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By

Kelly Savage Sopchak

August 2013

PREDICTORS AND CORRELATES OF VIDEOGAME ENGAGEMENT
AND VIDEOGAME ADDICTION

A Dissertation Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree

Doctor of Philosophy

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Abstract

Since the late 1960s, videogames have become a staple of American culture. Currently, Massively Multiplayer Online Role-Playing Games (MMORPGs), which allow players to operate in a fantasy world through an avatar or character of their choice, are among the most popular videogames. Even though playing videogames can offer educational and recreational benefits (Ceranoglu, 2010; Griffiths, 2004), extensive playing can be addictive (Yee, 2006). Researchers have distinguished between videogame engagement and videogame addiction. Videogame engagement refers to amount of time spent playing, whereas videogame addiction focuses on the person's inability to control time spent gaming and the dysfunction that may result from excessive play (Griffiths & Meredith, 2009). Research findings have revealed relatively high levels of co-morbidity of psychological dysfunctions (e.g., depression) with behavioral addictions such as gambling (Grant et al., 2010; Petry, 2009). These findings suggest that psychological dysfunctions may also be associated with videogame addiction. Working with Taiwanese college students, Hsu, Wen, and Wu (2009) developed the User Experience model to capture personal, social, and role-playing factors that motivate individuals to play and that contribute to addiction to online, multiplayer videogames. Research related to the predictors of engagement and addiction to videogame playing is scarce.

The objectives of this study included (a) to examine the factor structure of the User Experience Scale by Hsu et al. (2009) with North American gamers; (b) to examine the combined and unique contribution of the identified user motivation factors to

videogame addiction, and (c) to examine the relation of symptoms of depression, anxiety, and attention deficits to videogame addiction. Initial plans for the study also included examining the relationships between both motivations and psychological symptoms with videogame engagement; however, engagement, as measured by time spent gaming, was unrelated to the predictors. Additionally, a significant relationship between videogame engagement and addiction was not supported. Adult participants who live in North American were solicited to complete an online survey from online MMORPG forums; a chance to receive one of five \$90 gift cards was offered as an incentive for participation. Instruments used to collect survey data included the User Experience Scale (Hsu, Wen, & Wu, 2009), Videogame Addiction Scale (Chou & Ting, 2003), Adult ADHD Self-Reporting Scale (World Health Organization, 2003), Penn State Worry Questionnaire (Meyer, Miller, Metzger, & Borkovec, 1990), and Center for Epidemiologic Studies Depression Scale (Radloff, 1977). Results of the factor analyses of the User Experience Scale items indicated that four distinct factors captured users' motivations for playing videogames: Affiliation, Prestige, Accomplishment, and Fantasy. Regression analysis identified the factors of Accomplishment and Fantasy as distinctively contributing to videogame addiction. Of the psychological symptoms assessed, both ADHD and Depression contributed uniquely and positively to videogame addiction.

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Chapter I

Introduction

History of Videogames

Since the late 1960s, videogames have become a staple of American culture. While arcade games were initially the only means for play, by the mid 1970s Atari had released the first home console gaming system. This system transitioned the gaming culture from a public pastime to a private means of entertainment. Atari dominated the market with games like Pong, PacMan, and Space Invaders until game sales diminished during the economic decline of the 1980s. The plummeting Atari stock made way for a new gaming company, Nintendo. The videogame highlights of the late 80s and early 90s were the Super Mario Brothers, Tetris, and a handheld gaming system, the Game Boy. The turn of the 21st century brought new gaming moguls like Sony and Microsoft and the addition of videogames designed for computer play. The Internet influenced the videogame industry as games were created for online play. In-game interactions among players all over the world flourished within the online world (*The Irish Times*, 2006).

Description of MMORPGs

Massively Multiplayer Online Role-Playing Games (MMORPGs), as their name indicates, emerged within the online environment. In these games, players operate in a fantasy world through an avatar or character of their choice. At the beginning of the game, players create their avatar or alter ego, which may vary in detail depending on the game. Avatars may adopt a wide variety of identities, such as a knight in a foreign land, a war hero, a plumber, a car thief, or a murderer. Once the gamer creates the avatar and

choose its job, the purpose of the game is to have the avatar gain skills and advance through the game levels. Most often, individuals play MMORPGs online with hundreds to thousands of other players. While in older games players controlled avatars and the computer program controlled all the other characters, in MMORPGs players control almost all of the characters in the game. Games that are played over the Internet have created a virtual community of players with its own social norms and values that, in some ways, mimics real life, but also provides excitement, anonymity, and freedom. Even though MMORPGs are available in a variety of themes and plots, these games share a similar structure and format (Yee, 2006).

In most MMORPGs, the players' goals are to complete quests or missions (e.g., conquering the enemy, gathering specific items, farming or working to gain currency), as well as to increase their avatars' skills and job complexity (Yee, 2006). At the completion of tasks, players gain points that must be accumulated to advance through the game's levels and the various areas of the virtual world. As players advance levels in the game, their avatars acquire new skills and talents and gain access to previously unavailable items (e.g., weapons, armor, or pets), both of which make the play experience increasingly complex for the user. The accumulation of coveted items helps players increase their social status within the game's community. Once players reach high levels in the game, the probability that they will receive an invitation to become a member of a linkshell or guild of gamers increases. Similar to social groups or cliques in everyday life, members of guilds help each other advance through the games' levels, get coveted in-game items, and form alliances. While many guilds simply invite new members to join at the recommendation of other members, some guilds have application procedures that may

include written essays, interviews, proof of in-game achievements, references, and a probationary period.

Current Issues in Gaming

Research findings have illustrated positive and negative aspects of videogame involvement. In the positive side, videogames have been used to increase educational engagement (Deily, 2010; Educational Videogames, 2010), thwart the effects of Alzheimer's disease on short-term memory (Robberts-Grey, 2008), facilitate therapeutic relationships (Ceranoglu, 2010) and develop healthy exercise programs (Murphy, 2009). In the negative side, research conducted in the late 1990's and early 2000's showed a correlation of videogame playing to violence among adolescents and young adults. However, findings that are more recent suggest that the correlation between violence and videogame playing emerges only when games are played for more than four hours per day (Ward, 2010). Addiction is another negative consequence of videogame playing that has recently been examined by researchers. However, there has been limited research regarding predictors of videogame involvement and the relation of psychological factors, such as depression or stress, to engagement with and addiction to videogame playing (Griffiths & Meredith, 2009).

