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RESEARCH NOTE

INTEGRATING TECHNOLOGY ADDICTION AND USE: AN EMPIRICAL INVESTIGATION OF ONLINE AUCTION USERS[1]

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Technology addiction is a relatively new mental condition that has not yet been well integrated into mainstream MIS models. This study bridges this gap and incorporates technology addiction into technology use processes in the context of online auctions. It examines how user cognition and ultimately usage intentions toward an information technology are distorted by addiction to the technology. The findings from two empirical studies of 132 and 223 eBay users, using three different operationalizations of addiction, indicate that the level of online auction addiction distorts the way the IT artifact is perceived. Informing a range of cognition-modification processes, addiction to online auctions augments user perceptions of enjoyment, usefulness, and ease of use attributed to the technology, which in turn influence usage intentions. Overall, consistent with behavioral addiction models, the findings indicate that users' levels of online auction addiction influence their reasoned IT usage decisions by altering users' belief systems. The formation of maladaptive perceptions is driven by a combination of memory-, learning-, and bias-based cognition modification processes. Implications of the findings are discussed.

Keywords: Technology addiction, addiction, online auction, IT continuance, enjoyment, user behavior, obsessive–compulsive behavior, intrinsic and extrinsic motivation

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Introduction

The question "What drives the use of information technologies?" has been a fundamental and prominent subject in IS research. The focus of this question has shifted from initial use (King and He 2006; Sun and Zhang 2006; Venkatesh and Davis 2000; Venkatesh et al. 2003) to continued, post-adoption usage decisions (Kim 2009; Limayem et al. 2007). Regardless of the usage stage, it has been argued that individuals employ reasoned-action considerations that drive, in part, the use of information technologies. While recent studies demonstrate that additional mechanisms, such as habit (Limayem et al. 2007), perceived switching costs (Kim and Son 2009), and sequential updating and feedback (Kim 2009), come into play, the rational, attitude-based decision process appears to be prominent and significant in the formation of usage decisions (Bhattacherjee et al. 2008; Kim 2009; Kim and Son 2009; Limayem and Cheung 2008; Limayem et al. 2007; Sorebo and Eikebrokk 2008; Vatanasombut et al. 2008). Therefore, this study focuses on the reason-based decision process of users.

To study the logic behind technology use, researchers have often expanded the theoretical core of the technology acceptance model (TAM) (Davis 1989). Following recommendations by Benbasat and Zmud (1999, 2003), more relevant technology use research has been generated by examining important predictors of perceived ease of use and usefulness, including beliefs regarding system design (Jiang and Benbasat 2007); emotional states (Venkatesh 2000); cognition, such as trust (Gefen et al. 2003); and individual differences (e.g., computer playfulness and computer self-efficacy) (Compeau and Higgins 1995; Webster and Martocchio 1992). All of these concepts were included under the overarching TAM framework as "external variables" that can establish and explain proximal beliefs, such as usefulness and ease of use, which ultimately influence system usage.

The abovementioned literature has mostly assumed that technology use is a positive phenomenon that should be promoted through a more nuanced understanding of the drivers of key system-referenced perceptions. But, is this always the case? Is technology use always a desirable positive outcome? Several studies have suggested that unhealthy technology overuse can be problematic and may have negative consequences (Caplan 2002; Davis et al. 2002; Huang et al. 2007; Shapira et al. 2003; Yellowlees and Marks 2007). The MIS community should, therefore, also examine, in some contexts, whether and how IT use can be reduced back to healthy levels.

One of the emergent technology-usage related problems that merits research at the individual, organizational, and societal levels is technology addiction (Block 2008), which is a special type of behavioral, non-substance addiction (Holden 2001). Because no uniform definition of this concept exists (Byun et al. 2009), we amalgamate several exiting definitions. Building on the definitions by Byun et al. (2009) and Griffiths (1999), and adding symptoms from other definitions (Brown 1997; Charlton and Danforth 2007; Davis 2001; Davis et al. 2002; Griffiths 1998; Hur 2006; Skoric et al. 2009), we define technology addiction as a psychological state of maladaptive dependency on the use of a technology to such a degree that the following typical behavioral addiction symptoms arise:[2] (1) salience—the technology dominates a user's thoughts and behaviors; (2) withdrawal—negative emotions arise if a person cannot use the technology; (3) conflict—the use of the technology conflicts with other tasks, which impairs normal functioning; (4) relapse and reinstatement—a user is unable to voluntarily reduce the use of the technology; (5) tolerance—a person has to use the technology to a greater extent to produce thrill; and (6) mood modification—using the technology offers thrill and relief, and results in mood changes. Consistent with common definitions of addiction (Robinson and Berridge 2003), we argue that technology addiction is further exhibited through an obsessive pattern of IT-seeking and IT-use behaviors that take place at the expense of other important activities.

While anecdotal evidence suggests that worrisome levels of addiction to some IT exist, for example, mobile e-mail (Turel and Serenko 2010), the Internet (Griffiths 1999), and online auctions (Peters and Bodkin 2007), the technology addiction concept has not yet been integrated into mainstream IT use models. The purpose of this study is, therefore, to examine whether users' levels of addiction influence their reasoned IT usage decisions by distorting various systems' perceptions. Addressing this question can help researchers understand how the level of addiction to a technology shapes users' perceptions and behaviors. It can further guide the development of plans for detecting, monitoring, and reducing technology addiction and problematic technology use. To this end, we expand the TAM and perceived enjoyment model (van der Heijden 2004)[3] by integrating it with technology addiction.

We argue that technology addiction, like many other addictions, distorts the expectancy-value formulation that individuals develop for decision making (Sutton 1987). The perception of the subject causing addiction (i.e., the technology to which a person is addicted) is shaped and modified by

[2]This definition was given to three domain experts and refined based on their comments. All three experts agreed with the definition.

[3]TAM is just a convenient choice, and technology addiction may be integrated with many other IS models.

one's level of addiction, through memory-, learning-, and bias-based cognition modification mechanisms, on which we elaborate later in this paper. Particularly, we expect that a system to which a person is addicted is viewed through a misrepresenting lens that augments the positive attributes of the system (e.g., ease of use) and the abilities attributed to the system to cater to one's intrinsic (as captured by enjoyment) and extrinsic (as captured by usefulness) needs. Technology addiction is, therefore, expected to have a framing effect on key system-referenced perceptions. The notion of biased reasoning has been studied in other addiction contexts, such as smoking (Sutton 1987), drinking (Schlegel et al. 1992), and drug use (Morrison et al. 2002), but it has not yet been examined in the IS environment. To develop and validate a model explicating the effects of technology addiction on use decisions, relevant IS and psychology studies were reviewed. The model was tested in the context of online auction websites using two samples (n_1 = 132, n_2 = 223), and three different measures of technology addiction.

Theoretical Background

Technology Addiction

The extant literature indicates that the use of IT may lead to a number of negative outcomes. A potentially critical one is technology addiction, which can affect various aspects of a person's life and may even require treatment (Young 2007). Technology addiction may compromise the user's social life, disrupt emotional functioning, interfere with school, family, and work, and negatively affect others in the user's social circle (Block 2008; Ferraro et al. 2007; Morahan-Martin and Schumacher 2000).

The scope of the technology addiction concept has not been well defined, and multiple definitions have been proposed (Byun et al. 2009). Many terms have also been used to describe this phenomenon: Internet addiction disorder (Yang and Tung 2007), compulsive Internet use (Meerkerk et al. 2010), problematic or pathological Internet use (Bayraktar and Gün 2007), pathological use of video games (Keepers 1990), and computer addiction (Shotton 1991). This lack of uniformity is expected when a new psychological condition is introduced (Davis et al. 2002), and especially given that the definition of general *addiction* is not yet resolved in the medical field (Charlton and Danforth 2007). Despite this disagreement, most researchers argue that technology addiction is a special type of behavioral addiction (Holden 2001) that encapsulates a psychological dependency on the use of an IT. Behavioral addictions, including technology addiction, are often manifested through a number of symptoms, such as salience, withdrawal, conflict, relapse and reinstatement, tolerance, and mood modification, all of which were defined in the introduction.

The medical community has also debated the existence and terminology of technology addiction. On the one hand, the current version of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR)[4] does not officially recognize technology addiction as a disorder, arguing that it is a result of other preexisting mental conditions (e.g., reduced impulse control) (Yellowlees and Marks 2007). On the other hand, prior studies have demonstrated the existence of addiction with respect to various information technologies (Griffiths 2001; Lin 2004; Turel and Serenko 2010), and there have been recent calls for further study and formal recognition of this condition (Block 2008). The existence of behavioral addictions, and specifically technology addiction, has recently received neurobehavioral support, as have the similarities between substance and technology addictions. In both behavioral (gambling, eating, etc.) and substance (alcohol, tobacco, etc.) addictions, addicts engage in risky behaviors, neglect their duties, and suffer various negative consequences because of imminent changes in the brain area responsible for motivation and learning (Helmuth 2001). A functional magnetic resonance imaging (fMRI) study revealed that urge/craving in online gaming addiction and urge/craving in substance addiction share similar neurobiological mechanisms (Ko et al. 2009). It is, therefore, reasonable to apply concepts, models and theories from the substance addiction area to the fairly new field of behavioral addictions.

Furthermore, discriminant validity of the technology addiction concept has been demonstrated. It has been suggested that technology addiction goes beyond the concept of mere technology overuse (Davis 2001) or high engagement with a technology (Charlton and Danforth 2007). It is also different from the concept of habit, because habit captures automatic actions due to learning (Limayem et al. 2007), which do not relate to psychological dependency. That is, simply overusing a technology, automatically using a technology, or being overly engaged in using a technology is not an addiction. One's level of addiction, as per our definition, corresponds to the degree of psychological dependency the user has developed with the technology, and to the magnitude of associated behavioral addiction symptoms.

