Deterring Adolescent Dependency on Text Messaging: A Conceptual Model and Framework for Behavior Control

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Deterring Adolescent Dependency on Text Messaging: A Conceptual Model and Framework for Behavior Control

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ABSTRACT

Technology acceptance has been well-studied in the IS field, however, technology dependency/addiction – a form of over-adaptation (Porter and Kakabadse, 2006) – requires much-needed attention. This research provides a behavior control conceptual model intended to govern technology over-adaptation. The model also incorporates a behavior control mechanism framework by which solutions to technology dependency can be devised, implemented, managed, and measured. The behavior control conceptual model will facilitate future empirical research while the mechanism framework will inform practitioners as to deterrence mechanisms that can be used to reduce addictive tendencies. In the context of deterring adolescent dependency on text messaging, behavior control mechanisms are proposed through technology device control, "institutionalized" rules and regulations, and ultimately "intrinsic" cognitive beliefs.

Keywords:

Technology addiction, text messaging, behavior control, theory of planned behavior, technology acceptance model

INTRODUCTION

As technology becomes more pervasive in our daily lives, it creates an anytime, anywhere accessibility to us that unfortunately, for many people, results in technology over-use. This over-adaptation (Porter and Kakabadse, 2006) can develop into an addictive dependency on the technology, for example, in all-day and all-night text messaging.

Clinical studies have reported on the "perils of night texting" as explained by a young student who spoke of her lack of sleep from her "addiction" to text-messaging friends at all hours of the night[1]. Medical experts call the night-texting problem a "crisis" with consequences that can be detrimental[2]. For example, sleep deprivation can lead to safety, learning, and health issues -- obesity, Type II diabetes, heart disease, hypertension, and memory impairment—that "impact the quality of life."[3] Text-messaging has also led to the emergence of the socially harmful practice of sexting (short for 'sex text messaging'). A lack of eye contact has been observed in social exchange behavior[4] (among adolescents) associated with text messaging suggesting a loss of human contact skills.

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[1] Source: The Star Ledger, "OMG, The perils of night texting", Tuesday, September 29, 2009. www.starledger.com

[2] Source: Ibid.

[3] Source: The Star Ledger, "OMG, The perils of night texting", Tuesday, September 29, 2009.

[4] Source: http://www.DrGarySmall.com/

In a larger sense, the issue of "technology addiction" is also a global issue. For example, South Korea considers Internet addiction one of its most serious public health issues. Researchers in many other countries have echoed the findings in the US linking excessive text messaging to sleeping abnormality. For instance, Fuller (2006) in Australia found that female students, in particular, were losing sleep due to their excessive use of text messaging.

According to the Pew Research Center (Lenhart, 2010), text messaging by teens (i.e., adolescents ages 12-17) had doubled in September 2009 (54%) from what it was in November 2006 (27%) far surpassing their use of other communication channels (i.e., instant messaging, cell phone calling, social networking sites, face-to-face, email, and landline phones) that either remained stable or declined in use. It is because of this staggering revelation that this article focuses mainly on the excessive text-messaging activities of adolescents and suggests particular control mechanisms deterring such technology dependency. However, the conceptual model (Section 2) and the control framework (Section 3) can apply equally as well to any of the other forms of technology over-adaptation.

From an IS perspective, this research extends the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), as well as the conceptual work of Porter and Kakabadse (2006) who conceptualized that over-adaptation to technology usage can lead to addictive tendencies. It conceptualizes a behavior control model intended to govern the use of text messaging by adolescents. It provides a behavior control mechanism framework by which solutions to text-messaging dependency issues can be devised, implemented, and managed within the behavior control model.

Information systems researchers have been addressing the acceptance and use of technological innovations (e.g., by employing the TAM; Davis, 1989). However, not much research has been done in the IS field regarding the unintended negative consequences of IS even, as in the past, we continue to witness that technology usage can lead to unintended negative consequences. It is researchers in other fields who have raised the red-flags, as evidenced in the previous findings from the medical field. Psychologists such as Kubey (1986, 1996, 2001, 2002) and McIlwraith (1990, 1998) have explored the unintended consequences of viewing television (TV) and its affect on "viewer addiction." Kubey (1996) compared reports about TV dependency (although "bolstered by anecdotal evidence") with psychiatric criteria for addiction (DSM-IV, 1994) and suggested that people's TV viewing behaviors paralleled five of the seven DSM-IV criteria for "diagnosing substance addiction."[5]

This doesn't imply that technology innovations are inherently bad—consider the clichés "Guns don't kill; people kill" or "Cars don't kill; speed kills." Young (1996) concluded from her research that it is not the technology itself (specifically the Internet) that creates the addictive behavior but the interactive properties of the applications that utilize the technology.

