RESEARCH ARTICLE

The benefits and dangers of enjoyment with social networking websites

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Abstract
Information Systems enjoyment has been identified as a desirable phenomenon, because it can drive various aspects of system use. In this study, we argue that it can also be a key ingredient in the formation of adverse outcomes, such as technology-related addictions, through the positive reinforcement it generates. We rely on several theoretical mechanisms and, consistent with previous studies, suggest that enjoyment can lead to presumably positive outcomes, such as high engagement. Nevertheless, it can also facilitate the development of a strong habit and reinforce it until it becomes a 'bad habit', that can help forming a strong pathological and maladaptive psychological dependency on the use of the IT artifact (i.e., technology addiction). We test and validate this dual effect of enjoyment, with a data set of 194 social networking website users analyzed with SEM techniques. The potential duality of MIS constructs and other implications for research and practice are discussed.
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Introduction
Habitual and continued use of information systems (IS) has become prevalent in business and leisure contexts. The driving forces behind such behaviors have therefore intrigued the IS research community (Bhattacherjee *et al*, 2008; Venkatesh *et al*, 2008; Kim, 2009). One of the key factors that positively influence the continued use of IS employed in voluntary settings is perceived enjoyment. It can do so through multiple mechanisms. First, as a positive experiential cognition, it can directly increase future usage intentions (van der Heijden, 2004; Cyr *et al*, 2006). Second, it can also increase users' satisfaction with the system, which in turn augments continued use intentions (i.e., satisfaction serves as a partial mediator between perceived enjoyment, and continuance intentions, see Thong *et al*, 2006). Third, it can facilitate the development of a habit of using an IS (Limayem *et al*, 2007), which in turn can increase intentions to perform the enjoyable behavior (Orbell *et al*, 2001; Ajzen, 2002). As such, many of these studies and their followers have called for finding ways to increase IS user enjoyment as a means to drive further system use.

In this study, we first follow the spirit of the abovementioned line of work, and show that perceived enjoyment can indeed be a positive factor that drives high engagement with the system (which is typically a desirable phenomenon); users who enjoy the system are absorbed in, and more enthusiastic about its use. However, we argue and empirically demonstrate that the effects of enjoyment in IS settings can be dangerous as well; that is, that abusing good things (enjoyable IS in our case) can turn them into

bad things (a problematic dependency on the IS). To this end, we build on the demonstrated role of perceived enjoyment as a factor reinforcing the continued use of substances, pathological gambling and the enactment of other addiction-driven behaviors (Platt, 1986; Carter & Tiffany, 1999; McDaniel, 2002; Morasco et al, 2007; Wohl et al, 2007). IS in many cases can be as intrinsically rewarding as substances, and can hence be addiction-prone (Chou & Ting, 2003; Han et al, 2010; Han et al, 2011). Enjoyment, we argue, facilitates the development of a strong IS use habit (Limayem et al, 2007; Ko et al, 2009; Limayem & Cheung, 2011), which in turn through informing cognitive and neurobehavioral mechanisms, serves as a prerequisite for the formation of high levels of addiction to using the IS. Thus, 'bad habits', as defined in behavioral research (Ouellette & Wood, 1998), can also be formed in IS use contexts through the reinforcing role of enjoyment.

Ultimately, we demonstrate the dual effect of enjoyment in human–computer interactions and add to the current body of research, which mostly emphasized its positive consequences, by also focusing on its potential adverse impacts. We do so in the context of social networking websites (SNW), because evidence suggests that there may be worrisome levels of habitual pathological use behaviors among SNW users (Pempek et al, 2009; Karaiskos et al, 2010; Fenichel, 2011), and that SNW can be addiction-prone technologies (Echeburua & de Corral, 2010). While SNW use may not result in strong negative life consequences compared with the use of other habitual technologies, such as online gaming (e.g., Xu et al, 2012), it produces the strongest deficient self-observation and the second strongest deficient self-reaction among other habitual technologies (gaming, shopping, etc., LaRose et al, 2010).

Findings based on structural equation modeling analysis applied to the data set collected from 194 SNW users suggest that more enjoyment is not always better. On the one hand, it can increase users' engagement with the system, which is a non-pathological, desirable phenomenon. On the other hand, it can lead to the development of a 'bad' IS habit, which in turn leads to the development of higher levels of technology addiction.

Theoretical background

In this section, we describe four concepts that are pertinent to this study: IS enjoyment, IS use habit, SNW addiction, and high engagement. We then proceed in the next section with developing hypotheses regarding the associations among these concepts.

IS enjoyment

In the past, IS were mostly considered tools developed to help users perform work-related tasks, automate complex processes, store information, and facilitate communication. Over time, as somewhat hedonic applications emerged, for instance, video games and SNW, the motivational drivers of system use have shifted from extrinsic

considerations, such as usefulness of the system, to intrinsic reflections, such as perceived enjoyment with the system (Turel et al, 2007; Turel et al, 2010). Intrinsic motivation drives voluntary activity done for no apparent reinforcement other than the process of performing the activity per se (de Charms, 1968). The innate psychological needs for self-competence, determination, realization, autonomy, recognition, relatedness, and entertainment are the major intrinsic driving forces of engaging individuals in various activities. Enjoyment is inherent in such activities and the positive experiences associated with them.

The theory of intrinsic motivation has been successfully utilized to explain task enjoyment with computer-related activities (Igbaria et al, 1994; van der Heijden, 2003). Hedonic intrinsic motives are also important for system use decisions (Venkatesh, 2000). Perceived enjoyment is a key intrinsic motivator defined as 'the extent to which the activity of using the computer is perceived to be enjoyable in its own right' (Davis et al, 1992, p. 1113). Given its importance and prevalence, it has been the focus of many IS use studies (van der Heijden, 2004; Cyr et al, 2006). The key assumption in these works is that enjoyment is a positive factor facilitating, directly and indirectly, the use of IS. Whereas this reasoning has merit, it is possible that in some situations enjoyment may also lead to undesirable behaviors, which in turn, in the long run, may result in negative consequences for the users and/or their environments (families, co-workers, friends, the society at large, etc.) Accordingly, in this paper, we argue that enjoyment may have a dual effect. On the one hand, it may improve and augment user experiences with the system, and by so doing induce further usage. On the other hand, it may cause the development of a strong IS use habit, and reinforce it, until it leads to the development of high levels of technology addiction.

IS use habit

Habits are learned sequences 'of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals or end-states' (Verplanken & Aarts, 1999, p. 104). They are pertinent to human behavior because repeated enjoyable actions can eventually form a habit in many situations. Over time, a mental relationship between the goal and the best course of action is developed, and relevant cue – response links become highly accessible in the memory (Ouellette & Wood, 1998). People are cognitive misers; they tend to minimize the amount of cognitive effort when they are faced with a specific task. As a result, if familiar environmental or situational cues are present, individuals may not engage in full cognitive deliberation and thoroughly consider their behavior. Rather, they often semi-automatically engage in habitual behaviors, without devoting their full cognitive capacity to these tasks (Wood et al, 2002; Verplanken & Orbell, 2003).

In the IS context, habit refers to the 'extent to which people tend to perform behaviors (use IS) automatically

because of learning' (Limayem *et al*, 2007, p. 709). IS use habits can therefore play an important role in continued IS use (de Guinea & Markus, 2009). Specifically, it has been shown that IS use habits can moderate the transition of usage intentions into usage behaviors; this transition is strong when a habit is low and decisions are mostly cognitively informed, but, after repeated use when a strong habit forms, continued usage decisions can become less goal-oriented and reliant on mindful cognitions (Limayem & Cheung, 2011). For example, IS use habit in the context of online shopping moderates the relationship between satisfaction and repurchase intent (Khalifa & Liu, 2007).

Social networking website addiction

Habits are not always productive, and in many contexts people develop what is termed 'bad habits'. Bad habits refer to automatic and repetitive counterproductive or harmful behaviors, such as substance abuse or repetitive deviant actions. They often represent 'acts that yield short-term rewards that are inconsistent with long-term intentions and goals' (Ouellette & Wood, 1998, p. 56). In this study, we focus on a key cyber-world equivalent outcome of bad habits, namely, technology addiction, which is a pathological problematic state. Building on the definition of drug addiction (Robinson & Berridge, 2003) and consistent with the recent conceptualizations of technology addiction in the MIS literature (Turel *et al*, 2011b), we define technology addiction as a user's maladaptive psychological state of dependency on the IT use which is manifested through an obsessive pattern of IT-seeking and IT-use behaviors that take place at the expense of other important activities and infringe normal functioning (i.e., it produces a range of typical behavioral addiction symptoms).

Prior research has demonstrated the potential existence of this phenomenon in multiple IS contexts and its symptomatic adverse consequences (see Table 1). Even though some addictions may relate to positive behaviors, such as exercising, writing or meditating (Glasser, 1976), addiction is generally considered a pathological state, which may require treatment. Technology addiction is also typically a negative phenomenon. For example, users may develop harmful psychological conditions, and experience serious family, work, and life problems, including social isolation, obesity, reduced work and school performance, mood alteration, and even death (Young, 1998b; Bruner & Bruner, 2006; Byun *et al*, 2009). Organizations may, under certain conditions, be legally and financially responsible for the harm experienced by their employees or customers resulting from technology addiction (Turel & Serenko, 2010). Societies may also be impacted, and hence some countries treat technology-related addictions as a serious public health issue and consider the implementation of national policies (Block, 2008).

While technology-related addictions are important phenomena, it is critical to note that not all IT artifacts are equally addictive. For example, it is unlikely that somebody may become addicted to MS Office. In contrast, the eBay website is a good example of an addiction-prone technology (Peters & Bodkin, 2007). The reason is that addictions often form through processes of positive reinforcement and neural sensitization (Robinson & Berridge, 2003), and hence, IT artifacts producing thrill or filling socio-psychological voids in users' lives can be more addictive than others (Young, 1998a, b, 2010a). It is not surprising that most technology-related addictions have been observed with respect to hedonic systems. In fact, the most frequent examples of IT artifacts in technology addiction research have been video games, messaging applications (e.g., chat-rooms), and Internet gambling websites.