Given the implied viability and importance of technology addiction, it deserves attention from MIS scholars. First, the outcomes of technology addiction need to be better understood. Technology addiction may have personal, social, and

[4] *Diagnostic and Statistical Manual of Mental Disorders* (DSM) contains a list of psychological disorders that is used by North American psychologists, psychiatrists, and medical doctors. It is updated every several years. As of February 2011, the current version was IV-TR.

workplace related implications, such as substantial productivity losses (Yellowlees and Marks 2007), severe health problems (Block 2008), and organizational liability (Kakabadse et al. 2007). Second, the IT artifact can enable and facilitate technology addiction in leisure as well as organizational contexts. The role of the IT artifact and potential designs and uses that prevent addiction or reduce harm should be explored. Third, understanding the reason-based psychological models of addiction is imperative because people's cognition and beliefs should be altered for effective treatment (Hodgson 1987) or prevention. Indeed, many interventions are aimed at cognitive restructuring that addresses addicts' biased belief systems (McCusker 2001). All of these areas present opportunities for MIS scholars.

Online Auction Addiction

It is impossible to assess general addiction to information technologies in a single study. Therefore, the present study focuses on online auction addiction as an instance of technology addiction. In line with our definition of technology addiction, online auction addiction is defined as a maladaptive psychological dependency on the use of online auctions to such a degree that typical behavioral addiction symptoms occur.

Online auctions present a number of potentially addictive attributes. They can produce a rush, excitement, and a sense of competition that alters an individual's behavior (Anwar et al. 2006). Online auctions help the user fulfill (and potentially develop) compulsive gambling, shopping, and Internet use needs (Peters and Bodkin 2007). The more participants are in an auction, the longer individuals stay involved with the auction, and the more competitive they become (Rafaeli and Noy 2002). To succeed, they may even cross-bid simultaneously. As a result, some users may exhibit lower self-regulation in online auctions resulting in the development of addiction and associated symptoms (Black 2007). Such users may have little control over bidding and buying (Herschlag and Zwick 2002). They get a thrill and relief from participating and winning bids, and want to constantly experience this condition. Indeed, given the addictive potential of this technology, some users may develop online auction addiction (Peters and Bodkin 2007).

Drawing on multiple disciplines, Peters and Bodkin (2007) developed a theoretical conceptualization of behavioral addiction to online auctions, according to which online auction addiction is manifested through three behavioral problems: compulsive consumption, Internet addiction (use of the medium to access, view, and participate in auctions), and compulsive gambling (bidding in auctions). *Compulsive consumption* is a "consumer's tendency to be preoccupied with buying that is revealed through repetitive buying and a lack of impulse control over buying" (Ridgway et al. 2008, p. 622). This process represents a primary response to personal psychological and/or physiological problems rather than to actual consumption needs (Faber and O'Guinn 1988). People may engage in compulsive buying to relax, regulate emotions, or express self-identity. It is a common problem; almost 6 percent of U.S. consumers may be classified as compulsive buyers (Koran et al. 2006). Online auctions serve as a convenient, accessible, effective, and efficient tool that helps individuals engage in both planned and compulsive buying behaviors.

Internet addiction represents a second online auction addiction dimension. Individuals may be addicted not only to the shopping process and its outcome but also to the medium through which the addictive behavior is conducted. However, it is necessary to differentiate between addiction *to* the Internet in general and addictions *on* the Internet, when the Internet is used as a tool to facilitate the problematic behavior (Widyanto and Griffiths 2006). It is unlikely that people develop general addictions to the Internet. Instead, the Internet becomes a place where users conduct their addictive behaviors, and they become addicted to a particular IT artifact (Griffiths 2000), including online auction websites.

Compulsive gambling is also relevant because users may be addicted to the gambling (bidding) aspect of auctions. Participating in online auctions is somewhat similar to gambling because there is an opportunity to win and lose when competing over a desirable item, and participants have limited control over the outcome. Individuals may engage in compulsive gambling in order to meet their psychological needs resulting from negative developmental history, personal characteristics, lack of coping skills, and inefficient perceptual structures (Blaszczynski and Nower 2002; Steel and Blasszczynski 1998). Compulsive gambling may also be affected by structural and cultural factors (Ocean and Smith 1993; Raylu and Oei 2002).

Integrating Technology Addiction with Intended Use

Given its viability across contexts (King and He 2006) and stages of use, from early adoption to post-adoption (Kim and Son 2009), an extended TAM was chosen as the reasoned decision making nomological network of perceptions that is expected to be distorted by one's level of addiction. While addiction may influence and distort a wide range of technology-referenced perceptions, it is desirable to link it to the TAM framework because of its centrality in MIS research.

Table 1. Model Hypotheses (Adapted from van der Heijden 2004)

Hypothesis	Rationale
H1: Perceived usefulness has a positive direct effect on behavioral usage intentions toward an online auction website.	TAM suggests that behavioral intentions to use a system are formed by two perceptual variables: perceived usefulness and perceived ease of use of the system (Davis 1989).
H2: Perceived ease of use has a positive direct effect on behavioral usage intentions toward an online auction website.	
H3: Perceived ease of use has a positive direct effect on perceived usefulness of an online auction website.	Easy to use systems allow users to complete more work given a set level of effort. Hence, the ease of use of a system increases its usefulness.
H4: Perceived enjoyment has a positive direct effect on behavioral usage intentions toward an online auction website.	Perceived enjoyment is especially important in hedonic or semi-hedonic technology settings, in which the mere intrinsic joy of using the technology is an important determinant of user perceptions and behaviors, over and above its utilitarian usefulness. Online auction websites are somewhat hedonic artifacts—that is, it is not all about getting good deals (functional extrinsic utility), but also about enjoying the experience and thrill (intrinsic utility). Therefore, perceived enjoyment affects system usage intentions above the utilitarian usefulness and ease of use considerations.
H5: Perceived ease of use has a positive direct effect on perceived enjoyment with an online auction website.	Perceived enjoyment can be influenced by the ease of use of the system. Systems that are easier to use are more enjoyable. In such cases, users do not have to exert much effort to achieve their excitement and joy (Igbaria et al. 1995; van der Heijden 2004).

In this study we focus on key system-referenced perceptions, prescribed as predictors of use intentions by TAM and its extensions, and examine how users' levels of addiction influence their reasoned IT use decisions by distorting these perceptions. The first set of hypotheses replicates van der Heijden's (2004) TAM-enjoyment model, and establishes the nomological network of the perceptions to be distorted. The hypotheses and their rationales are outlined in Table 1.

This study conceptualizes technology addiction as an external, individual-difference variable as described by Davis (1989). This is a common reason-based conceptualization according to which perceptions fully mediate the effect of individual differences on behaviors (Ajzen 1991; Ajzen and Fishbein 1980). It is further supported in many MIS studies (Agarwal and Prasad 1999).

Using the abovementioned conceptualization, we assume that all users, regardless of their level of addiction, want to maximize their utility (Becker and Murphy 1988) and, hence, follow a reasoned action process; that is, they take into account an extended set of technology perceptions when forming behavioral usage intentions. Reason-based decision models, such as the theory of reasoned action (Fishbein and Ajzen 1975) and the theory of planned behavior (Ajzen 1991) have been proven to be viable for explaining behaviors of addicts in many situations (Becker and Murphy 1988; Morrison et al. 2002; Schlegel et al. 1992). Addicted individuals, like others, when faced with multiple courses of action (e.g., use eBay or not use eBay) will choose the one with the greatest subjective utility to them (Mausner 1973). It is, therefore, reasonable to expect some rationality in the decision processes of users with high levels of addiction. Distorted rationality is incorporated into such reason-based models through the use of biased perceptions regarding the subject causing addiction (Sutton 1987). The use of a modified perception system ultimately biases a person's attitude toward the problematic behavior. These distorted perceptions are termed *maladaptive cognitions* (Davis 2001).

How is this effect produced? From a neurobehavioral perspective, online auction addiction, like other addictions, can rewire users' brains and make them hypersensitive to rewards and other stimuli (from the online auction in our case) which modifies their perception system (Robinson and Berridge 1993, 2001). From a psychological perspective, several bias-based belief modification mechanisms, including emotional bias, confirmation bias, after-purchase rationalization, and the resolution of cognitive dissonance (see Table 2), can operate to modify the user's perception system. Simultaneously, several memory- and learning-based mechanisms, such as feedback and sequential updating, function to achieve the

Table 2. The Theoretical Psychological Mechanisms that Drive the Augmentation of System-Referenced Perceptions of Addicted Users

Mechanism	Description	References	Examples in the Current Context
Bias-Based Cognitive Change Mechanisms			
Emotional Bias	Addicted individuals over-rely on their emotions when forming perceptions. They may illogically minimize negative aspects and maximize positive facets of a system. Addicts experience positive emotions during use episodes, which in turn influence their cognition and decision-making processes.	Beck (1976); Damasio (1994)	A successful online gambler may disregard the amount of time spent online, ignore past losses, and emphasize only the significance of a winning episode. His or her perceptions would be driven by emotions, such as thrill, rather than by a logical assessment.
Confirmation Bias	People's tendency to look for and utilize information that confirms their existing predispositions.	Mynatt et al. (1977); Wason (1960)	Given previous positive interactions with the system and favorable views of the system, users may seek confirmatory and disregard disconfirmatory evidence. Therefore, they may emphasize successful tasks completed via the system and ignore negative experiences that contradict their previously established beliefs.
After-Purchase Rationalization	A process in which a consumer reevaluates a transaction by seeking logical arguments in favor of the purchased product, even when unwarranted.	Cohen and Goldberg (1970)	After a purchase, an online auction addict may find logical justifications for the use of a seemingly unneeded item bought online during a rush. This may artificially inflate the extrinsic and intrinsic utility of the system.
Cognitive Dissonance	Individuals feel uncomfortable when they have two opposing feelings or thoughts, and they need to resolve this unpleasant situation. One way to resolve it is through beliefs adjustment.	Festinger (1957)	Addicted individuals know that their actions (online auction overuse) are wrong, and they may be ashamed of their behaviors (Ferraro et al. 2007). By increasing their perceived gains from the action—extrinsic (participating in online auctions is very financially rewarding) and intrinsic (participating in online auctions is enjoyable)— they resolve their cognitive dissonance. They may also alter the perceived ease of use of the website to inflate their justification to use it. Such dissonance reduction strategies are common especially when the attitude at hand is important to individuals (Starzyk et al. 2009), which is the case for online auction users.
Learning- and Memory-Based Cognitive Change Mechanisms			
Sequential Updating of Perceptions	Perceptions in post-use situations are not made from scratch. They are affected by perceptions formed in previous use stages (users' schema or semantic memory).	Bhattacherjee (2001); Bhattacherjee et al. (2008); Bhattacherjee and Premkumar (2004); Kim (2009)	More addicted individuals are likely to have higher prior evaluations of the system compared to less addicted users (Huh and Bowman 2008). These augmented evaluations serve as an input to current system evaluations and will impose a higher starting point for perceptions of usefulness, ease of use, and enjoyment.
Feedback from Past Use	In routine tasks, individuals tend to elaborate and infer their judgments from past behaviors.	Bajaj and Nidumolu (1998); Kim (2009)	Individuals with high addiction levels may actually utilize the system differently, in a way that is more useful and more enjoyable to them. Addicted users may spend more time using online auctions than others. With practice, the use of the system becomes easier. They are likely to find lucrative bids and, hence, manage to better satisfy their functional and emotional needs. Thus, past positive use episodes may augment users' positive evaluations of the system. The routines of the task may drive addicted users to construct their perceptions based on past-use heuristics rather than on a full consideration of system attributes. This effect is consistent with the feedback mechanism postulated by Davis (2001): from the symptoms of pathological use to maladaptive cognition.

