

GAMING HABITS AND SELF-DETERMINATION:
CONSCIOUS AND NON-CONSCIOUS PATHS TO
BEHAVIOR CONTINUANCE

By

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Media and Information Studies – Doctor of Philosophy

2013

ABSTRACT

GAMING HABITS AND SELF-DETERMINATION: CONSCIOUS AND NON-CONSCIOUS PATHS TO BEHAVIOR CONTINUANCE

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This dissertation examines how non-conscious habits and conscious motivations contribute to an individual's intention to continue playing online multiplayer games. It empirically examines distinct predictions of behavioral intention based on different theories in two gaming contexts—casual social network games (SNGs) and massively multiplayer online games (MMOs). Addressing inconsistencies in prior studies, habit is conceptualized as the mental construct of automaticity, thus distinguishing habit from frequency of past behavior and self-identity. Results indicate that strong habits positively predict behavior continuation intention and moderate the effect of motivation for SNGs but not MMOs. Self-identity was a positive predictor for both genres. Gender differences in self-determined motivation were present in social network games but not massively multiplayer online games. The residual effect of past behavior was stronger than any conscious or non-conscious processes; once perceived frequency of past behavior was taken into consideration, it was the strongest indicator of behavioral continuation intentions.

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Dedicated to my progressive grandparents, who believed that higher education was the most important indicator of success for a woman.

ACKNOWLEDGMENTS

I would like to thank my dear advisor, Robert LaRose, whose sharp critiques have prepared me for the most ferocious of peer reviewers; whose brilliant insights bore holes in dams of existing scholarship, making way for innovative paradigms; and whose sincere love for students represents the pinnacle of the true spirit of higher education. I am grateful for emotional support and soft-spoken words of wisdom from Wei Peng, as well as my other committee members Nora Rifon, and Robby Ratan, who provided a guiding light in times of darkness. I could not have made it here without the support of Nicole Ellison and Cliff Lampe, whose gave me wonderful research opportunities and social support. Finally, I thank my family for patience, emotional support, and acknowledging me for the curious creature that I am.

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INTRODUCTION

Why do people continue to use media? Much of the early theoretical frameworks and empirical research on media usage focuses on adoption of new technologies (e.g., Technology Acceptance Model; Davis, 1989; Diffusion of Innovations; Rogers, 1995) and media choice (e.g., Social Cognitive Theory; Bandura, 2002; Theory of Planned Behavior; Ajzen, 1991; Uses & Gratifications; Katz, Blumler, & Gurevitch, 1974). These theories have an underlying assumption that people make conscious decisions about media selection and usage. What happens, however, with behavior that is not the result of a conscious thought process? How do conscious and non-conscious processes contribute to continued media use?

The broader research interest informing this dissertation is sustained use of media. Here, sustained use is defined as a stable long-term behavior that continues with little interruption or weakening. Sustained use of media is important to understand from many perspectives. For media service providers, it is linked to brand loyalty (Jacoby & Kyner, 1973). For individuals and/or institutions trying to use technology for behavioral change, sustained use is necessary to achieve positive outcomes, as behavioral change requires time. Educational use of media is another domain in which sustained use is required, because learning takes time.

This dissertation examines two theories that provide an explanation towards sustained use: self-determination theory (Ryan & Deci, 2000) and the theory of habit (Triandis, 1979). These two theories, to be explained in further detail in chapters three and four, respectively represent two different psychological mechanisms. Self-determination theory is a conscious-choice theory, meaning that the theory works on the assumption that people actively think about their decisions before they engage in behavior. The Triandis (1979) theory of habit, on the other hand, examines the non-conscious explanation of human behavior. In other words, this theory

explains behavior that is not deliberate. While there have been many studies using one of the two theories, there has been less research that examine the two theories in tandem.

This dissertation focuses on the relationship between habit, self-determined motivations, and behavior continuation intention. The media of interest in this dissertation are two different genres of multiplayer online games: massively multiplayer online (MMO) games and social network games (SNGs). Multiplayer online games were chosen as the context of the study for three main reasons. First, most studies of habits have been of behaviors that have a weak social component, such as flossing one's teeth (Orbell & Verplanken, 2010), choosing a mode of transportation (De Bruijn, Kremers, Singh, Van Den Putte, & Van Mechelen, 2009), or drinking a glass of water every morning (Lally, Van Jaarsveld, Potts, & Wardle, 2010). Second, MMOs and SNGs, while both being multiplayer online games, differ substantially in terms of how frequently they are played. Frequency of past behavior is a construct that has been shown to moderate the habit-intention relationship (Danner, Aarts, & Vries, 2008). Thus, examining two game genres that differ in frequency of past behavior will enable us to see if results of hypotheses are consistent across behaviors of different frequency levels. Third, MMOs and SNGs greatly differ in the gender makeup of the people who play: the majority of MMO players are men (Williams, Yee, & Caplan, 2008) and the majority of casual SNGs are women (Casual Games Association, 2012). Prior studies have found gender differences for certain types of motivations, thus analyses in this study will be able to account for gender-motivation interactions.

The dissertation is presented in the following order. First, a conceptual definition of habit is provided. Habit is distinguished from frequency of past behavior and self-identity. The theoretical explanations of the relationships between these three constructs are hypothesized.

This is important because of lack of parsimony in media literature in regards to the conceptual definition of habit.

Second, the dissertation will examine how self-determined motivations and habit predict intentions to continue playing online multiplayer games. Two hypotheses that predict different interaction effects of motivation and habit on continuation intention are tested. The reinforcement hypothesis, based on self-determination theory (SDT), predicts that habit will strengthen the relationship between motivations and continuation intention. The competing hypothesis, the replacement hypothesis, is based on habit theory. This hypothesis predicts that as habits moderate the relationship between self-determined motivations and continuation intention. The moderation is such that the relationship between motivations and intention will diminish as habit becomes stronger.

Third, gender differences related to motivation will be examined through the lens of social norms and stereotype threats. These differences will be contextualized in two different genres of online multiplayer games: casual social network games (SNGs) and massively multiplayer online (MMO) games.

Finally, based on the results of the hypothesis testing, habit strength and motivation will be incorporated into a integrated model predicting gaming continuation intention that takes into consideration frequency of past behavior, self-determined motivations, and self-identity. Gender and motivation interactions will be included in separate model for SNGs and MMOs.

CHAPTER 1: HABIT OF MEDIA CONSUMPTION

Most media consumption behavior, defined as “observable acts of individual media exposure,” (p. 194) is governed by habits (LaRose, 2010). Media habits are a form of automaticity that develop as people repeat media consumption behavior in stable circumstances (LaRose, 2010). Habits are essential to achieve cognitive efficiency and to conserve scarce attentional resources, relieving the cognitive effort of decision making that individuals must undergo each time a behavior is performed.

Traditionally, scholars assumed that people were consciously motivated to use media—whether that was to fulfill a specific need (Uses and Gratifications perspective; e.g., Greenberg, 1974; Katz, Blumler, & Gurevitch, 1974; Papacharissi & Mendelson, 2011), or achieve an expected outcome (Social cognitive perspective; LaRose & Eastin, 2004; Peters, 2008). Once habits are established, however, they begin to take the place of conscious motivations and turn into strong antecedents of media use. In some instances, habits supplant conscious intentions as determinants of media behavior (Limayem, Hirt, & Cheung, 2007; Ouellette & Wood, 1998; Verplanken & Orbell, 2003).

Most prior studies examined the moderating effect that habit on the intention-behavior link (Limayem, Hirt, & Cheung, 2007; Trafimow, 2000). The present dissertation contributes to that line of research by examining the direct role of habit as well as the interaction between habit and motivation, in predicting behavioral continuance intention.

Media Habits and Online Games

Understanding the role of media habits among people who play multiplayer games online is increasingly important because such games require a large and possibly problematic time commitment. According to market research firm NPD Group (2010), the average number of

hours played by those who purchased multiplayer online games has steadily increased between 2008 and 2010. The increased amount of time spent playing games has been an issue of public concern because of patterns of excessive use that have often been termed “addiction” (e.g., Grüsser, Thalemann, & Griffiths, 2007; Mehroof & Griffiths, 2010). However, scholars have pointed out that what may look like addiction could actually be habit; a form of deficient self-reaction (LaRose, Lin, & Eastin, 2003; Tokunaga & Rains, 2010). LaRose and Eastin (2004) differentiated deficient self-reaction from deficient self-regulation, which refers to an individual’s inability to control their behavior. They pointed out that deficient self-regulation, not deficient self-reaction, is the construct that has been associated with problematic outcomes, even if both are manifestations of automaticity (LaRose, 2010).

This notion of an individual’s inability to control their behavior has also been called problematic Internet use (Caplan, 2003, 2010; Caplan, Williams, & Yee, 2009) and compulsive use (Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009). Tokunaga & Rains (2010) ran two path analyses using data from meta analyses to examine the relationship between problematic Internet use and time spent using the Internet and found that while the two constructs were related, there was very little evidence to support any significant relationship between time spent on the Internet and psychosocial problems such as social anxiety, loneliness, and depression.

Habit and deficient self-regulation (compulsive use) are very similar in terms of how much they contribute to time spent playing games. Hartmann, Jung, & Vorderer (2012) differentiated video games habits from addictive tendencies and found that both constructs positively contributed to increased time spent playing games. Similarly, Wohn (2012) found that in the context of social network games—games played on social network sites such as

Facebook—conscious motivations accounted for 14 percent of the variance of how much time people spent playing games, and that including habit increased that variance to 32 percent. However, even if habit is a predictor of time spent playing a game, a habitual player may not have the problematic outcomes that are associated with compulsive use (LaRose & Eastin, 2004). The normal populations that have been the subject of most studies of so-called “video game addictions” belie the characterization of the phenomenon as mental disease. Rather, it should be regarded as habitual behavior within the realm of normal media consumption (LaRose, in press).

The present dissertation makes an important theoretical contribution to understanding of media selection and attendance even if the alarmist theme of mental disease is not at issue. The main research question driving this research is examining how habits contribute to an individual’s intention to continue playing online multiplayer games while taking into consideration the fact that the media being studied has a heavy social component. Much of the research on habits in general have focused on behaviors (e.g., flossing, listening to the radio, choosing transportation) that may have some degree of social influence but are, for the most part, do not rely very much on behaviors of others. Online multiplayer games, however, require much interaction with other people. Testing theory that has mainly been studied in the context of individual behavior in a context that is interactive will allow us to see how individual-level factors predict individual intentions within a complex social environment.

Different online multiplayer games facilitate different types of interaction among players. Two genres of online multiplayer games are of interest here: massively multiplayer online (MMO) games and casual social network games (SNGs). These two games differ on various levels, such as game design and game aesthetics, but the reason for distinguishing these two genres in this study are due to differences in theoretically relevant factors in understanding

motivation and habit. Those factors would be communication factors, such as speed of communication (asynchronous/synchronous), connectivity with a social network site (high/low anonymity), frequency of game play (high/low), and gender differences. The goal here is not to test how the effect of these specific factors, but to acknowledge that these two game genres have features that may need to be taken into consideration when hypothesizing and interpreting how theories would operate in these similar, yet different contexts.

MMOs are virtual environments that are persistent and host thousands of people concurrently (Yee, 2006b). A persistent world is a digital environment that exists independent of the players, much like the offline physical world. All players access the same world. While MMOs can be played alone, many of the missions in the games require collaboration in groups, resulting in synchronous interactions with other players (Yee, 2006b). This is because each individual has a specific set of skills that are different from others; thus the game is designed such that players require the skills of others to perform specific tasks.

SNGs are digital game applications that use network data from social network sites and are different from MMOs because the players are also connected outside of the game on the social network platform (Wohn, Lampe, Wash, Ellison, & Vitak, 2011; Wohn & Lee, 2013). SNGs do not have a single world that is persistent. Because of the connection to a social network site that is reflective of one's actual identity, this makes it relatively difficult for people to remain completely anonymous. SNGs are easier to play with other players' help, thus "forcing" players to interact with each other by making it difficult for players to progress in the game without interacting with other players (Wohn, Lee, Sung, & Bjornrud, 2010). Unlike MMOs, however, this interaction is mostly asynchronous and dyadic. For example, the requests that players make of each other are usually through private messages within the game.

Games as Persuasive Technology

The importance of distinguishing habit from behavioral factors such as time in a gaming context becomes even more pronounced when the games are being utilized for education purposes or to instigate behavioral change. Although online multiplayer games have mainly been studied as a form of entertainment, there is a growing trend of using games as a form of persuasive technology that fosters some sort of positive behavioral change. Persuasive technology is an interactive information technology that is designed for changing users' attitudes or behavior (Fogg, 1998). Many technology interventions for health these days try to encourage positive behavior by incorporating rewards and quantifiable measures of progress, which are common mechanisms in games. The practice of incorporating design elements that are characteristic for games in non-game contexts referred to as "gamification" (Deterding, Dixon, Khaled, & Nacke, 2011). Many persuasive technology systems have gamification elements—for example, individuals receive virtual "badges" for achieving certain physical activity milestones or rely on social reinforcement to do certain tasks.

One of the biggest problems of the reward system of gamification, however, is the lack of people's intention to continue the behavior once the novelty of immediate rewards and punishment wane, and continuance of the behavior in the absence of rewards. Scholars found that when extrinsic rewards, such as point systems, are removed from a social network site, people are less likely to contribute (Thom, Millen, Dimicco, & Street, 2012).

The present dissertation contributes to gamification scholarship by examining two different theoretical perspectives that make predictions about behavioral continuance that may shed light on when mechanisms such as rewards and punishment may work, and what can overcome the limitations of behavior that is driven by such extrinsic factors. Moreover, the nonconscious process of habit will provide explanations as to why the effect of motivation can change based on level of habit.

Two Theories of Behavioral Continuance

There are many theories that purport to predict behavior; of those, two theoretical frameworks that predict long-term behavior will be considered here. The first is self-determination theory (Ryan & Deci, 2000), which assumes that people continually make conscious choices about their behavior. The second is the theory of habits (LaRose, 2010; Triandis, 1979), which assumes that people do not rely on conscious choices about their behavior once habits are established. The reason these two theories were chosen were because they represent the dual processes of cognitive activity that are involved in affecting behavior. These two competing pathways consist of the “thoughtful” route, which is represented through models of reasoned action, and the “non-conscious” route, which reflects behavior that is automatically activated as a result of a certain stimuli. Self-determination theory is very much a conscious choice theory, where the underlying assumption is that the individual carefully makes a decision about what he or she will do. The theory of habit, on the other hand, is at the opposite end of the conscious spectrum in that the lack of thought is what characterizes the individual’s behavior. Although these theories seem like they are exactly the opposite, they are both similar in that they are both describing mechanisms that lead to behavioral sustenance, or long-term behavior.

CHAPTER 2: THEORETICAL BACKGROUND

This section discusses the theoretical background of research preceding media habits and how the construct of media habits differs from similar yet distinct constructs that were studied earlier, such as ritualistic use of media. A conceptual definition of habits is presented.

Passing Time and Ritualistic Behavior

The construct of habit has long been of interest to media researchers that has been studied, forgotten, and re-examined time and time again (LaRose, 2010; Stone & Stone, 1990). In one of the earliest studies, Greenberg (1974) identified habit as one of the seven television viewing motivations of children and adolescents. A content analysis of adolescents' open-ended responses to television's influences on their lives showed that 52% of those who mentioned negative effects referred to television viewing as a "habitual dedication established by routine rather than by conscious choice." (Krendl & Lasky, 1989, p. 103). Data from focus groups also indicated that habit played a major role in explaining why people watched television (Adams (2000).

Mass communication research has associated media habits with ritualistic use of media, such as passing time (e.g., Papacharissi & Rubin, 2000; Rubin, 1983; Rubin, 1984). LaRose (2010) critiqued this conceptualization: whereas passing time has been measured in past uses and gratifications studies as a conscious motivation (e.g., "I do X to pass time"), habits describe non-conscious behavior (e.g., "I do X without thinking"). Thus someone engaging in a habit will do it out of routine rather than in conscious pursuit of a specific goal. In other words, habits are behaviors that are executed without particular association to an expected outcome, although people can retrospectively provide explanations. Thus habit is more than a coping mechanism for passing time; rather, it is a non-conscious, or automatic behavior, especially in light of more

recent research on habits (e.g., Orbell & Verplanken, 2010; Verplanken, 2010; Wood & Neal, 2007). Although Rubin (1984) was able to capture some aspects of habit, such as the concept of television-viewing as being a cue-triggered behavior, he added attitudinal items to his measure of habit, conceptually confounding conscious (attitude) and non-conscious (automatic) processes.

Automatic Behavior

Automaticity is a type of behavior that is activated by situational cues in a stable environment. People engage in automaticity to achieve cognitive efficiency (Bargh, Chen, & Burrows, 1996; Bargh, 1994). Automaticity includes at least one of the following characteristics: lack of control, lack of awareness, lack of intention, and lack of attention (Bargh, 1994).

Automatic behavior has also been used to explain individuals' activation of stereotypes (Bargh, Chen, & Burrows, 1996), processes of persuasion (e.g., Chaiken, Liberman, & Eagly, 1989), and behavioral scripts (Abelson, 1981). Scripts are cognitive structures that organize a series of actions when activated by a specific situation (Abelson, 1981). This happens because the brain stores complex sequences of behaviors into "units" in order to be cognitively efficient. Although Abelson (1981) himself distinguished scripts from habits because he viewed habits as being behavioral, when habits are conceptualized as a mental construct, they are very similar, to the concept of scripts.