SNW have emerged as another potentially addictive technology, which, similar to other addiction-prone IS, fills social voids in people's lives and produces ongoing thrills (Pempek *et al*, 2009; Echeburua & de Corral, 2010). Addiction to using such websites is a plausible phenomenon, which is classified as a sub-category of the technology/Internet spectrum addiction disorders (Karaiskos *et al*, 2010). Consistent with common computer-related and general addiction symptoms (Brown, 1997; Ferraro *et al*, 2007), SNW addiction can be manifested through a number of core symptoms, which interfere with other activities and normal functioning. These include conflict (e.g., the use of the website conflicts with other tasks), withdrawal (i.e., negative emotions arise if the website cannot be used), relapse and reinstatement (i.e., inability to voluntarily reduce the usage of the website), and behavioral salience (i.e., the use of the website dominates other tasks).

The strength or frequency of these symptoms is often used for calculating addiction levels; that is, addiction is often conceptualized as a continuous variable that pertains to all users by ranging from weak or no symptoms (low addiction scores) to people with many, strong symptoms (high addiction scores) (Charlton & Danforth, 2007). While such scores can be used for classifying users as addicted or not, there are no acceptable cutoff criteria (Block, 2008). We hence also treat technology addiction as a continuous variable, similar to previous conceptualizations in the MIS literature (Turel *et al*, 2011b).

In order to put SNW addiction in context, Table 2 compares three types of addiction with: (1) computer and video games; (2) online auction websites; and (3) SNW. It demonstrates that regardless of the IT artifact, each technology-related addiction is similar with respect to the core addiction symptoms, such as conflict, withdrawal, relapse and reinstatement, and salience. Addiction to SNW use is closer to online gaming addiction, in that it can produce immediate social conflicts and damages, and is different from bidding and gambling disorders, which can have immediate and strong financial ramifications. While the negative consequences of addiction to SNW (e.g., reduced school performance) may not be as strong as those of online auction addiction (e.g., financial debts), it can still produce deficiency in normal functioning, reduce one's

Table 1 Outcomes of technology-related addictions

Potential outcomes of technology-related addictions

Individual level	• *Mobile phone addiction* causes psychological distress (Beranuy *et al*, 2009), financial problems, dangerous or prohibited usage (e.g., when driving) (Billieux *et al*, 2008), anxiety, and insomnia (Jenaro *et al*, 2007).
	• *Computer and video game addiction* causes financial issues, epileptic fits, eye strain, mood disturbances, aggression, headaches, anti-social behaviors (Griffiths & Hunt, 1998; Griffiths *et al*, 2010), conflict with others, and little satisfaction with offline world (Bruner & Bruner, 2006; Hussain & Griffiths, 2009), and may lead to a wide range of physical and psychological damages (Xu *et al*, 2012).
	• *Cyber-sex and cyber-porn addiction* damages personal well-being, social relationships, work, sex life, and family relations (Cavaglion, 2009; Cavaglion & Rashty, 2010); leads to depression, social isolation, marital problems, and adultery (Schwartz & Southern, 2000; Daneback *et al*, 2005).
	• *Instant messaging addiction* leads to the loss of relationships due to IM overuse, reduced control over IM use, and academic performance decrement (Huang & Leung, 2009).
	• *Internet addiction* has a negative impact on various aspects of an addict's personal life (Beard & Wolf, 2001; Davis *et al*, 2002), leading to depression (Iacovelli & Valenti, 2009), mood altering, loneliness, disinhibition (Morahan-Martin & Schumacher, 2000), reduced self-esteem (Niemz *et al*, 2005), stress, compulsivity (Whang *et al*, 2003), learning problems, and poor school performance (Bayraktar & Gün, 2007; Yang & Tung, 2007).
	• *Mobile email addiction* increases technology–family conflict, which in turn augments work–family conflict resulting in negative consequences for both the user and his or her family (Turel *et al*, 2011a).
	• *Online auction addiction* reduces control over bidding and buying, which leads to unnecessary purchases (Herschlag & Zwick, 2002), creates substantial psychological distress, facilitates hostile behaviors, and increases anxiety (Peters & Bodkin, 2007).
	• *Online gambling addiction* causes mood swings, consumption of alcohol, illicit drugs use, and financial problems (Matthews *et al*, 2009; McBride & Derevensky, 2009; Griffiths *et al*, 2010).
Organizational level	• *Mobile email addiction* increases the user's work overload, which in turn reduces his or her level of organizational commitment (Turel & Serenko, 2010).
	• Employees who become addicted to *work-related information and communication technologies (ICT)* may hold their employers legally responsible for both work and personal problems that resulted from heavy ICT overuse (Kakabadse *et al*, 2007).
	• Individuals addicted to *violent video games* may hold game developers and distributors legally responsible for their criminal actions by suggesting that these behaviors were triggered by the game (Toobin, 2003).
	• People addicted to *video games* may sue game developers and distributors for the negative consequences of their addiction (MSNBC Digital Network, 2010).
Societal level	• *Addiction to workplace ICT* may decrease productivity, lower organizational commitment, and increase turnover (Turel *et al*, 2011a).
	• *Addiction to personal-use ICT* may reduce the level of personal well-being, change social interaction patterns, and create an economic burden. For example, addiction to digital television and video game consoles develops a new culture of in-house entertainment, when people tend to spend more leisure time at home (Griffiths & Wood, 2000). Online gambling addiction may surpass traditional gambling addiction because of accessibility and anonymity of the medium (Griffiths & Parke, 2002). Many adolescents may be addicted to online games (Xu *et al*, 2012), which may result in a less physically active population (Bruner & Bruner, 2006).
	• *Technology addiction prevention and treatment programs are necessary.* Research-driven prevention techniques may be devised (Xu *et al*, 2012), because treatment may place a burden on the health care system and require substantial financial resources.
	• *New policies* for diagnosing and treating technology addictions should be developed (Wood & Williams, 2007).

control and self-regulation (LaRose *et al*, 2010), and indirectly lead to long-term social deficiencies and financial loses.

Three overarching theoretical perspectives can explain the formation of addiction toward using SNW: (1) the cognitive behavioral model (Davis, 2001); (2) the social skill model (Caplan, 2005); and (3) socio-cognitive model of unregulated media use (LaRose *et al*, 2003). The cognitive behavioral model suggests that some SNW users can develop maladaptive cognitions. These cognitions are amplified by various environmental factors,

for example, social isolation or lack of peer support, and lead to the development of maladaptive obsessive use patterns. The social skill model proposes that users who lack self-presentational skills are more likely to engage in virtual communication instead of face-to-face interactions. This behavioral pattern, once constantly reinforced through rewards, promotes obsessive use and negatively affects the individual. The socio-cognitive model of unregulated use posits that SNW use is determined by outcome expectancy (e.g., to use the website to relieve loneliness). Combined with high

Table 2   Comparison of three types of technology addiction

Core symptoms of technology addiction	Examples in the current context		
	Computer and video games	Online auction websites	SNW
Conflict (i.e., the activity interferes with other tasks)	Sacrificing sports, work, sleep, friends, and school for the sake of play.	Continues bidding and buying regardless of financial debts.	Slowly giving up real-world relationships; using SNW at work or classroom instead of being productive.
Withdrawal (i.e., negative emotions arise if the activity cannot be conducted)	Snapping when play is interrupted. For example, kids refuse going to sleep before 'completing another level'.	Has to complete auction participation at any cost; those who interrupt this process are viewed with hostility.	Exhibiting aggression toward those who prevent from SNW use, for example, when parents ask to temporarily stop the usage.
Relapse and reinstatement (i.e., inability to voluntarily reduce the activity)	All previous attempts to self-regulate the continuation of play have failed.	Stopped using auctions when a substantial debt has accumulated, but resumed later, which further increased debt.	Deactivated the accounts several times, but reactivated them later.
Salience (i.e., the activity dominates thoughts and behaviors)	Strong anticipation of play, spending any available moment playing.	Expectation of bidding; checking the auction website continuously, staying engaged in the auction for long hours.	Accessing the website at every opportunity from any place, comprehending unnecessary information, making trivial postings.

self-efficacy to use the website (e.g., as a result of prior experience) and low control over the use, the expectation of positive rewards develops compulsive behavioral patterns. Regardless of the theoretical standpoint on the development of addiction, all models argue that addictions result in various negative consequences for the users and their environments.

There is empirical evidence to support this claim. By combining the social skill model and the socio-cognitive model, LaRose *et al* (2010) empirically demonstrated that SNW addiction has a detrimental effect on the user's work, social and school activities. In addition, a report describing a patient who was referred to professional counseling to treat problematic SNW use exemplifies the potential manifestations of such addictions (Karaiskos *et al*, 2010). The presumably addicted individual spent a lot of time interacting with the website, accumulated numerous virtual friends in a short period of time, stopped several essential activities, remained home to be able to access the website, and lost her job because she frequently had to satisfy her use cravings at the expense of performing her job duties. She also tried to access the website via her mobile phone during the psychiatric evaluation. While no formal diagnosis was established in this case, it highlights the types of symptomatic outcomes of technology-related addictions and specifically, those of SNW addiction. It further highlights the similarities between addiction to using SNW and other technology-related addictions, for example, online gaming addiction. The latter also fulfils social and identity needs of individuals and creates conflicts with other activities, negative mood, and a constant state of need to use the technology (Young, 2010a b). Overall, the discussion above implies that conceptual definitions and measures developed to capture other types of technology-related addictions are plausibly applicable to the SNW context.