A key milestone occurred in 1990 at a special symposium called by the American Psychological Association with psychologists who had conducted empirical studies of TV addiction/dependency (e.g., McIlwraith) with the intention of creating a working definition for TV addiction which was—*heavy TV watching that is subjectively experienced as being to some extent involuntary, displacing more productive activities, and difficult to stop or curtail* (Kubey, 1990). McIlwraith (1998) suggested a possible analogy between this definition of TV addiction and Internet addiction, however, he also cautioned that further study would be necessary to determine if both shared similar (or distinct) patterns of "*personality factors, imaginal styles, and obtained gratifications*" associated with dependency behavior.

Porter and Kakabadse (2006) developed a conceptual process model that linked attributes of behavior and potential addiction to individual performance in an organizational context. They found that *fear* and *discomfort* were motivating factors in the addictive use of technology by individuals. These authors recognized that individuals attempted to overcome their fears and discomforts by modifying the IT artifact or the context of its use so as to be more tolerable and even enjoyable—what the authors referred to as an adaptation process. These authors found that addictive tendencies emerged when individuals over-adapted by directing all of their attention to the addiction to the exclusion of other life satisfactions (Porter and Kakabadse, 2006). This finding is important in framing a context wherein adolescents are academically and socially challenged to adopt

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[5] Television "addiction" is not recognized as a mental disorder by the DSM-IV (1994).

the use of certain IT Artifacts (i.e., Internet, voice mail, text messaging, etc.) with the potential of developing an addictive dependency on those IT Artifacts.

Adolescent students are academically challenged (likely increasing their use of the Internet) in competing for academic status and rewards which might drive some students to over-adapt their use of technology as a coping mechanism to avoid the stigma of failure. Students are subjected to socially-conditioned pressures leading to fears and discomforts through a variety of external triggers (Kakabadse, 2007). Students feel the need to be fashionable and keep up with the latest technological fads for fear of being labeled as old fashioned or to avoid the threat of being left out. Adolescents constantly check for text messages (boosting their self esteem and self worth because 'somebody wants them') or send trivial (unnecessary) text messages to maintain their 'don't forget me' connectedness with friends[6]. Frequently, this evolves into all-night texting. Thirty-three percent of teens sent more than 100 texts a day while 15% sent more than 200 texts a day (approximately 4000 texts a month) (Lenhart, 2010). A California 13-year-old girl racked up 14,528 text messages in one month after which she was limited by her parents to 5000 per month and none between 9 p.m. and 6 a.m. on weekdays[7].

Given these implications regarding the over-adaptation of technology usage, we ask how specific behavior controls might be implemented and measured to lessen the addictive tendencies.

In response to the research question, this paper is organized as follows. Section 2 describes a behavior control conceptual model that addresses technology over-adaptation; Section 3 introduces a behavior control mechanism framework that serves as a platform to devise, implement, and manage deterrence mechanisms, exemplified with a set of solutions to adolescent text messaging issues; Section 4 concludes and discusses implications to researchers and practitioners.

BEHAVIOR CONTROL CONCEPTUAL MODEL

We propose a behavior control conceptual model where technology over-adaptation can be understood and controlled. The premise is that there is a need for behavior control that can influence an adolescent's form and degree of adaptation in technology usage to cope with their fears and discomforts arising from academic, social, and external pressures. A control mechanism is postulated to shape an individual's beliefs that are manifested through the *Perceived Behavioral Control* (PBC), *Attitude*, and *Subjectivel Norms* (SN) constructs from the Theory of Planned Behavior (TPB) and influence their behavioral intention to use technology, and ultimately the actual use of the technology with proper adaptation as represented in the technology acceptance model (TAM) (Davis et al., 1989). This hybrid TAM-TPB relationship fits within the generic description given by Wixom and Todd (2005) of how researchers have extended the use of the original TAM model.