Researchers have distinguished between videogame engagement and videogame addiction. Videogame engagement refers to amount of time spent playing, whereas videogame addiction focuses on the person's inability to stop or limit time spent gaming and the dysfunction that may result from excessive play (Griffiths & Meredith, 2009). Researchers have theorized about the aspects of the game experience that help explain individuals' increasing levels of engagement with online, multiplayer videogames.

Working with Taiwanese college students, Hsu, Wen, and Wu (2009) developed the User Experience model that captures personal, social, and role-playing factors that are believed to be associated with gamers' motivations to play and addiction to videogames. Further research is needed to examine to what extent the User Experience model is useful to examine aspects of the videogame experience associated with gaming motivations and addiction among American videogame players (Sopchak, 2011). In light of the limited existing research regarding videogame addiction, the current study has three purposes. The first purpose is to examine among North American gamers the factor structure of the instrument developed by Hsu et al. (2009) with college students in Taiwan to assess the personal, social, and role-playing dimensions of the User Experience model. The second purpose is to examine the combined and unique contribution of the identified dimensions of the User Experience model to engagement with and addiction to videogame playing. The third purpose of the study is to examine the relation of symptoms of depression, anxiety, and attention deficits to videogame engagement and addiction.

Chapter II

Review of Literature

Researchers in videogame addiction have borrowed concepts and models from research related to other behavioral addictions. Therefore, the current chapter will provide a brief discussion of the research literature regarding predictors and correlates of behavioral addictions, particularly gambling addiction. The chapter also includes a review of the videogame addiction literature, including the User Experience Model developed by Hsu et al. (2009) to assess motivations for and predictors of addiction to videogame playing.

Behavioral Addictions

Behavioral addictions are sequences of behaviors that are recurrent and have maladaptive consequences (Bradley, 1990). The construct of behavioral addictions include problematic gambling, some sexual behaviors, compulsive buying, and excessive engagement in internet use, videogame playing, and exercise (Shaffer & Kidman, 2003). Addictions to these behaviors are associated with similar problems in biological, psychological, and social domains (Shaffer & Kidman, 2003). Even though behavioral addictions do not involve the ingestion of a substance, like addictions to alcohol or drugs, neurocognitive researchers have identified similarities between those addicted to substances and to behaviors in regard to neurological pathways, neurotransmitter elevations, and brain wave activity (Arnold, Auchenbach, & McElroy, 2001; Comings, 2010; Grant, Potenza, Weinstein, & Gorelick, 2010; Potenza, 2008).

Brown's model of behavioral addiction includes six traits that characterize maladaptive involvement with specific behaviors: euphoria (an elevation in mood while

engaging in the behavior), salience (the behavior becomes one of the most important elements in one's life), tolerance (the need to engage in the behavior more to receive the euphoric response), withdrawal (negative feelings occur when unable to engage in the behavior), conflict (within interpersonal relationships or responsibilities and are attributed to excessive engagement in the behavior), and relapse (returning to the behavior after one quits) (Smahel, Blinka, & Ledaby, 2008). The maladaptive consequences of these traits observed across different types of behaviors have led clinicians and researchers to acknowledge the existence of behavioral addictions.

Gambling Addiction

Gambling is the behavioral addiction that has received the most attention in the empirical literature. In 1980, the *Diagnostic and Statistical Manual of Mental Disorders* introduced the diagnosis of Pathological Gambling as an impulse control disorder, and in its fifth edition the inclusion of Internet addiction and other behavioral disorders may be introduced (Grant et al., 2010). *The Gambler*, written by Dostoyevsky, and the observable effects of problematic gambling, led Freud to include gambling with alcohol and drug use in his addiction triangle (Freud, 1928). It was then that Freud (1928) proposed that the addiction for gamblers is not about winning money, but in the emotional thrill gained through the behavioral act of gambling.

According to recent estimates, 2.9% of Americans meet criteria for problematic and pathological gambling (Committee on the Social and Economic Impact of Pathological Gambling, National Research Council, 2000). The DSM-IV classifies Problematic Gambling as an Impulse-Control Disorder Not Elsewhere Classified, but the DSM-V will re-classify Gambling Disorder under Addiction and Related Disorders. The

DSM-IV-TR identifies the following 10 gambling related symptoms: 1) a preoccupation with gambling (either thinking about past or planning future gambling), 2) tolerance (needing to increase frequency or duration to elevate mood), 3) relapse or unsuccessful attempts to stop or decrease, 4) withdrawal or negative feelings when trying to stop or decrease behavior, 5) using gambling to escape problems or negative mood, 6) continuing to play despite losing, 7) lying to hide the amount of gambling, 8) committing crimes to fund gambling, 9) losing important relationships, occupation, or professional opportunity because of gambling, and 10) using others (e.g., family and friends) to fund gambling or repay debts (American Psychiatric Association, 2000). Currently, to diagnose a gambling disorder requires that at least five of the ten gambling symptoms be 1) persistent, 2) recurrent, and 3) maladaptive, and they cannot be due to an episode of mania (American Psychiatric Association, 2000). Problematic Gamblers more frequently become homeless, divorced, or involved with state agencies to protect children, and have higher rates of mental illness, incarceration, unemployment and welfare benefits, and suicide compared to those without a gambling addiction (Potenza, Kosten, & Rounsaville, 2001).

Over the years, researchers of gambling behaviors have made theoretical and empirical advancements that provide support for the existence of behavioral addictions. The progress made within the gambling literature has become the foundation for research regarding other behavioral addictions, such as Internet addiction, videogame addiction, and sex addiction (Griffiths & Meredith, 2009). In many ways, videogame addiction resembles problematic gambling, as both have similar stimuli (lights, sounds, buttons) and are games played for enjoyment (Griffiths, 1991). However, the tangible reward of immediate money that may be gained during gambling differs from the immediate

rewards obtained during videogame playing (Griffiths, 1991). Therefore, it is possible that there are similarities and differences in the factors that help explain gambling and videogame addictions.

Videogame Addiction

Playing videogames can facilitate improvement in educational, social, and therapeutic settings (Ceranoglu, 2010; Griffiths, 2004). However, over the years it has become apparent that extensive playing can be addictive (Yee, 2006). Since the early 1990s, researchers have proposed that engagement and enthusiasm for games can add to life, whereas videogame addiction reduces quality of life (Griffiths, 2005, Hagendorn & Young, 2011). It is important to note that extensive gaming is not necessarily an indication of addiction, as the behavior may not be persistent, recurrent, or maladaptive. Research findings provide support for the formal diagnosis of a videogame addiction disorder, and it was reported that this disorder might be included in the DSM-5 (Lemmens et al., 2009). However, within the recently released DSM-V, videogame addiction was not identified as a disorder, although it was specified as an area for further investigation (American Psychiatric Association, 2013).