In social psychology, habit is thus conceptualized as an automatic behavior that is triggered by an environmental stimulus (Bargh & Chartrand, 1999; Verplanken & Orbell, 2003; Wood & Neal, 2007)—a mechanism that the brain undertakes to offset cognitive efforts. The idea of cognitive overload has been the underlying explanation of many theories of peripheral information processing (e.g., Chaiken, Liberman, & Eagly, 1989). For example, the elaboration

likelihood model (see Petty & Cacioppo, 1984) argues that there are two routes of information processing: the central route is a thoughtful process where people carefully consider information that is presented based on the strength of arguments; the peripheral route is when people rely on cognitive “shortcuts,” or heuristics to make a judgment. The peripheral route described by Petty and colleagues is an example of automatic processing.

Recent studies in neuroscience support the conceptual difference between conscious behavior and automatic behavior, showing that the part of the brain that engages in automatic behavior is different from the part of the brain that is activated when an individual is thinking consciously. Although this paper will not go into details about the neurological underpinnings of how the brain functions, it is important to know the general functions of the prefrontal cortex in understanding why automatic behavior is different from active behavior.

The prefrontal cortex—the front part of the brain right behind one’s forehead—is responsible for cognitive control, the ability to orchestrate thought and action in accordance with internal goals (see Miller & Cohen, 2001). The kind of “top-down processing” that the prefrontal cortex engages in is not critical for performing simple, automatic behaviors (Miller & Cohen, 2001). Habit learning, however, is processed primarily through the basal ganglia (Yin & Knowlton, 2006; Yin, Knowlton, & Balleine, 2004).

CHAPTER 3: DEFINING HABITS

Conceptual Definitions

Despite the increase in adopting the concept of habits in media research (e.g., Limayem & Cheung, 2011; Limayem, Hirt, Cheung, 2007; Wohn, Velasquez, Bjornrud, & Lampe, 2012), there still remains the problem of parsimony in conceptual definitions. In fact, while LaRose's (2010) definition of media habit focuses on automaticity, scholars who use the term "media habits" most often do not have a clear conceptual definition. Even among the empirical studies that cited LaRose (2010), there was a wide range of different conceptualizations of habit, including frequency of past behavior (e.g., Hartmann et al., 2012; Vitak, Crouse, & LaRose, 2011) and sets of behavior sequences (Taneja, Webster, Malthouse, & Ksiazek, 2012), which was a similar concept to what Abelson (1981) argued as being habits when he distinguished scripts from habits.

Even LaRose (2010) himself re-conceptualized habits in his 2010 article from his earlier work on deficient self-regulation (LaRose, Lin, & Eastin, 2003) and deficient self-observation (LaRose & Eastin, 2004). Deficient self-regulation was defined as a state in which the individual loses self-control over media usage, referring more to the "lack of control" aspect of the four components of automaticity. This construct, while it correlated strongly with the self-report habit index (SRHI), did not include behavioral frequency. Deficient self-observation, on the other hand, reflected lack of awareness and cognitive deficiency, and aligned much closer with the current definition of automaticity. Thus, earlier work by LaRose was based on the social cognitive theory perspective of deficient self-regulation and deficient self-observation

conceptualized habit as a multidimensional construct instead of a unidimensional structure of automaticity.

The problem with the varied conceptual definitions of habit is not unique to media scholarship; it resides within the greater body of literature on habits in general. Even among scholars who acknowledge habits as a form of automaticity, there is disagreement between those who argued that habits are associated with goals (Aarts & Dijksterhuis, 2000; Verplanken, Aarts, & Van Den Berg, 2000) and those who argued habits can persist without goals (Neal et al., 2011; Wood & Neal, 2007). In addition, some scholars argued habits are behaviors that are frequently performed (Aarts, Verplanken, & Knippenberg, 1998; Verplanken & Orbell, 2003) while others maintain that habits can be independent of frequency of behavior: Gardner (2012) pointed out that saying “amen” after a prayer can be habit because it is an automatic response that is associated with the end of a prayer, even if one only attends church once a year.

This dissertation uses LaRose’s (2010) definition of habit as a form of automaticity, which is mostly consistent with Verplanken and Aarts’ (1999) definition of habit as a learned sequence of acts that have become automatic responses to specific cues in stable circumstances and work towards a goal, except that LaRose (2010) did not see habit as something that goal-oriented. The definition of habit as an automatic behavior has been prevalent in more recent applied habit studies related to health behaviors (Gardner, Abraham, Lally, & De Bruijn, 2012; Gardner, de Bruijn, & Lally, 2011, 2012; Lally, Van Jaarsveld, Potts, & Wardle, 2010) as well as some studies of media behaviors including online user-generated content communities and social network games (Limayem et al., 2007; Wohn, Lee, Sung, & Bjornrud, 2010; Wohn et al., 2012; Wohn, 2012).

Frequency of Past Behavior and Habits

Frequency of past behavior (FOPB) is strongly related to habit strength and sometimes used as a proxy when measuring habits (e.g., Hartmann et al., 2012; Neal, Wood, & Quinn, 2006; Vitak et al., 2011). The reason for this relationship between the two constructs is because the basic mechanism of habit formation involves repetition and reinforcement of behavior, where expected reinforcement and the cues that accompany it serve as the agent that promotes repetition (Verplanken & Wood, 2006).

As people repeat their actions in a stable context, the association between the context and their behavioral response become a part of procedural memory (Neal et al., 2006). Thus habit formation has been long seen as a form of procedural learning (Graybiel, 2008). Procedural learning, or implicit learning, is when the subject learns the probabilities of particular stimulus-response (S-R) associations without full awareness (Yin, Knowlton, & Balleine, 2004). Two major brain areas are associated with probabilistic learning tasks: the basal ganglia (striatum) and the medial temporal lobe (Graybiel, 2008). When a task favors implicit learning, activity in the medial temporal lobe decreases as striatum activity increases, when learning is more explicit, the reverse happens. The switch from a goal-oriented behavior to a habitual (S-R) behavior is influenced by different regions of the brain (Graybiel, 2008) and neurological evidence supports the notion that there is a shift in brain activity when behavior adjusts from goal-directed behavior to habitual behavior (Tricomi, Balleine, Bernard, & O'Doherty, 2009). This mechanism of habit being formed through repetition explains why habit strength correlates to some extent with frequency of past behavior and has been measured as such in the past with some justification.

While the development of a habit may be strongly associated with frequency of past behavior, there are excellent arguments to the effect that frequency of past behavior is distinct

from habit strength (e.g., Ajzen, 2002; Gardner et al., 2012; Verplanken, 2006). For example, Ajzen (2002) argued that habit should not be equated with frequency of behavior, because some behaviors may be frequent, yet not habitual, and vice versa. Gardner (2012) also made a similar argument. He also pointed out that low frequency of behavior could also be indicative of habit—such as a habit of *not* doing something—in which case frequency of past behavior would actually be negatively related with habit. However, there have yet to be many studies that examine the habit of *not* doing something.

Based on the studies reviewed above, habits should be associated to some degree with frequency of past behavior when habit is still being developed, as frequency would assist in that development. However, once a behavior is already a strong habit, frequency of behavior does not necessarily have to be related to habit. Lally, Van Jaarsveld, Potts, & Wardle (2010) empirically examined habit formation of 82 individuals and modeled curves based on whether or not the individuals engaged in the behavior, which was used as the frequency of behavior measure, and habit, as measured with automaticity items from the SRHI. They examined whether or not the relationship between habit and frequency of behavior was linear or asymptotic; about 40% of individuals fit the non-linear asymptotic curve.

We can thus hypothesize that the habit and frequency of past behavior have a linear relationship until habit is formed:

H1: Habit strength is positively associated with frequency of past behavior until habits are formed. Once habits are formed, frequency of past behavior will no longer contribute to habit

Frequency of Past Behavior and Self-identity

In conceptualizing the components of habit, Verplanken and Orbell (2003) suggested that habit may “be descriptive of a person and thus express identity” (p. 1317) since habits are

integrated into everyday life, although they noted that this may not hold true for all habits. Other than this very short explanation and a lack of a conceptual definition for identity, Verplanken and Orbell (2003) did not go into detail about why identity is a part of habit.

Like habit, identity is also a complex construct, and is also called self-identity or self-concept. For the sake of parsimony, this study will employ the definition of self-identity as “salient and enduring aspects of one’s self-perception” (p. 1087; Rise, Sheeran, & Hukkelberg, 2010). Self-identity is the perspective an individual takes of oneself when the individual categorizes himself or herself into a specific role and engages in behaviors that are related to that identity (Stets & Burke, 2000).

The overlap between habit and self-identity can foremost be found in how the constructs are formed: like habits, self-identity can be formed through behavioral repetition (Bem, 1967). Bem (1967) describes this phenomena as self-perception. Self-perception happens because people develop post-hoc explanations for their behavior by making their identities congruent with their behavior because people infer their identities from their behavior (Bem, 1967). Repeated behaviors become incorporated into one’s self-identity because the execution of the behaviors is interpreted by the individual as being more important than the attitudes that the individual holds toward the behavior itself (Charng, Piliavin, & Callero, 1988).

Bem (1967) explains the mechanism of the past behavior- self-identity link through Skinner’s operant conditioning theory—it is thus easy to see why self-identity and habit are interchangeably used or confounded. However, while habit describes how consistent exposure to a stimuli trains the brain such that the stimuli triggers an automatic response in the brain and subsequent behavior, Bem limits interpretation to internal stimuli, noting that in most cases, people “implicitly assume” (p.185) that internal stimuli accompany external, or environmental

stimuli, but that is not always the case. Thus self-identity and frequency of past behavior should be strongly correlated:

H2. Frequency of past behavior is positively associated with self-identity.

Habit and Self-identity

The above two sections explain how past behavior relates to habit, and how past behavior relates to self-identity. This section explains why these two constructs are distinct, despite the fact that they share a common origin. In the definition of habit presented earlier, this paper used LaRose's (2012) definition of media habits as a form of automaticity. Automaticity, as defined above, is the ability to do things without thought, based on sufficient repetition through past behavior. At the end of the day, automaticity is an observable behavior, which is consistent with LaRose's definition of media consumption.

Self-identity, on the other hand, is an attitude, thus remaining at the level of a mental construct. An attitude can lead to subsequent behavior but is not yet in behavioral form. Of course, some scholars have argued that habit is a mental construct (Verplanken, 2006), but this argument was mainly geared towards distinguishing habit from frequency of past behavior. Here, I clarify that habit is a mental construct that then manifests in some kind of behavior, while self-identity is a mental construct that manifests in an attitude. This distinction allows us to see the difference between habit and self-identity.

This would explain why empirical studies examining the relationship between self-identity and habit have conflicting findings. Wood, Quinn, & Kashy (2002) found that habits related to activities such as watching television and doing homework were more likely to lead to negative self-evaluations, which could be interpreted as low levels of self-identity. However, Gardner et al. (2012) found a positive correlation between self-identity and habit in the context

of physical activity. These somewhat conflicting findings imply that Verplanken and Orbell's (2003) may have been right in their suggestion of self-identity and habit being related in some cases but not others, when in fact, it may well be that the conflicting results were due to a discrepancy in the conceptual definition habit.

In the gaming literature, self-identity has mainly been researched from two perspectives. The first perspective is a stream of research examining identification; how attributes of the game character affect individuals' behavior both online and offline. Researchers found that people infer behaviors from the stereotypes associated with the appearance of the avatar (Yee, Bailenson, & Ducheneaut, 2009; Yee & Bailenson, 2007). For example, people who were assigned to a taller avatar negotiated more aggressively than people who were given shorter avatars (Yee et al., 2009) and people who were assigned to attractive avatars were more intimate with confederates in self-disclosure than people who were assigned to less attractive avatars (Yee & Bailenson, 2007). Similarly, scholars also found that people playing first-person shooter and racing games identified with the character or role that they were assigned to, and that this identification led to automatic shifts in implicit self-perceptions, which was conceptualized as the cognitive association between game character-related attributes and the players' self-identity (Klimmt, Hefner, Vorderer, Roth, & Blake, 2010).

The second perspective examines how offline identities are manifested in game play. For example, Bessiere, Seay, and Kiesler (2007) found that in the online game World of Warcraft, players created avatars that were closer to their self-reported ideal self than their real self. Avatars are a digital representation of an individual and despite the limited choices in visual customizations, enable individuals to create unique representations of themselves (Cheng, Farnham, & Stone, 2002). They found that this effect was more prominent for those individuals

who had low psychological well-being. That may be why scholars found that in a city simulation game that involves room for little role play, people were creating virtual environments that were closer to their real self than ideal self (Wohn & Wash, 2012). Both of these perspectives are similar in that they distinguish self-identity within the game and outside of the game.

Although the effects and manifestations of self-identity in games have been studied, there has been less focus on how those identities are formed and how self-identity relates to behavior and mental constructs. Moreover, attention to identification has neglected the aspect of the game play itself as being part of self-identity. This would be more similar to self-identification as a gamer, which is an individual's perception that he or she is an avid game player, which, though malleable over time (Shaw, 2012), is more stable and related to permanent roles (Giddens, 1991), thus making it distinct from the concept of identification with a game character, which is temporal in nature (Klimmt, Heffner, Vorderer, Roth, & Blake, 2010).

Because behavioral repetition can lead to both habit and self-identity, the latter two constructs may be related even if they are conceptually different, especially because scholars were using different conceptualizations of habit. Empirical data that distinguishes these two constructs are lacking and inconclusive.

It could also be that the distinction between habit and self-identity is valid for some behaviors but not others. For example, two studies in Verplanken and Orbell (2003) and another by Verplanken, Myrbakk, and Rudi (2010) examining transportation mode (e.g., riding their bicycle, taking the bus) did not find an empirical distinction between habit and self-identity—their exploratory factor analysis of the SRHI resulted in one dimension. However, in factor analyses of the SRHI regarding television viewing and turning on music at home, Verplanken and Orbell (2003) found two factors; although the authors did not provide details about how the

items loaded differently, the two-factor structure suggested that the SRHI may not be a unilateral construct, even though the third behavior that they studied, eating snacks, was a single factor structure.

On the other hand, it could be that lack of sufficient items related to self-identity to identify a separate factor in the SRHI may be what caused these inconsistencies because when Gardner et al. (2012) added several self-identity measures to the SRHI in the context of binge drinking, they found that two items in the SRHI that are about self-identity (e.g., “XXX is typically me) loaded with the other self-identity measures, yielding distinct factors between automaticity and self-identity measures. It is thus important to empirically establish a solid measure of self-identity and examine the relationship between self-identity and habit in the context of the current study after eliminating the possibility of measurement error (i.e., lack of items):

RQ1a. Is self-identity and habit distinct in the context of gaming behavior?

RQ1b. If so, how strong is the relationship between self-identity and habit?

CHAPTER 4: PREDICTING BEHAVIORAL INTENTIONS

The previous chapter examined the relationships between the three constructs of habit strength, self-identity, and frequency of past behavior.

This chapter examines how the factors distinguished above contribute to behavioral intention. A behavioral intention is a “cognitive representation of a decision to perform a given behavior” (Ajzen, 2002, p. 109). Based on this definition, behavioral continuation intention is defined as a cognitive representation of a decision to continue performing a given behavior. First examined is the basic relationship between habit, self-identity, frequency of past behavior, and behavioral continuation intention. The second section introduces the concept of motivation, and the correlation between motivation and behavioral continuation intention.

Intention is one of key variables in reasoned action theories such as the Theory of Planned Behavior (TPB; Ajzen, 1991; 2002). This theory is a very prominent theory in terms of explaining behavior with conscious decisions. The model in TPB indicates that the perceptual variables of attitude, subjective norm, and perceived behavioral control are predictors of intention, which in turn predicts behavior.

Habit scholars have repeatedly tried to update the TPB model. Early habit work conceptualized frequency of past behavior as habit, which has since been critiqued by a number of scholars including Ajzen (2002). Researchers have found that past behavior overwhelmed the effects of all other psychological variables in explaining behavioral intention, as well as subsequent behavior. This is referred to as the residual variance effect (Ajzen, 2002). Ajzen (2002) noted that it is an “undisputed fact that the frequency with which a behavior has been performed in the past can be a good predictor of later action” (p. 108). More interesting than past

behavior predicting future behavior were findings that past behavior directly predicted intention, since the correlations would not be based simply on measurement similarities.

The large effect of past behavior on behavioral intentions has led habit scholars to wonder if past behaviors were in fact reflecting the effect of habits. A meta-analysis examining intentions, past behavior, and later behavior found that the two significant predictors of future behavior were past behavior and intentions (Ouellette & Wood, 1998). When behaviors were not frequent, intention was the strongest predictor of future behavior, but when behaviors were frequent, past behavior was the main predictor.

Much of the research in the past ten years has therefore focused on the moderating effect of habit between intention and future behavior in the context of information systems (Limayem et al., 2007), transportation choice (De Bruijn, Kremers, Singh, Van Den Putte, & Van Mechelen, 2009), and health contexts (Gardner et al., 2012) among others. However, these recent studies that examined habit as a moderator of intention and future behavior did not take into consideration the effect of actual past behavior, nor take into consideration the fact that the moderation effect found by Ouellette and Wood (1998) were actually based on frequency of opportunities to perform the behavior as a measure of habit instead of actual frequency of past behavior, nor were they measures of automaticity.

Studies that examined the effect of habit, defined as automaticity, on behavioral intentions also have left out the linkage between past behavior and habit. For example, in the context of binge drinking, scholars found that automaticity was directly related to intention (Todd & Mullan, 2011), but they did not examine frequency of past behavior. Moreover, studies that examined both habit and frequency of past behavior as distinct constructs in the same model

(e.g., Verplanken, 2006) found that habit was correlated with both past behavior and intention, and used all three constructs in a regression model predicting actual behavior, but did not examine whether habit and past behavioral frequency predicted intention.

