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Information Technology Addiction: Construct Development and Effects on Work Performance

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ABSTRACT

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. An important limitation of past research is a focus that is too narrow to study the overall dynamics of IT addiction. My dissertation aims to elucidate these dynamics by incorporating multiple technologies and using a multi-method approach. Based on theories of reward and self-control, I will first define IT addiction and develop an instrument to measure it. I will then employ an experiment to validate the scale and to examine the effects of IT addiction on work performance. The results should pave the way for further academic inquiry into the nature of this ever-important construct, and should suggest practical measures to overcome its deleterious effects in the workplace.

Keywords

IT addiction, instrument development, work performance, multi-method, reward, self-control.

INTRODUCTION

People increasingly rely on technologies for their education, leisure, and work. They surround themselves with internet-connected devices to communicate with colleagues, play games, and catch up with friends. Using these technologies can be fun and functional, but a danger looms in their rewards. Processing rewarding stimuli strengthen habits and desires and can lead to addiction (Grant et al. 2010), i.e. impaired control over a specific behavior (West 2006). Like other addictions, IT addiction can affect quality of life; it leads to depression, family conflict, and poor academic performance (Turel and Serenko 2012). At work, one danger of IT addiction frequent interruptions. Shifts in attention are mentally taxing and impede memory and learning. Furthermore, when much attention is diverted to non-work activities, the lack of work focus affects job performance (Coker 2011). These adverse consequences merit inquiry into the 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 narrowly focus on specific activities or use instruments with increasingly problematic validity in the work context.

To address this limitation, I aim to elucidate the meaning of IT addiction. I define IT addiction based on theories of reward and self-control (Muraven and Baumeister 2000). I will then develop a scale to measure it, and examine its effects on work performance. The resulting scale should aid academic inquiry into the construct. An improved understanding of its dynamics should be of great value to those concerned with job performance as it may be used to reduce IT addiction in individuals and organizations.

BACKGROUND

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 been based on the mere co-occurrence of various phenomena related to drug use. Examples include the need for more stimuli to achieve satisfaction and having conflicts with others about the behavior. The correlations between such addiction phenomena is low because of a range of confounding factors (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 research on rewards and self-control has helped to gain an understanding of our capacity to refrain from engaging in rewarding behaviors. An impaired capacity of such self-control is commonly seen as the central and cardinal feature of addiction. In the proposed studies, I therefore use reward and self-control theory to define and measure IT addiction.

Rewards

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, reward is obtained from cognitively processing information that positively alters expectations about something important or relevant (Rihet et al. 2002). The function of reward is to facilitate learning and to assign motivational status to behavior. We quickly learn which cues, contexts, and actions precede reward, such that the 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 desires. With repetition, these impulses strengthen and become harder to resist (Robinson and Berridge 2003). The corresponding neural associations are easily acquired but are difficult to lose; it can take tremendous effort to 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 fail to 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). 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 self-control) and within individuals, across time and situations (state self-control). People low (vs. high) in trait self-control report more addiction. Low trait self-control should hence predispose individuals to develop IT addiction.

Many other factors can influence the forces of self-control and impulses (Muraven and Baumeister 2000). For example, people tend to fail at self-control when they are in a bad mood, when they have slept poorly, when they have little intrinsic motivation for self-control, and when they have recently exerted effort to resist impulses. These factors should also predict when we fail to inhibit the use of IT.

IT ADDICTION

I define IT addiction as an individual's trait of impaired control over the use of an information technology. This means that an individual high in IT addiction has developed a behavioral pattern of IT disinhibitions: using an IT in spite of goals not to do so.

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. Individuals may derive reward from IT use, which may strengthen subsequent impulses to use IT (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, such as paying attention to other activities.

When enacting impulses to use an IT would conflict with a goal, one would need to override this impulse in favor of that goal. But the stronger these conflicted impulses are, the more difficult this is. Various trait and state factors of self-control should also predict disinhibited use of IT. Indeed, some studies on IT addiction have already demonstrated various factors, including trait self-control, specific genetic aberrations, and low conscientiousness.

Object of Addiction

Past studies on addiction have studied many IT artifacts, ranging from the internet (Young 1996) to eBay (Turel et al. 2011). An IT is addictive to the extent it repeatedly and positively alters expectations about something important (Rihet et al. 2002). 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.

In the proposed study, I consider a range IT artifacts, rather than a specific one. This focus supports the study of the overall relationships of IT addiction, because of the many commonalities across its forms, such as email addiction or eBay addiction. Today, individuals can engage in a wide range of activities 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). Research has shown that our ability to override impulses over time and its relationship with many 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. Because of these commonalities, a generic lens should ease the study of IT addiction and its relationships with a range of other variables.