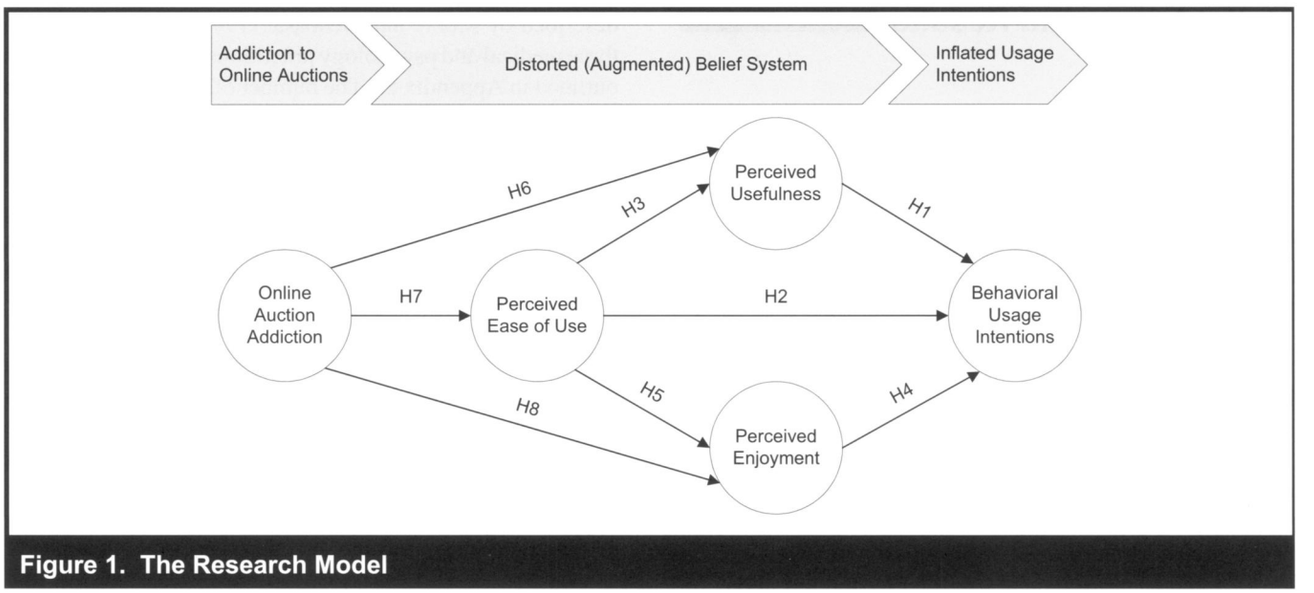

Figure 1. The Research Model

same effect; that is, to augment one's perceptions regarding the positive attributes of the system. Because addiction results in more frequent system use, users with higher levels of addiction are likely to achieve higher intrinsic and extrinsic utilities (e.g., get more products at lower prices, achieve more thrill), through which a behavior-evaluation feedback mechanism informs their perceptions (Kim 2009). Moreover, addicted users have high evaluations of positive system attributes to begin with (Huh and Bowman 2008). These serve as inputs to the sequential updating process in which current system evaluations are influenced by an individual's existing belief system (Bhattacherjee and Premkumar 2004).

As a result of these belief modification processes, the way addicts perceive internal and external factors is altered, which often results in misrepresented reality (Greenfield and Rogers 1999; Perl et al. 1997). There is a positive relationship between the degree of addiction and the extent of perceptual distortion. One's level of addiction is positively associated with the extent of engaging in high-risk behaviors, making wrong attributions, and exhibiting impaired views of reality (Coombs 2004). As a proof of this concept, it has been shown that addicted users develop inflated system evaluations; they perceive computer games more positively than non-addicted individuals (Huh and Bowman 2008). Thus, a similar intensification of positive system-referenced perceptions in the case of online auctions may exist.

Overall, several theories and perspectives can explain the mechanisms through which system-referenced perceptions of addicts are modified. These mechanisms, some neurobehavioral and some psychological, work in parallel and may differ from one context to another. The result of their operation, however, produces the same result: a set of maladaptive, intensified perceptions.

The hypotheses presented below build on the abovementioned notions that (1) focal system-referenced perceptions may be influenced by external individual-difference factors, as a matter of reasoned-action theories, and (2) technology addiction is an individual-difference factor that may intensify perceptions through neurobehavioral, memory-, learning-, and bias-based cognition modification processes. Overall, it is expected that addiction to online auctions produces a framing effect that allows users to perceive these websites more positively. We therefore presume that users who exhibit higher levels of addiction develop more positive perceptions about the system. Specifically, the more addicted individuals are, the more they find the system (logically or not) easier to use and better in serving their intrinsic and extrinsic needs. Hence,

H6: The level of online auction addiction has a positive direct effect on perceived usefulness of an online auction website.

H7: The level of online auction addiction has a positive direct effect on perceived ease of use of an online auction website.

H8: The level of online auction addiction has a positive direct effect on perceived enjoyment with an online auction website.

Figure 1 presents the research model.

Methodology and Results

Study Design

Two studies focusing on eBay users were conducted. This is an advantageous approach because it can increase the external validity of the model. eBay was chosen as the IT artifact because (1) it is the largest online auction website, and (2) high levels of online auction addiction seem to exist among eBay users (Peters and Bodkin 2007).

Measures

Items pertaining to perceived usefulness, perceived ease of use, perceived enjoyment, and behavioral usage intentions were adapted from MIS instruments with well-established psychometric properties (see Appendix A). However, there are no accepted measurement scales for technology addiction constructs (Byun et al. 2009). Three primary approaches for measuring behavioral and technology addictions have been proposed in prior research, which can be also applied for measuring online auction addiction. First, behavioral addictions can be captured with measures of obsessive-compulsive disorder, a closely related concept. In such cases, measures of obsessive-compulsive disorders are adapted to capture the salient components of the studied addiction (e.g., compulsive consumption; see Faber and O'Guinn 1988, 1992; Faber et al. 1987). Second, technology addictions can be treated as unidimensional concepts that are measured with the core symptoms of the studied technology addiction (e.g., Charlton and Danforth 2007; Young 1998). Third, technology addiction can be operationalized as a multidimensional construct or composite, in which case several scales together capture the core symptoms of addiction (e.g., Davis et al. 2002; Ferraro et al. 2007; Hur 2006).

Existing technology addiction and obsessive-compulsive disorder scales vary in the sets of addiction symptoms they capture, and consequently the space of potential measures of technology addiction is convoluted (Byun et al. 2009). Therefore, different scales for measuring online auction addiction were used in the two studies presented in this paper. Three scales were selected based on their fit to the eBay context; one for each common operationalization of addiction, as mentioned above: (1) a unidimensional compulsive consumption scale; (2) a unidimensional scale capturing core technology addiction symptoms; and (3) a multidimensional scale that follows Peters and Bodkin's (2007) conceptualization. Table 3 outlines the employed scales, and maps scale items onto the six core symptoms of online auction addiction. The mapping was obtained with a procedure similar to the one described by Moore and Benbasat (1991), using input from three medical and psychology practitioners. The procedure is outlined in Appendix B. The number of domain experts who agreed on a classification of an item to a symptom after two rounds (initial classification followed by deliberation) is indicated in the table. As one can see, the measures reflect the convoluted nature of addiction research with items tapping into different dimensions of the latent concept. It also appears that salience, conflict, and relapse are the symptoms that dominate measures of technology addiction.

In Study 1, online auction addiction was operationalized as a compulsive buying tendency based on the Faber and O'Guinn (1992) scale adapted to the eBay context. This modified scale measures addiction through a range of symptoms, including salience, withdrawal, conflict, relapse, and mood modification. While the scale may not equally tap into all symptoms of addiction, it captures the salient aspects of the concept.