It is thus necessary to examine the habit-intention relationship while 1) distinguishing habit from past behavior, and 2) adding past behavior into the model. Some studies have found that habit is a significant direct predictor of intention. For example, Trafimow (2000) found that people who had a habit of using a condom were more likely to report higher intentions to use a condom. Similarly, Wohn et al., (2012) found that people who had a habit of going to the online community Everything2 were more likely to report stronger intentions of visiting the website in the future. We would thus expect habit to be directly related to intention:

H3. Gaming habit strength is positively associated with behavioral continuance intention.

Similarly, self-identity, especially in a planned behavior perspective, has also been found to be directly related with behavioral continuance intention. To the best of my knowledge, however, this has not been examined in the context of multiplayer games:

H4. Gaming self-identity is positively associated with behavioral continuance intention.

However, what happens when past behavior is added to the model of continuance intention? Summarizing prior meta-analyses, Ajzen (2011) found that even when self-identity was added to the TPB model, although it increased predictive validity, it did not account for the residual effect of past behavior on behavioral intentions. In other words, once past behavior was taken into consideration, it was able to predict intention over and above the predictive power of

the attitudinal variables in TPB. Ajzen (2011) noted that this residual effect of past behavior on intention is still unresolved.

Another meta-analysis by Albarracin, Johnson, Fishbein, & Muellerleile (2001) showed that when examining TPB variables and past behavior to predict intention and future behavior in the context of condom use, past behavior had a direct effect on intention that was larger than that of the TPB variables of norm, attitude, and perceived behavioral control. However, this model also included links between intention and future behavior and did not include the constructs of habit and self-identity. Hagger and Chatzisarantis (2009) also conducted a meta-analysis of studies that integrated TPB and SDT in health contexts and found that the TPB variables of attitude, perceived norms, and perceived behavioral control mediated SDT and intention, but when past behavior (which studies had operationalized as frequency of past behavior) was added to the extended model, past behavior was a direct predictor of SDT variables, TPB variables, and behavioral intentions.

Does this mean that all variables are essentially useless? Smith et al. (2007), who was examining beer purchasing behavior, found that past behavior (amount of beer purchased) was a strong indicator of future behavior, but it also moderated the effect of self-identity. Using the TPB framework, the researchers examined how TPB variables, past behavior, and self-identity, were associated with intention and future behavior. They found an interaction effect between self-identity and past behavior such that self-identity was more strongly correlated to intention when frequency of past behavior was low than when it was high. While this suggests that past behavior may be a moderator, this study used a different measurement of past behavior in terms of volume rather than frequency.

Based on the studies reviewed above, the limitations of prior research in untangling the role that frequency of past behavior plays in predicting behavioral intention come down to three points. First, none of the studies examined all three constructs of habit, frequency of past behavior, and self-identity. Second, the moderating effect of past behavior on self-identity has been examined in the context of extent of past behavior but not frequency. Third, the studies did not examine the possible moderating effect of frequency of past behavior on habit. It is thus important to address these limitations in creating a model predicting behavioral intention by examining how self-identity and habit are associated with behavioral intention, then adding frequency of past behavior, and finally interactions between frequency of past behavior and habit, as well as frequency of past behavior and self-identity.

RQ2. How does frequency of past behavior affect the relationship between habit and behavioral continuation intention?

RQ2a. Does past behavior lower the effect of habit and self-identity?

RQ2b. Does past behavior moderate the effect of habit and self-identity?

CHAPTER 5: MOTIVATIONS AND BEHAVIORAL CONTINUANCE INTENTIONS

The previous chapter examined the relationship between three distinct constructs that are questionably used interchangeably in the literature, and behavioral continuation intention. As prior conceptualizations of habit posed a potential confound with frequency of past behavior and self-identity, habit was explicated in an attempt to fill in a gap in literature; namely, using all three constructs in the same study.

Habit, as conceptualized earlier as a form of automaticity, is more or less a non-conscious behavior. This chapter focuses on the conscious construct of motivation. Studies on gaming behavior have mainly used conscious motivations to explain why people play games, either from the perspective of need satisfaction (Przybylski, Rigby, & Ryan, 2010; Ryan, Rigby, & Przybylski, 2006), desire (Yee, 2006a), or expected outcomes (Wohn, 2012).

One theory that has been used to explaining gaming behavior is self-determination theory (SDT; Ryan & Deci, 2000). The theory maintains that human beings have an innate psychological need for competence, autonomy, and relatedness, and when these needs are met, the behavior becomes more enjoyable, which leads to increased engagement and persistence in behavior (Deci, Koestner, & Ryan, 1999; Deci & Ryan, 1985; Ryan & Deci, 2000).

What makes this theory interesting and a good candidate as a parallel theory to habit is the fact that the theory is not just interested in continuation of behavior—it specifically has predictions for behavior that is further into the future. In other words, while most theories of motivation, including TPB, posit that stronger motivation leads to stronger intention and subsequent behavior, SDT stipulates that certain types of motivation may predict short-term behavior but not long-term behavior. Also, compared to Uses and Gratifications, one of the most popular theories of motivation in media-related literature that offers a set of categorical

motivations, SDT focuses on motivations that lie on a spectrum based on how much they fulfill innate psychological needs. This allows self-determination theory to make predictions about short term, versus long term, behavior, which is something that neither Uses and Gratifications nor TPB does. In the context of media usage, there are many reasons why one would want to differentiate short term versus long term behavior: from an industry perspective, behavioral continuance is correlated to profit and sustainability; from a societal perspective, the extent of behavior continuance of media shapes cultural practices; and from an individual perspective, depending on whether the particular media usage is something that he or she perceives as being positive or negative, is something that can help the individual from a learning perspective. For example, for a parent who wants their child to use a math game to learn multiplication, understanding self-determination theory, as opposed to any other theory of motivation, assists their understanding of what type of strategy to use in education, as they would want the child to keep playing the game for a longer period of time.

Self-determination Theory: Motivational Types

SDT identifies different types of motivation that lie on a continuum from extrinsic to intrinsic. *Extrinsic motivation* is when individuals engage in a behavior as a means for a certain goals or to comply with external forces, while *intrinsic motivation* is when individual engage in behaviors for the pleasure and satisfaction that is independent of external factors. This concept of gaming motivations as lying on a spectrum from extrinsic to intrinsic spectrum has also been used in identification of player styles in educational games (Heeter, 2008) and is distinct from the typology of motivations used in most game motivation research (e.g., Kahn et al., 2013; Yee, 2006a) in that it is based on a theory of fulfilling fundamental psychological needs rather than affordances of the medium (Ryan, Rigby, & Przylski, 2006).

In reality, most motivations are extrinsic, but there can be varying degrees to which the individual can transform external factors into inner values that he or she personally endorses. This concept is known as internalization, and is considered to be a proactive process (Deci, Eghrari, Patrick, & Leone, 1994). In comparison to habit, which is non-conscious, motivations, at least according to SDT, are conscious.

Within extrinsic motivation, SDT presents four different forms of regulation to differentiate degrees of internalization: external, introjected, identified, and integrated.

External regulation is when behavior is contingent on external stimuli, such as rewards or punishment. It is considered to be the most extrinsic of the four regulation types and is the type of reinforcement-based motivation that is described in operant conditioning. In a gaming context, for example, players who are extrinsically motivated are interested in activities such as getting points, leveling up, completing quests, and collecting items (Heeter, 2008). In SDT, it is considered to be a type of regulation that allows for very little autonomy, thus resulting in weak maintenance of behavior once the contingencies of reinforcement are removed. People who play multiplayer “social” games could be reinforced and punished by game mechanics such as points, but can also be reinforced by social factors, such as other players. For example, even if a person thinks a certain game is stupid, he or she may continue to play it for the sake of family members.

Introjected regulation is when individuals are driven by reinforcement but they are the ones who administer rewards or punishment on themselves. The behavior is still influenced by the contingencies of immediate reward or punishment, but it is self-administered. For example, an individual who wants to eat healthfully can reward themselves with a movie after eating vegetables, or punish themselves with chores after eating a candy. Although there is some internalization because the individual is in control of the contingencies, the behaviors that result

from introjected regulation are still low on the self-determination continuum because the behaviors are still relatively detached from the internal values. Introjected regulation, however, does not make much sense in the context of wanting to play games, although it may be a mechanism to discourage gaming behavior.

Identified regulation is when the individual poses a more long-term goal that is consistent with an underlying understanding of the value of the behavior, such as playing a game to improve a relationship or improve communication or collaboration skills. It is still extrinsic because the behavior is a means to get to the end goal, but it is the individual's choice to engage in the behavior, which is internally endorsed. In other words, when the behavior is identified, it is performed because it is valuable and important to the individual (Levesque, Copeland, & Sutcliffe, 2008). In the context of multiplayer online games, people may want to play the game to achieve positive relationship outcomes and develop social skills (Wohn et al., 2011).

Integrated regulation is when an individual engages in a behavior because it supplements his or her internal values. For example, an individual may want to play online multiplayer games because he or she thinks it is important to experience new entertainment technologies. It is different from intrinsic motivation, because it may not necessarily be something that is enjoyable, but it is the most internalized of the four types of extrinsic motivation because it is not associated with a specific goal. Many empirical studies, however, did not find support for this construct as being distinct from intrinsic motivation (e.g., Gardner & Lally, 2012; Markland & Tobin, 2004; Vallerand & Bissonnette, 1992).

Finally, intrinsic motivation, is when the behavior itself is enjoyable on its own. For example, people who like to explore new territories in virtual worlds because they find it fun would be considered as having intrinsic motivation (Heeter, 2008). This can be considered a

hedonic intrinsic motivation. There is also a type of intrinsic motivation that is based on the individual's desire to accomplish or fulfill something (Vallerand & Bissonnette, 1992). This accomplishment-oriented intrinsic motivation has mainly been studied in the context of education and is somewhat similar to identified regulation, except for the fact that there is no specific goal—the individual just has an abstract tendency to want to better themselves.

In the context of online games, scholars found that fulfillment of the three basic psychological needs—autonomy, competence, and relatedness—significantly predicted intentions to continue playing games, which was measured as how many months college students intended to continue playing an MMO (Ryan, Rigby, & Przylski, 2006). Fulfillment of the three psychological needs also was a significant positive predictor of intrinsic motivation, which was measured as enjoyment (Ryan, Rigby, & Przylski, 2006). However, the authors did not examine the direct effect of intrinsic motivation on intention to continue playing so it was not a direct test of self-determination theory. This may be why the regression coefficients for the three psychological needs variables prediction behavioral intention were very small (beta values < .16). Secondly, they only examined one type of motivation—intrinsic motivation—and did not examine other motivations on the self-determination continuum. Finally, they only considered conscious factors that predict behavioral intention, bypassing any effect of nonconscious processes, such as habit.

Testing Self-determination Theory Assumptions

This study addresses these three limitations in the following manner. First, it will test the basic assumptions of SDT in that the three basic psychological needs for autonomy, relatedness, and competence will predict self-determined motivation, and higher levels of self-determined motivation will be more strongly related with behavioral intention.

H5. Fulfillment of three basic psychological needs will positively predict self-determined motivation

H5a: Autonomy will positively predict self-determined motivation to play games.

H5b: Competence will positively predict self-determined motivation to play games

H5c: Relatedness will positively predict self-determined motivation to play games

H6. Self-determined motivations will be positively associated with intentions to continue playing online multiplayer games farther into the future.

CHAPTER 6: GENDER AND GENDER DIFFERENCES IN GAME PLAYING

MOTIVATION

Chapter 4 examined how the non-conscious construct of habit contributes to behavioral continuation intention, while Chapter 5 examined how the conscious construct of self-determined motivation contributes to behavioral continuation intention. Chapter 7 will examine how both conscious and non-conscious elements contribute to behavioral continuation intention. Before this, however, there are two important contextual elements that must be considered: gender and genre. The arguments in the previous chapters were mainly theoretical and drew from literature across different domains.

Because the theories describe the mechanisms of behavioral intention from a very fundamental level, there is nothing in the theories discussed that would suggest that they would apply to one domain and not another. However, this study is being conducted in the context of online multiplayer games, which have some substantial differences in regards to genre and gender. This chapter therefore will address these two factors and how they are theoretically relevant to the main variables of motivation, habit, frequency of past behavior, and self-identity.

Gender Differences

Many studies have documented gender differences when it comes to playing games (e.g., Cassell & Jenkins, 1998; Hartmann & Klimmt, 2006; Lucas & Sherry, 2004). In summary, scholars have found that males and females have different preferences for game genre, have different motivations for why they play, and significantly differ in terms of how much time they spend playing games. Although these differences have been found across numerous studies, only a few studies have tried to provide a theoretical explanation for why these gender differences

may exist. Here, we take a communication perspective, following Lucas and Sherry (2004), to explain gender differences through the understanding of social norms and stereotypes. One major difference, however, in formulating hypotheses based on this theoretical perspective, however, is that the landscape of game player demographics has substantially changed in the past ten years, namely the rise of “casual” games and with it, the increase of female game players (Wohn & Lee, 2013). As of 2013, 45% of all game players are female (Entertainment Software Association, 2013).

Although more females are playing games, they are not necessarily playing the same ones as males. Industry and research statistics suggest that there are major demographic differences in terms of game genres. MMOs have more male than female players. Williams, Yee, and Caplan (2008) found that the gender distribution in the MMO EQ2 was 80.8% male. Casual games, however, cater more for the female player: the average casual game player is a woman between 35 and 44 (Casual Games Association, 2012). It is thus important to empirically examine whether or not gender differences in motivation are still present in a landscape where females are just as likely to be game players as males.

Social motivation. Numerous studies, both in the context of games and other types of media, have found that females prefer social interaction over men. In a study of girls and women in Germany, Hartmann & Klimmt (2006) asked participants to rate fictional video games and found that females disliked games that lacked meaningful social interaction. In the context of social network games, Sung, Bjornrud, Lee, and Wohn (2010) also found that females were more likely to engage in social interaction such as exchanging gifts. While not interaction per se, Yee (2006b) found that female players of MMOs were significantly more likely to be driven by

relationship-related motivations than men. Based on prior research, we would thus expect to see gender differences in both SNGs and MMOs in regards to socially-related motivation:

H7. Females will have higher social motivations than males

Achievement motivation. The question of whether or not males are more competitive than females has been one of great interest of scholars in general. Certainly there has been an abundance of evidence suggesting that adult women tend to avoid competition (e.g., Niederle & Vesterlund, 2007; Vandegrift & Brown, 2005). Many of the studies examining gender differences in competition in a game-playing context are consistent with these theories. Yee (2006b) found that male MMO players were significantly more likely than female players to be driven by achievement-oriented motivations.

For example, Hartmann & Klimmt (2006) found that females were less attracted to competitive elements in videogames; games that had time pressure and any kind of conflict or threat in the narrative were defined as being competitive. They also measured males' and females' desire to compete and desire to win. Overall, males reported higher desire to win and higher desire to compete. However, in predicting use of different computer genres, the authors found that the desire to compete was only a significant predictor for first-person shooter games and strategy games— not for action adventure games or sports games. The need to win was only a significant predictor for first-person shooters. These results suggest that gender differences in competitiveness may be genre-specific.

Literature from the 1990s to early 2000s pointed to men enjoying competitive games more than women (see Lucas & Sherry, 2004). However, more recent studies suggest that while “nature” plays some role in shaping competitive behavior, cultural aspects, such as social norms,

also reduce or amplify gender disparities (Booth & Nolen, 2009). Although not in the context of game, Steele, Spencer, and Aronson (2002) found that stereotype threats about gender can strongly affect an individual's behavior in multiple contexts. This may be why many studies in sports show that women perform best when competing in teams of the same sex while men perform best in mixed-sex teams (Ivanona-Stenzel & Kubler, 2011).

In the case of casual SNGs, this stereotype threat is minimal. Although there are interpersonal interactions within the game, these interactions are mostly asynchronous and with people that the player already knows (Wohn & Lee, 2013). MMOs, on the other hand, pose a large stereotype threat. Scholars have documented gender discrimination taking place within MMOs. Moreover there is a pre-conceived notion that female players play in a different manner than males, which reinforces gender stereotypes when men play with female avatars. In fact, male players who were playing with a female avatar were found to engage in behaviors that were more reflective gender role stereotypes than actual females (Huh & Williams, 2009). We may thus see genre differences for gender differences in achievement-oriented motivations. Based on the rationale above:

H8. Females will have higher achievement motivation than males for SNGs

H9. Males will have higher achievement motivation than females for MMOs

Time. The data on gender differences in terms of time spent playing games is inconclusive and is not particular to any genre. Several studies have also found that men spent more time playing games than women (Ogletree & Drake, 2007). College males have also been found to spend more time playing games than college females (Lucas & Sherry, 2004). In explaining why males play more than females, scholars have suggested that certain

characteristics of games, such as competition and explicit goals, are more likely to appeal to males (Greenberg, Sherry, Lachlan, Lucas, & Holmstrom, 2010). Greenberg et al. (2010) found a significant difference in playing time between males and females, and suggested that rather than a biological or social explanation (Lucas & Sherry, 2004), it could be a content issue. In other words, they proposed that the videogames studied at the time were designed by males targeting males, and suggested that an increase in games designed specifically for females may increase more female engagement. The Greenberg et al. (2010) study was based on data collection prior to 2008. Content analyses of gender representation in games roughly around the same time indicate that character representations in games were oriented towards male players—for example, females were underrepresented and proportionally more sexualized than males (Ivory, 2006).

