine and validate the instrument, and an experiment also for validation. With this plan I aim to develop a high-quality scale and provide solid evidence of its validity.

**Operationalization**

Based on the theories of reward and self-control, I model the construct of IT addiction as reflective. I have defined IT addiction as an individual’s trait of impaired self-control over the use of an IT. Through using IT repeatedly, an addict’s impulses to use an IT have become so strong that they often cannot be controlled or overridden when one intends to do so. IT addiction therefore causes IT disinhibitions. The frequency of such disinhibitions over an extended period of time indicate the degree of IT addiction. Because of my study focus, I propose to measure IT addiction with items that should capture this frequency. Hence, I assume that the latent construct of IT addiction causes the behavior that is referred to in the items.
I model the construct of IT addiction as unidimensional, given extant theory and measurement. Theories of self-control tend to view self-control as a unidimensional variable (Muraven et al. 1998). The depletion theory, for example, successfully predicts poor self-control across types of impulses and across behavioral domains (Muraven and Baumeister 2000). More specifically, trait measures of behavioral disinhibitions have been shown to be unidimensional across addiction contexts, including alcohol (Kahler et al. 1995) and gambling (O'Connor and Dickerson 2003). Therefore, I aim to generate measurement items that all capture the frequency of IT disinhibitions over an extended period of time, such that their (co-)variance can well be explained by one underlying factor: IT addiction.

Although the items should capture the same content domain, they should do so in different ways (Nunnally and Bernstein 1994). I therefore design items to refer to various situations. Specifically, each item I aim to measure the frequency of IT disinhibition given the occurrence of a particular situation. Such specificity eases the interpretation of items (Dillman 2000). With different situations across items, participants may give more information about the frequency of their disinhibitions because they are triggered to rely on a variety of episodic memories. Without reference to situations in the items, respondents may consistently rely on an activated memory of a specific past situation, which may be a poor representation of all relevant memories. Referring to different situations also reduces common method bias that is due to consistency motif (Podsakoff et al. 2003).

The specific situations referred to in the items should not only be specific, but also distinct and universal, and lend themselves for measurement of the frequency of IT disinhibitions. The initial pool of items refers to a variety of personal, social, and occupational situations, such that the resulting instrument can be used to measure IT addiction in a population of working adults.

I word the items to clearly indicate disinhibitions, i.e. IT use in spite of goals or intentions not to do so. I tested this, asking various working adults to rate various behaviors (pretest A, n=7). In interviews, I asked them how clearly descriptions of people, such as “Person A often uses email when he knows it’s better to go to sleep,” indicated that they had difficulties in resisting their impulses to use an IT. All items were rated on average as clear (>5.5 on a scale from 1 to 10), which improved my confidence in the content validity of the initial instrument.

In my instrument, each item refers to a set of six predefined forms of IT: email, text and instant messages, online social networks, online news, electronic games, and online shopping. They constitute a list of addictive uses of IT that is comprehensive albeit not exhaustive (see for example the literature on television addiction; Horvath 2004). Incorporating all possibly addictive technologies would make the items too difficult to answer. Respondents would need to think about technologies that are too great in number, or too broadly defined, such as the internet or the PC. People may use the internet or their PC for extended periods of time on a day in both goal-congruent and goal-incongruent ways, making the cognitive evaluation of the frequency of disinhibitions more difficult. I therefore focus on six specific and pervasive uses of IT that all have been studied in the context of addiction. In my instrument, I introduce them before presenting the actual items; I use the phrase “these activities” in the items to refer to them. In a small pretest (pretest B, n=7), I tested whether this made the items difficult to answer or the responses difficult to interpret. In interviews after the questionnaire, participants said they could easily answer test versions of the items. They also indicated that they mostly thought about the IT they used most; they did not simply think about one specific application when answering the questions. These pretest findings increased my confidence that my approach is not only conceptually relevant but also practically feasible.

Items of the initial instrument all have a seven-point Likert frequency scale. They include:

How often do you do any of these activities...

... when you know it’s better to go to sleep?
... when you actually should be enjoying a meal with friends or family?
... when you had intended to have a face-to-face conversation with a friend or family member?
... when you’re having an important phone call that you need to focus on instead?
... when you had intended to do a household chore instead?
... when you should instead do a boring work task?
... when you actually need to stay concentrated on a difficult work task?
... when you in fact need to finish a task as soon as possible?
... when you should instead be focusing on making an important work-related decision?
... when you’re actually having an important face-to-face work-related conversation?