The literature varies on the estimates of the percent of gamers who are addicted. While in one study 40% of gamers of MMORPGs considered themselves to be addicted (Shamhel, Blinka, & Ledaby, 2008), several other studies suggest that only from 10%-15% of gamers may actually be addicted (Przybylski et al., 2009; Yee, 2006; Young, 2009). This discrepancy could be due to differences across studies in the definition of addiction versus engagement given past perceptions that excessive hours spent gaming always indicated addiction. Those who are addicted range in the severity of their

symptoms. While some addicted gamers may only have trouble sleeping, others may experience seizures, a decline in physical appearance, and even death (Young, 2009). While seizures and death are extreme and rare, it is much more common that videogame addiction is associated with disruptions in the in gamers' offline relationships and daily lives.

To assess videogame addiction, researchers have incorporated the diagnostic criteria of salience, tolerance, mood, modification, relapse, withdrawal, conflict, and problems that were developed to identify gambling addictions (Gentile, 2009). Items in videogame addiction scales often mirror Problematic Gaming diagnostic criteria (Griffiths & Meredith, 2009). Using the DSM-IV-TR diagnostic criteria for Problematic Gambling to assess videogame addiction has allowed researchers to distinguish between engagement and addiction.

Like gambling, videogame addiction negatively affects the person, the family, and society. The person experiences psychological and physiological disturbances, as mentioned above, which in turn negatively affect those around them (Griffiths, 2008; Young, 2009). The individual's family may also experience betrayals, as the gamer begins to lie about gaming and may steal money to finance subscription fees or to buy new games (Griffiths & Hunt, 1998). The individual's friends may also feel rejection as the gamer socially isolates and seeks engagement with others through a virtual world. Both family and friends may find themselves on the receiving end of irritability and aggravation, as the gamer may have an increase in negative disposition when not playing (Callahan, 1992). On a larger scale, there are societal effects as engagement in school or work decreases as addiction increases (Griffiths & Hunt, 1998). Extensive gamers feel

tired after playing late into the night and experience a general decrease in motivation regarding life outside the videogame world (Callahan, 1992; Young, 2009). When engagement becomes addiction, disruptions can be observed in various domains of one's life. However, despite these deterrents, there seem to be social, personal, and role-playing dimensions of the videogame experience that motivate individuals to engage in problematic gaming.

User Experience Model

Researchers have examined factors associated with players' motivations to play MMORPGs. In their User Experience model of MMORPGs, Hsu, Wen, and Wu (2009) identified 11 factors related to the videogame playing experience that may explain players' engagement with these games. Previously, researchers had examined many of these factors (Blinka, 2008; Guo, Savoy, Byrd, & Salvendy, 2009; Hostetter, 2002; Lewis, Webber & Bowman, 2008). However, Hsu et al. (2009) organized the 11 factors in terms of three dimensions: social, person, and role-playing.

The social dimension refers to aspects of the gaming experience that involve immediate or virtual interactions with members of the gaming community. Specific factors in the social dimension include cooperation, belonging, obligation, competition, and recognition (Hsu et al., 2009). These factors have been studied in relation to guild member behavior and alliance to the guild. Murphy (2009) suggested that the social experiences of cooperation and competition within the game-related guilds fuels players' engagement with the game and the guilds. Gamers want to increase the skill levels of themselves and their avatars to gain access to increasingly complex challenges when playing either solo or in groups. In many cases, skill level is demonstrated through the

player's in-game abilities and items that are displayed or worn by the avatar. As players progress through the game's levels, they are likely to receive increasing recognition within their groups and sometimes from the larger gamer community. It is believed that this recognition serves as a potent motivator for gamers to invest time and effort to conquer the games' challenges.

The person dimension describes interpersonal aspects of the user's interactions with the game including challenge, fantasy, reward, control, and curiosity (Hsu et al., 2009). In one study fantasy, defined as access to an imaginary world not limited by reality, was one of the largest contributing factors to player satisfaction (Guo, Savoy, Byrd, & Salvendy, 2009). Interactions with others within the game provide intrapersonal satisfaction and fulfillment of personal desires like curiosity, fantasy, and the desire for challenge (Hostetter, 2002). Control over the gaming experience, as perceived by the gamer, also contributes to a player's engagement and involvement with the game (Rozendaal, Keyson, Ridder, & Craig, 2009). As mentioned earlier, gaining items and rewards and accomplishing achievements are key elements that motivate players, increasing involvement with the game (Meerkerk, Eijnden, Franken, & Garretsen, 2010).

The role-playing factor refers to the relationship between the gamer and the avatar (Hsu et al., 2009) in terms of both the player's expression of self through the avatar, and interactions with other avatars. Researchers often use the term character attachment to refer to the player-avatar relationship. Younger players tend to report higher levels of character attachment than older players (Blinka, 2008), but there is still identification with their avatars among adult players. In one study, character attachment moderated the negative relationship between self-esteem and amount of time-spent gaming among

adults (Lewis, Webber & Bowman, 2008). There was a stronger negative relationship between self-esteem and time spent gaming among gamers with high character attachment than among those with low character attachment.

Hsu and his colleagues found that among college student in Taiwan, 69.1% of the variance in videogame playing addiction was accounted for by five of the dimensions of the User Experience Model: reward, role-playing, obligation, belonging, and curiosity (2009). These findings suggest that factors within each dimension, social, person, and role-playing, were associated with videogame addiction. While the User Experience model seems theoretically sound, results of a study with North American gamers revealed low levels of internal reliability for most of the 11 scales used to assess the three dimensions of the model (Sopchak, 2011). The alphas across the 11 factors ranged from .57 to .86.

The findings described above regarding the internal consistency of the subscales that assess the User Experience Model's dimensions suggest that the assessment model may lack parsimony when applied to North American gamers. Before examining the relative contribution of the social, person and role-playing dimensions of the gaming experience to videogame addiction among American gamers, it is necessary to examine the factor structure of the items used to assess the User Experience Model. Therefore, examination is needed, with American gamers, of the factor structure of the items used to assess the social, person and role-playing dimensions of the gaming experience. The identified factors will then be used to examine the relative contribution of aspects of the gaming experience to videogame engagement and videogame addiction among American gamers.

Behavioral Addictions and Psychological Functioning

The behavioral addiction literature suggests that increases in symptoms of depression, anxiety, or attention deficit are associated with increases in the engagement with and addiction to specific behaviors. The occurrence of two or more psychological disorders at once is referred to as comorbidity (Petry, 2005). Numerous studies have assessed the presence of comorbidities among people diagnosed with behavioral addictions, primarily problematic gambling (Petry, 2009). It is estimated that about 96% of those who meet criteria for pathological gambling also meet criteria for another psychological disorder (Kessler et al., 2008). However, in a recent search no studies were located that assessed comorbidity and videogame addiction, which is consistent with descriptions of limitations of research in this area (Griffiths, 2008).