High engagement

In contrast to most other addiction-driven behaviors (e.g., drug use), computer usage is generally encouraged. This means that not all levels of use, habitual or not, can lead to pathological problems. In fact, in many cases, especially when frequent habitual use does not harm the self and others, it may not be considered pathological and should not require treatment. For example, a user may spend many hours per week using SNW, but core addiction symptoms (e.g., conflict or withdrawal) may never emerge. In such cases, users may still present non-core, or peripheral, symptoms, that is, non-harmful symptoms that do not directly interfere with normal functioning (Charlton & Danforth, 2007). These non-pathological symptoms manifest from high engagement, which is a positive degree of psychological involvement with a system (psychological salience), which can also be conceptualized as low apathy toward system use (Charlton & Danforth, 2010). In contrast to addiction, high engagement is a non-pathological state, which does not require intervention and may be controlled by users (Charlton, 2002). It may also be considered a mostly positive outcome because it means that users care about the system and make it a central part of their lives. A hospital, for example, would be happy to see its physicians highly engaged in the use of a new electronic medical records system, and an online gaming provider would be happy to have highly engaged, yet not addicted, users. Indeed, addiction and high engagement are two separate outcomes of ongoing system use and

reinforcement processes, which can depend on users' genetic predispositions, personalities, and environmental factors (Charlton & Danforth, 2010).

The view that high engagement is mostly a positive, or at least a non-negative, phenomenon distinct from addiction has received empirical support (Skoric *et al*, 2009). In the latter study, technology addiction tendencies were negatively associated with scholastic performance, but high engagement did not exhibit such a relationship. The distinction between these constructs is also emphasized by Reddy (2008). Charlton & Birkett (1999) further argue that high engagement can be a positive phenomenon, because high engagement with educational applications may improve school performance. The rationale is that highly engaged users tend to be absorbed in system use and make it a central part of their lives, but in a way that does not infringe normal functioning. Highly engaged users may fall into the state of flow (Csikszentmihalyi, 1990) and exhibit high levels of cognitive absorption. This requires deep attention, involvement, and perceptual engrossment with the experience; users feel a sense of curiosity, control, temporal dissociation, focused immersion, and heightened enjoyment (Agarwal & Karahanna, 2000). They are implicitly aware of the context and content of human–computer interaction processes, and become more open to novelty, innovating and experimenting (Langer, 1992). Overall, high engagement constitutes a mostly positive non-pathological orientation toward an IS that does not produce negative symptoms (Charlton, 2002). Note that high engagement does not capture experienced enjoyment. It taps into euphoria emerging from the mere thought of using the SNW and the centrality of the SNW in someone's life (i.e., psychological salience). It is therefore different from enjoyment (which is a post-use emotional reflection), though both represent positive phenomena.

Hypotheses

Perceived enjoyment is a key antecedent of high engagement with IS. The literature demonstrates that it is critical for the users to enjoy their experience with an IT, especially ones used for communication purposes (Dimmick *et al*, 2000; Bourdeau *et al*, 2002). When people perceive an IS to be enjoyable, they tend to put more effort into the use, concentrate longer, process more information, and utilize it repeatedly in the future (i.e., become less apathetic to it, and make it a central part of their lives). Moreover, the more enjoyable the system is, the more individuals become absorbed into the process (Agarwal & Karahanna, 2000). They find new innovative ways to use the system, feel in control, lose track of time, and immerse themselves in the process. Therefore, they become more psychologically involved, and less apathetic toward using the system:

H1: *Perceived enjoyment with a social networking website is positively related to high engagement with the social networking website.*

Perceived enjoyment is also instrumental to habit formation (Limayem *et al*, 2007) because the development of habit is magnified by pleasure gratification (LaRose, 2010). One of the reasons is that emotions influence human memory. Positive emotional stimuli, such as joy, trigger cognitive and neural mechanisms that increase one's explicit memory (Hamann, 2001). As a result, people memorize facts, events, and actions associated with positive emotions faster and remember them longer (Sharot & Phelps, 2004). Therefore, when system use is accompanied by enjoyment, users are likely to form stronger usage habits (Pahnila & Warsta, 2010). Extending this idea to SNW:

H2: *Perceived enjoyment with a social networking website is positively related to the social networking website use habit.*

In addition to perceived enjoyment, IS habit is also influenced by past behavior (Limayem *et al*, 2007). Experience gained with repetitive practice and use modifies peoples' cognitions and their neurobehavioral pathways, which ultimately guide future behavior (Neal *et al*, 2006). First, ongoing practice creates links in the memory between cues and actions. Second, an implicit association may emerge between the goal and required behavior within a particular context. Third, when a specific course of action has been consistently rewarded (e.g., by heightened enjoyment), respective goal-seeking behaviors are automatically triggered with expectations of subsequent rewards. Thus, an ongoing engagement in the same behavior can inform learning processes that establish links between the behavior and the expected outcome, and be the basis upon which habit is formed. While this ongoing engagement in a behavior has been often conceptualized as the frequency of past usage of an IT artifact (Limayem & Cheung, 2011; Limayem *et al*, 2007), we suggest that consistent with Venkatesh *et al* (2008), it is also plausible that gaining experience with a SNW is evident through the time-per-day one has spent on it (i.e., duration of use). Therefore:

H3: *The average daily use duration of a social networking website is positively related to the social networking website use habit.*

Usage comprehensiveness, which captures the degree 'to which an individual makes use of the various applications offered under the umbrella of a single IS' (Limayem *et al*, 2007, p. 715), is another type of past behavior that can lead to a stronger habit. SNW provide users with various features and functions (e.g., posting messages, playing games, watching videos). When a broad set of features is utilized, it increases the use of SNW, encourages the ongoing practice and facilitates learning processes that underlie habit formation. A broad use of system features allows users to discover new ways to gratify their expectations. Furthermore, people who use more features are likely to develop a psychological

connection with the IT, identify themselves with the system, and create an automatic response to use it for all suitable activities (Schwarz & Chin, 2007). Thus:

H4: *The usage comprehensiveness of a social networking website is positively related to the social networking website use habit.*

While the terms 'bad habits' and addiction are sometimes used interchangeably (Astin, 1962; Hollender, 1980), they are different. Habits are a prerequisite for the formation of addiction (e.g., habitual alcohol drinking may lead to alcoholism); not all habits are bad (e.g., putting on the seatbelt when getting into the car), and some bad habits, especially less hedonic ones, do not transform into an addiction (e.g., being late). Moreover, 'habits are not intrinsically compulsive in any motivational sense, no matter how automatic they are' (Robinson & Berridge, 2003, p.33). They hence lack the obsessive–compulsive facet, as well as many symptoms (e.g., withdrawal) of addictions and are distinct from addictions. However, for some individuals, despite their volitional self-restriction and attempts to minimize their behavior, habits may go out of control and turn into an addiction, manifested through a number of negative symptoms (Marlatt *et al*, 1988). This phenomenon has been observed with respect to various technologies, including SNW (LaRose *et al*, 2010).

In line with these works, it is argued that SNW use habit is a mandatory and instrumental prerequisite for the formation of technology addiction. First, perceived as a rational process, there can be a transition of habits into a state of addiction through the reduced attention to future negative consequences imposed by growing habitual use (Becker & Murphy, 1988). According to this view, IS users who develop a growing habit pay less and less attention to the potential harms of their habitual use pattern, and by so doing, increase their addiction symptoms and the level of addiction to the IS. Second, from a neurobehavioral perspective, there may be a habit-driven process of 'neural sensitization' (Robinson & Berridge, 2003). When habitual SNW use increases, the brain can become more sensitive to use cues and consequently overemphasizes the salience of the thrill, until it forms a pathological state of 'wanting'. According to this view, higher levels of addiction are developed through a growing hypersensitivity to SNW stimuli (which are more frequent when a strong habit develops), and a consequent growing gap between one's expected rewards and the actual rewards (Robinson & Berridge, 1993). As such, addiction can be a potential outcome of over-practiced SNW use habits:

H5: *IS use habit is positively related to addiction to the social networking website.*

Note that the model does not propose a link between habit and high engagement. This decision was made because habit can have both positive and negative effects on high engagement, and the end result (the balance of these opposing effects) depends on the circumstantial salience of these effects. On the one hand, enjoyable habits can increase high engagement, because they make the repeated activity a central part of a person's life (Ouellette & Wood, 1998). They can also produce euphoria (an intense and exaggerated feeling of well-being) and tolerance (a growing need to perform the activity), which are key facets of high engagement (Charlton & Danforth, 2007). On the other hand, it can also train the user's brain to increase the expected positive-incentive value of SNW use, while the actual hedonic value obtained from it stays the same or decreases (see neural sensitization theory, Robinson & Berridge, 2001). Thus, SNW users with a strong habit may feel diminished euphoria, and be less engaged in using the website. Furthermore, enjoyable habits, similar to other habits, lead to semi-automaticity and to devoting less cognitive resources to activities (Orbell & Verplanken, 2010). Empirical evidence suggests that when people develop a strong habit, they engage in the behavior semi-automatically, ignore other choices (Verplanken *et al*, 1997; Verplanken & Aarts, 1999), and are generally indifferent toward their actions (Verdejo-García *et al*, 2006). Following this path, IS use habits can lead to stronger apathy and lower engagement. Taken together, IS use habit can have both positive and negative effects on high engagement, which can be emphasized differently in different contexts. We thus do not put forth a hypothesis regarding the potential effect of habit on high engagement.

Also, note that it was not hypothesized that high engagement leads to addiction. Rather, both were conceptualized as parallel direct or indirect outcomes of enjoyment. While over time high engagement may be accompanied by addiction symptoms (Charlton & Danforth, 2007), it does not have to lead to addiction. For example, a researcher may be highly engaged in running SEM models, but is very unlikely to develop an addiction to SEM software use.

Methodology

Sample
Data were collected by means of an online questionnaire administered to SNW users who were taking a sophomore year marketing class at a large American business school. Students in this class could voluntarily participate in this study for two bonus points. Those who have not used SNW had an opportunity to participate in alternative projects for the same incentive. No restriction on the type of the SNW was placed (i.e., all SNW were eligible), and only those participants with at least 3 months of usage experience were selected. Out of the 226 students in this course, 204 completed the survey. After removing incomplete submissions, 194 usable responses were retained (response rate of 86%).