If the Greenberg et al. (2010) argument is valid, then we would expect to see gender differences in play time based on game genre due to the increase in the past few years of games targeting females. Between 2009 and 2013, there has been a surge of game releases targeting female players, mostly in casual games and casual SNGs (Casual Games Association, 2012; Wohn & Lee, 2013). Casual games do not have characters that reinforce gender stereotypes and/or have hypersexualized visualizations of game characters (Wohn, 2009), which may be one reason for their appeal to women. As mentioned above, Hartmann & Klimmt (2006) found that females disliked games that had characters portraying gender role stereotypes. We can thus hypothesize that for casual SNGs, women will spend more time playing these games than men:

H10. Females will spend more time playing casual SNGs than males

However, it is uncertain how this design-driven logic applies to MMOs. The majority of MMO players are men, which suggests that designers would be designing the game to cater to male players, yet Williams, Yee, and Caplan (2008) found that female players of the MMO EQ2 on average play slightly more hours per week (29 hours) than men (25 hours). It is therefore an open question as to whether or not men play more than women in MMOs.

RQ3. Are there gender differences in playing time in MMOs?

CHAPTER 7: THE REINFORCEMENT AND REPLACEMENT HYPOTHESES

Until now, this study has examined theoretical linkages between self-determined motivation and self-identity, habit and self-identity, self-identity and behavioral intention, and motivation and behavioral continuance intentions.

This section examines the relationship between habit, motivation, and behavioral intention. SDT posits a direct link between self-determined motivation and intention (H6) but it does not take into consideration non-conscious predictors of behavioral intentions. Here, this study presents two alternative hypotheses that address the relationship between self-determined motivations and habit in different ways: the reinforcement hypothesis and the replacement hypothesis.

The Reinforcement Hypothesis

The *reinforcement hypothesis* posits that habit can reinforce, or amplify the effect of motivation on behavioral intention. This hypothesis is based on reasoned action perspectives such as the theory of planned behavior (TPB; Ajzen, 1991) and SDT (Ryan & Deci, 2003). In explaining how habits fit into TPB, Ajzen and Fishbein (2000) argued that individuals do not consciously consider their behavioral, normative, and control beliefs prior to every instance of behavior, but rather that the attitudes, once established, are activated automatically. Thus even if the behavior is automatically activated the attitude is still very much intact (Ajzen & Fishbein, 2000; Ajzen, 2002).

This notion of conscious motivation as being something that is parallel to habit is supported by the fact that conscious processes and automatic processes guide behavior in tandem

(Bargh & Chartrand, 1999; Graybiel, 2008). Although it is true that conscious and automatic processes are governed by different areas of the brain, the brain is not a light switch that completely turns off one section when another section is activated (Graybiel, 2008).

SDT states that the extent of self-determination in the motivation will affect the likelihood of the individual being able to continue engaging in a behavior for a long period of time. This may be especially true for motivations that are not conscious. As noted earlier, SDT operates under the assumption that motivation is a conscious process, yet this assumption has been criticized by scholars examining the nonconscious processes underlying motivations (Levesque et al., 2008; Levesque & Pelletier, 2003).

Although these scholars do not speak of habit per se, their description descriptions of the nonconscious processes, “individuals are repeatedly exposed to situations where they feel autonomous and self-determined, they come to automatically associate various situations with feelings of autonomy” (p.220; Levesque et al., 2008), are essentially explaining the concept of mental habits that Verplanken (2010) discusses. In other words, if the habit was strongly associated with a particular motivation, then activation of the habit would also trigger the motivation.

Thus according to the reinforcement hypothesis, habit and self-determined motivations will interact such that the relationship between motivation and continuance behavioral intentions will be stronger for those with higher self-determination than those with lower self-determination.

H11a. Habit strength will moderate the relationship between video game motivation and video game continuance behavioral intentions. Stronger habits will strengthen the association between motivation and behavioral intention.

The Replacement Hypothesis

The second hypothesis is the *replacement hypothesis*. This hypothesis posits that conscious motivations are replaced by habit as habit strength increases (LaRose, 2010; Triandis, 1979). Conscious motivations, at least in the media literature, have been defined as desire to fulfill needs (Sherry, Lucas, Greenberg, & Lachlan, 2006) or to meet expected outcomes (LaRose & Eastin, 2004; LaRose, Mastro, & Eastin, 2001). In the habit literature, the most similar concept to motivations is goals, and there is neurological evidence that indicates a shift in brain activity when behavior adjusts from goal-directed behavior to habitual behavior (Tricomi et al., 2009) because the behaviors are governed by different regions of the brain.

Although this dissertation will not go deeply into the neurological mechanisms of habit, it is sufficient to note that the prefrontal cortex—the front part of the brain right behind one’s forehead—is responsible for cognitive control, the ability to orchestrate thought, and action in accordance with internal goals (see Miller & Cohen, 2001). The kind of “top-down processing” that the prefrontal cortex engages in is not critical for performing simple, automatic behaviors (Miller & Cohen, 2001). Habit learning, however, is processed primarily through the basal ganglia (Graybiel, 2008; Hilário, Clouse, Yin, & Costa, 2007; Yin & Knowlton, 2006), which is in control of automatic behaviors and thoughts. Studies that examined an interaction between intention and habit (e.g., Gardner, De Bruijn, & Lally, 2012; Ji & Wood, 2007; Limayem et al., 2007; Ouellette & Wood, 1998) in predicting subsequent behavior provide some support for the idea that habits can dissipate or even eliminate the role of motivation (Verplanken, 2010).

According to the replacement hypothesis, habit and self-determined motivations will have a negative interaction such that the stronger the habit, the lower the effect of self-motivation

will be on motivation. Thus as habit plays a moderating role such that as strength increases, the predictive power of motivation on behavioral continuation intentions decreases.

H11b. Habit will moderate the relationship between video game motivations and video game continuance behavioral intention. Stronger habits will weaken the association between motivation and behavioral intentions.

An Integrated Model

The previous sections examined the relationships between habit, self-identity, frequency of past behavior, and behavioral continuation intentions, as well as the interaction between self-determined motivation and habit in predicting behavioral intention. Based on the results of the hypotheses stated above, all independent variables will be included in the same model predicting behavioral continuation intention.

CHAPTER 8: METHODS

The study employed a survey design to test the hypotheses using cross-sectional data. Participants completed a web-based questionnaire that asked them about habit, self-identity, self-determined motivations, past behavior, and continuation intention in the context of their favorite online multiplayer game.

Data Collection

Participants were recruited through Mechanical Turk (MTurk). Mechanical Turk is an online task-completion system in which people can request others to perform a task and pay them without having to meet in person. In demographic surveys that workers in Mechanical Turk are very similar to data collected from traditional subject pools across a variety of research domains and that retention rates for panel surveys are high (see Shapiro, Chandler, & Mueller, 2013). In particular, a 2011 study found that MTurk users are slightly more diverse than the standard Internet sample demographic and significantly more diverse than a typical American college sample (Buhrmester, Kwang, & Gosling, 2011). All MTurk participants in this particular study were given \$.75 for their participation. This was slightly higher than the average running rate for MTurk participation.

Participants were recruited to two separate surveys. One was for massively multiplayer online games (MMOs) and one was for casual social network games. These two genres were chosen to recruit a variety of different players, as it is well-known that males are more likely to play MMOs and females are more like to play casual social network games (Entertainment Software Association, 2013). For both surveys, participants had to answer a few screening questions. The first was about whether or not they have played, or were currently playing an online multiplayer game or social network game. The second was their age, as to limit the study

to adults age 18 or older. A third screening criteria was to limit participants to those within the United States to prevent possible scamming activity and control for possible cultural differences that have been found to exist within the subject population (Lee & Wohn, 2012). Gender was used to “block” participants as to obtain a similar number of male and female participants.

Once participants met these criteria, they were directed to an online consent form and asked to choose their favorite MMO or social network game. Ten examples were given for both MMOs (e.g., World of Warcraft, Guildwars) and social network games (e.g., Candy Crush Saga, Words With Friends). If the participant’s favorite game was not among the ten examples, they could type in their game. The questions of the survey were thus tailored specifically to each participant based on their favorite game. For example, participants would be asked, “Think of your favorite game, [NAME OF GAME]” before answering sets of questions, and response items were also tailored (“Playing [GAME] is part of who I am”). This customization was to help participants focus on the same game throughout the survey.

Measures

Habit measures were automaticity items from the SRHI (Verplanken & Orbell, 2003). The choice to measure habit as automaticity is an effort to keep the conceptual and operational definitions consistent, because many scholars who defined habit as automaticity have still used frequency of past behavior as their measure of habit (e.g., Hartmann et al., 2012; Neal et al., 2011; Vitak, Crouse, & LaRose, 2011). The index includes confounding measures that do not pertain to automaticity as the authors designed the original scale to include history of past behavior (frequency of past behavior, time since adoption, and regularity) and self-identity expression in addition to automaticity indicators. Due to this multi-dimensional structure of the SRHI and in an attempt to shorten the scale, many scholars have critiqued the full measure

(Gardner, 2012; Sniehotta & Penseau, 2012) and have since used abbreviated versions of the SRHI by taking out the behavior and self-identity measures and just focusing on the automaticity dimension (for a meta-analysis related to physical activities, see Gardner, De Bruijn, & Lally, 2011). For example, Gardner and colleagues created a four-item automaticity subscale of the SRHI that showed automaticity and self-identity as distinct constructs (Gardner et al., 2012).

To fully elucidate on the three-factor structure of the SRHI, two original behavioral frequency measures (“I play [Game] regularly” and “I play [Game] frequently”) and three self-identity measures (“...is an important part of who I am,” “I think of myself as someone who plays X,” “It would be out of character for me not to play X”) from Gardner et al. (2012) as well as the item “...is part of my identity” were added to the SRHI to examine the factor structures of the items. The additional self-identity items and behavioral frequency items were added to even out the number of items for each of the three dimensions, as the SRHI has a disproportionate number of automaticity items in comparison to items related to self-identity and frequency of past behavior. The reason additional items were added was to have enough items in each dimension to properly run a factor analysis, as the lack of measures in a construct has been considered to be one of the reasons why the SRHI was found to be a one dimension construct in the past (see Gardner et al., 2012). All of the items were answered on a seven point scale from “strongly disagree” to “strongly agree.”

Explicating the SRHI: Empirical Distinction Between Habit, Self-Identity, and Frequency of Past Behavior

Principal axis factor analysis with Varimax rotation of the 12 SRHI items, four self-identity items, and two additional behavioral frequency items (“...something I do regularly,” “...something I do consistently” yielded three factors (see Table 1).

Table 1

Factor Loadings of Principal Axis Factor Analysis

	PAF (Full) Factors			PAF (cross-loadings removed) Factors		
<i>(Starting to play X is something...)</i>	1	2	3	1	2	3
<i>Self-report Habit Index</i>						
...I do frequently	.71	.27	.14	.69	.24	.17
...I do automatically	.44	.70	.15	-	-	-
...I do without having to consciously remember	.28	.80	.14	.28	.80	.16
...I do without thinking	.21	.88	.13	.22	.91	.16
...I start doing before I realize I'm doing it	.11	.80	.22	.16	.76	.24
...That would require effort not to do it	.11	.62	.48	-	-	-
...That is part of my routine	.62	.32	.30	.64	.27	.32
...I would find hard not to do	.19	.58	.51	-	-	-
...I have no need to think about doing	.24	.64	.21	.26	.63	.22
...That makes me feel weird if I do not do it	.15	.51	.57	-	-	-
...That's typically "me"	.60	.34	.41	-	-	-
...I have been doing for a long time	.57	.24	.27	.57	.20	.30
<i>Additional behavioral frequency measures</i>						
...That I do regularly	.89	.23	.13	.92	.18	.16
...That I do consistently	.83	.29	.19	.86	.24	.22
<i>Self-identity</i>						
... is an important part of who I am	.33	.20	.71	.25	.21	.80
I think of myself as someone who plays X	.57	.12	.44	-	-	-
It would be out of character for me not to play X	.39	.27	.67	.3	.28	.68
... is part of my identity	.33	.18	.76	.24	.20	.87

Frequency of past behavior items loaded most highly on the first factor, while those relating to automaticity loaded most highly on the second factor, and self-identity factors loaded most highly on the third factor. Several items, however, strongly cross-loaded on two different factors. Removing items that loaded above .4 on two factors yielded a clean three-factor structure, explaining a total of 70.17% of variance. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .90 and Bartlett's test of sphericity indicated a Chi-Square of 9057.07, $df = 66$, $p < .001$. Table 1 shows the results of the PAF analysis with all items and then with five cross-loaded items that loaded above .4 on two factors removed.

Factor structures generated by PCA were then re-examined using Confirmatory Factor Analysis (CFA) with the software package AMOS 20.0 to determine the conceptual coherence of the proposed factor structures (Figure 1).

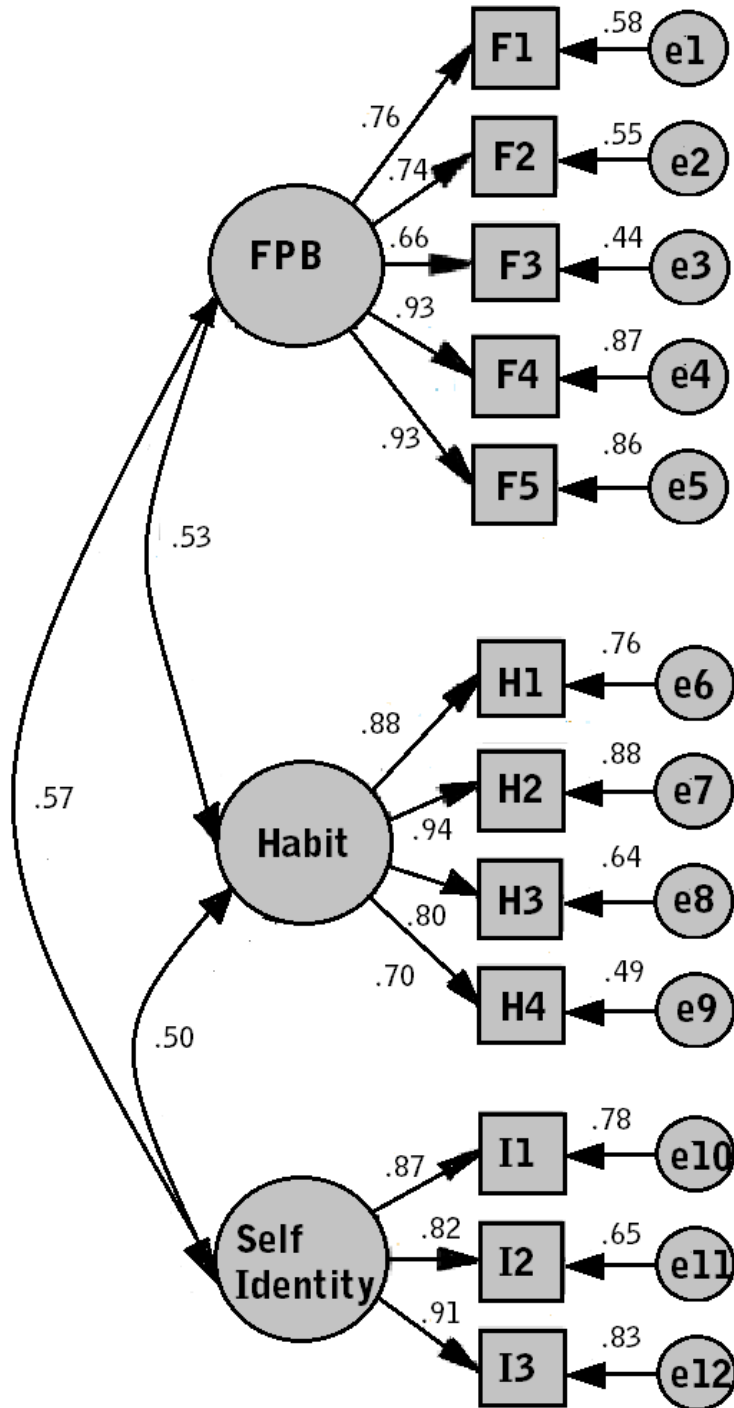
Table 2

Means and Standard Deviations of Individual Items

<i>(Starting to play X is something...)</i>	
...I do frequently	$M = 5.16, SD = 1.54$
...I do automatically	$M = 4.38, SD = 1.76$
...I do without having to consciously remember	$M = 4.22, SD = 1.82$
...I do without thinking	$M = 4.05, SD = 1.86$
...I start doing before I realize I'm doing it	$M = 3.49, SD = 1.92$
...That would require effort not to do it	$M = 3.32, SD = 1.84$
...That is part of my routine	$M = 4.44, SD = 1.80$
...I would find hard not to do	$M = 3.42, SD = 1.84$
...I have no need to think about doing	$M = 3.88, SD = 1.77$
...That makes me feel weird if I do not do it	$M = 3.07, SD = 1.80$
...That's typically "me"	$M = 4.31, SD = 1.71$
...I have been doing for a long time	$M = 4.83, SD = 1.72$
<i>Additional behavioral frequency measures</i>	
...That I do regularly	$M = 5.13, SD = 1.49$
...That I do consistently	$M = 4.87, SD = 1.60$
<i>Self-identity</i>	
... is an important part of who I am	$M = 3.05, SD = 1.73$
I think of myself as someone who plays X	$M = 4.81, SD = 1.61$
It would be out of character for me not to play X	$M = 3.48, SD = 1.80$
... is part of my identity	$M = 2.85, SD = 1.75$

Figure 1

Confirmatory Factor Analysis of Items for Frequency of Past Behavior (FPB), Habit, and Self-Identity That Were Derived From Principal Components Analysis



Notes. All factor loadings were significant at the $p < .001$ level. Estimates are standardized.