In those seeking treatment, for either a behavioral addiction or other psychological diagnosis, comorbidity has been established (Petry, 2005). Numerous findings indicate that mood disorders and impulsivity are often present in individuals with behavioral addictions (Grant et al., 2010; Poppe, 2010; Yen et al., 2007). Furthermore, these psychological symptoms seem more severe among individuals with than without behavioral addictions (Bernardi & Pallanti, 2009). Because the use of clinical samples limits the generalizability of these results, there is a need to examine among the general population the relation of psychological symptoms to behavioral addictions (Grant et al., 2010). The discussion that follows addresses findings regarding the prevalence of symptoms of depression, anxiety and attention-deficit/ hyperactivity across behavioral addiction domains.

Depression. It is believed that depression is both a predictor and a consequence of behavioral addictions (Hinic, Mihajolovic, & Dukic-Dejanovic, 2010). In a national survey of 9,282 Americans, major depression and dysthymia co-occurred with pathological gambling with a 38.6% prevalence rate. Of those diagnosed with both disorders, 20.5% reported gambling problems predating depression, 73.5% reported depression occurring first, and 6.1% reported the disorders beginning within the same year (Kessler et al., 2008). Adolescents and adults with Internet addiction have reported higher levels of cognitive and somatic symptoms of depression as compared to peers without addictions (Hinic et al., 2010; Petry, 2005; Yen et al., 2007). Rates of depressive disorders have ranged from 33% to 76% for individuals seeking treatment for problematic gambling through inpatient programs (Hinic et al., 2010; Petry, 2009). In addition, there have been elevations in reports of suicidal ideations and attempts among pathological gamblers as compared to the general population (Petry, 2005). Based on findings with problematic gamblers, one may expect symptoms of depression among a large proportion of individuals addicted to videogames. Based on the literature, it is predicted that there will be a positive relationship between videogame addiction and depressive symptoms. A statistically significant relationship between depressive symptoms and videogame engagement is not suspected, but if there is a relationship, the strength will be weak.

Anxiety. Despite limited studies, findings suggest that there is an association between anxiety and behavioral addictions (Grant et al., 2010; Petry, 2009). Individuals seeking help for anxiety have shown relatively high rates of behavioral addictions (Bernardi & Pallanti, 2009; Hagedorn & Young, 2011). Most commonly, social anxiety

has been associated with Internet and gambling addictions (Poppe, 2010; Yen et al., 2007), with one study suggesting that females with Internet addiction are more likely to experience social anxiety than their male counterparts (Yen et al, 2007). In another study, the prevalence rate of an anxiety disorder among problematic gamblers was 60.3%, with gambling occurring first for 13.4%, anxiety occurring first for 82.1%, and the two beginning within the same year for 4.5 % (Kessler et al., 2008). In general, problematic gamblers report relatively high levels of all types of anxiety disorders with the exception of obsessive-compulsive disorders and agoraphobia (Perty, 2005). Based on the findings related to Internet and gambling addictions, it is likely that individuals addicted to videogame playing may experience heightened levels of anxiety symptoms.

Attention-Deficit/ Hyperactivity Disorder (ADHD). Compared to depressive or anxiety disorders, comorbidity of ADHD and behavioral addictions has received considerably less attention. Given the high frequency at which those with ADHD develop addictions to substances and over engage in behaviors such as exercise, shopping, and sex, the lack of research in this area should be remedied (Blankenship & Laaser, 2004). Current findings suggest that there are relatively high rates of ADHD among problematic gamblers, with at times up to 20% of those in treatment meeting the diagnostic criteria for ADHD (Petry, 2005). Kessler et al. (2008) found that 13.4% of problematic gamblers experienced ADHD prior to their behavioral addiction. While psychotherapists have provided anecdotal reports of a high frequency of ADHD among sex addicts, Blankenship and Laaser (2004) were the first researchers to assess the prevalence of ADHD among sex addicts. They found that for 55% of their sample, the diagnosis of

ADHD was probable to highly probable and for 14% the diagnosis was possible (Blankenship & Laaser, 2004).

A study by Bioulac and associates (2008) assessed the gaming practices and the behaviors while gaming of 50 children and adolescents (ages 6-16) with (n=29) and without (n=21) a diagnosis of ADHD. Results suggest that compared to their peers without ADHD, participants with ADHD played videogames more frequently and for a longer duration and also were less likely to choose to stop playing without parental influence (Bioulac et al., 2008). For those with ADHD, 59% exhibited negative behavioral reactions to stopping play, such as crying, verbal outbursts, and aggression (Bioulac et al., 2008). While Bioulac et al. (2008) did not evaluate videogame addiction, it seems that those with ADHD may be less likely to self monitor their gaming behaviors and therefore may be at risk for developing an addictive pattern of gaming. Based on the findings of past research, relationships between ADHD and videogame engagement and between ADHD and videogame engagement are predicted.

The Present Study

The present study was conducted as a means of contributing to the research literature related to videogame addiction and engagement in three areas. First, this study will lead to better understanding of the aspects of gaming that entice North American gamers by examining the factor structure of the items used to assess the person, social, and role-play domains of the User Experience Model. The second objective of the study is to assess the unique and combined contribution of the identified factors in the person, social, and role-play domains to videogame addiction and to videogame engagement among North American gamers. The third purpose of the study is to examine the relation

of psychological symptoms of depression, anxiety, and ADHD to videogame engagement and videogame addiction. Based on the findings related to other behavioral addictions, it is hypothesized that positive relationships will be found between the symptoms of each depression, anxiety, and ADHD and videogame addiction. It is also predicted that three psychological predictors will be more strongly related to videogame addiction than to videogame engagement.