In Study 2, three different operationalizations of addiction were applied, capturing the same range of symptoms. First, the modified Faber and O'Guinn (1992) scale, as in Study 1 was used. Second, the unidimensional construct of online game addiction developed by Charlton (2002) was adapted to the eBay environment. This unidimensional scale captures all six addiction symptoms but emphasizes salience and conflict. Third, online auction addiction was operationalized as a molecular second-order construct (Chin and Gopal 1995; Wetzels et al. 2009), which is manifested through three components: compulsive consumption, Internet addiction, and compulsive gambling (Peters and Bodkin 2007). Note that, consistent with Yellowlees and Marks (2007), who distinguish between addiction to specific uses of the Internet and addiction to the Internet in general, instead of measuring general consumption tendencies, general Internet addiction, and general gambling tendencies, we focused on contextualized behaviors (i.e., using the IT artifact for consumption, interaction, and bidding). Thus, the three behavioral manifestations of online auction addiction were compulsive buying at online auctions (vis-à-vis compulsive consumption), obsessive-compulsive general use of online auction websites (vis-à-vis Internet addiction), and obsessive-compulsive participation in online auctions (vis-à-vis compulsive gambling). To capture compulsive buying, the measure of compulsive buying by Ridgway et al. (2008), which has been proven to be reliable and valid, was used. To measure obsessive-compulsive website use and obsessive-compulsive participation in auctions constructs, the Yale-Brown Obsessive-Compulsive scale was adapted (Pallanti et al. 2005). The items capturing general use referred to "the eBay website"; in contrast, the items capturing the use of eBay for bidding mentioned "participating in eBay auctions." All items were

Table 3. Constructs and Scale Items Mapped onto the Six Core Symptoms of Online Auction Addiction*

				Six Core Symptoms of eBay Addiction (Griffiths 2000; Peters et al. 2007)					
Concept & Study in which it was used		**Source & Studies**	**Items**	**Salience**	**Withdrawal**	**Conflict**	**Relapse**	**Tolerance**	**Mood**
Compulsive Consumption on eBay (a core component of eBay addiction) - Used in Studies 1 & 2		Compulsive Consumption by Faber and O'Guinn (1992)	**FOGS1**. If I have any money left at the end of the pay period, I just have to spend it on eBay.	3		2			
			FOGS2. I felt others would be horrified if they knew of my eBay spending habits.	3					
			FOGS3. I bought things on eBay even though I couldn't afford them.	3		3			
			FOGS4. I charged my credit card on eBay when I knew I didn't have enough money in the bank to cover it.	3		3			
			FOGS5. I bought myself something on eBay in order to make myself feel better.						3
			FOGS6. I felt anxious or nervous on days I didn't go shopping on eBay.		3				3
			FOGS7. I made only the minimum payments on my credit cards as a result of my eBay shopping.		3	3			
Unidimensional Online Auction Addiction - Used in Study 2		Behavioral Technology Addiction by Charlton (2002)	**CTAS1**. I sometimes neglect important things because of my interest in eBay.com	3		3			
			CTAS2. My social life has sometimes suffered because of me interacting with eBay.com	3		3			
			CTAS3. Using eBay.com sometimes interfered with other activities.			3			
			CTAS4. When I am not using eBay.com I often feel agitated.	3	3				3
			CTAS5. I have made unsuccessful attempts to reduce the time I interact with eBay.com.	3			3		
			CTAS6. I am sometimes late for engagements because I interact with eBay.com.	3		3			
			CTAS7. Arguments have sometimes arisen because of the time I spend on eBay.com.	3		3			
			CTAS8. I think that I am addicted to eBay.com.	3	3	3	3	3	3
			CTAS9. I often fail to get enough rest because I interact with eBay.com.	3		3			
eBay Addiction as a Molecular Second-Order Construct, as per the Conceptualization by Peters and Bodkin (2007) - Used in Study 2	Compulsive Buying Scale	Compulsive Buying by Ridgway et al. (2008)	**CBS1**. I have unnecessary items that I bought on eBay.com	3			3		
			CBS2. Others might consider me an "eBay shopaholic."	3					
			CBS3. Much of my life centers around buying things on eBay.com.	3					
			CBS4. On eBay.com, I buy things I don't need.	3			3		
			CBS5. On eBay.com, I buy things I did not plan to buy.	3			3		
			CBS6. I consider myself an impulse purchaser on eBay.com.	3					
	Compulsive Use of the Online Auction Website (Compulsive Use of the Medium)	Obsessive Compulsive Use by Pallanti et al. (2005)	**CUW1**. Much of my time is occupied by thoughts about the eBay website.	3					
			CUW2. My thoughts about the eBay website interfere with my social, school, work, or role functioning.	3		3			
			CUW3. My thoughts about the eBay website cause me anxiety and/or distress.	3					
			CUW4. I often try to turn my attention away from the thoughts about the eBay website.	3			2		
			CUW5. I have much control over my thoughts about the eBay website. (REVERSED)	3			3	3	
			CUW6. I spend much of my time using the eBay website.	3		3			
			CUW7. My use of the eBay website interferes with my social, school, work, and/or role functioning.	3		3			
			CUW8. I become anxious and/or distressed when I am prevented from using the eBay website.	3	3				
			CUW9. I often try to resist my eBay website usage compulsion.	3			2		
			CUW10. I have much control over my use of the eBay website. (REVERSED)				3	3	
	Compulsive Participation in Online Auctions (Compulsive Gambling)	Obsessive Compulsive Gambling by Pallanti et al. (2005)	**CPAU1**. Much of my time is occupied by thoughts about participating in eBay auctions.	3		3			
			CPAU2. My thoughts about participating in eBay auctions interfere with my social, school, work, or role functioning.	3		3			
			CPAU3. My thoughts about participating in eBay auctions cause me anxiety and/or distress.	3					
			CPAU4. I often try to turn my attention away from the thoughts about participating in eBay auctions.	3					
			CPAU5. I have much control over my thoughts about participating in eBay auctions. (REVERSED)	3			3		
			CPAU6. I spend much of my time participating in eBay auctions.	3		3			
			CPAU7. My participation in eBay auctions interferes with my social, school, work, or role functioning.			3			
			CPAU8. I become anxious and/or distressed when I am prevented from participating in eBay auctions.		3				2
			CPAU9. I often try to resist my eBay auction participation compulsion.	3			2		
			CPAU10. I have much control over my participation in eBay auctions. (REVERSED)				3	3	

*The reader may treat "3" as strong agreement (the item is very likely to capture the designated symptom) and "2" as imperfect agreement (the item may capture the designated symptom).

Table 4. Construct Means

	FOGS	CTAS	CBS	CUW	CPAU	PU	PEOU	PE	BI
Study 1	1.52	n/a	n/a	n/a	n/a	5.10	5.45	4.93	5.65
Study 2	1.35	1.53	2.21	1.71	1.72	5.10	5.37	4.73	4.94
Study 1 & 2	1.42	n/a	n/a	n/a	n/a	5.10	5.40	4.81	5.04

measured on a seven-point Likert-type scale, except for the Faber and O'Guinn scale, which was measured on a five-point scale to be consistent with prior research.

It is common that negative behaviors are underreported (Schat et al. 2006), due in part to social desirability bias (SDB). Because addiction and compulsive shopping are sensitive issues, social desirability bias may potentially affect the measurement of related variables (Ridgway et al. 2008). Social desirability bias is a style of responding whereby individuals attempt to portray themselves in a way viewed favorably by others. When subjects self-report data, they tend to understate negative characteristics and behaviors (Crowne and Marlowe 1960; Williams and Podsakoff 1992). In order to assess the presence of social desirability bias, a 13-item short form of the Marlowe–Crowne scale (Reynolds 1982) was included in both studies. All addiction measures are reported in Table 3, and all other scales are presented in Appendix A.

Procedures and Populations

Data collection for the two studies was done through an online survey administered to current eBay users. Only users who purchased at least one item on eBay within the last year and employed eBay for personal, noncommercial purposes were included. In Study 1, one of the authors of this paper, who has been an eBay user, developed a list of 320 potential respondents based on his personal interactions with these people. An online survey operationalizing online auction addiction with the Faber and O'Guinn scale was sent to this list. A total of 132 valid responses were received and used in the analysis, a response rate of 41 percent. Respondents' ages ranged from 19 to 58 with a mean age of 36 years and a standard deviation of 7. The sample included 67 percent women and 33 percent men.

In Study 2, the online questionnaire operationalizing online auction addiction using three different approaches, as per Table 3, was administered to 335 students of a North American university who have taken a marketing course and who were eBay users. The completion of the survey was encouraged with a bonus grade point. Completed surveys were obtained from 223 respondents, a response rate of 67 percent. Respondents' ages ranged from 18 to 36 with a mean of 26 years and a standard deviation of 7. The sample included 59 percent women and 41 percent men. Construct means are provided in Table 4.

Preliminary Assessment

Four preliminary tests were conducted, followed by validity and reliability assessments of the measures. First, the potential moderating roles of age and gender were considered. A multivariate analysis of variance (MANOVA) model applied to the data set from Study 1 showed that gender as a fixed factor has no significant omnibus effect on the model's constructs (Pillai's Trace of 0.13, $p = 0.41$) after controlling for age as a covariate (Pillai's Trace of 0.10, $p = 0.66$). The same model applied to the data set from Study 2 yielded similar results (Pillai's Trace values of 0.36, $p = 0.20$ for gender and 0.35, $p = 0.27$ for age). Thus, age and gender were not included as control variables in the research model.

Second, the impact of social desirability bias was assessed by calculating Spearman's correlations between all addiction constructs and SDB scores. A lack of correlation suggests that SDB has no association with the reported addiction scores. Negative correlation means that those who tend to portray themselves in a favorable light by responding in a socially approved way tend to under-report their addictive behaviors. The following correlations were obtained: $rho_{\text{Second Order Addiction Construct-SDB}} = -0.13$, $p < 0.05$; $rho_{\text{FOGS-SDB}} = -0.12$, $p < 0.05$; and $rho_{\text{CTAS-SDB}} = -0.06$, $p = 0.38$, ns.[5] For one scale (CTAS), no correlation was observed, and two scales (second order addiction construct and FOGS) were marginally negatively correlated with SDB. These correlations are expected, and they are much smaller than the correlation between SDB and compulsive buying reported by Ridgway et

[5]Abbreviated scale names correspond with the names used in Table 3. FOGS data from Study 1 and Study 2 were merged for social desirability bias assessment.

al. (2008) (-0.21, $p < 0.01$). Therefore, the conclusion was that social desirability bias, while it may exist, is not a major issue in this study.

Third, the potential effect of common method variance (CMV) was examined. Several techniques were applied to the data including Harman's single factor test, examination of correlation matrixes as specified by Pavlou et al. (2007), and a marker-variable technique adapted from Lindell and Whitney (2001). Detailed results are provided in Appendix F, which suggest that CMV is unlikely to have a major influence on the data. Nevertheless, more research using multiple methods would be needed to increase confidence in this conclusion, because the employed techniques are imperfect (Richardson et al. 2009).

Finally, the interchangeability of measures of addiction was assessed. The correlations between addiction constructs were $r_{FOGS\text{-}CTAS} = 0.66$, $r_{Second\ Order\ Addiction\ Construct\text{-}CTAS} = 0.75$, and $r_{FOGS\text{-}Second\ Order\ Addiction\ Construct} = 0.75$, all significant at $p < 0.001$. These results indicate that the scales are somewhat interchangeable, but because they tap into different ranges of symptoms as per Table 3, they are not fully exchangeable. Thus, the rest of the analysis uses all three scales.