Model fit was evaluated using the Root Mean Square Error of Approximation (RMSEA)—which should be under .10 for a satisfactory model and .05 for an excellent model—and the Comparative Fit Index (CFI), which should be above .90 for a sufficient model (Kline, 1998). The three-factor structure ($\chi^2 = 384.11$, $df = 51$, $p < .001$) produced an acceptable model, CFI = .97, NFI = .96, RMSEA = .08. The model fit was consistent with Gardner et al. (2012) who found a two-factor solution with automaticity and self-identity items, which had a marginal CFI (.89) and RMSEA (.11). All of the factor loadings were significant at the $p < .001$ level.

Three variables were created based on the factor structure in Table 1. Frequency of past behavior ($M = 4.88$, $SD = 1.37$) was five items (Cronbach's alpha = .91), habit as automaticity ($M = 3.91$, $SD = 1.61$) was four items ($\alpha = .91$), and self-identity ($M = 3.09$, $SD = 1.60$) was three items ($\alpha = .90$).

Self-determined Motivations

Self-determination motivations were developed based on general MMO (Yee, 2002) and social network game motivations (Wohn et al., 2010; Wohn & Lee, 2013) that were re-worded to mirror existing self-determination motivation scales whenever relevant. The items addressed the different regulatory types. Social external regulation ($\alpha = .93$) pertained to reinforcement received from other players within the game (similar to the external regulation of physical activity behaviors in Gardner et al., 2012) while game external regulation was about reinforcement via game mechanics ($\alpha = .90$). Identified regulation ($\alpha = .94$) was about wanting have a social connection.

Intrinsic motivation was separated into two: following intrinsic motivations in academic contexts (Vallerand & Bissonnette, 1992), intrinsic accomplishment ($\alpha = .90$) was about one's feeling of pleasure when improving one's own performance, while intrinsic hedonic ($\alpha = .94$)

was a measure of pure enjoyment—this was the measure of intrinsic motivation used by Przybylski et al. (2010) in their study of self-determination in the context of MMOs.

Amotivation ($\alpha = .83$) referred to complete absence of motivation.

Table 3

Means and Standard Deviations of Individual Items and Motivation Scales (N = 1018)

Intrinsic accomplishment	<i>M</i> = 4.76, <i>SD</i> = 1.42
Because the game allows me to experience a personal satisfaction in my quest for excellence	<i>M</i> = 4.78, <i>SD</i> = 1.80
For the pleasure I feel when performance improves	<i>M</i> = 5.13, <i>SD</i> = 1.66
To feel a sense of mastery	<i>M</i> = 4.64, <i>SD</i> = 1.86
To feel a sense of accomplishment	<i>M</i> = 4.74, <i>SD</i> = 1.82
For the pleasure I experience when I surpass my own top score	<i>M</i> = 4.92, <i>SD</i> = 1.79
For the satisfaction I feel when accomplishing a difficult level	<i>M</i> = 5.14, <i>SD</i> = 1.67
Identified	<i>M</i> = 3.52, <i>SD</i> = 1.71
To feel connected with a specific group	<i>M</i> = 3.42, <i>SD</i> = 1.95
To feel like I am a part of a group	<i>M</i> = 3.40, <i>SD</i> = 1.90
To feel like I am part of a community	<i>M</i> = 3.50, <i>SD</i> = 1.95
To develop social connections with others	<i>M</i> = 3.88, <i>SD</i> = 1.96
Because I want to maintain relationships	<i>M</i> = 3.40, <i>SD</i> = 2.00
External: Social	<i>M</i> = 2.42, <i>SD</i> = 1.49
Because I am under pressure from others	<i>M</i> = 2.39, <i>SD</i> = 1.59
Because people expect me to	<i>M</i> = 2.39, <i>SD</i> = 1.64
Others will not be pleased if I don't	<i>M</i> = 2.20, <i>SD</i> = 1.52
People keep remind me	<i>M</i> = 2.80, <i>SD</i> = 1.84
External: Game	<i>M</i> = 4.33, <i>SD</i> = 1.81
To complete missions	<i>M</i> = 4.19, <i>SD</i> = 2.12
To unlock game elements	<i>M</i> = 4.45, <i>SD</i> = 2.07
To collect more items or badges	<i>M</i> = 3.80, <i>SD</i> = 2.05
Intrinsic hedonic	<i>M</i> = 6.02, <i>SD</i> = 1.01
To enjoy myself	<i>M</i> = 6.16, <i>SD</i> = 1.05
To have fun	<i>M</i> = 6.19, <i>SD</i> = 1.06
Because it makes me feel happy	<i>M</i> = 5.72, <i>SD</i> = 1.25
Amotivation	<i>M</i> = 2.98, <i>SD</i> = 1.52
I don't see the point of playing this game	<i>M</i> = 2.55, <i>SD</i> = 1.63
I think playing this game is a waste a time	<i>M</i> = 2.79, <i>SD</i> = 1.80
I could care less about this game	<i>M</i> = 3.59, <i>SD</i> = 1.92

The first factor (intrinsic accomplishment) explained 17.81% of variance, the second factor (identified) explained 15.74% of variance, the third factor (external social) explained 13.80% of variance, the fourth factor (external game) explained 10.45% of variance, the fifth factor (intrinsic hedonic) explained 10.15% of variance, and the sixth factor (amotivation) explained 8.9% of variance. In total, the explained variance of the six factor solution was 76.88%. The complete list of items and factor loadings of principal components analysis are in Table 2. The means and standard deviations of the individual items are reported in Table 3. For the single-items composite measure of self-determined motivation, the subscales were combined by multiplying different “weights” to the regulatory types (Markland & Tobin, 2004). External regulation was assigned a weight of (-2), identified regulation has a weight of (+2), intrinsic motivation a weight of (+3), and amotivation a weight of (-3).

Gaming continuation intention items asked the individual about their intent to continue using the technology (Bhattacharjee, 2001; Limayem et al., 2007). Three items asked about intention in three different time frames. The items were: “I intend to continue playing [Game] in the next...” followed by “week,” “month,” or “3 months.” Participants could rate these statements on seven-point Likert-type scale from “Very unlikely” to “very likely.” Two items gave participants a hypothetical scenario: “If a new game came out, what are your intentions to continue playing your current favorite game?” Participants could then select from a seven-point semantic differential scale that ranged from “Weak intentions to continue” to “Strong intentions to continue,” and “Likely to switch to new game” to “Unlikely to switch to new game.” All behavioral continuation intention items were on seven-point Likert-type scales. Analyses used a composite five-item measure that averaged the five items. MMO players had significantly higher

behavioral continuation intentions ($M = 5.62$, $SD = 1.27$) than SNG players ($M = 5.42$, $SD = .20$) although both were well above the mid-point of the scale, $t(951) = -2.55$, $p < .05$.

Participants also answered a number of questions about themselves, such as gender, age, race, education level, and household income. Participants were asked to select their favorite game from a list of popular games, or type in the name of their favorite game if it was not on the list. All game-related questions were thus about their favorite game, by repeatedly telling participants to think about their favorite game. The survey was designed so that any reference to the name of the game was the name of their favorite game that they provided at the beginning of the survey.

Participants also provided descriptive information related to their current favorite game, such as time spent playing their favorite game per session, how many people they actively play with in the game, and how long they had been playing the game. Due to a similar item in the SRHI (“I have been doing X for a long time”), length of game play was not included in regression models with the SRHI. Exact question and response items are in Appendix A.

CHAPTER 9: RESULTS

Descriptive Statistics

The surveys were posted on Mechanical Turk at 1pm EST and were completed by 8pm the same day. Male participants filled up the quota more quickly than females. Twelve cases were deleted because of systematic missing data, which was operationalized as having two or more blank answers in a row. On average, participants took about 10 minutes to complete the survey, with completion times ranging from five to 20 minutes.

Age of participants ranged from 18 to 70 ($M = 28.94$, $SD = 8.68$, Median = 27); the mean was slightly younger than the average game player (32 years old) according to the Electronic Software Association. The majority of participants were white (81.4%), followed by Asian (10.3%), Black (6.5%), American Indian or Alaska Native (1.8%), and Pacific Islander (.3%)—the percentages do not total 100% because some participants chose more than one race. Only 6.5% of participants self-identified as being Hispanic. On average, participants ($N = 1011$) reported that they completed 15.8 years of formal education ($SD = 2.27$, Median = 16). In terms of the highest academic level completed ($N = 1,011$), most participants had completed a 4-year college (37.2%), followed by high school (32.6%) and 2-year college (21.8%). There were also 52 individuals who held a Masters degree, eight who had an MBA or JD, and four who had a doctoral degree. Eleven individuals had graduated from middle school. Only 504 participants reported their household income. Of those who reported their household income, 18.8% were under 20,000 a year, 32.4% were 20,000 to less than 40,000 a year, 30.4% were 40,000 to less than 80,000 a year, 9.1% were 80,000 to less than 100,000 a year, and 2.8% were 150,000 or more a year. Due to the large amount of missing data, household income was not included in further analysis.

Game Descriptive Statistics

Participants were asked to select their favorite game and answer game-related questions specifically about that game. Participants could write in their favorite game if their choice was not available. For MMOs, the most popular game participants reported as being their favorite was *World of Warcraft* (39.1%), followed by *League of Legends* (12.7%), *Star Wars: The New Republic* (6.9%), *Guild Wars* (5.8%), and *Maple Story* (3.8%). Several game titles that were “multiplayer” but not “massively multiplayer,” such as *League of Legends*, *Halo online*, and *Team Fortress*, were removed from analysis to be consistent with the conceptual definition of MMOs.

For casual social network games, *Words With Friends* (28%) was reported as being the most popular with participants, followed by *Candy Crush Saga* (25.9%), *Draw Something* (11.9%), *Farmville* (8%), *Texas Hold'em Poker* (7.2%), *Tetris Battle* (4.7%), and *Plants vs. Zombies Adventure* (4.3%). Compared to MMOs, casual SNGs were more diverse in genre, ranging from simple arcade games to word, card, strategy, and simulation. A full list of the games that participants reported can be found in Appendix B. A table of Pearson Product-Moment correlations among all variables can be found in Appendix C.

Differences Between Casual SNGs and MMOs

There were statistically significant differences between casual SNG players and MMO players in terms of how frequently they played the game in a typical week ($t(938) = 3.81, p < .001$), how frequently they played the game in the previous week ($t(938) = 4.36, p < .001$), time spent per game session ($t(938) = -30.43, p < .001$), and how long they have been playing the game ($t(938) = -9.37, p < .001$). Casual SNG players reported higher frequency of game play in a typical week than MMO players but spent less time per session than MMO players. On average,

MMO players had been playing their favorite game for a longer period than casual SNG players (see Table 4).

Table 4

Differences in Basic Game-Play Variables Between Casual SNGs and MMOs

	Casual SNG ($n = 515$)	MMO ($n = 425$)
Frequency of game play in past week	$M = 2.88, SD = 1.45$	$M = 2.48, SD = 1.31$
Frequency of game play in a typical week	$M = 3.11, SD = 1.40$	$M = 2.78, SD = 1.28$
Time spent per session	$M = 2.30, SD = 1.05$	$M = 4.54, SD = 1.20$
How long they have been playing the game	$M = 6.38, SD = 2.13$	$M = 7.66, SD = 2.01$

Prior experience. The MMO players in this study ($n = 425$) had mostly been playing their favorite game for a long time- about 62.8% said they had been playing for a year or more. In comparison, the casual SNG players who participated in this study ($n = 515$) had played their favorite game for a shorter duration than the MMO players. About 54% of players had been playing their favorite SNG for less than six months; 17% had been playing the game between six months and one year, and about 29% had been playing for more than one year (Table 5).

Table 5

How Long User Has Been Playing Their Favorite Game (Percentage)

	Casual SNGs	MMOs
1 week or less	1.0	.5
More than 1 week but less than 2 weeks	2.3	.9
At least 2 weeks but less than 4 weeks	6.2	2.4
At least 1 month but less than 2 months	9.7	9.0
At least 2 months but less than 4 months	18.9	7.5
At least 4 months but less than 6 months	15.8	5.2
At least 6 months but less than 8 months	11.9	6.8
At least 8 months but less than 1 year	5.4	5.9
1 year or more	28.8	61.8
Total	100.0	100.0

Time spent. When asked how much time they spend playing the game in a typical session, which was explained as the time between when the player logs on and off, most MMO players said they spent more than an hour but less than 2 hours (34.9%), followed by those who played more than two hours but less than three hours (29.7%). About 15% said they played more than 30 min. but less than an hour, 2% played more than 10 minutes but less than 30 minutes. There were also 39 players (9.2%) who said they played between three and four hours, and 37 players (8.7%) who played four hours or more.

On the other hand, most casual SNG players (42.2%) spent more than 10 minutes but less than 30 minutes during each game session, with the majority (88.7%) of player spending less than one hour per session. There were 45 individuals (8.8%) who played more than one hour but less than two hours, seven who played between two and three hours, two who played between three and four hours, and four individuals who played four hours or more (Figure 2). The difference in time spent per session was significantly different between SNGs and MMOs, $t(952) = -30.51, p < .001$.

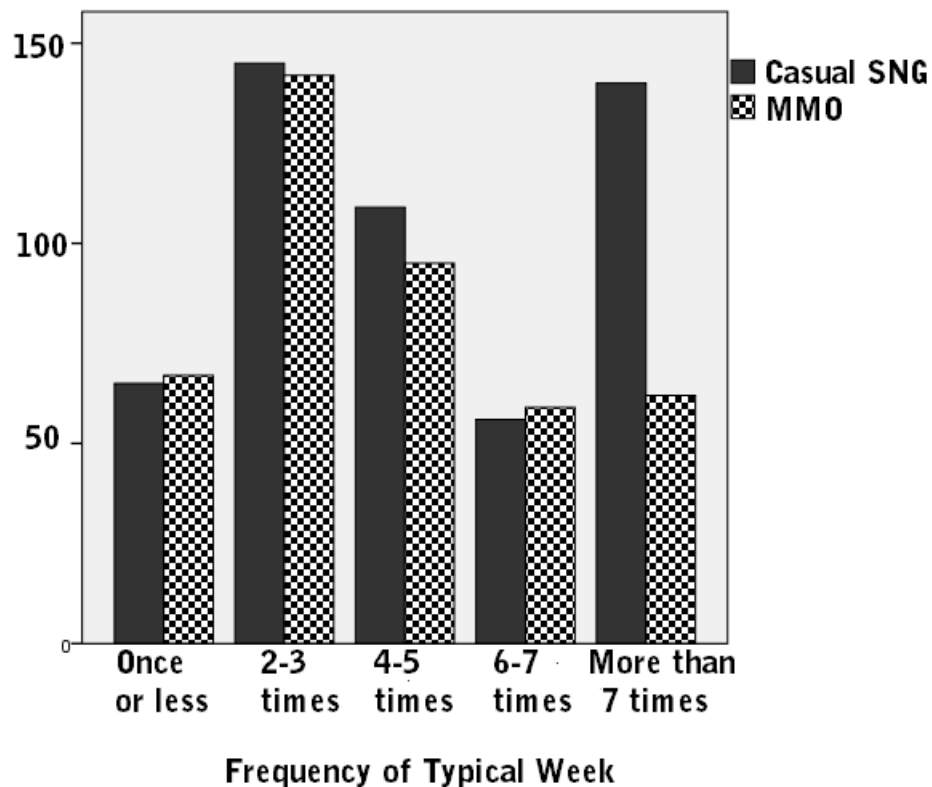
Frequency of past behavior. When asked about how frequently they play their favorite game in a typical week, almost half of all MMO players (49.3%) played three or less times a week. In contrast, in a typical week, 27% of casual SNG players played more than seven times, 10.9% played six or seven times, and 21.2% played four or five times (Figure 2).

Self-determined motivations. T-test comparisons of means indicated that there were significant differences in motivations between casual SNG players and MMO players. SNG players were more likely to be amotivated ($M = 3.23, SD = 1.55$) than MMO players ($M = 2.68, p < .001$), $t(952) = 5.58, p < .001$. SNG players were also significantly more likely to play because of social obligations ($M = 2.57, SD = .53$) than MMO players ($M = 2.22, SD = .42$),

$t(952) = 3.60, p < .001$. MMO players had higher intrinsic hedonic motivation (playing for enjoyment; $M = 6.19, SD = .93$) than SNG players ($M = 5.88, SD = 1.06$), $t(952) = -4.61, p < .001$. MMO players also had higher intrinsic accomplishment motivation ($M = 5.02, SD = 1.29$) than SNG players ($M = 4.52, SD = 1.51$), $t(952) = -5.50, p < .001$. MMO players reported higher motivations for external motivations related to game mechanics (e.g., wanting to earn badges, complete missions; $M = 5.20, SD = 1.31$) than SNG players ($M = 3.63, SD = 1.86$), $t(952) = -14.73, p < .001$.

Figure 2

Frequency of Behavior in a Typical Week for Casual SNG Players and MMO Players



Hypothesis Testing

Habit and frequency of past behavior. H1 posited that habit strength has a curvilinear relationship with habit, such that habit is positively associated with frequency of past behavior strength before habit is formed, and that once habit is formed, the relationship would not exist. To test this, Pearson product-moment correlations were conducted between the habit and three different measures of frequency of past behavior: the behavioral frequency items in the SRHI, frequency of behavior in the past week, and frequency of behavior in a typical week (Tables 6 and 7).