Chapter III

Methodology

Participants

Two hundred and forty gamers participated in this online survey. Surveys from 28 gamers were removed from the data because they did not meet the study's age (at least 18 years of age) and location inclusion criteria (residents of North America). Participants ranged in ages from 18-49 years of age, with the average age of 26.78 within the sample. The age at which they began playing videogames ranged from 5-43 years of age, with the average of 18.19 years. In terms of employment status: 31.8 % were unemployed, 43.1% were employed full-time, 22.3% were employed part-time, and 2.8% were disabled. Due to a programming error, demographic information related to gender and ethnicity was only obtained from 148 of the 212 participants, approximately 70% of the sample. For this percentage of the sample, 73.6% (n=109) participants reported their gender as male and 26.4% (n=39) reported their gender as female. For the 148 participants who reported their ethnicity, 74.3% (n=110) were Caucasian, 10.8% (n=16) Asian/ Pacific Islander, 6.1% (n=9) Hispanic, 4.1% (n=6) Native American/ Alaska Native, 4.1% (n=6) Other/ Multiracial, and .7% (n=1) Black/ African-American. These results are consistent with previous research (Griffiths, 2008), as participants were primarily male, with the majority identifying as Caucasian. Institutional Review Board approval was granted by the University of Houston's Committee for the Protection of Human Subjects. The survey was anonymous, and an incentive of a chance to receive one of five \$90 gift cards was offered to increase participation. The five participants, who received a \$90 gift card, were

selected by matching integers from a random number generator to emails received from each of the participants after they completed the survey.

Instruments

Demographic Questionnaire. The demographic questions were the same as those assessed in Hsu, Wen, and Wu's (2009) study, which included questions about age, gender, and gaming habits. Amount of time spent gaming was assessed by hours spent gaming per day ($M=4.05$, $SD= 2.65$) and number of days spent gaming per week ($M=5.25$, $SD= 1.43$); these numbers were then used to calculate the amount of time per week spent playing ($M=22.08$, $SD= 16.27$). Incomplete data related to gender and ethnicity prevented analyses related to such issues.

Videogame Engagement. In order to assess videogame engagement, the amount of time spent gaming was assessed by hours spent gaming per day and number of days spent gaming per week. These numbers were used to calculate the amount of time per week spent playing.

User Experience Scale. Players' motivations to engage with videogames were assessed with the User Experience Scale (UES: Hsu, et al., (2009)). The UES, which includes 44 items rated on a 5-point scale ranging from strongly disagree (1) to strongly agree (5), assesses players' engagement with videogames in three domains: person, social, and role-play. The person domain describes interpersonal aspects of the user's engagement with the game, and it includes the factors of challenge (3 items), fantasy (3 items), reward (5 items), control (3 items), and curiosity (3 items). Specific factors in the social dimension include cooperation (4 items), belonging (8 items), obligation (4 items), competition (4 items), and recognition (3 items). The role-play dimension only includes

the factor of role-play, which is assessed by 4 items. Factors within the domains found in the original study include challenge (e.g., This game provides an appropriate test of my skills), fantasy (e.g., While I am playing this game, I can imagine I am someone else), curiosity (e.g., This game is novel and unique), control (e.g., I can do whatever I want in this game), role-play (e.g., I try to create new persona and styles into my characters), competition (e.g., I can be more powerful and wealthy than others), cooperation (e.g., I can work with others to achieve goals), recognition (e.g., I feel I can do something which is appreciated by others), belonging (e.g., I think my guild members let me feel comfortable and safe), obligation (e.g., I will share knowledge and help other guild members), and rewards (e.g., The unique items that I have can be known in the game). Scores for the Taiwanese college students (age range of 18-25) revealed a Cronbach's alpha internal reliability coefficients for the total scale of .93 and Cronbach's alphas for scores in the 11 factors ranged from .69 to .92. Five of the factors (Recognition, Role-playing, Control, Curiosity, and Fantasy) had alphas below .80 (Hsu et al., 2009). In a study with North American gamers, there were lower rates of reliability as alphas for the 11 factors ranged from .57 to .86 (Sopchak, 2011).

Videogame Addiction. Videogame addiction was assessed with the rating scale developed by Chou and Ting (2003). This scale, that consists of nine questions scored on a 5-point scale ranging from totally disagree (1) to totally agree (5), assesses withdrawal, conflict, tolerance, salience and relapse. Sample items include: "Sometimes I lie to family members or friends to conceal how long I play cyber-games," "I have been deeply involved in playing cyber-games," and "I felt depressed whenever I have needed to stop playing cyber-games." Scores on the nine items are averaged to create an overall

addiction score. The scale has shown high to moderate Cronbach's alpha internal reliability coefficients from .91 with a stratified sample of 1000 online gamers of all ages (Chou & Ting, 2003) to .73 with college students from Taiwan (Hsu et al., 2009). In the current study, a Cronbach's alpha of .85 indicates high internal consistency.

Adult ADHD Self-Reporting Scale (AARS-v1.1). Symptomatology related to ADHD was assessed with the AARS-v1.1 an 18-item scale developed by the World Health Organization (2003). Response options capture frequency of ADHD symptoms in a 5-point scale ranging from 0 Never to 4 Very Often. Higher values indicate a greater frequency of ADHD symptoms. The scale assesses symptoms of inattention, "How often do you have difficulty keeping attention when you are doing boring or repetitive work?" hyperactivity "How often do you feel restless or fidgety?" and impulsivity "How often do you interrupt others when they are busy?" In the current study, scores in the scale yielded a Cronbach's alpha of .87 which indicates high internal consistency.

Penn State Worry Questionnaire (PSWQ). The PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) assesses pathological worry, which is commonly associated with Generalized Anxiety Disorder. Information on symptomatology is assessed through 16 items that focus on whether or not it is typical for one to worry. Response options capture worry related symptoms in a 5-point scale ranging from "Not at all typical of me" to "Very typical of me." Examples of items include statements such as "My worries overwhelm me" and "Once I start worrying I cannot stop." This scale has good internal consistency ($\alpha=0.91$) and it has been shown to discriminate between GAD and other disorders related to anxiety (Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ uses standard and reversed scored items that sum to between 16 and 80, with higher

scores indicating higher levels of pathological worry. In the current study, the PSWQ scores yielded a Cronbach's alpha of .95 which demonstrates high internal consistency.

Center for Epidemiologic Studies Depression Scale (CES-D). The CES-D (Radloff, 1977) was used to assess symptoms related to depression. The CES-D consists of 20 items and response options that capture frequency of depressive symptoms on a 4-point scale ranging from 0 to 3 points. Items' scores are summed to create a total score that ranges from 0-60. Higher scores indicate higher levels of depressive symptoms. Generally, scores between 15-21 have been considered indicative of symptoms of mild to moderate depression, while scores higher than 21 may suggest symptomatology related to major depression. Internal consistency has been described as high, with Cronbach's alpha coefficients ranging from .85 to .90 across studies (Radloff, 1977). In the current study, a Cronbach's alpha of .91 suggests high internal consistency.