Model Estimation

The research model was estimated with PLS-Graph v.3.0. PLS was chosen because negative behaviors tend to produce skewed distributions, and PLS places less restriction on variable distributions. Furthermore, it is suitable for modeling second-order constructs (Turel et al. 2010). The second-order factor was operationalized by using the repeated-indicators approach (i.e., the hierarchical component model) (Lohmoller 1989; Turel et al. 2007).

Five models were specified and estimated. The first model, in which the Faber and O'Guinn scale was used for measuring addiction, was based on the data set from Study 1 ($n_1 = 132$). The second, third, and fourth models, in which addiction was operationalized by means of the Faber and O'Guinn scale, the Charlton scale, and the second-order approach, respectively, were based on the data set from Study 2 ($n_2 = 223$). Because the Faber and O'Guinn scale was used in Studies 1 and 2, the fifth model was based on the combined data set ($n_{1+2} = 355$). For model 5, which used two data sets, a control for data source (i.e., study 1 or 2) was initially included. Because it had a minor effect on only one construct of the model (behavioral usage intentions), it was concluded that the data source had a very limited, if any, effect on the model, and it was removed from the analysis.

As can be seen in Appendices C, D, and E, all measures were reliable and valid. All item loadings were within an acceptable range. Cronbach's alpha and composite reliability values exceeded the recommended threshold of 0.7. All items loaded on their respective constructs higher than on the other constructs (see Tables C1, C2, C4, D1, D2, D4, D5, D7, D8, D10, E1, and E3 in the appendices), and the square root of the average variance extracted exceeded inter-construct correlations (see Tables C3, D3, D6, D9, and E2 in the appendices).

Bootstrapping with 250 resamples was done to test significance levels of path coefficients in the five models (see Table 5). When addiction was operationalized as a second-order construct, the following beta coefficients were observed between the first- and second-order factors: CBS – 0.80 ($p < 0.001$); CUW – 0.87 ($p < 0.001$); and CPAU – 0.90 ($p < 0.001$).[6]

The obtained path coefficients and their levels of significance indicated that H1, H3, H4, H5, H6, and H8 were supported in all models. H7 (Addiction – PEOU) was rejected in Study 1, but supported in all other studies. H2 (i.e., PEOU – BI) was supported only in Study 1. Overall, the five models suggest that consistent with the proposed theory, addiction inflates one's perceptions of usefulness and enjoyment (R^2 ranges from 33 percent to 48 percent for usefulness, and from 39 percent to 61 percent for enjoyment). Given that the path from addiction to enjoyment is consistently stronger than that from addiction to usefulness, it is possible that addiction is more instrumental in distorting hedonic gain beliefs. Note that results regarding the intensification of ease of use perceptions are mixed: nonsignificant in one and significant in four models. This can imply that while addiction potentially inflates ease of use perceptions, it may not distort them with the same magnitude it would modify hedonic and utility gain perceptions.

Overall, the proposed paths were mostly significant, and the model explained major proportions of the variances in behavioral intentions (from 43 percent to 74 percent). The findings lend support to the proposed research model, and demonstrate how technology addiction influences rational assessment processes of the IT artifact that is the subject of addiction.[7]

[6] Abbreviations correspond to the ones used in Table 3.

[7] As an exploratory step, the moderating effect of online auction addiction on the relationship between perceptions (i.e., PU, PE, and PEOU) and behavioral usage intentions was tested and ruled out. The results are available from the first author upon request.

Table 5. The Structural Model: Path Coefficients and Their Levels of Significance

* = p < 0.05 ** = p < 0.01 *** = p < 0.001		Study 1 (n = 132)	Study 2 (n = 223)			Studies 1 & 2 (n = 355)
Hypothesis/Addiction Scale		FOGS	FOGS	CTAS	Second-Order	FOGS
H1	PU → BI	0.20**	0.24 **	0.24**	0.24**	0.21***
H2	PEOU → BI	0.17*	0.02	0.02	0.03	0.07
H3	PEOU → PU	0.67***	0.51***	0.54***	0.51***	0.59***
H4	PE → BI	0.57***	0.46***	0.46***	0.46***	0.52***
H5	PEOU → PE	0.74***	0.54***	0.58***	0.55***	0.64***
H6	ADD → PU	0.15*	0.18***	0.15***	0.23***	0.16***
H7	ADD → PEOU	0.08	0.21***	0.10*	0.18**	0.14**
H8	ADD → PE	0.21**	0.27***	0.19***	0.28***	0.24***
R^2	PU	48.2%	33.6%	32.7%	35.5%	40.0%
	PE	61.2%	42.6%	39.4%	43.4%	50.8%
	PEOU	0.6%	4.2%	1.1%	3.3%	1.9%
	BI	74.4%	43.3%	43.4%	43.3%	53.0%

Discussion

Prior research suggests that addictions distort people's perceptions so that individuals manage to rationalize unjustified abnormal behaviors. MIS theories further indicate that perception modification processes involve feedback and sequential updating from one's existing belief system and behaviors. Taken together in this study, it is argued that addiction to a technology modifies users' belief systems, and particularly their perceived enjoyment, usefulness, and ease of use. Data obtained from two samples in two separate studies support this theory in the context of online auctions. The level of online auction addiction of eBay users augmented their intrinsic and extrinsic gain perceptions as well as, in some cases, the ease of use attributed to the system. In essence, addiction to online auctions formed a positive lens through which the system seemed somewhat easier to use and much better in fulfilling one's intrinsic and extrinsic needs. While past studies postulated and examined many antecedents of technology-referenced perceptions at initial adoption and post-adoption stages, they rarely tested the effects of users' mental conditions, and particularly technology addiction. This study, therefore, has important theoretical and practical implications.

Theoretical Implications

Adding addiction to system use models allows researchers to better understand how users form their focal perceptions and make decisions under conditions of psychological dependency. According to system use theories (Bhattacherjee and Premkumar 2004; Davis 1989; Kim 2009; Venkatesh et al. 2003), perceptions are shaped in part by the features of the system under investigation and by user beliefs regarding whether the system adequately serves their extrinsic and intrinsic needs (Davis 1989; Davis et al. 1992; Teo et al. 1999; van der Heijden 2004; Venkatesh 2000). However, as this study demonstrates, the development and modification of one's belief system are not that simple, because they are also related to his or her mental conditions. Individual differences in users' levels of addiction significantly explain variation in their assessments of the system.

The findings, therefore, lend support to several existing MIS and psychology theories and inform further research in these fields. The view that system users follow a reason-based decision process when forming use intentions is supported (Davis 1989; Venkatesh et al. 2003), at least for individuals with levels of addiction that are not too high.[8] The view that individual differences are germane to the formation of system-referenced beliefs (Agarwal and Prasad 1999) is also supported. A higher level of technology addiction leads to inflated positive perceptions of the system. This lends potential support to the existence of biases that modify an addict's perception of reality (Sutton 1987) so that he or she can justify system overuse. It extends the logic developed in sub-

[8]For extreme addiction cases, the reasoned-action model may not apply or may show different results.

stance abuse research to behavioral addiction research, and especially to the case of technology addiction. The similarities between these different types of addiction have been noted (Ko et al. 2009); and therefore, further integration of MIS theory with addiction research is warranted. MIS scholars can capitalize on the vast research on addictions to better understand technology addiction, its antecedents and outcomes. They also have an opportunity to inform medical and clinical psychology research. For example, human–computer interaction and IT-use theories and models can inform the development of technology addiction prevention and treatment programs.

Technology addiction research is in its embryonic stage. This study contributes to the body of knowledge by presenting a clear definition of the phenomenon and by clarifying measurement issues. This study presents the first attempt to pinpoint the addiction dimensions that different scales capture. The Faber and O'Guinn (1992) scale seems to be slightly less theoretically complete and content-valid than the other two scales. In fact, this scale was designed for screening purposes to identify compulsive shoppers, but not for measuring continuous addiction variables for use in SEM models. Nevertheless, it produced results similar to the ones obtained with the other measures. Thus, the debate regarding the appropriate measures of technology addictions (Byun et al. 2009) may be fruitful for pathological disorder screening purposes, but is less relevant for theory formation.

The effect of ease of use on usage intentions was significant in one model only. It is possible that continued use reduces the importance of ease of use, especially for IT-proficient individuals or simple technologies such as online auctions. Showing that ease of use was not always influenced by online auction addiction is also instructive. It is possible that the Addiction → PEOU relationship is weak. This seems plausible, especially given that not all of the cognition-modification processes listed in Table 2 apply to ease of use. While usefulness and enjoyment perceptions may be influenced by learning and memory mechanisms as well as by a wide range of biases, it seems that ease of use may be influenced by a smaller set of processes. These may include sequential updating and feedback, but may include to a lesser extent, for example, after-purchase rationalization.

Overall, IT use models were developed in MIS research under the premise that use should be encouraged as a means to increase IT-related benefits. Nevertheless, at some point and in some contexts, in which a reasonably high level of addiction develops, MIS scholars should start thinking about a set of alternative questions, including

- How can we reduce IT use back to healthy levels?
- How can we control use or modify the IT artifact so that technology addiction is prevented?
- What are some of the negative outcomes that we may and should prevent?

This study does not answer all of these questions, but it serves as a platform for future technology addiction research, and for better understanding of addiction-driven system overuse behaviors and their effects on users and their environments.

Practical Implications

The results of this study demonstrate that technology addiction should not be disregarded because it can affect the way users interact with information systems. The key implications of this study stem from the finding that addiction augments system-referenced perceptions. Adjusting such maladaptive perceptions may be done with belief modification techniques (cognitive behavioral therapy) prescribed in psychology journals (Fairburn et al. 1993). These approaches may require tampering with the IT artifact to modify one's perceptions and to reduce harm (e.g., giving an addicted user a "reduced" version of an IT artifact is similar to giving a drug addict clean needles); other treatment approaches may be therapy-based.[9] The development and effectiveness of different prevention and treatment approaches should be explored in future research.

This study also raises the issue of potential legal liability of technology providers. Anecdotal evidence suggests that lawsuits are a possible line of action for addicted technology users (Kakabadse et al. 2007). Hence, even though this study does not provide proof regarding the viability of this issue, providers of addiction-prone technologies may consider ways to minimize or prevent harm.