The TAM assumes that when someone forms an intention to act, they will be free to act without limitation and the theory of planned behavior (TPB) attempts to resolve this limitation[8]. The TPB posits that individual behavior [to act] is driven by behavioral intentions to act which in turn is determined by three factors: attitude toward the behavior, subjective norms, and perceived behavioral control (Mathieson, 1991). It is this last factor (*Perceived Behavioral Control*) that is considered to compensate for the lack of "action without limitation" considerations in the TAM model by referring not only to the skills needed to use the [Artifact] but also the opportunities, and resources (Mathieson, 1991).

Figure 1 (adapted Davis et al., 1989; Mathieson, 1991; Porter and Kakabadse, 2006) illustrates our proposed behavior control conceptual model. Basically, our model postulates that the TPB constructs (preceded by *Behavior Control*) influence an

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[6] Childalert (a UK agency dedicated to child safety and parental advice) http://www.childalert.co.uk/cases/case48.asp

[7] http://www.nytimes.com/2009/05/26/health/26teen.html?_r=2

[8] http://www.fsc.yorku.ca/york/istheory/wiki/index.php/Theory_of_reasoned_action

individual's *Intention to Use* (e.g., text messaging) with the implication that eventual *Use* could lead to the deterrence of O*ver-Adaptation*.
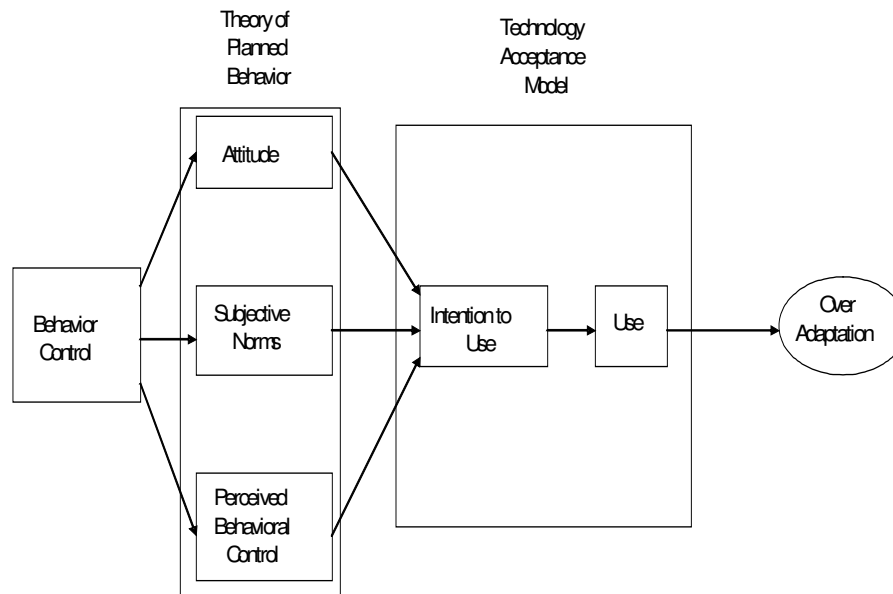

Figure 1: Behavior Control Conceptual Model

The preceding *Behavior Control* construct (implemented by a mechanism framework as show in Section 3) provides a means of intervening in the technology use with the intent of limiting such activities so as to lessen (and hopefully avoid) the over-adaptation to technology. In the next section, we describe the details of this framework and the nature of the mechanisms that comprise it.

BEHAVIOR CONTROL MECHANISM FRAMEWORK

The *behavior control mechanism* (BCM) framework is a hierarchical structure[9] of escalation levels that forms a ladder of linked deterrence-based strategies—Technology, Economics, Policies and Legislation, and Beliefs. *Technology* serves to ensure that device capabilities are implemented to fully enable and support *Economics* features. *Economics* serves to guide the development of market-driven solutions that have the potential to avoid the over-adaptation of technology usage. *Policies and Legislation* ensures that, if necessary, laws can be developed and invoked to govern the proper (contextual) use of an artifact (i.e., a *Technology*-level device or *Economics*-level feature as an application of the device), especially when harm might be caused to the general public. Finally, *Beliefs* represents that stage of nurtured cognitive maturity whereby the user's own sense of right and wrong takes over as a self-governing mechanism.