Procedure

Participation for this study was solicited through posting on online gaming forums. Before joining the study, informed consent was obtained from all participants. Participants who consented then completed an online self-report survey consisting of demographic questions, the User Experience Scale, an addiction rating scale, the Adult ADHD Self-Reporting Scale (AARS-v1.1), the Penn State Worry Questionnaire (PSWQ), and the Center for Epidemiologic Studies Depression Scale (CES-D). All instruments were counterbalanced for order effects. Demographic information included questions about age, gender, ethnicity, and gaming habits. Participants were asked to respond to 44 items rated on a 5-point scale that are related to the User Experience Model and 9 items rated on a 5-point Likert scale that relate to videogame addiction.

Additionally, participants were asked to complete 20 items on a 4-point scale associated with symptoms of depression, 16 items on a 5-point scale related to symptoms of anxiety, and 18 items on a 5-point scale related to symptoms associated with ADHD. After the survey was completed, participants were given the option to email the word “participant” to an account established solely for this study. The provided email address was not linked to the completed survey. After the data were collected, there was a drawing that resulted in five email addresses chosen to receive a \$90 gift card.

Analysis

The data analysis of this study was done in several parts. First, independent scale scores for ADHD, Depression, Anxiety, and Addiction were calculated from the related items. Additional preliminary analyses were conducted to examine the bivariate correlation among the predictor and criterion variables included in the study. The skewness and variability of the addiction and engagement scores and the predictor variables was assessed through p-plots to examine to what extent the data met the assumptions of the analysis conducted to examine the posed research questions.

To examine the factor structure of the User Experience Model for North American gamers, an exploratory factor analysis was conducted. The analysis included all the items from various domains of the model: person (17 items), social (23 items), and role-play (4 items). Consistent with the original study by Hsu et al. (2009), first the results of a principle factor analysis with pro-max rotations were examined, and then other extractions and rotation methods were conducted (e.g. principal components with varimax rotation) to identify for each domain the most parsimonious solution that also demonstrates simple structure.

Two simultaneous linear regression analyses were planned to examine the unique and combined contribution of the person, social, and role-play factors to videogame engagement and videogame addiction. However, only one factor was found to have a weak relation to videogame engagement, so the regression with engagement (time spent playing) as the dependent variable was not conducted. Before conducting the regression, the variance inflation factors were calculated to check for multicollinearity among the predictor variables. It was expected that the role-play, social and person factors would contribute unique variance to videogame addiction.

Two additional simultaneous regression analyses were conducted to examine the relation of the psychological symptoms of depression, anxiety, and ADHD to videogame engagement and videogame addiction. This was planned, but the regression with engagement (time spent playing) as the criterion was not conducted because the three scales symptoms did not correlate with engagement. Before conducting the regressions, the variance inflation factors were calculated to check for multicollinearity amongst the predictor variables. No predictions were made regarding the relative contribution of each symptom to either videogame addiction or videogame engagement.

Chapter IV

Results

Factor Analyses

Several methods were used to examine the factorability of the 44 items on the User Experience Scale (UES). Each of the scales' 44 items correlated at .3 or higher with at least one other item, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .88, and Bartlett's test of sphericity was significant ($p < .001$), all of which indicate that a factor analysis was appropriate.

The most parsimonious solution that also demonstrated simple structure was identified through a principle components analysis with a varimax rotation. Factor retention was based on the Cattell's scree test and the variance explained criteria for parsimony, both of which supported a four or five factor model. Item analysis of rotated component matrices resulted in a four-factor model that included 34 items that showed factor loadings of .45 or higher in only one factor. The four factors explained 46.5% of the total variance. The first factor explained 15.85%, the second factor explained 11.13%, the third factor explained 10.34%, and the fourth factor explained 9.18% of the variance. The factor labels proposed by Hsu et al. (2009) were modified to better explain the four factors retained. The factors were labeled 1) Affiliation, 2) Prestige, 3) Accomplishment, and 4) Fantasy. Affiliations included items from Hsu et al. (2009) social factors of belonging, obligation, recognition, and cooperation. The second factor, Prestige, was composed of items Hsu et al. (2009) identified as relating to the factors they labeled competition, rewards, and recognition. Accomplishment was composed of items previously included within their factors of

labeled challenge, curiosity, and control. The final factor, Fantasy included items Hsu et al. (2009) included in their fantasy and role-play factors. Cronbach's alpha internal consistency coefficients obtained for each of the four identified factors were relatively high: .91 for Affiliation, .72 for Prestige, .80 for Accomplishment, and .82 for Fantasy. Significant correlations were also found among the four factors, as moderately strong positive relationships occurred. Overall, these analyses indicated that four distinct factors captured users' motivations to engage in playing MMORPGs. The factor-loading matrix for this final solution is presented in Table 1.

Table 1

Factor loadings and communalities based on a principle component analysis with varimax rotation for the User Experience Scale

	Affiliation	Prestige	Accomplishment	Fantasy
I can join a guild and feel a sense of belonging to it	.722			
I want to stay longer in the game due to my guild	.716			
I can participate in in-game activities with guild members	.714			
I share knowledge and help other guild members	.714			
I think my guild members let me feel comfortable and safe	.700			
I can join a guild, which I feel is interesting, in the game	.675			
The guilds arouse a sense of obligation in me	.641			
I share pleasures and pains with other guild members	.632			
My guild taught me how to be a good member of the guild	.626			
I feel I can do something which is appreciated by other players	.568			
I hope my guild can provide me with various group activities in which to participate	.542			
This game enables me to cooperate with other players	.536			
I think the utility of teamwork is better than solo play	.475			
I can compete with other people to win something		.645		
This game lets me accumulate resources, items, and money		.639		

	Affiliation	Prestige	Accomplishment	Fantasy
My success and achievements can be visible to other players		.592		
I can do something in order to achieve a specific goal		.592		
I can optimize my character according to his or her profession		.575		
The unique items that I have can be known in the game		.558		
I can be more powerful and wealthy than others		.554		
This game provides an appropriate test of my skills			.749	
This game challenges me to perform to the best of my ability			.705	
This game fully discloses my potential ability			.606	
Playing this game always surprises me in a good way			.538	
I can do whatever I want to do in this game			.522	
I can dominate anything I want in this game			.512	
I feel I am an influential person in this game			.510	
This game is novel and unique			.458	
While I am playing this game, I can imagine I am someone else				.786
I like to play the role of the game and to do something that I cannot achieve in my real life				.747
I like my character very much and I have often imagined that I was the character				.727
I try to create new personas and styles to my characters				.610
This game lets me enter a world outside of my own experiences				.597

	Affiliation	Prestige	Accomplishment	Fantasy
This game arouses my fantasies				.548

Note. Factor Loadings <.4 are suppressed

Preliminary Analyses

Results of the bivariate correlation analyses of the variables included in the study, displayed on Table 2, showed that time spent gaming was not related to the Addiction score ($r = .12, p > .05$). There was a relationship between hours spent gaming on a daily basis and the number of days one plays per week ($r = .21, p < .01$). This suggests that the more hours participants play per day, the more days they report they play per week. The Addiction score, but not time spent playing, was positively related with ADHD, Depression, and Anxiety scores. Therefore, analyses of psychological factors were focused only on the dependent variable of Addiction score. Patterns of correlations between the four factor scores and the three symptom scales were observed. ADHD, depression, and anxiety were all positively correlated to Fantasy, and depression was found to also have a positive relation to Accomplishment. Affiliation and Prestige factors were not related to the symptom scales. To evaluate the reliability of each predictor and criterion variable, Cronbach's alphas were calculated for each scale. Table 3 includes the means, standard deviations, and Cronbach's alphas for all variables included in this study.