To substantiate the relevance of this work, and to better inform practitioners (Gill and Bhattacherjee 2009), applicability checks (Rosemann and Vessey 2008) were conducted. Summaries of the findings from the study were communicated to five practitioners in three relevant fields: MIS, policy, and psychology. Their comments and perspectives are provided in Table 6. The practitioners have confirmed the relevance of the topic and the findings, and have pinpointed several avenues in which technology addiction research can be advanced.

[9] A list of potential treatments is available at http://www.zurinstitute.com/internetaddiction.html#useabuse.

Table 6. Practitioner Comments

Practitioner	Perspective	Comment
A chief information officer of a large university	Employee/ organizational user	"[Technology] addiction is extremely important to study, as society moves in a greater manner to technical intermediation, the impacts to employees is critical....Employers should be cautious regarding work life balance....It may turn to litigious issues."
A senior IT manager of a telecommunications service provider	Impact on minors and potential opportunities for service providers	"The study clearly demonstrates that certain technology services are addictive; therefore, service suppliers may have a burden of responsibility to the general public." "The findings underscore the need for service providers to understand the impact of their products on the public, particularly where it involves minors. For service providers your findings should provide an opportunity to work with parents in order to differentiate themselves from their competitors. Rather than looking at making gains at the expense of addiction, focus should be placed on partnering with parents and experts to provide controls that prevent unwanted behavior and feedback mechanisms that create alerts of potential concerns."
A licensed psychologist (trains psychotherapists in treating Internet addiction)	Clinical and research implications	"Studying what links addiction through cognition modification to perceptions regarding the technology is a worthy research that can help us clarify the types of cognitions that are involved in maladaptive behaviors that are related to modern technologies."
A clinical psychologist (treats substance addictions)	Clinical implications	"Empirically supported cognitive behavioral treatment (CBT) has been proven effective in treating individuals with compulsive behaviors. CBT has yet to be examined in relation to technology addiction....CBT treatment appears to be the appropriate empirical intervention to address the cognitive processes and behaviors that are involved in technology addiction."
A city councilor	Policy and legal implications	"Auction owners can benefit from the findings of the study since it may have major implications for them from a legal perspective (i.e., not informing the public that there may be a possibility of addiction or that the users of the online auction should be over 18 years of age, etc.)." "Stakeholders should alert the regulatory agencies that a potential danger exists and provide a regulatory framework similar to those used for regulating other forms of addictions (i.e., age limitations, referral to suitable agencies, disclaimers, Q&A, and others)."

Limitations and Future Research Directions

Despite its contributions, this study had several limitations that point to future research directions. First, the conceptualization of technology addiction is at an early stage of development, and the definition of compulsive buying has only recently been resolved (Hollander and Allen 2006). The current version of the DSM does not use the term *addiction*. Practitioners still debate on what constitutes behavioral addiction (Holden 2001). It is possible that different terminology describing the phenomenon will be developed. Nevertheless, this study empirically demonstrated that this concept (whether it is referred to as addiction) augments user perceptions and, hence, formed a platform for future research.

Second, a direct link between technology addiction and perceptions was proposed. However, other variables may fully or partially mediate this relationship (see, for example, mechanisms in Table 2). Future researchers should test mediators in various contexts to develop a better understanding of the addiction–perception relationship. Related to this, assuming that individuals rationalize their behavior by distorting their

perceptions may not be the only viable conceptualization. It is possible that in cases of extremely high levels of addiction, IT use may be totally unreasoned or irrational (Ortiz de Guinea and Markus 2009). Therefore, decision models that rely on irrationality and a broader set of user states should be examined.

Third, data in this study were skewed: the majority of all respondents exhibited low addiction levels. We recognize that some readers may feel that this is a fatal flaw. However, this distribution presumably represents the population of all eBay users (only a small fraction is heavily addicted to online auctions). Furthermore, data skewness is common when measuring negative behaviors, for instance, compulsive shopping (Ridgway et al. 2008) and Internet overuse (Brenner 1997). In this study, technology addiction was conceptualized and operationalized as a continuous variable. The purpose was not to establish whether an individual is addicted to online auctions but rather to test how one's level of addiction impacts system-referenced perceptions. In such cases, it is appropriate to use a sample that represents all addiction levels in the population. However, future research that develops technology addiction screeners (to classify addicts from non-addicts), may utilize samples with very high addiction levels to be contrasted with samples of very low addiction levels (e.g., see Faber and O'Guinn 1992).

Fourth, this study relied on cross-sectional convenience samples. While this may be justified in an initial exploration of a new phenomenon, unresolved issues include internal and external validities. In this study, validity is increased by replicating the research model with data sets from two separate samples.

Fifth, whereas this study outlines the effect of addiction on perceptions, it does not identify the underlying causes of addiction. In addition to the neurobehavioral (Ko et al. 2009), psychological, and sociological (Hur 2006) perspectives that may explain the level of addiction, it is probable that some types of products purchased by means of online auctions may be more conducive to the development of addiction. It is also possible that the IT artifact and the communication channels it employs play a role in forming technology addiction. Questions regarding addictive features of technologies, media, and the computer interface should, therefore, be addressed. Furthermore, this study focused mostly on eBay buyers. It would be also interesting to explore potential addictions among sellers in online auctions.

Other future research directions may stem from this study. First, affiliation, opinion, and support of like-minded peers may facilitate the formation of addictive behaviors (Ocean and Smith 1993). It is possible that social norms influence user addiction to and use of online auctions. Second, it is plausible that other mental conditions (e.g., low impulse control; see George 2009) may explain the interplay among systems, users, and their social and professional circles. Third, it is likely that addiction distorts many other system-referenced perceptions (e.g., trust, satisfaction, etc.) beyond TAM perceptions. Fourth, employee–organization and employee–family interface theories can be informed by addiction research. These theories focus on the influence of the nature of IT work and IT use on one's family and organization, and vice versa (e.g., Joseph et al. 2007; Rutner et al. 2008). Because conflict with one's environment (employer and family) is a common symptom of addiction, technology addiction concepts may be integrated into organizational behavior and work–family conflict models (see, for example, Turel et al. 2011). Overall, it is imperative that MIS researchers better conceptualize and examine technology addictions, their antecedents and outcomes.

Conclusion

Technology addiction is a relatively novel phenomenon. In this study, it has been incorporated into technology use processes in the context of online auctions. The empirical findings suggest that the level of addiction to online auctions distorts the way the IT artifact is perceived, which is in line with prior addiction research. Specifically, it was found that addiction augments user perceptions of enjoyment, usefulness, and, in some cases, ease of use attributed to auction websites. It is hoped that future research will be conducted on technology addictions. MIS theory can be extended from the typical context of desirable system use to situations in which (over)use becomes unhealthy and needs to be controlled. Given that information technologies have become an irrevocable part of modern society, further research on the identification, prevention, and treatment of technology addiction is warranted.

References

Agarwal, R., and Prasad, J. 1999. "Are Individual Differences Germane to the Acceptance of New Information Technologies?," *Decision Sciences* (30:2), pp. 361-391.

Ajzen, I. 1991. "The Theory of Planned Behavior," *Organizational Behavior and Human Decision Processes* (50:2), pp. 179-211.

Ajzen, I., and Fishbein, M. 1980. *Understanding Attitudes and Predicting Social Behavior*, Englewood Cliffs, NJ: Prentice-Hall.

Anwar, S., McMillan, R., and Zheng, M. 2006. "Bidding Behavior in Competing Auctions: Evidence from eBay," *European Economic Review* (50:2), pp. 307-322.

Bajaj, A., and Nidumolu, S. R. 1998. "A Feedback Model to Understand Information System Usage," *Information & Management* (33:4), pp. 213-224.

Bayraktar, F., and Gün, Z. 2007. "Incidence and Correlates of Internet Usage Among Adolescents in North Cyprus," *CyberPsychology & Behavior* (10:2), pp. 191-197.

Beck, A. T. 1976. *Cognitive Therapy and the Emotional Disorders*, New York: New American Library.

Becker, G. S., and Murphy, K. M. 1988, "A Theory of Rational Addiction," *Journal of Political Economy* (96:4), pp. 675-700.

Benbasat, I., and Zmud, R. W. 1999. "Empirical Research in Information Systems: The Practice of Relevance," *MIS Quarterly* (23:1), pp. 3-16.

Benbasat, I., and Zmud, R. W. 2003. "The Identity Crisis Within the IS Discipline: Defining and Communicating the Discipline's Core Properties," *MIS Quarterly* (27:2), pp. 183-194.

Bhattacherjee, A. 2001. "Understanding Information Systems Continuance: An Expectation-Confirmation Model," *MIS Quarterly* (25:3), pp. 351-370.

Bhattacherjee, A., Perols, J., and Sanford, C. 2008. "Information Technology Continuance: A Theoretic Extension and Empirical Test," *Journal of Computer Information Systems* (49:1), pp. 17-26.

Bhattacherjee, A., and Premkumar, G. 2004. "Understanding Changes in Belief and Attitude Toward Information Technology Usage: A Theoretical Model and Longitudinal Test," *MIS Quarterly* (28:2), pp. 229-254.

Black, G. S. 2007. "A Comparison of the Characteristics of eBay Consumers and eBay Nonconsumers," *Journal of Direct, Data and Digital Marketing Practice* (9:1), pp. 16-29.

Blaszczynski, A., and Nower, L. 2002. "A Pathways Model of Problem and Pathological Gambling," *Addiction* (97:5), pp. 487-499.

Block, J. J. 2008. "Issues for DSM-V: Internet Addiction," *American Journal of Psychiatry* (165:3), pp. 306-307.

Brenner, V. 1997. "Psychology of Computer Use: XLVII. Parameters of Internet Use, Abuse and Addiction: The First 90 Days of the Internet Usage Survey," *Psychological Reports* (80:3), pp. 879-882.

Brown, R. I. F. 1997. "A Theoretical Model of the Behavioural Addictions—Applied to Offending," in *Addicted to Crime*, J. E. Hodge, M. McMurran, and C. R. Hollin (eds.), Chichester, UK: Chichester, pp. 13-66.