At each level in the hierarchy, deterrence-based solutions are devised, implemented, and managed that evolve from and contextually strengthen the strategy levels (i.e., solutions) beneath it as shown in Figure 2. For instance, an *Economics*-level solution that might provide a customized message response to text messages would exploit a *Technology* solution that fully enables and supports the feature. Similarly, the *Policies and Legislation* level solution might entail proper regulatory

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[9] The concept of a hierarchical framework is quite common in developing management approaches to business. Businesses typically map critical elements onto such a framework to illustrate how they interrelate and how they enable businesses to determine the best way to meet specific needs. Eloff and von Solms (2000), for example, used this technique to assist management in the interpretation, as well as in the application of internationally accepted approaches to Information Security Management.

approvals, for example, to launch particular *Economics*-level solutions. And, finally, at the *Beliefs* level, social acceptance of regulatory mandates (i.e., possibly having to comply with tariff restrictions) would be necessary to successfully invoke Legislative-level solutions.
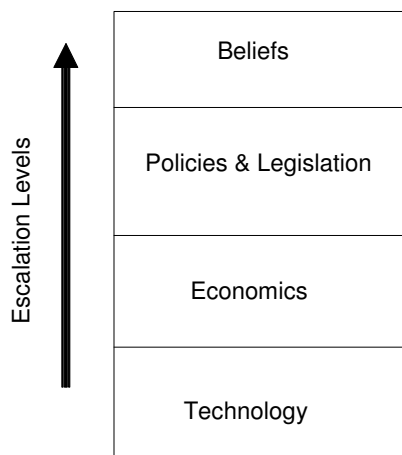

Figure 2: Behavior Control Mechanism Framework

To apply this behavior control mechanism framework in the specific context of text-messaging among adolescents, we next incorporate specific mechanisms as solutions as shown in Figure 3.

One mechanism is proposed to support the Technology level—*Device Capability*. Basic device platforms must be able to support feature customization at the *Economics* level.

Figure 3: Behavior Control Mechanism Framework in the context of Text-Messaging

Three mechanisms are proposed to support the Economics level—*TM Activation Control, TM Message Alert, and TM Auto Response*—that address the timeliness and frequency of text messaging and, hence, are essential to controlling the opportunities that an adolescent has in using text messaging. Parents today have the ability to block certain TV programs from pre-adolescent viewing, a capability made available by TV service providers. A similar "paid for" feature (TM Activation Control) made available by mobile phone service providers would allow parents to deactivate their adolescent's mobile phone (or just certain features like text messaging) during specific time periods such as during family meals and after bedtime, both identified as situations of high adolescent text messaging. TM Message Alert (another paid-for feature) would allow for parents to activate a capability that would provide them with an alert message for each text-message sent by their adolescent child(ren). Parents may not want to totally deactivate their adolescent's TM capability and the TM Message Alert feature would give them an alternate means of monitoring the number and time period of the text messages. Last, a TM Auto Response feature (also a paid-for feature) would allow for a less-intrusive way for parents to effectively convince their adolescent child(ren) to limit their text messaging especially during late night hours. That is, the device would automatically respond with a customized message without the user having to reply in real-time.

One mechanism is proposed to support the Policies and Legislation level—*Driver Point System.* One-in-three (33%) adolescents ages 16-17 admitted texting while driving which represents 26% of all American adolescents ages 16-17 (Lenhart, 2010). The current law (in many states) prohibits hand-held cell phone usage while driving which includes text messaging. The penalty is a fine and no points. Local police departments have found repeat offenders who were not dissuaded enough by the fine alone for using the cell phone while driving. We believe that a more effective penalty would be to add "points" to the driver's record in addition to the fine. In our view this amendment to the current laws would be most effective in reducing cell phone usage while driving for both parents and their adolescents since parents themselves would be at risk of a fine as well as points—thereby taking a more aggressive stance with their adolescents about cell phone calling and text messaging while driving.

Finally, two mechanisms are proposed to support the Beliefs level—*Education and Social Opinions.* It is conceivable that education institutions can incorporate information regarding the potential health issues associated with improper and excessive text messaging (e.g., all-night texting) into their Health Education courses for all grades and the dangers of text messaging while driving into their Driver Education courses for secondary education students. Not only should this result in a text messaging self-governance (if you will) among adolescents through awareness of personal health risks; but, it would also increase a student's safety awareness regarding the dangers of texting while driving. In addition, school districts typically have an "acceptable use policy" that governs the situations for which students are able to use school-provided as well as student-owned devices on campus. This is another vehicle by which Education-governed solutions can be devised. The expected Beliefs impact would be that students would potentially develop and maintain a sense of "civic responsibility" for their actions that would be self-governing. The Social Opinions mechanism implies the broad environmental context in which adolescents live and they should be aware of public opinion regarding certain behaviors. This would need to be represented, voiced, and demonstrated by every member of the community—parents, the local authorities, educators—who has an influence over the behavior of its adolescents. To date, parental attempts to control adolescent cell phone use—by limiting its use, checking its contents, or monitoring their whereabouts—has had little or no affect on cell phone use by adolescents (Lenhart, 2010).