Measurement

IT addiction directly manifests in disinhibited IT use; the more one uses IT in spite of inhibitory goals, the more one is addicted. This symptom of impaired control is widely adopted in measurement instruments of forms of IT addiction.

IT addiction may also manifest in phenomena commonly associated with addiction in general, including salience, tolerance, withdrawal, conflict, mood modification, and relapse (Brown 1993; Griffiths 1996). But I do not include them in my instrument of IT addiction because of alternative explanations for these phenomena. To illustrate, consider someone who has just assumed a busy job, in which timely responses to clients' emails are essential for good performance. This person now needs to use email more than before; checking email starts 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's self-control over the use of email is impaired. 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.

I model IT addiction as a unidimensional continuous latent variable with reflective indicators. The unidimensionality is based on my focus on only the essential aspect of addiction, i.e. impaired self-control, rather than wide range of phenomena. Impaired self-control has been shown to be unidimensional in various addiction contexts. In accordance with current addiction literature (American Psychiatric Association 2010), I see addiction as a construct with varying degrees. I model the construct as reflective because of the assumption that IT addiction constitutes a cause of certain patterns in behavior.

EFFECTS ON PERFORMANCE

One danger of IT addiction is its negative effect on work performance (Beard 2002). This effect may be transmitted immediately (poor work focus), over a short term (e.g. poor sleep) and over a long term (e.g. poor focus at school). Little empirical work has elucidated this effect on work performance. A better understanding of the magnitude of the overall effect in general, and mechanisms of the immediate effects specifically, should help individuals and organizations address this deleterious effect. I therefore aim to estimate this magnitude and the extent to which IT addicts perform worse because they sacrifice attention at work in order to use IT.

Specifically, IT addiction influences *what* people pay attention to and *how long* they pay attention to something. The impulses of IT addicts may affect their performance by drawing their attention away from work toward IT use for non-work purposes. Such IT use is called cyberloafing. Cyberloafing is generally believed to drain productivity, but research on the overall effects of cyberloafing on job performance is scarce. Various research firms have estimated the total costs of cyberloafing by multiplying average wage with the total duration of cyberloafing. This approach may overestimate the costs; when done in moderation, cyberloafing may have the same positive effects on performance as taking breaks (Coker 2011). In one study, cyberloafing affected performance only when more than 12% of time was spent cyberloafing (Coker 2011). I therefore hypothesize that IT addiction is positively associated with cyberloafing (H1), and that high (vs. not high) levels of cyberloafing are associated with low work performance (H2).

The impulses of technology addicts may also affect their performance by fragmenting their attention. Because employees high (vs. low) in IT addiction have poorer self-control over impulses to use an IT, I expect they shift their attention between tasks more frequently. Compared to attending tasks sequentially, multitasking (MT) costs both time and accuracy (Monsell 2003). Various experiments have shown that people who multitask more in daily life, perform worse on a multitasking test (Sanbonmatsu et al. 2013). I therefore hypothesize that IT addiction is positively associated with multitasking (H3), and that multitasking is negatively associated with work performance (H4).

As discussed, IT addiction may also affect work performance on a longer term. I therefore hypothesize that cyberloafing and multitasking *partially* mediate the effect of IT addiction on work performance (H5).

METHOD

To develop the instrument and test the hypotheses I employ a multi-method approach. I plan to conduct interviews, surveys, and a laboratory experiment. The procedures for developing the instrument – which I term the IT Addiction Scale (ITAS) – are mostly based on MacKenzie et al.'s (2011) guidelines. I first generate the items and test their content validity through interviews. I will then use the items in a pilot study, sampling more than 100 working adults (sample 1). Various psychometric tests would then lead to refinement of the scale. Next, I will combine the resulting scale with instruments of other constructs (including CL and MT) in a questionnaire. A sample of around 300 company executives enrolled in MBA programs at various universities (sample 2) would then self-administer the questionnaire. The resulting data would be used for various psychometric and hypothesis tests. For the experiment, a sample of around 100 working adults (sample 3), partially overlapping with sample 2, would come to the laboratory to complete a series of computer tasks. Some of the tasks are scored, providing a proxy of work performance. Several days after the experiment, they would administer the questionnaire online. I use these settings and procedures for validating the scale and testing the hypotheses.

As space is limited, I will only discuss in more detail some important considerations regarding item generation, test procedures (see Table 1), and the experiment procedures.

Item Generation

To develop the instrument, I have generated various items based on self-control theory. Each item consists of three elements: each refers to an action, a conditional inhibitory goal, and a situational self-control factor.

The action refers to specific uses of IT, which are introduced before the items. These uses are checking for email, text messages, online social networks and online news, playing electronic games, and online shopping. All these have been studied before in an addiction context. Each item refers to the same uses.

Similar to Hofmann (2012), I explicitly refer to an inhibitory goal in order to measure disinhibitions. This

inhibitory goal is the same for each item and refers broadly to the need to focus on other activities.