The sample included 48% women. Participant ages ranged from 19 to 40 years, with an average of 23 years. They had on average 10.6 years of Internet experience, 2.9 years of SNW experience, 2.5 years of full-time work experience, and 3.8 years of part-time work experience. They managed from 2 to 1,000 contacts on their SNW, with an average of 225 contacts per user. The respondents utilized multiple SNW (from 1 to 4 per person), with an average of 1.7 websites per user. 90% used Facebook, 56% – MySpace, 16% – Twitter, 8% – LinkedIn, and 7% – other SNW (e.g., Hi5.com, Xing.com, and Cyworld). They employed SNW in order to: stay in touch with close friends and relatives (98%); read messages (62%); post messages and photos (56%); browse the pages of people in their network (39%); meet new people (24%); stay in touch with people they met on this SNW (20%); play online video games (19%); watch videos (16%); post videos (10%); and send virtual gifts (3%).

Survey instrument

Because people can use more than one SNW, respondents were asked to reflect on their experience with their most frequently used SNW. All multi-item scales were adapted from well-established research instruments, and were measured on 7-point Likert-type scales (see items and sources in Table 3). To capture addiction and engagement, short versions of the Charlton & Danforth (2007) scales were used. They included only items that presented loadings higher than 0.6 in the original study. This was done to economize on items for participants. While these scales were developed for assessing core and peripheral computer-related addiction symptoms in the context of massive multiplayer online games, it is argued that they can also fit other computing contexts, including SNW. First, these scales capture the prevalence of typical behavioral addiction symptoms consistent with Brown's (1997) conceptualization, which is commonly applied for measuring technology-related addictions (Byun et al, 2009). For example, items A2 and A3 capture symptomatic conflict, and item A5 captures relapse and reinstatement symptoms. Similarly, the high engagement items capture psychological salience symptoms. These can pertain to any IT, beyond the original context of online games. Second, parallels between game and SNW addictions can be drawn. Both applications can help fill social voids in people's lives, improve their social visibility, and create a feeling of immersion, all of which are important drivers of potential overuse behaviors (Wan & Chiou, 2006; Sheldon et al, 2011) and ultimately addiction (Young, 2010b). As indicated in Table 2, online video games and SNW produce very similar core technology addiction symptoms. Third, these scales have been applied successfully to other addiction-prone IT artifacts, such as mobile e-mail (Turel et al, 2011a).

Self-reported past usage behaviors (comprehensiveness and time-per-day) were measured with open-ended numerical questions adapted from Limayem et al (2007)

to the context of SNW. Demographic variables (age, gender, work experience) were also collected.

Prior research demonstrates that individuals tend to under-report negative phenomena, such as stealing, lying, and addiction (Crowne & Marlowe, 1960; Williams & Podsakoff, 1992) because they want to be viewed positively by other members of society, including researchers. This phenomenon is referred to as Social Desirability Bias (SDB). It is plausible that the respondents to our survey presented such a bias, because addiction may be viewed as having negative social reflections on the respondents. In order to assess this possibility, the short 13-item version of Marlowe-Crowne scale (Reynolds, 1982) was administered as part of the survey.

Results

Preliminary assessment

The initial assessment focused on the potential influence of common method variance (CMV). This risk was initially mitigated in the survey design phase: negatively worded items were utilized, and multiple measurement scale types (Likert and open-ended numerical questions) were employed. However, given the self-reported nature of the data, the risk still exists (Sharma et al, 2009). Because all CMV detection techniques have limitations (Podsakoff et al, 2003), potential CMV risk in this study was assessed by several methods.

First, Harman's single-factor test was conducted. An exploratory principal components analysis was applied with no rotation to all multi-item scales. It produced four components: the first explained only 41% of the variance, and the remaining explained additional 31%. Second, the procedure specified by Pavlou et al (2007) was applied. The correlation matrix (Table 4) was examined, and correlations in excess of 0.9 were not detected. Such correlations can raise the suspicion of CMV, but the correlations in our case ranged from 0.17 to 0.69. This further implies that there was no systematic bias in the data. Third, while we did not have a marker variable that is unrelated to the model's constructs as suggested by Lindell & Whitney (2001) (to economize on survey items), we measured SDB. It was expected that this construct, which is external to the model, negatively and weakly correlates with socially undesirable phenomena, such as addiction, but not with the other constructs. The data support this expectation. SDB scores had a negative and significant correlation only with high engagement (-0.14, $P<0.05$), and a marginally significant negative correlation with addiction (-0.13, $P<0.1$), but not with the other constructs. This further implies that there was no systematic bias in the data. Overall, the combination of results from the abovementioned tests suggests that CMV is unlikely to have a major influence on the data.

The second preliminary assessment focused on the potential influence of SDB. As mentioned above, low

Table 3   Measurement instrument

Construct	Source	Questions
Time-per-Day (Past Behavior)	Limayem et al (2007)	Considering your average behavior for the previous 3 months, how much time on an average day do you spend on this social networking website (in minuets)?
Comprehensiveness of Usage (Past Behavior)	Limayem et al (2007)	What are your primary uses of your most frequently used social networking website? (Select all that apply) Options: Meeting new people, staying in touch with close friends and relatives, staying in touch with people I have met on this social networking website, posting messages and photos, reading messages sent by others, browsing the pages of people in my network, sending 'gifts', expressing myself, playing online video games, posting videos, and watching videos.
Habit	Limayem et al (2007)	HAB1: Using this social networking website has become automatic to me. HAB2: Using this social networking website is natural to me. HAB3: When I want to interact with friends and relatives, using this social networking website is an obvious choice for me.
Addiction	Charlton & Danforth (2007)	A1: I sometimes neglect important things because of my interest in this social networking website. A2: My social life has sometimes suffered because of me interacting with this social networking website. A3: Using this social networking website sometimes interfered with other activities. A4: When I am not using this social networking website, I often feel agitated. A5: I have made *unsuccessful* attempts to reduce the time I interact with this social networking website.
High Engagement	Charlton & Danforth (2007)	ENG1: It would not matter to me if I never used this social networking website again. (R) ENG2[a]: I feel happy at the thought of using this social networking website. ENG3: The less I have to do with this social networking website, the better. (R) ENG4: This social networking website is unimportant in my life. (R)
Perceived Enjoyment	Davis et al (1992)	PE1: Using this social networking website is enjoyable. PE2: Using this social networking website is pleasurable. PE3: Using this social networking website is fun. PE4: Using this social networking website is exciting. PE5: Using this social networking website is interesting.
Social Desirability Bias	Reynolds (1982)	Please indicate whether the statements below are true or false with respect to yourself: SD1: It is sometimes hard for me to go on with my work if I am not encouraged. (F) SD2: I sometimes feel resentful when I don't get my way. (F) SD3: On a few occasions, I have given up doing something because I thought too little of my ability. (F) SD4: There have been times when I felt like rebelling against people in authority even though I knew they were right. (F) SD5: No matter who I'm talking to, I'm always a good listener. (T) SD6: There have been occasions when I took advantage of someone. (F) SD7: I'm always willing to admit it when I make a mistake. (T) SD8: I sometimes try to get even, rather than forgive and forget. (F) SD9: I am always courteous, even to people who are disagreeable. (T) SD10: I have never been irked when people expressed ideas very different from my own. (T) SD11: There have been times when I was quite jealous of the good fortune of others. (F) SD12: I am sometimes irritated by people who ask favors of me. (F) SD13: I have never deliberately said something that hurt someone's feelings. (T)

[a]Item dropped due to low loading.
(R) – negatively worded items.

negative correlations of SDB with high engagement and addiction were observed. The weak negative correlations indicate that individuals who tend to respond in a socially approved way might have marginally under-reported their addiction and high engagement levels. This is expected because people tend to hide their true addiction levels, and may believe that over-engaging in using SNW may be viewed negatively by others. In addition, the observed correlations are lower than those reported in other studies of negative self-reported

Table 4   Descriptive statistics, reliabilities[a] and correlations

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Time-per-day (Minutes)	43.60	49.70	—							
(2) Usage Comprehensiveness	3.75	2.07	0.17*	—						
(3) Perceived Enjoyment	5.05	1.28	0.35**	0.35**	*0.95 (0.94) [0.77]*					
(4) Habit	4.64	1.55	0.40**	0.38**	0.69**	*0.86 (0.86) [0.67]*				
(5) Addiction	2.27	1.24	0.29**	0.27**	0.29**	0.40**	*0.86 (0.84) [0.52]*			
(6) High Engagement	4.08	1.34	0.33**	0.32**	0.45**	0.36**	0.19**	*0.76 (0.77) [0.52]*		
(7) Age	23.02	3.58	−0.12	−0.07	−0.02	−0.16*	−0.14*	−0.03	—	
(8) Gender	—	—	−0.04	0.06	−0.06	−0.03	0.01	−0.03	0.08	—
(9) Number of Contacts	225.39	176.52	0.28**	0.13	0.23**	0.27**	0.10	0.19**	−0.29**	−0.15*

[a]Three reliability measures are reported for each multi-item construct on the diagonal: Cronbach's α, (Composite Reliability), and [AVE].
*$P<0.05$; **$P<0.01$.

phenomena (Ridgway *et al*, 2008). The lack of correlations of SDB with the other factors indicates that the rest of the data are not socially biased. Overall, it was concluded that the data are unlikely to be distorted by major biases. Thus, model estimation was appropriate.

Measurement model
Following the two step approach for model estimation (Anderson & Gerbing, 1988), the viability of the measurement instruments was first assessed. A Confirmatory Factor Analysis (CFA) model was fit to the data using AMOS 19. Cronbach's αs, Composite Reliability, and Average Variance Extracted (AVE) scores were calculated for all multi-item constructs. The model had a good fit ($\chi^2(135) = 226.33$, CFI = 0.96, IFI = 0.96, RMSEA = 0.059 with P-close = 0.13, and SRMR = 0.070) that meets recommended cut-off criteria (Hu & Bentler, 1999). All standardized loadings were above 0.6 ($P<0.001$), except for the loading of item #2 of the high engagement scale, which was low (0.44, $P<0.001$). This was also reflected in construct reliability measures. While the Cronbach's α and Composite Reliability scores for high engagement were acceptable (both equal 0.73), the AVE for this construct was 0.44, which is below the recommended threshold of 0.5. Thus, item ENG2 (see Table 3) was removed, and the measurement model was consequently reassessed.