Byun, S., Ruffini, C., Mills, J. E., Douglas, A. C., Niang, M., Stepchenkova, S., Lee, S. K., Loutfi, J., Lee, J. K., Atallah, M., and Blanton, M. 2009. "Internet Addiction: Metasynthesis of 1996-2006 Quantitative Research," *Cyberpsychology & Behavior* (12:2), pp. 203-207.

Caplan, S. E. 2002. "Problematic Internet Use and Psychosocial Well-Being: Development of a Theory-Based Cognitive–Behavioral Measurement Instrument," *Computers in Human Behavior* (18:5), pp. 553-575.

Charlton, J. P. 2002. "A Factor-Analytic Investigation of Computer 'Addiction' and Engagement," *British Psychological Society* (93:3), pp. 329-344.

Charlton, J. P., and Danforth, I. D. W. 2007. "Distinguishing Addiction and High Engagement in the Context of Online Game Playing," *Computers in Human Behavior* (23:3), pp. 1531-1548.

Chin, W. W., and Gopal, A. 1995. "Adoption Intention in GSS: Relative Importance of Beliefs," *Data Base for Advances in Information Systems* (26:2-3), pp. 42-64.

Cohen, J. B., and Goldberg, M. E. 1970. "The Dissonance Model in Post-Decision Product Evaluation," *Journal of Marketing Research* (7:3), pp. 315-321.

Compeau, D. R., and Higgins, C. A. 1995. "Computer Self-Efficacy: Development of a Measure and Initial Test," *MIS Quarterly* (19:2), pp. 189-211.

Coombs, R. H. (ed.). 2004. *Addiction Counseling Review: Preparing for Comprehensive, Certification, and Licensing Examinations*, New York: Taylor & Francis.

Crowne, D. P., and Marlowe, D. 1960. "A New Scale of Social Desirability Independent of Psychopathology," *Journal of Consulting Psychology* (24:4), pp. 349-354.

Damasio, A. R. 1994. *Descartes' Error: Emotion, Reason, and the Human Brain*, New York: Putnam Publishing.

Davis, F. D. 1989. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly* (13:3), pp. 319-340.

Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. 1992. "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace," *Journal of Applied and Social Psychology* (22:14), pp. 1111-1132.

Davis, R. A. 2001. "A Cognitive-Behavioral Model of Pathological Internet Use," *Computers in Human Behavior* (17:2), pp. 187-195.

Davis, R. A., Flett, G. L., and Besser, A. 2002. "Validation of a New Scale for Measuring Problematic Internet Use: Implications for Pre-employment Screening," *Cyberpsychology & Behavior* (5:4), pp. 331-345.

Faber, R. J., and O'Guinn, T. C. 1988. "Compulsive Consumption and Credit Abuse," *Journal of Consumer Policy* (11:1), pp. 97-109.

Faber, R. J., and O'Guinn, T. C. 1992. "Clinical Screener for Compulsive Buying," *Journal of Consumer Research* (19:3), pp. 459-469.

Faber, R. J., O'Guinn, T. C., and Krych, R. 1987. "Compulsive Consumption," in *Advances in Consumer Research,* M. Wallendorf and P. Anderson (eds.), Provo, UT: Association for Consumer Research, pp. 132-135.

Fairburn, C. G., Jones, R., Peveler, R. C., Hope, R. A., and O'Connor, M. 1993. "Psychotherapy and Bulimia-Nervosa: Longer Term Effects of Interpersonal Psychotherapy, Behavior-Therapy, and Cognitive-Behavior Therapy," *Archives of General Psychiatry* (50:6), pp. 419-428.

Ferraro, G., Caci, B., D'Amico, A., and Di Blasi, M. 2007. "Internet Addiction Disorder: An Italian Study," *Cyberpsychology & Behavior* (10:2), pp. 170-175.

Festinger, L. 1957. *A Theory of Cognitive Dissonance*, Stanford, CA: Stanford University Press.

Fishbein, M., and Ajzen, I. 1975. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Reading, MA: Addison-Wesley.

Gefen, D., Karahanna, E., and Straub, D. W. 2003. "Trust and TAM in Online Shopping: An Integrated Model," *MIS Quarterly* (27:1), pp. 51-90.

George, S. 2009. "Impulse Control Disorders: A Clinician's Guide to Understanding and Treating Behavioral Addictions," *British Journal of Psychiatry* (194:2), pp. 192-193.

Gill, G., and Bhattacherjee, A. 2009. "Whom Are We Informing? Issues and Recommendations for MIS Research from an Informing Science Perspective," *MIS Quarterly* (33:2), pp. 217-235.

Greenfield, T. K., and Rogers, J. D. 1999. "Alcoholic Beverage Choice, Risk Perception and Self-Reported Drunk Driving: Effects of Measurement on Risk Analysis," *Addiction* (94:11), pp. 1735-1743.

Griffiths, M. D. 1998. "Internet Addiction: Does it Really Exist?," in *Psychology and the Internet: Intrapersonal, Interpersonal and Transpersonal Implications,* J. Gackenbach (ed.), New York: Academic Press, pp. 61-75.

Griffiths, M. D. 1999. "Internet Addiction: Fact or Fiction?," *The Psychologist* (12:5), pp. 246-251.

Griffiths, M. D. 2000. "Internet Addiction: Time to Be Taken Seriously?," *Addiction Research & Theory* (8:5), pp. 413-418.

Griffiths, M. D. 2001. "Sex on the Internet: Observations and Implications for Internet Sex Addiction," *Journal of Sex Research* (38:4), pp. 333-342.

Helmuth, L. 2001. "Beyond the Pleasure Principle," *Science* (294:5544), pp. 983-984.

Herschlag, M., and Zwick, R. 2002. "Internet Auctions: Popular and Professional Literature Review," *Quarterly Journal of Electronic Commerce* (1:2), pp. 161-186.

Hodgson, R. 1987. "Editorial: Psychology and Addiction," *British Journal of Addiction* (82:4), p. 329.

Holden, C. 2001. "Compulsive Behaviors: 'Behavioral' Addictions: Do They Exist?," *Science* (294:5544), pp. 980-982.

Hollander, E., and Allen, A. 2006. "Is Compulsive Buying a Real Disorder, and Is it Really Compulsive?," *American Journal of Psychiatry* (163:10), pp. 1670-1672.

Huang, Z., Wang, M., Qian, M., Zhong, J., and Tao, R. 2007. "Chinese Internet Addiction Inventory: Developing a Measure of Problematic Internet Use for Chinese College Students," *Cyberpsychology & Behavior* (10:6), pp. 805-812.

Huh, S., and Bowman, N. D. 2008. "Perception and Addiction of Online Games as a Function of Personality Traits," *Journal of Media Psychology* (13:2).

Hur, M. H. 2006. "Demographic, Habitual, and Socioeconomic Determinants of Internet Addiction Disorder: An Empirical Study of Korean Teenagers," *Cyberpsychology & Behavior* (9:5), pp. 514-525.

Igbaria, M., Iivari, J., and Maragahh, H. 1995. "Why Do Individuals Use Computer Technology? A Finnish Case Study," *Information & Management* (29:5), pp. 227-238.

Jiang, Z. J., and Benbasat, I. 2007. "The Effects of Presentation Formats and Task Complexity on Online Consumers' Product Understanding," *MIS Quarterly* (31:3), pp. 475-500.

Joseph, D., Ng, K. Y., Koh, C., and Ang, S. 2007. "Turnover of Information Technology Professionals: A Narrative Review, Meta-Analytic Structural Equation Modeling, and Model Development," *MIS Quarterly* (31:3), pp. 547-577.

Kakabadse, N., Porter, G., and Vance, D. 2007. "Addicted to Technology," *Business Strategy Review* (18:4), pp. 81-85.

Keepers, G. A. 1990. "Pathological Preoccupation with Video Games," *Journal of the American Academy of Child & Adolescent Psychiatry* (29:1), pp. 49-50.

Kim, S. S. 2009. "The Integrative Framework of Technology Use: An Extension and Test," *MIS Quarterly* (33:3), pp. 513-537.

Kim, S. S., and Son, J. Y. 2009. "Out of Dedication or Constraint? A Dual Model of Post-Adoption Phenomena and its Empirical Test in the Context of Online Services," *MIS Quarterly* (33:1), pp. 49-70.

King, W. R., and He, J. 2006. "A Meta-Analysis of the Technology Acceptance Model," *Information & Management* (43:6), pp. 740-755.

Ko, C.-H., Liu, G.-C., Hsiao, S., Yen, J.-Y., Yang, M.-J., Lin, W.-C., Yen, C.-F., and Chen, C.-S. 2009. "Brain Activities Associated with Gaming Urge of Online Gaming Addiction," *Journal of Psychiatric Research* (43:7), pp. 739-747.

Koran, L. M., Faber, R. J., Aboujaoude, E., Large, M. D., and Serpe, R. T. 2006. "Estimated Prevalence of Compulsive Buying Behavior in the United States," *American Journal of Psychiatry* (163:10), pp. 1806-1812.

Limayem, M., and Cheung, C. M. K. 2008. "Understanding Information Systems Continuance: The Case of Internet-Based Learning Technologies," *Information & Management* (45:4), pp. 227-232.

Limayem, M., Hirt, S. G., and Cheung, C. M. K. 2007. "How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance," *MIS Quarterly* (31:4), pp. 705-737.

Lin, X. H. 2004. "Internet Addiction Disorder, On-Line Behavior and Personality: An Exploratory Study," *International Journal of Psychology* (39:5-6), pp. 272-272.

Lindell, M. K., and Whitney, D. J. 2001. "Accounting for Common Method Variance in Cross-Sectional Research Designs," *Journal of Applied Psychology* (86:1), pp. 114-121.

Lohmoller, J.-B. 1989. *Latent Variable Path Modeling with Partial Least Squares*, Heidelberg, Germany: Physica-Verlag.

Mausner, B. 1973. "An Ecological View of Cigarette Smoking," *Journal of Abnormal Psychology* (81:2), pp. 115-126.

McCusker, C. G. 2001. "Cognitive Biases and Addiction: An Evolution in Theory and Method," *Addiction* (96:1), pp. 47-56.