Table 2
Correlation Matrix

	1	2	3	4	5	6	7	8	9
1 Affiliation	---								
2 Prestige	.50**	---							
3 Accomplishment	.48**	.42**	---						
4 Fantasy	.43**	.33**	.46**	---					
5 ADHD	-.03	.06	.07	.22**	---				
6 Anxiety	-.01	.06	-.01	.14*	.39**	---			
7 Depression	-.09	.03	.26**	.19**	.44**	.48**	---		
8 Addiction	.25**	.26**	.34**	.40**	.43**	.25**	.33**	---	
9 Engagement	.14*	.06	-.02	.09	-.02	.13	.11	.12	---

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

Table 3
Mean and Internal Reliability of Variables

	M	SD	α
Addiction Score	23.14	6.96	.85
Engagement	22.08	16.27	
Affiliation	49.16	8.56	.91
Prestige	27.33	3.59	.72
Accomplishment	25.38	5.28	.80
Fantasy/ Role-Play	19.78	4.76	.82
ADHD	27.54	10.31	.87
Depression	14.78	10.54	.91
Anxiety	45.15	14.36	.95

Note. Ranges for scores: Addiction (9-45), Affiliation (13-65), Prestige (7-35), Accomplishment (8-40), Fantasy (6-30), ADHD (0-73), Depression (0-60), and Anxiety (16-80)

Regression Analyses

A linear regression analysis was performed to examine the unique and combined contribution of the User Experience model four factors to videogame Addiction scores. Variance Inflation Factor (VIF) statistics were between 1.37 and 1.59 and tolerance scores above .63, which suggests no multicollinearity between the predictor variables. The model, that included the four factors entered simultaneously, was statistically significant ($F_{4, 207} = 12.93, p < .001$). The adjusted R^2 indicated that the four factors shared 18.4% of the variance with addiction. Inspection of the Beta coefficients showed that only two factors, Accomplishment and Fantasy, contribute uniquely and positively to videogame addiction ($p < .05$ and $p < .001$, respectively). The results of this regression model are displayed in Table 4.

Table 4

Regression Model of four Videogame Motivation Factors Predicting Videogame Addiction

Dependent Variable	Independent Variables	β	<i>S.E.</i>	Standardized β	<i>VIF</i>	<i>Sig.</i>
Addiction	Affiliation	.03	.83	.00	1.58	.967
	Prestige	1.21	.95	.09	1.41	.206
	Accomplishment	1.74	.81	.17*	1.51	.032
	Fantasy	2.58	.64	.29**	1.38	.000

Note. $R^2 = .20$ and Adjusted $R^2 = .18$ for addiction model. * $p < .05$, ** $p < .01$.

The second regression analysis was performed to examine the unique and combined contribution of scores on ADHD, Depression, and Anxiety scales to Videogame Addiction scores. Variance Inflation Factor (VIF) statistics were between 1.31 and 1.45 and tolerance was at least .69, which suggests no multicollinearity between the predictor variables. This model, which included the variables of ADHD, Depression, and Anxiety entered simultaneously, was statistically significant ($F_{3, 208} = 18.11, p < .001$). The adjusted R^2 indicated that the variables shared 19.6% of the variance with Addiction. Inspection of the Beta coefficients showed that both ADHD and Depression contributed uniquely and positively to videogame Addiction, while Anxiety did not. The results of this regression model are displayed in Table 5.

Table 5

Regression Model of ADHD, Depression, and Anxiety Predicting Videogame Addiction

Dependent Variable	Independent Variables	β	<i>S.E.</i>	Standardized β	<i>VIF</i>	<i>Sig.</i>
Addiction	ADHD	.23	.05	.34**	1.58	.000
	Anxiety	.02	.04	.05	1.41	.505
	Depression	.11	.05	.16*	1.51	.032

Note. $R^2 = .21$ and Adjusted $R^2 = .20$ for addiction model. * $p < .05$, ** $p < .01$.

Chapter V

Discussion

The purpose of this study was to examine motivational and mental health predictors of videogame addiction among North American players. First, a factor analysis was conducted to identify the dimension of motivations for videogame play included in the User Experience Model (Hsu et al., 2009). Second, the unique and collective contributions of the identified motivation dimensions to videogame addiction were examined. Finally, the relations between psychological symptoms of depression, anxiety, and ADHD and videogame addiction were examined.

Initial plans for the study also included examining the relationships between both motivations and psychological symptoms with videogame engagement; however, engagement, as measured by time spent gaming, was unrelated to the predictors. Additionally, a significant relationship between videogame engagement and addiction was not supported. While others have identified a relationship between these constructs (Hsu et al., 2009; Peters & Malesky, 2008; Smahel et al, 2008), recent findings by Griffith et al. (2005, 2008, 2009) suggest that playing videogames in excess does not indicate addiction, though it can be problematic. Users who play for extended periods without using the game to fulfill real world needs and desires seem to avoid the reduction in quality of life attributed to videogame addiction.

The User Experience Model describes gamers' motivations to play in terms of three overarching dimensions: person, social and role-play. The person dimension refers to user's experience of interacting with game content, such as quests, non-playable characters, and points or items earned. The social aspect captures desires of interacting

with other players or characters played by other users within the game or virtual world. In order to fulfill intrinsic and extrinsic desires, the user must navigate the virtual world through an avatar, which is the role-play dimension, their virtual persona. The factor analysis of the User Experience Scale yielded four factors labeled Affiliations, Prestige, Accomplishment, and Fantasy. Even though they were conceptually linked, there was not a one-to-one correspondence between the four motivation factors and the three overarching dimensions of the User Experience Model.