The revised CFA model presented good fit ($\chi^2(118) = 173.87$, CFI = 0.98, IFI = 0.98, RMSEA = 0.050 with P-close = 0.50, and SRMR = 0.054). All factor loadings were above 0.6 and significant ($P<0.001$), which further indicates that the measurement model fits the data, and combined with the fit indices, indicates good convergent and discriminant validities. Descriptive statistics and inter-construct correlations are provided in Table 4. Reliability scores for multi-item scales, including Cronbach's αs, (Composite Reliability) and [AVE], are given on the diagonal. The square root of AVE has exceeded the inter-construct correlations, which confirms discriminant validity of the measures. The bottom part of the table includes potential control variables. As can be seen, all constructs presented sufficient variation and were reliable with Cronbach's αs

and Composite Reliability scores over 0.7, as well as AVE scores over 0.5. It was therefore concluded that the measurement model is acceptable.

Model estimation
Because the CFA model was adequate, a structural model that included potential control variables (age, gender, and number of contacts) as predictors of all endogenous constructs was specified and estimated. This model yielded excellent fit indices ($\chi^2(162) = 222.92$, CFI = 0.97, IFI = 0.97, RMSEA = 0.044 with P-close = 0.75, and SRMR = 0.055). While all the hypothesized relationships were significant (at $P<0.01$ and below), only one control variable, age, had a significant effect on habit ($P<0.01$). For parsimony reasons the non-significant control variable paths were removed, and the model as depicted in Figure 1 was specified and estimated. The model adequately fits the data ($\chi^2(138) = 198.5$, CFI = 0.97, IFI = 0.97, RMSEA = 0.048 with P-close = 0.59, and SRMR = 0.058), which supports the theory we put forth. Figure 1 provides the standardized path coefficients and the squared multiple correlations (SMC = % of explained variance).

Discussion
The purpose of this study was to advance our understanding of the dual effect of perceived enjoyment in user–IS interactions by focusing on not only its assumed-to-be positive but also its potential adverse consequences, which have been mostly omitted in prior MIS research. For this, we suggested a model based on the literature and tested it through a survey of 194 SNW users. The findings support the idea that IS use is no different from other behaviors, and that bad IS use habits, that is, habits that turn into addiction, which causes unproductive and undesirable outcomes, may emerge. On the one hand, users who enjoy their experience become highly engaged with the technology, which is often viewed positively by users, technology providers, and policymakers. On the other hand, when users of SNW increase their use time, the range of functionalities they employ and their hedonic gains (enjoyment), the use of SNW becomes habitual. When the level of habitual use increases, some
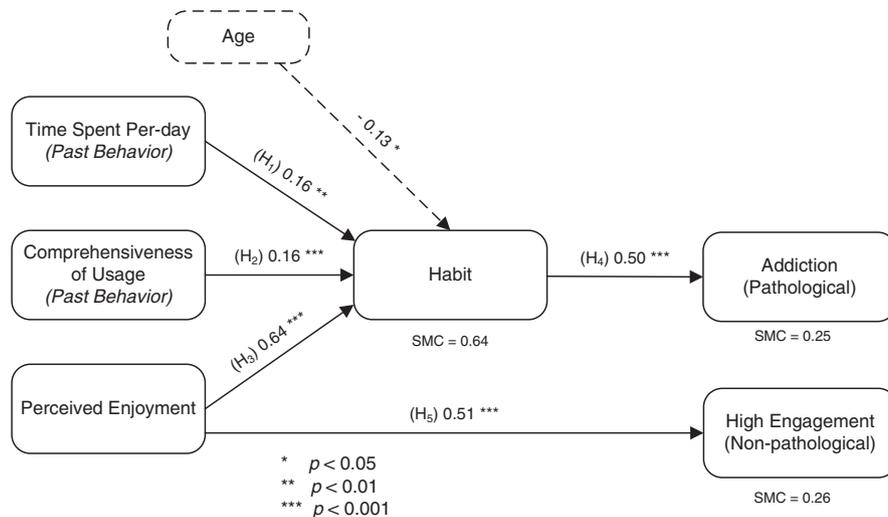
Figure 1 Research model.

users may start presenting core technology addiction symptoms. Not surprisingly, we see an increasing number of SNW users who may be classified as addicted or dependent (depending on the readers' terminology preference). At the same time, regardless of the terminology, their excessive habitual interaction with SNW may be psychologically, physiologically, and socially harmful (La Barbera et al, 2009; Echeburua & de Corral, 2010).

Theoretical implications

First, the empirical evidence provides support for our proposed model that links perceived enjoyment with two potentially diverging outcomes, habit that can cater to increases in addiction levels on one hand, and high engagement on the other. Prior research has mostly implied that a high degree of enjoyment with the system is beneficial for the users. Whereas we support this claim by demonstrating that perceived enjoyment increases users' engagement with the system ($\beta = 0.51$, $P < 0.001$), we also show that it has an even stronger impact on IS habit ($\beta = 0.64$, $P < 0.001$), which in turn helps forming technology addiction ($\beta = 0.50$, $P < 0.001$). Overall, the indirect effect of perceived enjoyment on technology addiction is 0.32 (0.64*0.50), which is fairly strong, and supports the reinforcement role enjoyment plays in such situations.

This finding highlights the importance of the dual effect of perceived enjoyment on user interaction with IS. Many studies across disciplines have shown that enjoyment is positively correlated with pleasant outcomes and is negatively associated with negative consequences (Dishman et al, 2005). Our results suggest that increased enjoyment can result in both undesirable and possibly desirable consequences. This duality (i.e., impact on both negative and positive outcomes), which has not received adequate attention in prior research, may transpire in many situations when people develop 'excessive appetites'.

For example, a person may exhibit high enjoyment with work and as a result, spend much of his or her time in the office. This may lead to the development of work–family conflict that will negatively affect the employee's personal life in the long run. People who enjoy watching TV late at night may report sleep deprivation, stress, and fatigue as a result of their unhealthy (yet enjoyable) habit. Online auction users may have fun winning lucrative bids, but they may suffer the consequences of paying off their credit card debts. The same arguments hold with respect to social networks; whereas enjoyment with SNW usage may facilitate high engagement, it may also result in habitual use, which may potentially, when grows strong, produce technology addiction symptoms.

It is possible that other MIS constructs also have dual impacts – positive and negative. For example, personal innovativeness in IT, defined as the domain-specific individual trait reflecting the willingness of a user to try out new information technologies (Agarwal & Prasad, 1998), is considered a positive factor because innovative individuals are more likely to adopt new systems, explore their functionality in depth, and perceive them easier to use. At the same time, highly innovative users may become so obsessed with having the latest version of a system that they acquire unnecessary latest releases, install trivial upgrades, and over-explore functions that do not in fact enhance their productivity. Another potential example is facilitating conditions beliefs, defined as 'the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system' (Venkatesh et al, 2003, p. 453). These beliefs motivate system use in organizations. However, if computer users continuously over-rely on IT support personnel, their own computer problem-solving skills may gradually deteriorate. They may become less resourceful, knowledgeable, confident and innovative, and more dependent on technical support

professionals. Two decades ago, Webster *et al* (1993) argued that computer playfulness and flow in human–computer interaction may have both positive and negative work-related consequences, including longer time completion, non-productive actions and over-involvement. Unfortunately, the latter line of research has received little attention. Given these propositions and the findings of this study, the potential duality of IS constructs is worth exploring in future research.

Second, our model extends the view that SNW use, and potentially the use of other IS, is not always a desirable phenomenon. In some cases, habitual overuse of technologies and the emergent strong psychological dependency on them may result in adverse consequences. The findings indicate that strong IS use habits can lead to high levels of technology addiction (an unproductive

and undesirable outcome) and can hence become 'bad habits'. We do not specify or study the threshold in which this transition takes place, and hence, call for future research to make these screening and classification judgments. Developing a screener for such psychological states and the resultant behaviors requires a different study design (Faber & O'Guinn, 1992), and initial consensus in the medical field (Block, 2008), which is yet to be reached. Given the medical and societal importance of this classification, we encourage researchers to pursue this path.

While the model does not determine the threshold for good or bad habits, it does demonstrate that 'bad' or simply put, harmful, IS use habits can potentially exist. It hence informs the IS use and habit lines of research, that have mostly focused on the positive outcomes of IS employment. The findings therefore imply that it is imperative that IS use research portray a more balanced view of system use, rather than only emphasizing the merits of usage behavior and exploring ways to encourage use. Several studies have already started advancing the notion that, in some cases, IS use should be reduced back to healthy levels (Block, 2008; LaRose *et al*, 2003; Turel *et al*, 2011a, b), but more research on how this can be achieved is needed. One approach is to identify antecedents of technology addiction and manipulate them through, for example, rationalization, dissuasion, taxing the addictive items and thereby increasing their cost, and pushing the addict-to-be toward alternative activities (e.g., sports) (Dickson *et al*, 2002). In this study, we focused only on one technology addiction antecedent, namely, IS use habit and its drivers; and suggested and verified a model that links these elements. Potential ways for manipulating IS use habit, and ultimately reducing technology-related addiction levels, are discussed in the practical implications section.

Third, the findings suggest that technology addiction and high engagement represent two distinct constructs, which supports previous arguments that were tested only in the online gaming environment (Charlton & Danforth, 2007, 2010). Extending this notion to the

social networking environment adds value and further validates the distinction between these constructs. The measurement of technology addiction is not well established, and many studies use various (though somewhat similar) definitions and measurement scales (Byun *et al*, 2009). This study does not solve this eternal debate. Rather, it supports the plausibility of the existence of two distinct yet correlated user phenomena: technology addiction (i.e., pathological) and high technology engagement (i.e., non-pathological, which can be viewed as mostly positive or at least as non-negative). Future research should further advance our understanding of these concepts and the measurement of technology addiction, potentially going beyond self-reported data, and using functional Magnetic Resonance techniques to identify the brain pathways that govern addiction-driven decisions and behaviors (Ko *et al*, 2009).