Items with reference to disinhibitions inevitably elicit responses that may be social desirable rather than truthful. Changing the wording of the items to avoid this effect is not feasible because it would introduce a more serious issue: poor content validity. Therefore, I accept this item property, and aim to mitigate its effect by emphasizing anonymity, confidentiality, and the importance of honest responses (Podsakoff et al. 2003). I later discuss my approach to detect and control for this bias.

**Survey Studies**

To refine and validate my instrument, I plan various questionnaire surveys: a pilot study, a field study, and a survey after the experiment. The aim of the pilot test is to evaluate and improve the reliability and validity of the set of items. I aim to collect responses from more than 100 working adults, who will remain anonymous (sample 1). Following MacKenzie et al.'s (2011) recommendations, I will conduct tests to (1) evaluate the goodness of fit of the measurement model, (2) assess the validity of the set of indicators at the construct level, (3) assess the reliability of the set of indicators at the construct level, and (4) evaluate individual indicator validity and reliability. I then use these tests to identify and eliminate problematic indicators by dropping or rewording them, so as to purify and refine the scale.

In the field study, I use this refined scale in addition to scales of other constructs to test predictive and discriminant validity. I aim to gather responses from 300 company executives enrolled in part-time MBA programs at various universities around the world (sample 2). The questionnaire includes Tangney et al.'s (2004) brief self-control scale and Benet-Martínez and John’s (1998) scale of conscientiousness. Both scales measure traits that are related to but distinct from IT addiction (Kuss et al. 2013; Mehrproof and Griffiths 2010). To test for predictive and discriminant validities, I will evaluate the size and significance of the correlations, and examine whether the squares of these correlations are smaller than the average variance explained in the ITAS items by their underlying factor (Fornell and Larcker 1981). To test the extent the correlations may in fact be explained by a tendency of socially responding, I control for this bias using a short form (Steenkamp et al. 2010) of the Balanced Inventory of Desirable Responding (BIDR; Paulhus 1991). My procedure depends on the outcome of an experiment test described later. In the field test, I also aim to control for common method bias using a number of method items, similar to Williams et al. (2010). These items refer to content that is unrelated to that of any other item in the questionnaire, such that their correlations should reflect a method bias.

For further validation, I conduct an experiment with a sample of 100 working adults (sample 3). A portion of the participants also have participated in the field study; others are new participants (“old” and “new” sample). Several days after they have executed tasks in a lab – the details of which are described below – all participants are asked to fill out a final questionnaire, which is identical to the one in the field study. To validate the scale, I use the data of the “old” sample to calculate test-retest reliability of the scale. Furthermore, I use the “old” and “new” groups of sample 3, and the different MBA groups of sample 2, to conduct various tests of cross-validity, calculating the cross-validation index (Cudeck and Browne 1983) and conducting multigroup analysis to test a variety of equivalences (Steenkamp and Baumgartner 1998; Vandenberg and Lance 2000).

**Laboratory Experiment**

One of the aims of the laboratory experiment is to evaluate three types of scale validity. I test for convergent validity using an experimental proxy measure of IT addiction; I test for predictive validity using measures of the depletion effect; and I estimate the extent ITAS leads to social desirable responding.

The experiment consists of a set of computer tasks in a laboratory, and a follow-up questionnaire after several days, which is identical to the one in the field study. The lab is equipped with a camera and
software to secretly record participants’ overt behavior and computer use. These recordings form the basis for ratings by independent observers. During the experiment, participants are technically able to use the lab’s computer and wireless internet access for personal use. The lab tasks take about one hour to complete. In this hour, participants answer questions on state fatigue (block 1), execute various scored tasks (block 2), execute tasks irrelevant to this study (block 3), execute more scored tasks (block 4), and answer questions on state fatigue, personal use of IT during the experiment, and intrinsic motivation in the experimental tasks (block 5). In blocks 2 and 4, participants are instructed to score as many points as possible by answering questions correctly in a limited period of time. Many points can be earned by correctly answering reading comprehension questions; these questions are not difficult to answer given one has read the accompanying text. During the reading test, participants will receive various notifications that additional short questions are available for relatively little points. More questions of both types are presented than can be seriously answered in the allotted time. Impulsively responding to the notifications should therefore result in a lower performance compared to keeping focused at the reading test.