Meerkerk, G.-J., van den Eijnden, R. J. J. M., Franken, I. H. A., and Garretsen, H. F. L. 2010. "Is Compulsive Internet Use Related to Sensitivity to Reward and Punishment, and Impulsivity?," *Computers in Human Behavior* (26:4), pp. 729-735.

Moore, G. C., and Benbasat, I. 1991. "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," *Information Systems Research* (2:3), pp. 192-222.

Morahan-Martin, J., and Schumacher, P. 2000. "Incidence and Correlates of Pathological Internet Use Among College Students," *Computers in Human Behavior* (16:1), 2000, pp. 13-29.

Morrison, D. M., Golder, S., Keller, T. E., and Gillmore, M. R. 2002. "The Theory of Reasoned Action as a Model of Marijuana Use: Tests of Implicit Assumptions and Applicability to High-Risk Young Women," *Psychology of Addictive Behaviors* (16:3), pp. 212-224.

Mynatt, C. R., Doherty, M. E., and Tweney, R. D. 1977. "Confirmation Bias in a Simulated Research Environment: An Experimental Study of Scientific Inference," *Quarterly Journal of Experimental Psychology* (29:1), pp. 85-95.

Ocean, G., and Smith, G. J. 1993. "Social Reward, Conflict, and Commitment: A Theoretical Model of Gambling Behavior," *Journal of Gambling Studies* (9:4), pp. 321-339.

Ortiz de Guinea, A., and Markus, M. L. 2009. "Why Break the Habit of a Lifetime? Rethinking the Roles of Intention, Habit, and Emotion in Continuing Information Technology Use," *MIS Quarterly* (33:3), pp. 433-444.

Pallanti, S., DeCaria, C. M., Grant, J. E., Urpe, M., and Hollander, E. 2005. "Reliability and Validity of the Pathological Gambling Adaptation of the Yale–Brown Obsessive–Compulsive Scale (PG-YBOCS)," *Journal of Gambling Studies* (21:4), pp. 431-443.

Pavlou, P. A., Liang, H. G., and Xue, Y. J. 2007. "Understanding and Mitigating Uncertainty in Online Exchange Relationships: A Principal–Agent Perspective," *MIS Quarterly* (31:1), pp. 105-136.

Perl, E., Shufman, E., Vas, A., Luger, S., and Steiner, J. E. 1997. "Taste- and Odor-Reactivity in Heroin Addicts," *Israel Journal of Psychiatry and Related Sciences* (34:4), pp. 290-299.

Peters, C., and Bodkin, C. D. 2007. "An Exploratory Investigation of Problematic Online Auction Behaviors: Experiences of eBay Users," *Journal of Retailing and Consumer Services* (14:1), pp. 1-16.

Rafaeli, S., and Noy, A. 2002. "Online Auctions, Messaging, Communication and Social Facilitation: A Simulation and Experimental Evidence," *European Journal of Information Systems* (11:3), pp. 196-207.

Raylu, N., and Oei, T. P. S. 2002. "Pathological Gambling: A Comprehensive Review," *Clinical Psychology Review* (22:7), pp. 1009-1061.

Reynolds, W. M. 1982. "Development of Reliable and Valid Short Forms of the Marlowe–Crowne Social Desirability Scale," *Journal of Clinical Psychology* (38:1), pp. 119-125.

Richardson, H. A., Simmering, M. J., and Sturman, M. C. 2009. "A Tale of Three Perspectives Examining Post Hoc Statistical Techniques for Detection and Correction of Common Method Variance," *Organizational Research Methods* (12:4), pp. 762-800.

Ridgway, N. M., Kukar-Kinney, M., and Monroe, K. B. 2008. "An Expanded Conceptualization and a New Measure of Compulsive Buying," *Journal of Consumer Research* (35:4), pp. 622-639.

Robinson, T. E., and Berridge, K. C. 1993. "The Neural Basis of Drug Craving: An Incentive–Sensitization Theory of Addiction," *Brain Research Reviews* (18:3), pp. 247-291.

Robinson, T. E., and Berridge, K. C. 2001. "Incentive–Sensitization and Addiction," *Addiction* (96:1), pp. 103-114.

Robinson, T. E., and Berridge, K. C. 2003. "Addiction," *Annual Review of Psychology* (54:), pp. 25-53.

Rosemann, M., and Vessey, I. 2008. "Toward Improving the Relevance of Information Systems Research to Practice: The Role of Applicability Checks," *MIS Quarterly* (32:1), pp. 1-22.

Rutner, P. S., Hardgrave, B. C., and McKnight, D. H. 2008. "Emotional Dissonance and the Information Technology Professional," *MIS Quarterly* (32:3), pp. 635-652.

Schat, A. C. H., Frone, M., and Kelloway, E. K. 2006. "Prevalence of Workplace Aggression in the U.S. Workforce: Findings from a National Study," in *Handbook of Workplace Violence,* E. K. Kelloway, J. Barling and J. J. Hurrell Jr. (eds.), Thousand Oaks, CA: Sage Publications, pp. 47-89.

Schlegel, R. P., D'Avernas, J. R., Zanna, M. P., DeCourville, N. H., and Manske, S. R. 1992. "Problem Drinking: A Problem for the Theory of Reasoned Action?," *Journal of Applied Social Psychology* (22:5), pp. 358-385.

Shapira, N. A., Lessig, M. C., Goldsmith, T. D., Szabo, S. T., Lazoritz, M., Gold, M. S., and Stein, D. J. 2003. "Problematic Internet Use: Proposed Classification and Diagnostic Criteria," *Depression and Anxiety* (17:4), pp. 207-216.

Shotton, M. A. 1991. "The Costs and Benefits of 'Computer Addiction'," *Behaviour & Information Technology* (10:3), pp. 219-230.

Skoric, M. M., Teo, L. L. C., and Neo, R. L. 2009. "Children and Video Games: Addiction, Engagement, and Scholastic Achievement," *CyberPsychology & Behavior* (12:5), pp. 567-572.

Sorebo, O., and Eikebrokk, T. R. 2008. "Explaining IS Continuance in Environments Where Usage Is Mandatory," *Computers in Human Behavior* (24:5), pp. 2357-2371.

Starzyk, K. B., Fabrigar, L. R., Soryal, A. S., and Fanning, J. J. 2009. "A Painful Reminder: The Role of Level and Salience of Attitude Importance in Cognitive Dissonance," *Personality and Social Psychology Bulletin* (35:1), pp. 126-137.

Steel, Z., and Blaszczynski, A. 1998. "Impulsivity, Personality Disorders and Pathological Gambling Severity," *Addiction* (93:6), pp. 895-905.

Sun, H., and Zhang, P. 2006. "The Role of Moderating Factors in User Technology Acceptance," *International Journal of Human Computer Studies* (64:2), pp. 53-78.

Sutton, S. 1987. "Social–Psychological Approaches to Understanding Addictive Behaviors: Attitude–Behaviour and Decision-Making Models," *British Journal of Addiction* (82:4), pp. 355-370.

Teo, T. S. H., Lim, V. K. G., and Lai, R. Y. C. 1999. "Intrinsic and Extrinsic Motivation in Internet Usage," *Omega-International Journal of Management Science* (27:1), pp. 25-37.

Turel, O., and Serenko, A. 2010. "Is Mobile Email Addiction Overlooked?," *Communications of the ACM* (53:5), pp. 41-43.

Turel, O., Serenko, A., and Bontis, N. 2007. "User Acceptance of Wireless Short Messaging Services: Deconstructing Perceived Value," *Information & Management* (44:1), pp. 63-73.

Turel, O., Serenko, A., and Bontis, N. 2010. "User Acceptance of Hedonic Digital Artifacts: A Theory of Consumption Values Perspective," *Information & Management* (47:1), pp. 53-59.

Turel, O., Serenko, A., and Bontis, N. 2011. "Family and Work-Related Consequences of Addiction to Organizational Pervasive Technologies," *Information & Management* (48:2/3), pp. 85-95.

van der Heijden, H. 2004. "User Acceptance of Hedonic Information Systems," *MIS Quarterly* (28:4), pp. 695-704.

Vatanasombut, B., Igbaria, M., Stylianou, A. C., and Rodgers, W. 2008. "Information Systems Continuance Intention of Web-Based Applications Customers: The Case of Online Banking," *Information & Management* (45:7), pp. 419-428.

Venkatesh, V. 2000. "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model," *Information Systems Research* (11:4), pp. 342-365.

Venkatesh, V., and Davis, F. D. 2000. "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies," *Management Science* (46:2), pp. 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. 2003. "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly* (27:3), pp. 425-478.

Wason, P. C. 1960. "On the Failure to Eliminate Hypotheses in a Conceptual Task," *Quarterly Journal of Experimental Psychology* (12:3), pp. 129-140.

Webster, J., and Martocchio, J. J. 1992. "Microcomputer Playfulness: Development of a Measure with Workplace Implications," *MIS Quarterly* (16:2), pp. 201-226.

Wetzels, M., Odekerken-Schröder, G., and van Oppen, C. 2009. "Using PLS Path Modeling for Assessing Hierarchical Construct Models: Guidelines and Empirical Illustration," *MIS Quarterly* (33:1), pp. 177-195.

Widyanto, L., and Griffiths, M. 2006. "'Internet Addiction': A Critical Review," *Journal International Journal of Mental Health and Addiction* (4:1), pp. 31-51.

Williams, M. L., and Podsakoff, P. M. 1992. "Effects of Group-Level and Individual-Level Variation in Leader Behaviours on Subordinate Attitudes and Performance," *Journal of Occupational & Organizational Psychology* (65:2), pp. 115-129.

Yang, S. C., and Tung, C.-J. 2007. "Comparison of Internet Addicts and Non-Addicts in Taiwanese High Schools," *Computers in Human Behavior* (23:1), pp. 79-96.

Yellowlees, P. M., and Marks, S. 2007. "Problematic Internet Use or Internet Addiction?," *Computers in Human Behavior* (23:3), pp. 1447-1453.

Young, K. S. 1998. "Internet Addiction: The Emergence of a New Clinical Disorder," *Cyberpsychology & Behavior* (3:2), pp. 237-244.

Young, K. S. 2007. "Cognitive Behavior Therapy with Internet Addicts: Treatment Outcomes and Implications," *Cyberpsychology & Behavior* (10:5), pp. 671-679.

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