Table 6

Pearson-Product Moment Correlations Between Frequency of Past Behavior and Habit Strength for MMO Players (n = 439)

	1	2	3	4
1.Habit strength	1	.57***	.27***	.29***
2.Freq. past behavior (from SRHI)		1	.53***	.56***
3.Freq. past behavior (last week)			1	.82***
4.Freq. past behavior (typical week)				1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7

Pearson-Product Moment Correlations Between Frequency of Past Behavior and Habit Strength for Casual SNG Players (n = 515)

	1	2	3	4
1.Habit strength	1	.50***	.26***	.27***
2.Freq. past behavior (from SRHI)		1	.49***	.49***
3.Freq. past behavior (last week)			1	.86***
4.Freq. past behavior (typical week)				1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The following correlations used the frequency of past behavior measure that was a subset of the SRHI. Frequency of past behavior moderately correlated with habit, $r(1018) = .53, p < .001$. For a more nuanced examination of the relationship between frequency of past behavior and habit, habit was divided into three groups based on quartiles. Correlation with frequency of past behavior and habit for the weak habit group was $r(262) = .21, p < .001$. The correlation between frequency of past behavior and habit for the strong habit group was $r(478) = .45, p < .001$, suggesting that counter to H1, the relationship between the two variables did not diminish over time.

This conclusion was further supported with a regression curve estimation between habit and frequency of past behavior. An asymptotic logistic curve, $F(1, 1016) = 348.93, p < .001$, R square = .26 did not fit the data better than a linear equation, $F(1, 1016) = 397.75, p < .001$. Curve estimations were also run with the data split for the two different genres. For MMO players, the regression of frequency of past behavior on habit had the more explained variance for a linear model, $F(1, 501) = 222.97, p < .001$, R square = .31) than a logistic model, $F(1, 501) = 190.49, p < .001$, R square = .28. For casual SNG players, the linear model, $F(1, 513) = 170.08, p < .001$, R square = .25 was slightly higher than the logistic model, $F(1, 513) = 155.65, p < .001$, R square = .23. H1 was thus weakly supported for casual SNGs but not for MMOs.

Self-identity and frequency of past behavior. H2 posited that frequency of past behavior is positively associated with self-identity. A Pearsons-Product Moment correlation among variables for both casual SNGs (Table 8) and MMOs (Table 9) using, again, three different measurement of frequency of past behavior, showed that self-identity and frequency of past behavior was significantly related. Results indicated that the association was strongest when operationalizing frequency of past behavior as a very generic frequency of past behavior (e.g., “I do X

frequently,” “I do X regularly”) as opposed to actual frequency in a specific time frame, such as last week. Thus subsequent analyses employed the generic measure of frequency of past behavior.

RQ1a inquired about whether or not self-identity and habit were distinct in the context of gaming behavior. Results from the exploratory and confirmatory factor analyses in Table 1 and Figure 1 suggest that these two constructs are distinct. RQ1b asked about the strength of relationship between self-identity and habit. The correlation between the two variables was moderate for both MMOs ($r = .53, p < .001$) and casual SNGs ($r = .46, p < .001$).

Table 8

Pearson-Product Moment Correlations Between Frequency of Past Behavior and Self-Identity for Casual SNG Players (n = 515)

	1	2	3	4
1.Self-identity	1	.54***	.22***	.19***
2.Freq. past behavior (from SRHI)		1	.49***	.49***
3.Freq. past behavior (last week)			1	.86***
4.Freq. past behavior (typical week)				1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 9

Pearson-Product Moment Correlations Between Frequency of Past Behavior and Self-Identity for MMO Players (n = 439)

	1	2	3	4
1.Self-identity	1	.62***	.38***	.39***
2.Freq. past behavior (from SRHI)		1	.53***	.56***
3.Freq. past behavior (last week)			1	.82***
4.Freq. past behavior (typical week)				1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Predicting intention with FPB, habit, and self-identity. H3 and H4 posited that habit strength and self-identity would be positively associated with behavioral continuation intention. RQ2 inquired into how frequency of past behavior would affect the habit- intention link and self-identity- intention link. Correlations for both casual SNG players (Table 10) and MMO players (Table 11) indicated that habit, frequency of past behavior, and self-identity were all positively correlated with each other and positively correlated with behavioral continuance intention. For both SNG and MMO players frequency of behavior had the strongest correlation to intention.

Table 10

Pearson-Product Moment Correlations Between Frequency Of Past Behavior, Habit, Self-Identity, And Intention for Casual SNG Players (n = 515)

	1	2	3	4
1.Intention (Next week)	1	.64***	.30***	.36***
2.Freq. past behavior		1	.50***	.54***
3.Habit			1	.46***
4.Self-identity				1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 11

Pearson-Product Moment Correlations Between Frequency of Past Behavior, Habit, Self-Identity, and Intention for MMO Players (n = 439)

	1	2	3	4
1.Intention (Next week)	1	.65***	.31***	.49***
2.Freq. past behavior		1	.57***	.62***
3.Habit			1	.53***
4.Self-identity				1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

To examine how these three variables predicted intention after controlling for one another, an Ordinary Least Squares (OLS) regression tested the effect of habit, frequency of past behavior,

and self-identity on intention to play games the next week. The same series of regressions was used for SNGs and MMOs separately. The first regression model had only habit and self-identity as independent variables. The second model added frequency of past behavior to examine the “residual effect” (RQ2a; Ajzen, 2001). The third and fourth models examined the possible moderating role of frequency of past behavior (RQ2b): the third had an interaction between frequency of past behavior and self-identity. The fourth model had an interaction between frequency of past behavior and habit.

Results for SNG players indicated that in a model with just habit and identity, habit was the only significant predictor of intention, $F(2, 512) = 10.26, p < .001$. Collinearity statistics indicated that the variables were acceptable in the same model. The VIF was 1.3 for habit strength, 1.28 for self-identity, and 1.09 for frequency of past behavior. However, when frequency of past behavior was added to the model, habit became insignificant and self-identity became a negative significant predictor, albeit a weak one, $F(3, 511) = 66.09, p < .001$. The change in R square between the first and second was significant at the $p < .001$ level.

Model 3 added an interaction between self-identity and frequency of past behavior, $F(4, 510) = 51.60, p < .001$, an improvement from the previous model at the $p < .05$ level. The interaction was significant, meaning that the negative effect of identity on intention was smaller with the increase of frequency of past behavior. All collinearity statistics were tolerable with VIFs under 1.99.

Adding the habit-frequency of past behavior interaction to Model 2 was only a slight significance change at the $p < .05$ level, $F(4, 510) = 57.94, p < .001$. Habit strength was no longer a statistical predictor but there was a significant interaction. All variables VIFs were under 1.8.

The final model added interactions between habit and frequency of past behavior, and self-identity and frequency of past behavior, $F(5, 509) = 40.60, p < .001$. Variables were centered when creating the interactions. The overall model did not significantly improve and neither of the interactions were statistically significant. Table 12 has the beta coefficients and statistical significance indicators for these models.

Table 12

Predicting Behavioral Intention in the Next Week with Frequency of Past Behavior, Habit Strength, and Self-Identity for SNG Players

	1	2	3	4	5
Habit strength	.16**	-.04	-.04	-.05	-.04
Self-identity	.06	-.18***	-.15**	-.17***	-.15**
FPB		.38***	.56***	.58***	.56***
Habit x FPB				-.09*	-.03
Self-identity x FPB			-.11*		-.08
Adjusted R ²	.04	.28	.28	.28	.28

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The same regressions were conducted on MMO players. The first model with only habit and self-identity showed that only self-identity was a positive predictor of behavioral continuation intention, $F(2, 436) = 36.72, p < .001$. Adding frequency of past behavior in the second model significantly improved the model at the $p < .001$ level, $F(3, 435) = 78.64, p < .001$. The model adding the self-identity and frequency of past behavior interaction significantly improved from the previous model at the $p < .001$ level, $F(4, 434) = 64.04, p < .001$. Frequency of past behavior was still the strongest predictor, although habit strength was a significant negative predictor and self-identity was a significant positive predictor. There was a negative interaction

between self-identity and frequency of past behavior such that the higher the frequency of past behavior, the lesser the effect of self-identity.

The fourth model examined the interaction between habit and frequency of past behavior, $F(4, 434) = 63.76, p < .001$. Frequency of past behavior was the strongest positive predictor, habit was a negative significant predictor, and identity was a positive significant predictor. There was also a negative interaction between habit and frequency of past behavior, meaning that the negative effect of habit was dampened with stronger past behavior.

The final model including both interactions was significant, $F(5, 433) = 51.54, p < .001$. The VIFs for variables in all models were under 2.12. None of the interactions, however, were statistically significant. The main effect of frequency of past behavior was still strong. Self-identity was positively associated with intention while habit strength was negatively associated with intention (Table 13).

Table 13

Predicting Behavioral Intention in the Next Week with Frequency of Past Behavior, Habit Strength, and Self-Identity for MMO Players

	1	2	3	4	5
Habit strength	.02	-.04	-.18***	-.19***	-.19***
Self-identity	.37***	-.18***	.15**	.12*	.14**
FPB		.38***	.55***	.56***	.55***
Habit x FPB				-.15***	-.07
Self-identity x FPB			-.15***		-.09
Adjusted R ²	.14	.35	.36	.36	.37

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Predicting self-determined motivation with basic psychological need fulfillment variables.

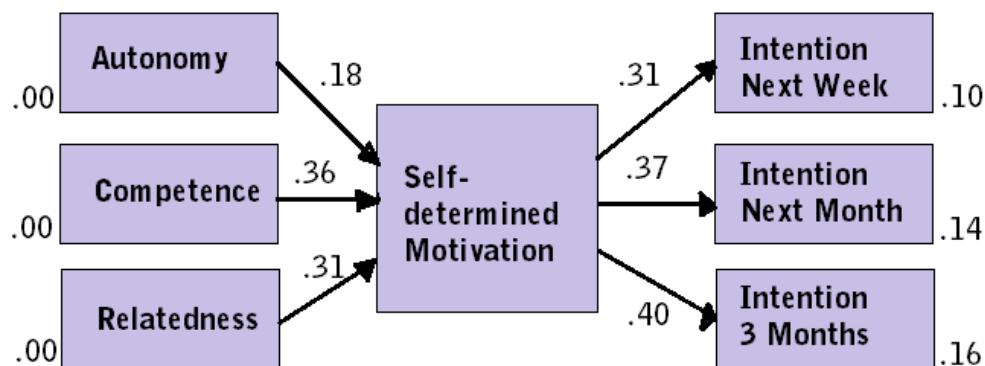
H5 posited that fulfillment of the three basic psychological needs discussed in SDT would positively predict motivation. H6 said that motivations higher in self-determinism will be

associated with long-term intentions. First, these hypotheses were tested with structural equation modeling using AMOS 20.0 using the composite self-determined motivation scale. The model had autonomy, competence, and relatedness predicting self-determined motivation. Self-determined motivation then predicted intention to continue gaming for the next week, next month, and next three months.

The model was moderately good fit, $\chi^2 = 43.54$, $df = 9$, $p < .001$, CFI = .99, RMSEA = .06. Need fulfillment of autonomy, relatedness, and competence were all significant predictors of self-determined motivation at the $p < .001$ level (see Fig. 3), supporting H3a, H3b, and H3c. The three basic psychological needs explained about 35% of variance of self-determined motivation.

Figure 3

Testing Basic Assumptions of Self-Determination Theory



Note. Regression weights are standardized.

Predicting behavioral continuance intention with self-determined motivation. Self-determined motivation was also a significant predictor of intention, regardless of timeframe, at the $p < .001$ level (H4). Post-hoc analyses comparing the difference in chi-square values between models by constraining paths between self-determined motivation and intention indicated that the differences in estimates between intention for next week, next month, and three months, were statistically significant at the $p < .001$ level (Table 14).

Table 14

Chi Square Values When Paths are Constrained

“Intention next week” constrained to 1	“Intention next month” constrained to 1	“Intention 3 months” constrained to 1	Chi square
Yes	No	No	3903.932, df = 11
Yes	Yes	No	3970.83, df = 11
Yes	No	Yes	3983.36, df = 11
No	No	Yes	3525.25, df = 10
No	No	No	43.62, df = 9
No	Yes	No	3900.39, df = 10

In other words, self-determined motivation was the strongest predictor for gaming continuation intention that covered behavior farther into the future than intention that was more short-term. This was very consistent with the basic assumptions of self-determination theory. Self-determined motivation explained 10% of variance of intention for next week, 14% of variance of intention for next month, and 16% of variance for intention for next three months. Figure 3, showing just exogenous variables, displays the regression weights and overall variance explained.

An alternative test of H5 was conducted by using the spectrum of motivations as separate variables as independent variables and a five-item composite scale of continuation intention as

the dependent variable. The model was significant, $F(6, 1010) = 46.67, p < .001$, adjusted $R^2 = .21$. Only intrinsic hedonic motivation ($\beta = .22, p < .001$) and intrinsic accomplishment motivation ($\beta = .16, p < .001$) were significant positive predictors of intention to continue playing one's favorite game. Amotivation ($\beta = -.19, p < .001$) was a significant negative predictor. None of the other motivations, however, were statistically significant indicators of intention (Table 15). The variables that were significant in the model were consistent across genre.

Table 15

OLS Regression Model Predicting Behavior Continuance Intention with Different Types of Motivation

	Genres Merged		MMO		SNG	
	Beta ¹	t	Beta ¹	t	Beta ¹	t
(Constant)		12.42***		7.98***		7.99***
Intrinsic hedonic	.22***	6.69	.18***	3.74	.23***	4.94
Intrinsic accomplishment	.16***	4.29	.18**	3.16	.12*	2.20
Identified	.06	1.57	.09	.179	.08	1.64
External social	.02	.55	.00	.07	.00	.04
External game	.03	.93	-.01	-.19	.08	1.67
Amotivation	-.19***	-5.92	-.19***	-4.18	-.20***	-4.46
Adjusted R ²	.21		.19		.21	
F stats (df)	46.67 ***	(6, 1010)	20.84***	(6, 496)	24.34***	(6, 508)

Note. * $p < .05$, ** $p < .01$, *** $p < .001$, ¹ Coefficients are standardized

Gender and genre differences in motivation. To test hypotheses related to gender, a series of 2 x 2 factorial ANOVAs examining main effects for gender, as well as interaction effects of gender and genre, was conducted on four different motivations: identified motivation (desire to

be social) and external social motivation were considered “social” motivation. Intrinsic accomplishment and external game motivation were considered achievement-related motivations.

H7 posited that females will have higher social motivations than males. There was no expected genre interaction. For external social motivation (motivated because others require you to play), there was a main effect of genre, $F(1, 1014) = 9.36, p < .001$, but no main gender effect, $F(1, 1014) = .29, p = .60$. There was also no nor gender by game interaction, $F(1, 1014) = 1.59, p = .21$. For identified motivation, there was a significant genre effect, $F(1, 1014) = 4.37, p < .05$. MMO players had higher identified motivation ($M = 3.9, SE = .08$) than SNG players ($M = 3.2, SE = .07$). There was no main gender effect, but there was an interaction $F(1, 1014) = 4.4, p < .05$. With casual SNG players, males had higher identified motivation ($M = 3.41, SE = .10$) than females ($M = 3.01, SE = .11$). H7 was not supported.

H8 posited that females will have higher achievement motivation than males for SNGs while H9 hypothesized that males will have higher achievement motivation than females for MMOs. For intrinsic accomplishment motivation, there was only a main effect of genre, $F(1, 1014) = 28.81$ and no main effect of gender, $F(1, 1014) = 2.24, p = .14$, nor interaction effect, $F(1, 1014) = 2.22, p = .14$. For external regulation related to game mechanics, there was a significant main effect of genre, $F(1, 1014) = 179.14, p < .001$. This indicates that MMO players were far more driven by game mechanics ($M = 5.03, SE = .07$) than casual SNG players ($M = 3.6, SE = .07$).

There was also a significant main effect of gender, $F(1, 1014) = 6.57, p < .05$. Female MMO players ($M = 4.47, SE = .07$) reported higher levels of external game regulation than males ($M = 4.2, SE = .07$). These results were inconsistent with the hypothesis of males being more

achievement oriented than females. H9 was not supported. Table 16 reports the means and standard deviations of motivations by genre and gender. When the motivation types were put into a composite scale with weights, there were no differences in self-determined motivation between males and females, $F(1, 1014) = .31, p = .58$. There was a significant difference for genre, $F(1, 1014) = 21.58, p < .001$. MMO players reported higher self-determined motivation than SNG players. There was no gender by genre interaction, $F(1, 1014) = .30, p = .59$.

Table 16

Means and Standard Deviations of Self-Determined Motivations by Genre and Gender

Motivation Type	Genres Merged		SNG		MMOs	
	Male (<i>n</i> = 515)	Female (<i>n</i> = 503)	Male (<i>n</i> = 260)	Female (<i>n</i> = 255)	Male (<i>n</i> = 255)	Female (<i>n</i> = 248)
Self-determined motivation	16.80 (9.67)	17.13 (9.68)	15.25 (10.15)	15.91 (9.75)	18.37 (8.89)	18.38 (9.46)
Intrinsic	5.98 (1.04)	6.07 (.98)	5.77 (1.12)	6.01 (.97)	6.19 (.90)	6.14 (.98)
Hedonic	4.69 (1.39)	4.82 (1.45)	4.39 (1.50)	4.66 (1.52)	5.00 (1.20)	5.00 (1.36)
Intrinsic accomplishment	3.61 (1.65)	3.43 (1.76)	3.41 (1.65)	3.01 (1.66)	3.82 (1.63)	3.85 (1.76)
Identified	2.45 (1.49)	2.40 (1.50)	2.65 (1.53)	2.48 (1.55)	2.25 (1.43)	2.31 (1.44)
External social	4.19 (1.80)	4.46 (1.80)	3.46 (1.77)	3.81 (1.94)	4.94 (1.51)	5.12 (1.36)
External game	3.05 (1.53)	2.90 (1.50)	3.28 (1.58)	3.17 (1.52)	2.82 (1.44)	2.62 (1.43)
Amotivation						

Gender differences in time. H10 posited that females would spend more time playing casual SNGs than males. There were, however, no significant differences between gender, $t(513) = -.52, p = .60$. Female SNG players ($M = 2.28, SD = 1.0$) played just as long as male players ($M = 2.33, SD = 1.11$). There were also no gender differences in time spent playing MMOs, $t(437) =$

-1.31, $p = .20$. Males ($M = 4.61$, $SD = 1.20$) did not significantly play more than females ($M = 4.46$, $SD = 1.20$). H10 was not supported.