Fourth, age was found to be a significant control variable with a negative effect on habit ($\beta = -0.13$). It was also negatively correlated with addiction ($r = -0.14$). This implies that younger individuals are more likely to develop SNW use habits, which can later turn into addiction, than their older counterparts. This corroborates previous findings that younger users are more at risk of technology addiction (Ferraro *et al*, 2007), but our study also explains why this is the case: younger users are more prone to develop SNW use habit, which can increase their levels of addiction through neural sensitization and diminishing the attention they pay to potential long-term harms.

Finally, the findings also demonstrate that the habit antecedents suggested by Limayem *et al* (2007), even though operationalized slightly differently in this study, still hold in the case of online SNW. They also highlight unique aspects of SNW use. Perceived enjoyment was found to be the key antecedent of habit ($\beta = 0.64$, $P < 0.001$). This is not surprising, given that user enjoyment is one of the key reasons for employing SNW, which are hedonic artifacts by nature. This is similar to Limayem *et al*'s (2007) observation that habit is formed mostly based on satisfaction, in the context of the Internet. The correlation observed in the current study between enjoyment and habit ($r = 0.69$) is higher than the observed correlations between habit and satisfaction in the cases of the Internet ($r = 0.44$, see Limayem *et al*, 2007) and learning management systems ($r = 0.50$, see Limayem & Cheung, 2011). This may imply that the hedonic context set by the IT artifact puts a boundary condition on the effects of positive emotional stimuli on habit formation. This proposition should be examined in future research.

Our findings show that past practice of the behavior, operationalized as the average daily use duration ($\beta = 0.16$, $P < 0.01$) and comprehensiveness of use ($\beta = 0.16$, $P < 0.001$), were less salient than enjoyment, yet important antecedents of habit. The strength of these links in our context, which was narrow and specific, was slightly above those observed by Limayem *et al*

(2007) (0.11 and 0.12, respectively) in the broader context of the Internet. This provides preliminary support to the proposition that stable contexts, or at least narrower contexts in which focused repetitive practice of the same behavior-stimuli is possible (e.g., a single application such as Facebook), are more pertinent to the formation of habit than less stable, or broader, contexts (e.g., the Internet in general, in which many behaviors and stimuli are available) (Ouellette & Wood, 1998). Future research should further examine the importance of context stability for the formation of IS habits.

Practical implications

From a practical standpoint, SNW operators may want to promote an enjoyable user experience for driving high engagement. They could do so through expanding the range of hedonic features they provide and the 'stickiness' of their websites. But this may come at a cost to the users, who may develop bad habits, which facilitate the development of technology addiction. Service providers may argue that addiction to their technologies is not necessarily a bad outcome from their perspective, because the legal ramifications are unclear (Kakabadse *et al*, 2007). However, caution should be exercised for the same reason – their liability is yet to be determined. Nevertheless, steps such as disclaimers, support lines, and education, which are common in other contexts, such as gambling, drinking, and smoking, may be taken by SNW providers to mitigate potential legal issues.

From users' perspective, technology addiction is an adverse outcome that they may want to prevent, if possible. Some elements, such as personality, that relate to these factors (Charlton & Danforth, 2010) cannot be controlled by them. However, users (and their guardians, in case of kids and adolescents) should at least be aware of these potential adverse outcomes, and try to regulate their use such that normal functioning is maintained. Furthermore, schools, parents, and employers can probably help in the self-assessment of use habit and provide early signs for the development of technology addiction. While the layperson may not be able to apply psychometric scales, the measurement of usage comprehensiveness and past use is fairly easy to conduct. These concepts do not even need to be self-reported (can be taken from computer use logs, if available). These are, as demonstrated in this study, indirect antecedents of addiction. The problem is that there are no acceptable cut-off criteria for classifying a person as an addict. Parents, employers, and teachers can therefore detect anomalies, rather than focus on defined criteria when attempting to detect potential cases of addiction.

How can IS use habit and, by association, addiction be reduced to healthy levels? While, as mentioned above, techniques such as education, dissuasion, and increasing costs (e.g., making it expensive to use a SNW) (Dickson *et al*, 2002) may work, our study points

to specific antecedents of habit (enjoyment, usage comprehensiveness, and time spent on the SNW), which can indirectly influence one's level of addiction. Many users may not voluntarily reduce these elements, but parents and employers can manipulate them. Restrictions on the time spent on the websites and the features allowed to be used (e.g., employers and schools may forbid playing online games via Facebook) can be enforced. Also, the enjoyment users experience can potentially be reduced by these steps, and by merely making the use of such websites more difficult, and less private, for users (e.g., by locating an adolescent's computer in a central place such as the living room) (Young, 2010b).

Limitations and future research

Several limitations should be acknowledged. First, the definition and conceptualization of technology addiction is at an early stage of development, and is still debated by the medical community (Block, 2008). It is possible that different terminology describing this psychological state will be developed. Nevertheless, our study empirically demonstrated that this state, regardless of terminology, is formed, in part on the basis of repetitive enjoyable habitual behavior.

Second, our study relied on cross-sectional convenience sample collected in one context (users of a single type of technology who reside in a single country). To increase the generalizability of the findings, the study should be replicated in other populations of users (e.g., who differ by age, culture, and profession from the users in our sample) and focus on different technologies. Furthermore, while we relied on theory for drawing directional conclusions, longitudinal data may further support this. Future research is encouraged to longitudinally track usage, enjoyment, habit, addiction, and engagement levels to further support the proposed causality. Moreover, we argued that IS use habits can have both positive and negative effects on high engagement, and we hence did not test this path. Our design cannot unearth these dual effects. We thus call for future research to study the circumstances under which the positive effects or the negative effects are illuminated.

Third, it is possible that not all enjoyment-facilitating features of the system are equal; whereas some may promote high engagement, others may lead to the development of a 'bad habit'. We do not explore the addictiveness of various features, and call future research to do so. Fourth, it was assumed that high engagement is mostly a positive, or at least a non-negative phenomenon. Nevertheless, the item tapping into 'happiness' was dropped, and items focusing mostly on the systems' centrality in one's life and empathy toward the system were retained. Future studies may use additional items or different measurement approaches to better capture the potentially positive aspects of high engagement. Lastly, while this study conceptualizes and examines the antecedents of technology addiction and high

engagement, it does not identify the potential outcomes of these states. Other works suggest that these include a variety of personal, social, financial, and work-related outcomes (Chou & Hsiao, 2000; Griffiths, 2000; Chou & Ting, 2003; Chou *et al*, 2005; Ghassemzadeh *et al*, 2008; Aboujaoude, 2010; Turel & Serenko, 2010), and the scientific community could benefit from including both antecedents and outcomes of technology addictions in one nomological network.

Conclusion
Perceived enjoyment is an important concept in user interaction with IS. This study shows that it informs not only presumed-to-be desirable cognitions and behaviors, such as high engagement, but also undesirable and potentially harmful ones, such as 'bad habits' and ultimately technology addiction. Given the increased prevalence of heavy habitual use and technology addictions in various contexts, such as online gambling, mobile email, online games, and others, further research on the antecedents and consequences of these phenomena is warranted. Given the potential duality of other MIS constructs, a more balanced view, focusing on both their positive and negative consequences, should be taken in future research.

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References
Aboujaoude E (2010) Problematic internet use: an overview. *World Psychiatry* **9**(2), 85–90.

Agarwal R and Karahanna E (2000) Time flies when you're having fun: cognitive absorption and beliefs about information technology usage. *MIS Quarterly* **24**(4), 665–694.

Agarwal R and Prasad J (1998) A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research* **9**(2), 204–215.

Ajzen I (2002) Residual effects of past on later behavior: habituation and reasoned action perspectives. *Personality and Social Psychology Review* **6**(2), 107–122.

Anderson JC and Gerbing DW (1988) Structural equation modeling in practice: a review and recommended two-step approach. *Psychological Bulletin* **103**(3), 411–423.

Astin AW (1962) Bad habits and social deviation: a proposed revision in conflict theory. *Journal of Clinical Psychology* **18**(2), 227–231.

Bayraktar F and Gün Z (2007) Incidence and correlates of internet usage among adolescents in North Cyprus. *CyberPsychology & Behavior* **10**(2), 191–197.

Beard KW and Wolf EM (2001) Modification in the proposed diagnostic criteria for internet addiction. *Cyberpsychology & Behavior* **4**(3), 377–383.

Becker GS and Murphy KM (1988) A theory of rational addiction. *Journal of Political Economy* **96**(4), 675–700.

Beranuy M, Oberst U, Carbonell X and Chamarro A (2009) Problematic internet and mobile phone use and clinical symptoms in college students: the role of emotional intelligence. *Computers in Human Behavior* **25**(5), 1182–1187.

Bhattacherjee A, Perols J and Sanford C (2008) Information technology continuance: a theoretic extension and empirical test. *Journal of Computer Information Systems* **49**(1), 17–26.

Billieux J, van der Linden M and Rochat L (2008) The role of impulsivity in actual and problematic use of the mobile phone. *Applied Cognitive Psychology* **22**(9), 1195–1210.

Block JJ (2008) Issues for DSMV: internet addiction. *American Journal of Psychiatry* **165**(3), 306–307.

Bourdeau L, Chebat J-C and Couturier C (2002) Internet consumer value of university students: e-mail-vs.-web users. *Journal of Retailing and Consumer Services* **9**(2), 61–69.

Brown RIF (1997) A theoretical model of the behavioural addictions – applied to offending. In *Addicted to Crime* (Hodge JE, McMurran M and Hollin CR, Eds), pp 13–66, Wiley, Chichester, UK.

Bruner O and Bruner K (2006) *Playstation Nation: Protect Your Child From Game Addiction*. Center Street, Hachette Book Group, NY.

Byun S, Ruffini C, Mills JE, Douglas AC, Niang M, Stepchenkova S, Lee SK, Loutfi J, Lee JK, Atallah M and Blanton M (2009) Internet addiction: metasynthesis of 1996–2006 quantitative research. *Cyberpsychology & Behavior* **12**(2), 203–207.