I test for convergent validity by comparing ITAS scores to an experimental proxy measure of IT addiction, which is an estimate of the frequency of IT disinhibitions during the experiment. To obtain this estimate, I rely on both observational and self-report ratings. In block 5, participants are asked how often they have used IT for personal purposes during the experiment, and how often such use was intended. Comparing their answers to the observers’ rating of the frequency of personal use, I calculate the frequency of unreported personal use. I assume that both unreported personal use and unintended reported personal use constitute IT disinhibitions, given the instructions to the participants to execute the tasks. I therefore use their sum as an estimate of the frequency of IT disinhibitions. These disinhibitions should reflect IT addiction in a different way than ITAS reflects IT addiction. This lab measure is less vulnerable to socially desirability bias, but more vulnerable to situational bias. To partial out this situational bias, I control for self-reported state fatigue at the onset of the experiment, which is an indicator of how depleted an individual is at that time (Muraven and Baumeister 2000). I also control for self-reported intrinsic motivation in the experimental tasks, which also should influence self-control performance (Muraven and Slessareva 2003). The size and significance of the corrected correlation should indicate the convergent validity of the ITAS.

I use the depletion theory of self-control for a test of predictive validity. Since the process of acquisition and strengthening of impulses play an important role in the development of addiction (Robinson and Berridge 2003), participants high (vs. low) in IT addiction should have more and stronger impulses to use IT during the experiment. They would hence need to exert more self-control and become more easily depleted than others (Muraven and Baumeister 2000). This means that during the experiment they become depleted, resulting in increased state fatigue and impulsivity. This increased impulsivity should affect their performance on the scored tasks of the experiment; they may opt to answer the incoming short questions right away instead of sustaining their focus on the reading test or they may temporarily ignore all available tasks and use IT for personal purposes. Hence, the increment in state fatigue from block 1 to block 5 and the decrement in task performance from phase 2 to phase 4 should be greater for participants high (vs. low) in IT addiction. If ITAS is a valid measure of IT addiction, ITAS scores should predict this depletion effect.

To estimate the degree ITAS suffers from socially desirability bias, I use a domain-specific measure of this bias. Again, I use the estimate of the frequency of personal IT use that participants fail to report. I assume that this frequency is an outcome of a social response tendency. In a similar way, this tendency should influence responses to the ITAS items, because the content and method of the self-report items are similar. I therefore use it as a measure of social desirability bias and control for it using the directly measured latent method factor technique (Bagozzi 1984; Williams et al. 1996). This technique is, despite its shortcomings, still recommended when a measure of a specific bias exists (Podsakoff et al. 2012).

Researchers studying IT addiction may not always be able to include domain-specific measures of social desirability, and may hence consider using more general ones. But the effectiveness of controlling for social desirability using general questionnaire scales has been controversial. One issue is that this practice may remove substance variance rather than mere method variance (Steenkamp et al. 2010). I use my observations in the experiment to test this in the context of IT addiction. Specifically, in a regression, I first predict the observation measure of the frequency of personal IT use in the experiment only with a
self-reported measure of that frequency. I then add the short form of the BIDR (Steenkamp et al. 2010) as a predictor variable. An increase in the predictive power of the self-reported frequency would mean that controlling for social desirable responding purifies the relationship between the two substantive measures (Steenkamp et al. 2010). In this scenario, researchers could use the social desirability scale with more confidence.

**Contributions and Limitations**

The proposed studies should pave the way for future research in an increasingly important area. Growing access to consumer electronics and online services increases the threat of IT addiction. This addiction leads to depression, family conflict, and poor academic performance. In the workplace, IT addiction may affect focus at work and lead to poor job performance. Such adverse consequences call for a better understanding of IT addiction.

My research on IT addiction should contribute to this understanding because it is different from previous studies in two important ways. First, it defines and measures IT addiction based on theories of reward and self-control, rather than on a specific collection of undesirable symptoms. This approach should clarify the meaning of IT addiction and facilitate further theory-driven research on the topic. Second, it develops a scale that measures IT addiction as a whole, rather than a specific form of IT addiction. Such a scale should be instrumental to the study of the overall dynamics of IT addiction. For example, the relationships of IT addiction with genetics, personality, and performance at work may be better understood using this scale compared to an existing scale of a specific form of IT addiction.

Like other self-report scales of self-control and addiction, the scale of this study is not perfectly valid and likely suffers from social desirability bias. I attempt to mitigate its effect through research procedures, and to detect and control for it with statistical remedies (Podsakoff et al. 2012). This should improve the interpretation of the predictive and convergent validity tests in the proposed study. Through validating the scale using various procedures, I hope to elicit sufficient confidence in its quality, such that future use and refinement of the scale further contributes to a better understanding of the ever-important construct of IT addiction.

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