Testing the moderating effect of habit. Two alternative hypotheses were posted in H11, examining the moderating effect of habit between self-determined motivation and behavioral continuance intentions. H11 was tested with an Ordinary Least Squares regression model, with habit and composite self-determined motivation scale as the main predictors and an interaction between habit and self-determined motivation to examine moderation by multiplying the variables after centering. The regression was not run separately for genre as the composite level of self-determination did not significantly differ between the two genres, as discussed in the previous section. The dependent variable was the individual's intention to continue playing the game, using the five-item composite intention scale. Age, gender, number of people they actively play with in the game, time spent on the game per session, were considered as controls. Results (Table 17) show a positive, significant relationship between habit and intention, and self-determined motivation and intention. There was a significant negative interaction between habit and self-determined motivation.

Table 17

OLS Regression Model Predicting Intention to Continue Playing Games

	Intention
Gender	.07*
Age	.12***
Game friends	.09*
Time per session	.04
Habit	.39***
Self-determined motivation	.49***
Habit x Self-determined motivation	-.25**
F stats	52.45***
Adjusted R ²	.43

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

To further examine the nature of this interaction, both habit and self-determined motivation were re-coded into three levels—low, medium, and high—based on quartiles. The low and high groups represented the lower and upper quartiles, respectively. Using the general linear model function, a 3 (self-determined motivation) x 3 (habit) between-subjects factorial ANOVA was calculated comparing the gaming continuation levels of participants. Gender, age, number of active game friends, and time per session (the same demographic variables as those used in the regression above), were covariates (Table 18).

Table 18

ANOVA Results Predicting Gaming Continuation Intention

Source	Type III Sum of Squares	df	F	Sig.	Partial Eta Squared
Corrected Model	417.057 ^a	12	31.91	.000	.277
Intercept	665.534	1	611.12	.000	.380
Gender ¹	7.310	1	6.71	.010	.007
Age	20.023	1	18.39	.000	.018
Game friends	15.268	1	14.02	.000	.014
Time per session	3.231	1	2.97	.085	.003
Self-determined motivation	101.422	2	46.57	.000	.085
Habit	123.428	2	56.67	.000	.102
Motivation x Habit	28.001	4	6.43	.000	.025
Error	1087.944	999			
Total	32550.720	1012			
Corrected Total	1505.002	1011			

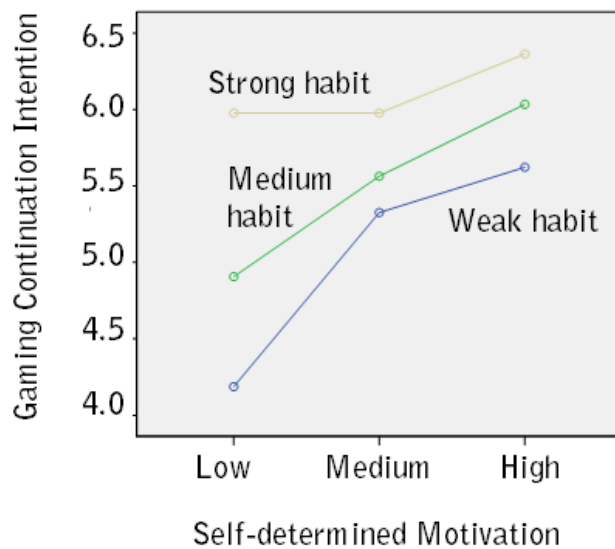
¹ 1= male, 2=female

Consistent with the regression results, the main effect for self-determined motivation was significant, $F(2, 999) = 46.57$, $p < .001$. Individuals with low self-determined motivation had

significantly lower levels of intention ($M = 5.02$, $SE = .07$, CI 95% [4.88~ 5.17]) than those with medium self-determined motivation ($M = 5.63$, $SE = .05$, CI 95% [5.53~ 5.72]), which in turn had lower levels of intention than individuals with high self-determined motivation ($M = 6.0$, $SE = .07$, CI 95% [5.87~ 6.14]). The main effect of habit was also positively significant, $F(2, 999) = 56.67$, $p < .001$. Individuals with weak habit had lower levels of continuation intention ($M = 5.05$, $SE = .07$, CI 95% [5.18~ 5.33]) than those with medium habit ($M = 5.50$, $SE = .05$, CI 95% [5.40~ 5.60]). The intention level of those with medium habit were significantly less than that of strong habit individuals ($M = 6.11$, $SE = .07$, CI 95% [5.97~ 6.25])

Figure 4

Interaction Between Self-Determined Motivation and Habit in Predicting Gaming Continuation Intention



Finally, the interaction was significant, $F(4,999) = 6.43$, $p < .001$. Figure 4 shows the nature of the interaction effect. Once a habit is formed (strong habit), the level of motivation did not significantly alter the individual's intention to continue playing games. For medium and

weak habit levels, however, increase in self-determined motivation significantly increased gaming continuation intention (Table 18, Figure 4).

For medium motivation individuals, the difference in intention was not statistically significant between those with low and medium habit, but was significantly different between those with medium and strong habit. For those with high motivation, the difference in habit was not significant between low and medium, and medium and high, but the difference was significant between strong and weak habit (Table 19).

Table 19

Means and Standard Deviations of Gaming Continuation Intention per Group

Habit	Self-determined motivation	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Weak (<i>n</i> = 251)	Low (<i>n</i> = 67)	4.19	.13	3.93	4.44
	Medium (<i>n</i> = 135)	5.33	.09	5.15	5.50
	High (<i>n</i> = 49)	5.62	.13	5.37	5.88
Medium (<i>n</i> = 507)	Low (<i>n</i> = 137)	4.901	.09	4.73	5.09
	Medium (<i>n</i> = 250)	5.56	.07	5.43	5.69
	High (<i>n</i> = 120)	6.03	.10	5.84	6.23
Strong (<i>n</i> = 254)	Low (<i>n</i> = 66)	5.98	.15	5.69	6.27
	Medium (<i>n</i> = 109)	5.98	.10	5.79	6.17
	High (<i>n</i> = 79)	6.36	.12	6.13	6.60

Note. Covariates appearing in the model are evaluated at the following values: Gender, age, how many people do you actively play with in the game, and time per session.

In conclusion, there was partial support for H11a—habit significantly strengthened the relationship between self-determined motivation and behavioral continuation when motivation was low, but when motivation was medium or high, there was significant differences when

looking at strong and weak habit, but not when comparing low and medium habit (in the case of medium and high motivation) or medium and strong habit (in the case of high motivation).

H11b was fully supported in that regardless of motivation, strong habits were a significant predictor of gaming continuation intention.

Integrated Model

An integrated model with habit, self-identity, self-determined motivation, and frequency of past behavior was constructed to predict behavioral continuation intention. Separate models were run for SNG players and MMO players. A hierarchical modeling process was taken to see the added effect of variables. The first model contained basic demographic variables as controls. The second model added habit, self-determined motivation, self-identity, and the habit-motivation interaction identified above. The third model added past behavior.

SNG players. For SNG players (Table 20), the first model $F(4, 505) = 18.37, p < .001$ indicated that age, being female, and how many people the player actively interacts with in the game are all significant predictors. The second model adding habit, self-identity, self-determined motivation, and the habit-motivation interaction was significantly improved from the prior model at the $p < .001$ level, $F(8, 501) = 29.52, p < .001$. It showed that habit, self-determined motivation, and self-identity are all positive predictors of intention, with motivation being the strongest indicator. The significant interaction between habit and motivation suggested that positive effect of motivation became weaker as habits grew stronger.

The final model, $F(9, 500) = 48.77, p < .001$, was significantly better than the second model at the $p < .001$ level. It indicated that when past behavior was added, the effect of habit (as automaticity) was no longer statistically significant. Self-determined motivation, however, was

still a positive indicator of intention. Of the demographic variables, age and gender (being female) were still significantly associated with behavioral continuation intention.

Table 20

Integrated Model Predicting Behavioral Continuation Intention to Play One's Favorite Casual SNG

	1	2	3
Gender		.17***	.14***
Age		.12**	.11**
Game friends	.18***	.07	.00
Time per session	.18***	-.02	-.03
Habit			.02
Self-determined motivation	.20***	.33***	.28
Self-identity	.04	.48***	-.07**
Habit x Self-determined motivation		.17***	-.13
Freq. Past behavior		-.25*	.54***
Adjusted R ²	.12	.31	.46

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

MMO players. For MMO players (Table 21), the first model indicated that older players were more likely to continue playing their favorite game and people who had more in-game connections were more likely to continue playing, $F(4, 433) = 10.76, p < .001$. The importance of in-game friends, however, disappeared in Model 2, $F(8, 429) = 25.71, p < .001$. Habit did not have any effect on continuation intention nor was there an interaction effect with motivation. Only self-determined motivation and self-identity were positive predictors. However, these effects were also washed away when frequency of past behavior was added in Model 3, $F(9, 428) = 41.52, p < .001$. Unlike SNGs, gender did not have any effect on continuation intention throughout the three models.

Table 21

Integrated Model Predicting Behavioral Continuation Intention to Play One's Favorite MMO

	1	2	3
Gender	-.01	-.04	-.04
Age	.11***	.06	.01
Game friends	.26***	.07	.03
Time per session	.06	.00	-.06
Habit		.18	-.15
Self-determined motivation		.38***	.11
Self-identity		.32***	.15
Habit x Self-determined motivation			.04
Freq. Past behavior		-.18	.57***
Adjusted R ²	.08	.31	.46

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

CHAPTER 10: DISCUSSION

This study incorporated two different theories in predicting behavioral continuation intention of playing a multiplayer online game. The first theory, the Triandis (1979) theory of habit, examined non-conscious processes in predicting behavioral continuation intention. The construct of habit, which has discrepant conceptual and operational definitions in the literature, was explicated to distinguish habit (as a form of automaticity) from frequency of past behavior and self-identity. The second theory, self-determination theory (Ryan & Deci, 2000), represented conscious choice processes in predicting behavioral continuation intention. A self-determination index was developed specifically for the context of multiplayer online gaming. The predictive strength of variables in each of these theories was examined separately and integrated into a final model that also included an interaction between habit and self-determined motivations. Separate analyses for casual social network games and massively multiplayer online games suggested that context does matter.

In the context of playing multiplayer online games, frequency of past behavior and habit strength had a linear, rather than loglinear relationship, which brings light to the fact that Lally et al. (2010) found an asymptotic curve for only 40% of the individuals in their study. This suggests that gaming behavior may be part of the 60% that did not show a curvilinear relationship between the two constructs. This could be related to how much potential frequency can be spent doing that particular behavior. For example, drinking water in the morning (Lally et al., 2010) was more or less a finite behavior, whereas playing games has a wider range in terms of the potential opportunity for frequent behavior. This explanation would be more consistent with the findings of Ouellette and Wood (1998), who also found that when frequency of opportunities to perform the behavior (high incidence behaviors), past behaviors predicted future behavior more

than intention. However, even though the two genres of games had significant difference in terms of how frequently people played the games, neither of them were truly constrained behaviors. Future research could try to compare games that one would probably not do more than once (such as an exercise game) with those that can have potential for more game play throughout the day (such as simple mobile games).

Another explanation for the absence of a loglinear relationship between frequency of past behavior and habit strength could be because of the between-subjects cross-sectional data. A more accurate method of determining this relationship would be to add an element of a within-subjects design and measure individuals over several time points. Lally et al. (2010) was able to track people's habits for at least three months, but the habits that were documented in this study varied by individual and were mostly individual behaviors in that they could be performed by the individual without the help of others. Examining the same behavior across participants—one that requires a strong social component—would be a future direction that would complement this study and the Lally et al. (2010) study.

Testing of basic self-determination theory mechanisms indicated full support of the theory. Explained variance of behavioral continuation intention by self-determined motivation was less than 20%, which was consistent with the explained variance of self-determined motivation in other studies (e.g., Przybylski et al., 2001). Moreover, the composite self-determined motivation scale was a better predictor for long-term intention than short-term intention.

While these findings seem, at a glance, to provide strong support for self-determination theory, the empirical results when using self-determination theory to predict behavior continuation intention indicate that the theory explains very little of intention when taking into

consideration people's level of habit. Of note, when comparing individuals with medium motivation and high motivation, that extra motivation is not significant unless the individual has at least an moderate level of habit, suggesting that in order to achieve high intention, higher motivation doesn't necessary provide any booster effects if one already has a strong habit. However, even if one has a strong habit, there was a significant difference between those with low motivation and high motivation. This has many theoretical and practical implications for both motivation and habit.

The absence of an effect of habit in MMOs (Table 20) may be due to the complex nature of MMOs in terms of how much social interaction is required. Especially compared to SNGs, which are more simplistic in nature, MMOs have stronger social features, such as synchronous collaboration, text-based communication, and voice communication. SNGs, however, have very weak social features—communication is mostly asynchronous and mediated through the system. For example, instead of directly conversing with someone in the game, SNG players exchange messages that are pre-designated by the system. The lack of intimate communication behavior, while it may encourage emotional bonding over a long period of time (Wohn et al., 2011) may reflect how SNGs are not “actually social.” The fact that SNG players reported higher external social motivations (playing because others require them to) further supports this notion of “faux-social” interaction within SNGs. MMO players, on the other hand, while driven by strong game-related factors, such as points and badges, still had much higher identified motivation (wanting to play for companionship) compared to SNG players. It could be that these social dynamics interrupt the non-conscious process of habit.

Future studies may be able to get at the nuance of social interactions vs. repetitive behavior by looking at the role of habit and motivation within a single game genre. Compared to

games that do not involve social components, online multiplayer games contain many different features that support different behaviors within the game. Social media is a collection of features that may serve very different purposes (Smock, Lampe, Ellison, & Wohn, 2011) and prior research has found that even within the same technology, different features correlate differently with habit depending on the level of cognitive effort involved (Wohn et al., 2012). For example, in an MMO, there are very “mindless” behaviors of repetitively killing monsters in a forest to achieve points. This type of game play may have a very strong habitual component. However, collaborating with 30 other players to defeat a very strong monster requires both communication and coordination skills that require more conscious choice. Moreover, even in a collaboration situation, being a leader versus being a follower may vary strongly in terms of both motivation and habit.

Implications

From a theoretical perspective, it appears to be critical to include non-conscious processes such as habit into models predicting behavioral intention. Especially for individuals with strong habit, not including habit may give the false illusion of the main effect of self-determined motivation. However, results suggest that in comparison to expected outcomes, self-determined motivations explain far more variance and are less deterred by habit when habit is entered into the model. Past studies have consistently found that expected outcomes account for less than 20% of intention, and habit “takes over” when it is added to the model. In this study, however, self-determined motivations still had a moderately strong effect on intention even after habit was added to the model. This implies that in comparison to generic expected outcomes, self-determined motivations explain more variance of intention.

From a practical perspective, whether that be to make money off of people playing games or developing games for prosocial or educational purposes, building habit seems to be key for people to continue playing the game. However, when people have a weak habit, self-determined motivations—in particular, intrinsic ones—may help boost continuation intentions. The model examining the relationship between the different types of motivation and game continuance behavioral intentions indicated that intrinsic motivation was a positive predictor and amotivation was a negative predictor. This was very consistent with self-determination theory and previous studies that only used intrinsic-hedonic measures as a proxy of self-determined motivation. However, external regulation—reinforcement through social connections or through the game—was not negatively related to intention. This may seem somewhat counter to self-determination theory, but it could be that in the context of gaming, external regulation is an underlying mechanism to behavior that makes it somewhat different from other contexts such as exercising or flossing one's teeth because the social and game mechanics reinforcement is originally part of the activity. For example, engaging in so-called “social” behavior is almost requisite of these multiplayer online games (Wohn & Lee, 2013). It could also be that the positive or negative effect of external regulation was “washed out” because participants had varied experiences with their favorite game of choice. Further examination is needed to see why external regulation in a gaming context does not affect people's continuation intention.

The SRHI has been criticized for being a multi-dimensional structure, yet scholars have failed to use all three constructs in the same analyses. By separating automaticity from frequency of past behavior and self-identity, this study begins to show the complex relationship between these factors. Of note, one item on the SRHI that directly measures automaticity (“...is automatic”) cross-loaded on frequency of past behavior and automaticity factors, and was thus

eliminated in the scale constructions of those constructs. This item, however, was found to be a strong measure of automaticity by Gardner, Abraham, Lally, & De Bruijn. (2012), who distinguished automaticity from frequency of past behavior through discriminant content validation, which involves statistical analysis of people who rate items by their face validity.

Since this method is based on face validity, it is thus unsurprising that the literal item of the behavior as being automatic was part of the automaticity scale. The analysis in this study, however, was based on response patterns, and may thus reflect how people nonconsciously feel about a behavior as being “automatic”—most importantly that the cross-loading of this item reflects how difficult it is to conceptually disentangle automaticity and frequency of past behavior.