Caplan SE (2005) A social skill account of problematic internet use. *Journal of Communication* **55**(4), 721–736.

Carter BL and Tiffany ST (1999) Meta-analysis of cue-reactivity in addiction research. *Addiction* **94**(3), 327–340.

CAVAGLION G (2009) Cyber-porn dependence: voices of distress in an Italian internet self-help community. *International Journal of Mental Health and Addiction* **7(2)**, 295–310.

CAVAGLION G and RASHTY E (2010) Narratives of suffering among Italian female partners of cybersex and cyber-porn dependents. *Sexual Addiction & Compulsivity* **17(4)**, 270–287.

CHARLTON JP (2002) A factor-analytic investigation of computer 'addiction' and engagement. *British Psychological Society* **93(3)**, 329–344.

CHARLTON JP and BIRKETT PE (1999) An integrative model of factors related to computing course performance. *Journal of Educational Computing Research* **20(3)**, 237–257.

CHARLTON JP and DANFORTH IDW (2007) Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior* **23(3)**, 1531–1548.

CHARLTON JP and DANFORTH IDW (2010) Validating the distinction between computer addiction and engagement: online game playing and personality. *Behaviour & Information Technology* **29(6)**, 601–613.

CHOU C, CONDRON L and BELLAND JC (2005) A review of the research on internet addiction. *Educational Psychology Review* **17(4)**, 363–388.

CHOU C and HSIAO M (2000) Internet addiction, usage, gratification, and pleasure experience: the Taiwan college students' case. *Computers & Education* **35(1)**, 65–80.

CHOU TJ and TING CC (2003) The role of flow experience in cyber-game addiction. *Cyberpsychology & Behavior* **6(6)**, 663–675.

CROWNE DP and MARLOWE D (1960) A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology* **24(4)**, 349–354.

CSIKSZENTMIHALYI M (1990) *Flow: The Psychology of Optimal Experience.* Harper & Row, New York.

CYR D, HEAD M and IVANOV A (2006) Design aesthetics leading to m-loyalty in mobile commerce. *Information & Management* **43(8)**, 950–963.

DANEBACK K, COOPER A and MANSSON S-A (2005) An internet study of cybersex participants. *Archives of Sexual Behavior* **34(3)**, 321–328.

DAVIS FD, BAGOZZI RP and WARSHAW PR (1992) Extrinsic and intrinsic motivation to use computers in workplace. *Journal of Applied Social Psychology* **22(14)**, 1111–1132.

DAVIS RA (2001) A cognitive-behavioral model of pathological internet use. *Computers in Human Behavior* **17(2)**, 141–224.

DAVIS RA, FLETT GL and BESSER A (2002) Validation of a new scale for measuring problematic internet use: implications for pre-employment screening. *Cyberpsychology & Behavior* **5(4)**, 331–345.

DE CHARMS R (1968) *Personal Causation: The Internal Affective Determinants of Behavior.* Academic Press, New York.

DE GUINEA AO and MARKUS ML (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)**, 433–444.

DICKSON LM, DEREVENSKY JL and GUPTA R (2002) The prevention of gambling problems in youth: a conceptual framework. *J Gambl Stud* **18(2)**, 97–159.

DIMMICK J, KLINE S and STAFFORD L (2000) The gratification niches of personal e-mail and telephone. *Communication Research* **27(2)**, 227–248.

DISHMAN RK, MOTL RW, SALLIS JF, DUNN AL, BIRNBAUM AS, WELK GJ, BEDIMO-RUNG AL, VOORHEES CC and JOBE JB (2005) Self-management strategies mediate self-efficacy and physical activity. *American Journal of Preventive Medicine* **29(1)**, 10–18.

ECHEBURUA E and DE CORRAL P (2010) Addiction to new technologies and to online social networking in young people: a new challenge. *Adicciones* **22(21)**, 91–95.

FABER RJ and O'GUINN TC (1992) A clinical screener for compulsive buying. *Journal of Consumer Research* **19(3)**, 459–469.

FENICHEL M (2011) Online behavior, communication, and experience. In *Online Counseling* (KRAUS R, STRICKER G and SPEYER C, Eds) 2nd edn, pp 3–20, Academic Press, San Diego.

FERRARO G, CACI B, D'AMICO A and DI BLASI M (2007) Internet addiction disorder: an Italian study. *Cyberpsychology & Behavior* **10(2)**, 170–175.

GHASSEMZADEH L, SHAHRARAY M and MORADI A (2008) Prevalence of internet addiction and comparison of internet addicts and non-addicts in Iranian high schools. *Cyberpsychology & Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society* **11(6)**, 731.

GLASSER W (1976) *Positive Addiction.* Harper & Row, New York.

GRIFFITHS M (2000) Internet addiction – time to be taken seriously? *Addiction Research & Theory* **8(5)**, 413–418.

GRIFFITHS M, PARKE J, WOOD R and RIGBYE J (2010) Online poker gambling in university students: further findings from an online survey. *International Journal of Mental Health and Addiction* **8(1)**, 82–89.

GRIFFITHS M and WOOD R (2000) Risk factors in adolescence: the case of gambling, videogame playing, and the internet. *Journal of Gambling Studies* **16(2–3)**, 199–225.

GRIFFITHS MD and HUNT N (1998) Dependence on computer games by adolescents. *Psychological Reports* **82(2)**, 475–480.

GRIFFITHS MD and PARKE J (2002) The social impact of internet gambling. *Social Science Computer Review* **20(3)**, 312–320.

HAMANN S (2001) Cognitive and neural mechanisms of emotional memory. *Trends in Cognitive Sciences* **5(9)**, 394–400.

HAN DH, BOLO N, DANIELS MA, ARENELLA L, LYOO IK and RENSHAW PF (2011) Brain activity and desire for internet video game play. *Comprehensive Psychiatry* **52(1)**, 88–95.

HAN DH, KIM YS, LEE YS, MIN KJ and RENSHAW PF (2010) Changes in cue-induced, prefrontal cortex activity with video-game play. *Cyberpsychology, Behavior, and Social Networking* **13(6)**, 655–661.

HERSCHLAG M and ZWICK R (2002) Internet auctions – popular and professional literature review. *Quarterly Journal of Electronic Commerce* **1(2)**, 161–186.

HOLLENDER MH (1980) Alcoholism: disease or bad habit. *Journal of Clinical Psychiatry* **41(6)**, 185–185.

HU LT and BENTLER PM (1999) Cut off criteria of fit indices in co-variance structure analysis; conventional criteria versus new alternatives. *Structural Equation Modeling* **6(1)**, 1–55.

HUANG H and LEUNG L (2009) Instant messaging addiction among teenagers in China: shyness, alienation, and academic performance decrement. *CyberPsychology & Behavior* **12(6)**, 675–679.

HUSSAIN Z and GRIFFITHS M (2009) Excessive use of massively multi-player online role-playing games: a pilot study. *International Journal of Mental Health and Addiction* **7(4)**, 563–571.

IACOVELLI A and VALENTI S (2009) Internet addiction's effect on likeability and rapport. *Computers in Human Behavior* **25(2)**, 439–443.

IGBARIA M, SCHIFFMAN SJ and WIECKOWSKI TJ (1994) The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology. *Behaviour and Information Technology* **13(6)**, 349–361.

JENARO C, FLORES N, GÓMEZ-VELA M, GONZÁLEZ-GIL F and CABALLO C (2007) Problematic internet and cell-phone use: psychological, behavioral, and health correlates. *Addiction Research & Theory* **15(3)**, 309–320.

KAKABADSE N, PORTER G and VANCE D (2007) Addicted to technology. *Business Strategy Review* **18(4)**, 81–85.

KARAISKOS D, TZAVELLAS E, BALTA G and PAPARRIGOPOULOS T (2010) P02-232 – social network addiction: a new clinical disorder? *European Psychiatry* **25(Supplement 1)**, 855.

KHALIFA M and LIU V (2007) Online consumer retention: contingent effects of online shopping habit and online shopping experience. *European Journal of Information Systems* **16(6)**, 780–792.

KIM SS (2009) The integrative framework of technology use: an extension and test. *MIS Quarterly* **33(3)**, 513–537.

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)**, 739–747.

LA BARBERA D, LA PAGLIA F and VALSAVOIA R (2009) Social network and addiction. *Cyberpsychology & Behavior* **12(5)**, 628–629.

LANGER EJ (1992) Matters of mind: mindfulness/mindlessness in perspective. *Consciousness and Cognition* **1(3)**, 289–305.

LAROSE R (2010) The problem of media habits. *Communication Theory* **20(2)**, 194–222.

LAROSE R, KIM J and PENG W (2010) Addictive, compulsive, problematic, or just another media habit? In *A Netwroked Self: Identity, Community, and Culture on Social Network Sites* (PAPACHARISSI Z, Ed), pp 59–81, Routledge, Hoboken, NJ.

LAROSE R, LIN CA and EASTIN MS (2003) Unregulated internet usage: addiction, habit, or deficient self-regulation? *Media Psychology* **5(3)**, 225–253.

LIMAYEM M and CHEUNG CMK (2011) Predicting the continued use of internet-based learning technologies: the role of habit. *Behaviour & Information Technology* **30(1)**, 91–99.

LIMAYEM M, HIRT SG and CHEUNG CMK (2007) How habit limits the predictive power of intention: the case of information systems continuance. *MIS Quarterly* **31(4)**, 705–737.

LINDELL MK and WHITNEY DJ (2001) Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology* **86(1)**, 114–121.

MARLATT GA, BAER JS, DONOVAN DM and KIVLAHAN DR (1988) Addictive behaviors: etiology and treatment. *Annual Review of Psychology* **39(1)**, 223–252.

MATTHEWS N, FARNSWORTH B and GRIFFITHS MD (2009) A pilot study of problem gambling among student online gamblers: mood states as predictors of problematic behavior. *CyberPsychology & Behaviour* **12(6)**, 741–745.