So, in terms of the proposed conceptual model (Figure 1), *Technology, Economics,* and *Policies and Legislation* are viewed as dimensions of the TPB-Perceived Behavioral Control construct, *Beliefs*/Education is viewed as a dimension of the TPB-Attitude construct, and the *Beliefs*/Social Opinions is viewed as a dimension of the TPB-Subjective Norms construct. This is illustrated in Figure 4.
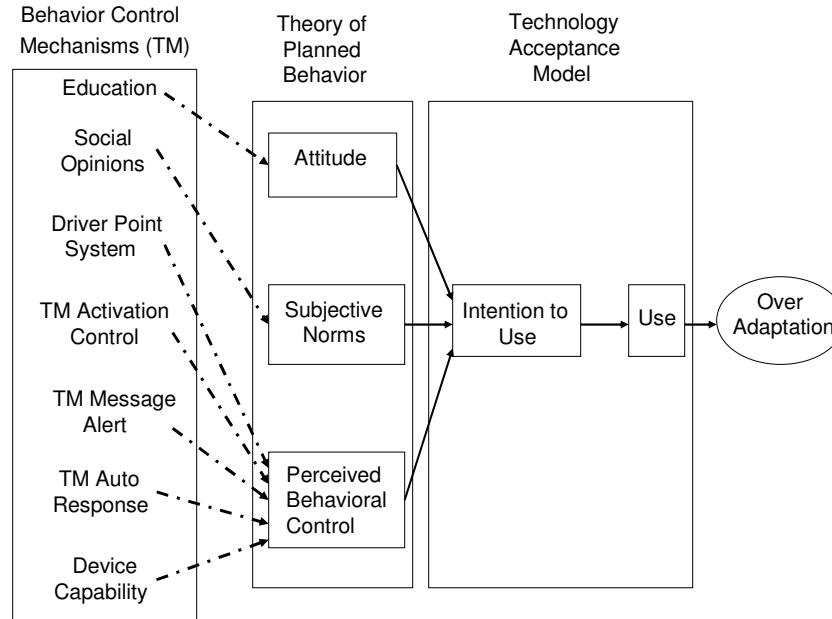
Figure 4: Conceptual Model with Behavior Control Mechanisms for Text Messaging

CONCLUSION

This research addresses dependency/addictive tendencies of technology over-adaptation in terms of what is often referred to as "technology addiction", particularly that of text messaging by adolescents. A behavior control conceptual model is proposed to explain how behavior control would govern the use of technology so that over-adaptation can be deterred. Furthermore, a behavior control mechanism framework is introduced to guide the design and implementation of control mechanisms.

Behavior control mechanisms for the deterrence of text messaging addiction are defined and used to populate a particular instance of the behavior control mechanism framework. Specifically, seven behavior control mechanisms are considered in this study—*device capability, text messaging activation, text messaging alert, text-message auto response, legalized point system, education, and social opinions*. The first one depends on service provider initiatives to develop devices that support features to control adolescent text messaging activity. The second three depend on parent-driven demand and represent an Economics perspective. The next one depends on legislative action and represents a Legal perspective. Both of the final two mechanisms are society-driven and depend on the community's initiatives to create a greater awareness in its adolescent population regarding the undesirable consequences of text messaging. The expectation is that adolescents would voluntarily reduce their text-messaging time so as to not drastically compromise their freedom to text message.

The behavior control conceptual model will facilitate future empirical research while the mechanism framework will inform practitioners as to deterrence mechanisms that can be used to reduce addictive tendencies.

The conceptual model and the control framework presented in this paper are thought to be applicable to deter potential addictive tendencies for all types of technologies. The behavior control model and the mechanisms that serve as building blocks of solutions to the over-adaptation of technology are general in nature, and, therefore, are considered to be generalizable for use with all forms of technology.

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