Although not the main focus of this dissertation, it is also important to consider that the measure of frequency of past behavior used in the analyses was not a single measure of frequency, but included other behavioral components introduced in the SRHI, such as behavioral regularity. This is somewhat different from the single-item approach that other habit scholars have taken in asking participants about their behavior in the past week (e.g., Gardner, De Bruijn, & Lally, 2012; Gardner, Abraham, Lally, & De Bruijn, 2012). One of the problems of asking about frequency of past behavior in a specific timeframe, such as a week, is that the particular week may have been atypical due to external circumstances. The frequency of past behavior measure used in this study enables individuals to provide a response that better reflects their perception of that behavior in general, at the cost of being unspecific about the timeframe.

Although much of the habit literature has focused on the non-conscious, or automaticity component, it could very well be that scholars are missing out on a more holistic concept of habit by dismissing behavioral factors as being completely separate from automaticity. One variable

that did not play a large part in this study was self-identity. Although previous studies have found a direct link between self-identity and behavioral intentions, only a few of those studies (e.g., Ouelette & Wood, 1998; Ajzen, 2011) took into consideration frequency of past behavior.

The results of gender difference in motivation provided evidence to suggest that the idea that gender differences found in earlier research had less to do with biological differences and more to do with social norms as suggested by Lucas & Sherry (2004), as the results related to casual social network games were opposite of what had been found in prior research. Not only were females playing the games more frequently, they were also more driven by points and in-game mechanics than males. Moreover, men were more likely to be playing to maintain social relationships than women.

Why do the gender results differ from prior research? It could be because social network games require less 3D mental rotation skills, which women biologically lack in comparison to men (Lucas & Sherry, 2004). This would make the games more accessible to women, thus the balance in skill enables them to become competitive. It could also be that females on Mechanical Turk are more tech-savvy than the normal female game player, which could be why participants' motivations could manifest without the impairment that lack of skill may influence. Another explanation could be that prior studies, which focused on college students, were biased samples. Although this study was certainly not a nationally representative sample, there was much more variation in terms of age. Future studies may want to explore gender differences in tandem with age; for example, how is competitiveness related with age for both genders?

Limitations

One of the limitations of this study was the convenience sample of Mechanical Turk users. It is thus important not to interpret some of the results, such as the descriptive of how people play games, too much beyond the scope of this sample. However, this study was more interested in learning theoretical linkages between variables in the context of games rather than trying to understand the technology itself. While there have been extensive studies of habit and motivation in the context of health, there have been fewer studies examining these variables and using both the theoretical framework of habit and self-determined motivation in a media usage context. Replication with other media types is necessary to find further support for the theories tested in this study.

Another limitation is that participants answered questions based on their favorite game. The focus on a specific game would have enhanced participants' ability to recall their behavior and make specific predictions regarding intention, but it may not reflect their gaming behavior in general—thus results of this study should not be seen as something that represents generic gaming behavior but rather as a finite context in which to test theoretical linkages between variables. For example, the gender differences that were detected among players of casual social network games but not MMOs are something that should be of future empirical work; it could be that the prior studies of MMOs are in need of revisiting.

CHAPTER 11: CONCLUSION

From this study, we found general support for self-determination theory when looking only at conscious processes. However, once we start looking at non-conscious processes, the role of motivation notably diminishes. Although habit can have a magnifying effect, especially for those who have low motivation, once habits become strong, different levels of motivation really do not make differences in terms of predicting behavioral continuation intention. Although results have yet to be replicated in the context of other types of media, these results provide insights into many practical implications, especially for technologies that we want people to continue using, such as those for education or health. The findings from this study would suggest that a strong habit, combined with high self-determined motivation, is the best “pairing” in terms of indicating whether or not a person will continue their behavior. The amplifying effect of habit adds to the importance of non-conscious processes in addition to conscious (motivation) processes in predicting behavioral intention.

APPENDICES

APPENDIX A: ANNOTATED QUESTIONNAIRE

[Annotations are made in brackets]

Welcome!

Thank you for agreeing to share your experiences playing massively multiplayer online (MMO) games. [MMO was replaced with social network game (SNG) for the SNG questionnaire]. Please answer all questions truthfully to the best of your knowledge. There are no right or wrong answers and your responses will be completely anonymous.

Among the *MMO* games that you played in the last two months, which was your *favorite* game? Please select one.

World of Warcraft

Shaiya Online

Guild Wars

Star Wars: The Old Republic

Neverwinter

Elder Scrolls Online

Lord of the Rings Online

Other (please specify in the space provided) _____

Gaming patterns

The following questions are about how frequently you play XXX. For each of the questions, please select the statement that best describes your experience.

[Frequency of Past Behavior]

During the *past week*, how frequently did you play XXX?

-Once or less

-Two or three times

-Four or five times

-Six or seven times

-More than seven times

In a *typical week*, how frequently do you play XXX?

-Once or less

-Two or three times

-Four or five times

-Six or seven times

-More than seven times

How frequently did you play XXX *in the past month*?

-4 or more times a day

- 2 or 3 times a day
- Once a day
- More than 2 times a week but not every day
- Twice a week
- Once a week
- Twice during the past month
- Once during the past month

In a *typical week*, how frequently do you play XXX?

- 4 or more times a day
- 2 or 3 times a day
- Once a day
- 3 or more times a week but not every day
- Twice a week
- Once or less

How much time do you spend *per session* playing XXX?

- 10 min. or less
- More than 10 min. but less than 30 min.
- More than 30 min. but less than 1 hour
- More than 1 hour but less than 2 hours
- More than 2 hours but less than 3 hours
- More than 3 hours but less than 4 hours
- 4 hours or more

How likely do you think you will be playing XXX in the future? Please rate the following statements from 1 (Very Unlikely) to 7 (Very likely)

- I will be playing XXX for the next week.
- I will be playing XXX for the next month.
- I will be playing XXX for the next 3 months.
- I will be playing XXX for the next 6 months.

Tell me more about how you play XXX. Which of the following statements best reflects your gaming pattern?

- I mostly play alone
- I equally play alone and with other people
- I mostly play with other people

[Self-Report Habit Index (SRHI)]

Think of when you *start* playing XXX and the circumstances in which that happens. Please answer the extent to which you agree or disagree with following items from 1 (strongly disagree) to 7 (strongly agree).

“When I start to play XXX, it is something...”

- I do frequently.
- I do automatically.
- I do without having to consciously remember.
- I do without thinking.
- I start doing before I realize I’m doing it.
- That would require effort not to do it.
- I would find hard not to do.
- I have no need to think about doing.
- That makes me feel weird if I do not do it.
- That belongs to my daily/weekly/monthly routine
- That’s typically “me.”
- I have been doing for a long time.
- That I do regularly [added item]
- That I do consistently [added item]

If you are still paying attention to this survey, please choose 5.

[Self-identity] Gaming and life

The following questions are about how important games are in your life.

Think about your favorite game, XXX. Please answer the extent to which you agree or disagree with following items from 1 (strongly disagree to 7 (strongly agree)).

Playing XXX is an important part of who I am
I see myself as a fan of XXX
I like to think of myself as someone who plays XXX
It would be out of character for me not to play XXX
Playing XXX is part of my identity

[Basic Psychological Need Fulfillment] Games and Feelings

The following section is about how playing XXX makes you feel. Please rate the statements from 1 (not at all true) to 7 (very true)

When I am playing XXX,

- I feel free to be who I am
- I can pretty much be myself
- I don’t have any obligations to other players
- I feel pressured by other players
- I have to do what I am told
- I feel like I can do what I want
- I feel like a competent person
- I feel very capable
- I feel a sense of mastery

When I am playing XXX,

- I feel a sense of accomplishment
- I feel like I know what I'm doing
- I feel connected with other people
- I feel a lot of closeness with other people
- I feel a sense of community
- I feel like other people care about me

[Self-determined Motivations] Gaming reasons (random item order)

The following statements are reasons that you may or may not play XXX. Please rate the statements from 1 (Not at all true for me) to 7 (Very true for me)

Why do you play XXX?

- Other people say I should
- Others will not be pleased with me if I don't
- I'm under pressure from others to play
- People keep reminding me to play
- To collect more items or badges
- To complete more missions or quests
- To get more points
- To feel a sense of accomplishment
- To feel a sense of mastery
- To prove to myself that I am capable

Why do you play XXX?

- Because I value social interactions
- Because I want to maintain relationships
- To feel like I'm part of a group
- To feel connected with a specific group
- To feel like I'm part of a specific community
- To have fun
- To enjoy myself
- Because it makes me feel happy

Why do you play XXX?

- For the pleasure that I experience when I surpass my own top score
- For the satisfaction I feel when I am in the process of accomplishing a difficult level
- Because the game allows me to experience a personal satisfaction in my quest for excellence
- For the pleasure I experience when my game performance improves
- I could care less about playing XXX
- I don't see the point of playing XXX
- I think playing XXX is a waste of time

The following section is basic questions about you.

What is your gender?

- Male
- Female

What year were you born in?

What is your race? (Select all that apply)

- White
- Black or African American
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Other Pacific Islander
- Other

Are you Hispanic?

- Yes
- No

Of the people you actually play with, how many of those people do you consider actual friends?

Excluding kindergarten, how many years of formal education have you completed?

_____years

What is the highest academic level that you completed?

- Middle school graduate
- High school graduate
- Graduated 2-year college / technical /vocational school
- Graduated 4-year college
- Holds advanced degree

Which best describes your current occupational status? Check all that apply

- Full-time employed
- Part-time employed
- Self-employed
- Not employed
- Retired
- Homemaker
- Other

APPENDIX B: FREQUENCY OF PARTICIPANTS' FAVORITE GAME ¹

Table 22

Frequency of Participants' Favorite Game

Casual SNG players	MMO players
Words with Friends (144) Candy Crush Saga (133) Draw Something (61) Farmville (41) Texas Hold'em Poker (37) Tetris Battle (24) Plants vs. Zombies Adventure (22) Diamond Dash (4) Pet Rescue Saga (4) Scrabble (4) Ruzzle (3) Castleville (2) Airport City (1), Backgammon (1), Beat Hazard (1), Bingo Blitz (1), Dawn of the Dragons (1), Double Down Casino (1), Empire Wars (1), Family Feud (1), Fruit Ninja (1), Full Bloom (1), Guess the Movie (1), Hover Kart Racing (1), It Girl, Jurassic Park Builder (1) , Kingdoms of Camelot (1), Live Uno (1), Mafia Wars (1), Online Poker (1), Papa Pear Adventure (1), Parallel Kingdom: Age of Ascension (1), Puzzles and Dragons (1), Restaurant Story (1), Sims FreePlay (1), Song Pop (1), Sorority Life (1), Superhero City (1), Wordfeud (1), You Don't Know Jack (1), Zombie Café (1)	World of Warcraft (197) League of Legends* (64) Star Wars: The New Republic (35) Guildwars (29) Runescape (21) Maple Story (19) Lord of the Rings Online (17) Neverwinter Nights (17) Elder Scrolls (12) EVE Online (8) Rift (6) Diablo 3 (4), Everquest (4), Tera (4) Aion (3), Defiance (3), D&D Online (3), Final Fantasy 11 (3), Team Fortress* (3) Call of Duty* (2), Diablo 2* (2), Final Fantasy XIV: A Realm Reborn (2), Halo* (2), Marvel Heroes (2), Ragnarok (2) Diablo* (1), Diablo LOD (1), Beatkeeper* (1), Counterstrike* (1), Endless Online (1), Entropia Universe (1), Evony Age 2(1), Forsaken World (1), Grepolis (1), Guild Wars 2 (1), Kingdom of Loathing (1), Lineage 2(1), Lost Saga (1), Mabinogi (1), Minecraft (1), Monopoly City Streets (1), Path of Exile (1), Phantasy Star Online 2(1), PokeMMO (1), R.O.S.E. Online (1), Realm of the Mad God (1), Shaiya Online (1), Runes of Magic (1), Seafight (1), Seven Seas Saga (1), Spiral Knights (1), Starcraft 2* (1), Ultima Online (1), Uncharted Waters Online (1), Vindictus (1), Wartune (1), Wizard 101 (1)

¹ Games that were deleted from analysis because they are multiplayer games, not massively multiplayer games, are marked with an asterisk

APPENDIX C: PEARSON PRODUCT-MOMENT CORRELATIONS AMONG VARIABLES

Table 23

Pearson Product-Moment Correlations Among Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Habit strength	-	.57***	.53**	.11*	.24***	-.06	.30***	.27***	.18**	.44***	.27***	.21***
2. Freq. past behavior	.50***	-	.62***	.24***	.34***	.13**	.45***	.31***	.40***	.45***	.34***	.06
3. Self-identity	.46***	.54***	-	.14**	.32***	.01	.34***	.40***	.22**	.48***	.41***	.26***
4. Time per session	.02	.12**	.17**	-	.24***	.09	.21***	.10*	.16**	.10*	.13**	-.03
5. Game friends	.14**	.32**	.17**	.03	-	-.01	.27***	.42***	.18***	.18***	.46***	.18***
6. Autonomy	-.02	.14**	-.04	.08	.03	-	.40***	-.16**	.31***	.09	-.18***	-.45***
7. Competence	.17**	.37**	.24**	.08	.21**	.49**	-	.15**	.45***	.53***	.18***	-.07
8. Relatedness	.20***	.26***	.39***	.17***	.24***	-.13**	.17***	-	.11**	.31***	.95***	.45***
9. Intrinsic hedonic	.08**	.45***	.14**	.13**	.20***	.39***	.46***	.08	-	.48***	.12**	-.21***
10. Intrinsic accomplishment	.33***	.44***	.41***	.18***	.13**	.07	.42***	.34***	.38***	-	.33***	.13**
11. Identified	.23***	.31***	.42***	.22***	.37***	-.13***	.17***	.95***	.12***	.35***	-	.50***
12. External social	.18***	.13**	.24***	-.02	.18***	-.40***	-.06	.51***	-.12**	.10*	.57***	-
13. External game	.32***	.28***	.30***	.12**	-.05	.04	.13**	.14**	.15**	.53***	.09*	.00
14. Amotivation	.03	-.27***	-.17***	-.02	-.15**	-.21***	-.28***	-.04	-.37***	-.25**	-.06	.14**
15. SDM	.05	.41***	.25***	.14**	.25***	.32***	.49***	.30***	.68***	.57***	.32***	-.18***
16. Intention next week	.19***	.50***	.14***	-.03	.19***	.12**	.21***	.03	.30***	.21**	.05	-.01
17. Intention next month	.19***	.53***	.17***	.03	.21***	.15**	.24***	.08	.34***	.24***	.09	-.00
18. Intention next 3 months	.23***	.56***	.33***	.13**	.25***	.12**	.32***	.12***	.34***	.34***	.13**	-.02
19. Intention	.30***	.64***	.36***	.08	.23***	.16***	.32***	.12***	.39***	.35***	.13**	.01
20. Gender	.06	.02	-.01	-.02	.02	.07	.04	-.11*	.11**	.09*	-.12**	-.02
21. Age	-.07	.15**	.15**	.17***	.15**	.11*	.10*	.08	.19***	.13**	.09*	-.07

Note. Two-tailed, * $p < .05$, ** $p < .01$, *** $p < .001$, MMO results ($n = 439$) are above the diagonal and SNG results ($n = 515$) are below the diagonal

Table 22 (cont'd)

Pearson Product-Moment Correlations Among Variables

	13	14	15	16	17	18	19	20	21
1. Habit strength	.28***	-.06	.22***	.22***	.25***	.26***	.31***	.04	-.08
2. Freq. of past behavior	.34***	-.33***	.48***	.57***	.59***	.56***	.65***	.04	.13**
3. Self-identity	.30***	-.26***	.38***	.38***	.42**	.47***	.49***	.07	.12**
4. Time per session	.15**	.14**	.17***	.05	.09	.16**	.11*	-.06	.02
5. Game friends	.07	-.16**	.30***	.22***	.23***	.26***	.27***	-.01	.04
6. Autonomy	.14*	-.28***	-.28***	.30***	.23***	.22***	.22***	-.01	.02
7. Competence	.31***	-.32***	-.32***	.52***	.39***	.32***	.36***	-1.0*	.07
8. Relatedness	.15**	-.05	.37***	.16**	.17***	.18***	.18***	-.01	.05
9. Intrinsic hedonic	.36***	-.40***	.71***	.33***	.35***	.33***	.36***	-.01	.01
10. Intrinsic accomplishment	.58***	.30***	.63***	.32***	.33***	.31***	.37***	.00	.05
11. Identified	.14**	-.08	.39***	.18***	.19***	.20***	.20***	-.01	.07
12. External social	.02	.25***	-.26***	-.00	-.03	-.04	-.02	.14	.02
13. External game	-	-.28***	.25***	.22***	.22***	.22***	.26***	.05	.03
14. Amotivation	-.04	-	-.75***	-.32***	-.36***	-.40***	-.35***	-.06	-.13**
15. SDM	-.04	-.75***	-	.39***	.43***	.45***	.44***	.01	.10*
16. Intention next week	.16***	-.24***	.26***	-	.88***	.66***	.79***	-.07	.10*
17. Intention next month	.10*	-.28***	.34***	.87***	-	.83***	.87***	-.03	.13**
18. Intention next 3 months	.16***	-.31***	.40***	.60***	.77***	-	.86***	.01	.14**
19. Intention	.20***	-.32***	.39***	.73***	.84***	.85***	-	-.00	.12**
20. Gender	.09*	-.04	.03	.15**	.17***	.16***	.21***	-	.03
21. Age	.02	-.21***	.26***	.11***	.15***	.24***	.23***	.13**	-

Note. Two-tailed, * $p < .05$, ** $p < .01$, *** $p < .001$, MMO results ($n = 439$) are above the diagonal and SNG results ($n = 515$) are below the diagonal

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