I use self-control theory to generate distinct items. Specifically, each item refers to one situational self-control factor, such as sleepiness. This approach makes the items more specific. It also allows for an additional validity test: if disinhibitions are measured, items referring to self-control failure conditions (e.g. feeling sleepy) should be scored higher than those referring to self-control success conditions (e.g. feeling energetic).

Sample items include:

I use IT for these activities…

… when I feel too sleepy for what I should be doing.
… when I should be doing something dull instead.
… when I should be doing something difficult instead.

The response scale for all items is a 7-point Likert agreement scale.

Test	**Procedures**
Content validity	Through interviews and short questionnaires, I obtain ratings on the ease of answering and the match between IT addiction and the content of the items.
Goodness of fit	I evaluate the fit of both the measurement model (sample 1) and the full model (samples 2, 3) using various fit indicators.
Item validity and reliability	In all samples, I evaluate the validity and reliability of the indicators at both the construct level and the indicator level (MacKenzie et al. 2011).
Predictive validity	Using sample 1, individual item scores will be compared using self-control theory. Moreover, using subsequent samples, I evaluate the associations of ITAS with a brief self-control measure (SC), a conscientiousness scale (Co), and experiment measures of the depletion effect (DE).
Discriminant validity	I test whether the average variance extracted of ITAS is greater than the squared correlations of ITAS with measures of other constructs.
Test-retest reliability	I evaluate the within-subject correlation between ITAS scores obtained before and after the experiment using the overlap of samples 2 and 3.
Cross-validity	I follow MacKenzie et al.'s (2011) guidelines to evaluate cross-validity.
Convergent validity	I evaluate size and significance of the correlation of ITAS with the self-reported frequency of inhibitory failure during the experiment (ITA_{lab}).
Impression Management	I estimate personal IT use during the experiment with both a self-reported and an observed rating. I use the difference as an indicator of bias.
Common Method Bias	I include four items that should be unrelated to any other item in the questionnaire, and use them to detect and control for method bias.
Hypotheses 1 and 3	I evaluate the effects of ITAS using a cyberloafing scale (CL_{job}), a multitasking scale (MT_{job}), and using experiment measures of cyberloafing (CL_{lab}) and multitasking (MT_{lab}).
Hypotheses 2 and 4	I evaluate the size and significance of the effect of CL_{lab} and CL_{job} on WP, and that of the effect of MT_{lab}, and MT_{job} on WP.
Hypotheses 5	I evaluate the size and significance of the effect of IT addiction on WP while controlling for its effect on CL and MT.
Robustness of findings	I test the extent to which controlling for SC, Co and intrinsic motivation for the experiment affects the tests of H1 and H3. To exclude an alternative explanation for findings, I test whether ITAS improves the prediction of CL_{job} on CL_{lab}, and MT_{job} on MT_{lab}.

Table 1. Overview of Test Procedures

Lab Procedures

Participants of the laboratory experiment will work through five phases of computer tasks: (1) answering questions on state fatigue, (2) execute various scored tasks, (3) execute tasks relevant to another study (40 minutes), (4) execute more scored tasks, and (5) answer questions on state fatigue, intrinsic motivation in the experiment, and personal use of IT during the experiment. The tasks in phases 2 and 4 are designed to resemble a work situation with a main task and incoming tasks. Participants may either sustain their focus on a scored reading comprehension task and score many points, or respond to incoming trivia questions and score little points. This design allows for measurement of multitasking (MT_{lab}) and a proxy of WP.

While they go through the five rounds, participants are technically able to use the lab's internet access for personal purposes. Their computer use and overt behavior is secretly recorded with software and a camera (consent will be obtained post-hoc). This allows for measuring personal IT use during the experiment (cyberloafing, CL_{lab}) and for estimating impression management bias (see Table 1).

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 to focus on the experiment and become more easily depleted than others

(Muraven and Baumeister 2000). This means that during the experiment they become tired and impulsive, which should affect their task performance. As a valid measure of IT addiction, the ITAS scores should therefore predict this depletion effect (DE). Specifically, the increment in state fatigue from phase 1 to phase 5 and the decrement in task performance from phase 2 to phase 4 should be greater for participants with high ITAS scores than those with low scores.

EXPECTED CONTRIBUTIONS

This work paves the way for future research in an increasingly important area. Growing access to IT increases the threat of IT addiction. As IT addiction affects quality of life in general and work performance specifically, individuals and organizations will be served with a better understanding of this phenomenon.

With the proposed work, I hope to contribute to this understanding. I aspire to pave the way for future inquiry into IT addiction by embedding it in self-control theory and providing fellow researchers with a valuable tool to measure it. I also hope to inform organizations and individuals about how IT addiction affects performance at work, such that they can take preventive and repressive measures.

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