MCBRIDE J and DEREVENSKY J (2009) Internet gambling behavior in a sample of online gamblers. *International Journal of Mental Health and Addiction* **7(1)**, 149–167.

MCDANIEL SR (2002) Investigating the roles of gambling interest and impulsive sensation seeking on consumer enjoyment of promotional games. *Social Behavior and Personality* **30(1)**, 53–64.

MORAHAN-MARTIN J and SCHUMACHER P (2000) Incidence and correlates of pathological internet use among college students. *Computers in Human Behavior* **16(1)**, 13–29.

MORASCO BJ, WEINSTOCK J, LEDGERWOOD DM and PETRY NM (2007) Psychological factors that promote and inhibit pathological gambling. *Cognitive and Behavioral Practice* **14(2)**, 208–217.

MSNBC DIGITAL NETWORK (2010) Judge: video game addiction suit can go on. [WWW document] http://www.Msnbc.Msn.Com/id/38890853/ns/us_news-crime_and_courts/ (accessed 24 August 2011).

NEAL DT, WOOD W and QUINN JM (2006) Habits? A repeat performance. *Current Directions in Psychological Science* **15(4)**, 198–202.

NIEMZ K, GRIFFITHS M and BANYARD P (2005) Prevalence of pathological internet use among university students and correlations with self-esteem, the general health questionnaire (GHQ), and disinhibition. *CyberPsychology & Behavior* **8(6)**, 562–570.

ORBELL S, BLAIR C, SHERLOCK K and CONNER M (2001) The theory of planned behavior and ecstasy use: roles for habit and perceived control over taking versus obtaining substances. *Journal of Applied Social Psychology* **31(1)**, 31–47.

ORBELL S and VERPLANKEN B (2010) The automatic component of habit in health behavior: habit as cue-contingent automaticity. *Health Psychology* **29(4)**, 374–383.

OUELLETTE JA and WOOD W (1998) Habit and intention in everyday life: the multiple processes by which past behavior predicts future behavior. *Psychological Bulletin* **124(1)**, 54–74.

PAHNILA S and WARSTA J (2010) Online shopping viewed from a habit and value perspective. *Behaviour & Information Technology* **29(6)**, 621–632.

PAVLOU PA, LIANG HG and XUE YJ (2007) Understanding and mitigating uncertainty in online exchange relationships: a principal-agent perspective. *MIS Quarterly* **31(1)**, 105–136.

PEMPEK TA, YERMOLAYEVA YA and CALVERT SL (2009) College students' social networking experiences on Facebook. *Journal of Applied Developmental Psychology* **30(3)**, 227–238.

PETERS C and BODKIN CD (2007) An exploratory investigation of problematic online auction behaviors: experiences of eBay users. *Journal of Retailing and Consumer Services* **14(1)**, 1–16.

PLATT JJ (1986) *Heroin Addiction: Theory, Research, and Treatment*. Robert E. Kreiger, Malabar, FL.

PODSAKOFF PM, MACKENZIE SB, LEE J-Y and PODSAKOFF NP (2003) Common method biases in behavior research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology* **88(5)**, 879–903.

REDDY S (2008) A disorder by any other name: excessive computer game playing. *Virtual Mentor* **10(1)**, 30–34.

REYNOLDS WM (1982) Development of reliable and valid short forms of the Marlowe-Crowne social desirability scale. *Journal of Clinical Psychology* **38(1)**, 119–125.

RIDGWAY NM, KUKAR-KINNEY M and MONROE KB (2008) An expanded conceptualization and a new measure of compulsive buying. *Journal of Consumer Research* **35(4)**, 622–639.

ROBINSON TE and BERRIDGE KC (1993) The neural basis of drug craving. An incentive-sensitization theory of addiction. *Brain Research Reviews* **18(3)**, 247–291.

ROBINSON TE and BERRIDGE KC (2001) Incentive-sensitization and addiction. *Addiction* **96(1)**, 103–114.

ROBINSON TE and BERRIDGE KC (2003) Addiction. *Annual Review of Psychology* **54(1)**, 25–53.

SCHWARTZ MF and SOUTHERN S (2000) Compulsive cybersex: the new tea room. *Sexual Addiction & Compulsivity* **7(1&2)**, 127–144.

SCHWARZ A and CHIN W (2007) Looking forward: toward an understanding of the nature and definition of IT acceptance. *Journal of the Association for Information Systems* **8(4)**, 230–243.

SHARMA R, YETTON P and CRAWFORD J (2009) Estimating the effect of common method variance: The method-method pair technique with an illustration from tam research. *MIS Quarterly* **33(3)**, 473–490.

SHAROT T and PHELPS EA (2004) How arousal modulates memory: disentangling the effects of attention and retention. *Cognitive, Affective, & Behavioral Neuroscience* **4(3)**, 294–306.

SHELDON KM, ABAD N and HINSCH C (2011) Two-process view of Facebook use and relatedness need-satisfaction: disconnection drives use, and connection rewards it. *Journal of Personality and Social Psychology* **100(4)**, 766–775.

SKORIC MM, TEO LLC and NEO RL (2009) Children and video games: addiction, engagement, and scholastic achievement. *CyberPsychology & Behavior* **12(5)**, 567–572.

THONG JYL, HONG S-J and TAM KY (2006) The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance. *International Journal of Human-Computer Studies* **64(9)**, 799–810.

TOOBIN J (2003) It's hard to prove video game caused shootings. Law center on the scene. [WWW document] http://www.Cnn.Com/2003/law/10/23/otsc.Toobin/ (accessed 24 August 2011).

TUREL O and SERENKO A (2010) Is mobile email addiction overlooked? *Communications of the ACM* **53(5)**, 41–43.

TUREL O, SERENKO A and BONTIS N (2007) User acceptance of wireless short messaging services: deconstructing perceived value. *Information & Management* **44(1)**, 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)**, 53–59.

TUREL O, SERENKO A and BONTIS N (2011a) Family and work-related consequences of addiction to organizational pervasive technologies. *Information & Management* **48(2–3)**, 88–95.

TUREL O, SERENKO A and GILES P (2011b) Integrating technology addiction and use: an empirical investigation of online auction users. *MIS Quarterly* **35(4)**, 1043–1061.

VAN DER HEIJDEN H (2003) Factors influencing the usage of websites: the case of a generic portal in the Netherlands. *Information & Management* **40(6)**, 541–549.

VAN DER HEIJDEN H (2004) User acceptance of hedonic information systems. *MIS Quarterly* **28(4)**, 695–704.

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)**, 342–365.

VENKATESH V, BROWN SA, MARUPING LM and BALA H (2008) Predicting different conceptualizations of system use: the competing roles of behavioral intention, facilitating conditions, and behavioral expectation. *MIS Quarterly* **32(3)**, 483–502.

VENKATESH V, MORRIS MG, DAVIS GB and DAVIS F (2003) User acceptance of information technology: towards a unified view. *MIS Quarterly* **27(3)**, 425–478.

VERDEJO-GARCÍA A, BECHARA A, RECKNOR EC and PÉREZ-GARCÍA M (2006) Executive dysfunction in substance dependent individuals during drug use and abstinence: an examination of the behavioral, cognitive and emotional correlates of addiction. *Journal of the International Neuropsychological Society* **12(3)**, 405–415.

VERPLANKEN B and AARTS H (1999) Habit, attitude, and planned behaviour: is habit an empty construct or an interesting case of goal-directed automaticity? *European Review of Social Psychology* **10(1)**, 101–134.

VERPLANKEN B, AARTS HAG and VAN KNIPPENBERG A (1997) Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology* **27(5)**, 331–360.

VERPLANKEN B and ORBELL S (2003) Reflections on past behavior: a self-report index of habit strength. *Journal of Applied Social Psychology* **33(6)**, 1313–1330.

WAN CS and CHIOU WB (2006) Psychological motives and online games addiction: a test of flow theory and humanistic needs theory for Taiwanese adolescents. *Cyberpsychology & Behavior* **9(3)**, 317–324.

WEBSTER J, TREVINO LK and RYAN L (1993) The dimensionality and correlates of flow in human-computer interactions. *Computers in Human Behavior* **9(4)**, 411–426.

WHANG LSM, LEE S and CHANG G (2003) Internet over-users' psychological profiles: a behavior sampling analysis on internet addiction. *Cyberpsychology & Behavior* **6(2)**, 143–150.

WILLIAMS ML and PODSAKOFF PM (1992) Effects of group-level and individual-level variation in leader behaviours on subordinate attitudes and performance. *Journal of Occupational & Organizational Psychology* **65(2)**, 115–129.

WOHL MJA, YOUNG MM and HART KE (2007) Self-perceptions of dispositional luck: relationship to DSM gambling symptoms, subjective enjoyment of gambling and treatment readiness. *Substance Use & Misuse* **42(1)**, 43–63.

WOOD RT and WILLIAMS RJ (2007) Problem gambling on the internet: implications for internet gambling policy in North America. *New Media & Society* **9(3)**, 520–542.

WOOD W, QUINN JM and KASHY DA (2002) Habits in everyday life: thought, emotion, and action. *Journal of Personality and Social Psychology* **83(6)**, 1281–1297.

XU Z, TUREL O and YUAN Y (2011) Online game addiction among adolescents: motivation and prevention factors. *European Journal of Information Systems* advance online publication, 29 November 2011; 10.1057/ejis.2011.56.

YANG SC and TUNG C-J (2007) Comparison of internet addicts and non-addicts in Taiwanese high school. *Computers in Human Behavior* **23(1)**, 79–96.

YOUNG K (1998a) *Caught in the Net: How to Recognize the Signs of Internet Addiction – and a Winning Strategy for Recovery*. John Wiley & Sons, New York.

YOUNG K (1998b) Internet addiction: the emergence of a new clinical disorder. *CyberPsychology & Behavior* **1(3)**, 237–244.

YOUNG K (2010a) Internet addiction over the decade: a personal look back. *World Psychiatry* **9(2)**, 91–91.

YOUNG K (2010b) *Understanding Gaming Addiction*. Center for Internet Addiction Recovery, Bradford, PA, pp 1–30.