The Affiliations factor includes aspects of social bonding within the game. Within an MMORPG, a player interacts and works with other players to accomplish goals that benefit multiple players simultaneously. The Affiliations factor describes the player's desire to engage and find acceptance from social systems within the game. As one acquires a membership role within these groups, feelings of commitment and responsibility to other group members develop and continue to motivate the user to play. This factor corresponds to the social dimension of the UEM and illustrates motivations to connect with other users within the game.

The Prestige factor denotes desires and motivations to obtain items and status through competition and independent play that can be seen by other players within the game. Items in this factor also capture the need for social recognition within the game. Prestige corresponded with social and person dimensions of the UEM, as the user seeks to acquire rare items, points, and rewards from the game (personal) in order to obtain desired positive regard and adoration from other users (social). Overall, Prestige relates more to the social dimension, as the game content or rewards sought are arbitrary and valued for their potential to elicit fame and recognition from other users.

The Fantasy factor includes desires to escape from the mundane and experience new environments, situations, and interactions that are not readily available or possible within the real world. The virtual world and the physical characteristics and abilities of the avatar are within the person dimension of the UEM, as all are aspects of game content. However, this factor also includes the role-play dimension, as Fantasy motivations and desires encompass the user's affinity for and operation of an avatar to immerse one's self within the virtual world of the game.

The final factor, Accomplishment, describes the user's need to progress, succeed, and master various skills and goals within the game. Additionally, this factor includes desires to control and command one's environment, experience, and avatar.

Accomplishment corresponds directly to the UEM person dimension, as the overall gaming abilities and skills of the user are challenged and developed through experiences and interactions with game content. Motivations to achieve and improve as a gamer drive the user to explore, practice, and become proficient when faced with increasingly difficult game content, such as quests, tactical dilemmas, or battles with non-playable characters.

One major hypothesis—that positive relationships would be found between the motivation factors and videogame addiction—was supported by the data. The results of the first multiple regression evaluating the four factors of the UES (see Table 4) indicated a significant amount of shared variance between the factors and addiction. All factors had a significant weight when examined independently in correlation with videogame addiction. However, when the four motivation factors were included in the model, only Accomplishment and Fantasy contributed unique variance to videogame addiction. The association between Fantasy and videogame addiction suggests that the higher the extent

to which players engage in videogames as a means to escape from real life problems into an imaginary environment, the more likely they will report higher levels of addiction. Likewise, the relationship between Accomplishment and videogame addictions suggests that the extent to which individuals are motivated to play to fulfill their needs to perceive themselves competent and powerful, the more likely that they will become dependent on game play. These relationships could be attributed to players' need to feel competent in their skills or abilities, and if these needs are not met in the real world then players may engage in maladaptive gaming behaviors in an attempt to compensate these desires in a world not based in reality. Motivations of Affiliation and Prestige were not uniquely associated to videogame addiction, when controlling for Fantasy and Accomplishment. This suggests that those who are motivated to play videogames in order to connect to other people within the game or to feel a sense of community attribute fewer real life problems to their use of videogames (Ceranoglu, 2010; Griffiths, 2004).

Another major hypothesis—that positive relationships would be found between each of the symptoms of depression, anxiety, and ADHD and videogame addiction—was supported by the data. Results indicated that as individuals reported higher symptomatology of depression, anxiety, or ADHD, they also reported higher levels of videogame addiction. The results of the multiple regression (see Table 5), assessing the variables of ADHD, depression, and anxiety as predictors of videogame addiction, were also significant. However, only depression and ADHD contributed unique variance to videogame addiction when all three variables were entered into the model. Higher levels of ADHD symptoms and higher levels of depression were positively related to higher levels of videogame addiction.

The absence of evidence supporting anxiety as a predictor could be due to the relatedness of symptoms of anxiety and depression. Within this study, there was a significant correlation ($r=.48$) between the symptoms of depression and anxiety. Research has called into question the conceptualization of anxiety and depression as separate constructs (Dobson, 1985). Furthermore, findings suggest that symptoms of anxiety and depression may be indistinguishable when assessed simultaneously within one study (Tannenbaum, 1992). Another explanation for the supported null hypothesis could be the small proportion of female participants within this study. Anxiety has been shown to be a significant predictor of videogame addiction with females but not males (Campbell, 2012).

Individuals with ADHD may feel disorganized, chaotic, or out of control within their real lives and engage in activities that provide a sense of control. However, over time, gaming behaviors become out of control as an addiction forms; as real world maladaptive consequences of excessive gaming increase, the gamer is compelled to play more. However, it is also possible that gamers who become addicted are more likely than their counterparts to experience symptoms of ADHD. Often times, gamers stay awake later and play MMORPGs for longer periods than intended, which can inhibit and modify patterns of sleep. Inadequate sleep leads to poor emotion regulation, attention, and motivation. In-game experiences are often stimulating and provide immediate reinforcement, and for individuals with symptoms of ADHD, playing videogames may be especially appealing, as the fast paced and exciting environments capture the users' attention and decrease the feelings of boredom. In addition, within the virtual world, there is organization and users cannot typically lose or misplace important items. However, just

as videogames may be more appealing to individuals with ADHD (Bioulac et al., 2008), difficulties related to poor self-monitoring, impulsivity, and procrastination may allow the user to engage in problematic gaming behaviors without first assessing the consequences. Overtime problematic gaming behaviors, without awareness or as a means to postpone responsibilities or tasks that require more mental effort, can develop into addiction.

Symptoms of depression were also found to contribute uniquely to the variance of videogame addiction. Individuals with depression may take on problematic gaming behaviors in order to avoid negative feeling such as sadness, hopelessness, and loneliness. As the user experiences euphoria and satisfaction while playing videogames, problematic gaming behaviors may increase while other real world interests may become less enjoyable. Individuals with depressive symptoms may also experience feelings of excessive or inappropriate worthlessness or guilt, and therefore attempt to cope by seeking escape within the virtual world. On the other hand, real life problems can become exacerbated, as those with videogame addiction may experience depression due to increased interpersonal conflicts and an inability to fulfill one's responsibilities. Often, gamers stay awake later and play MMORPGs for longer periods than intended, which can inhibit and modify patterns of sleep. Overtime, problematic gaming behaviors, such as inadequate sleep, may increase depressive symptoms due to decreased emotion regulation, concentration, and motivation.

In the bivariate correlations, ADHD, depression, and anxiety were all positively related to motivations of Fantasy, and depression was found to also have a positive relation to Accomplishment. This suggests that those motivated to play in order to fulfill

desires of escaping into and experiencing another world, persona, or identity also reported more psychological and emotional problems in real life. The relation between higher depressive symptom and higher Fantasy motivations could represent the need for coping with excessive sadness, isolation, and negative perceptions of self through escape and avoidance. The positive correlations of Accomplishment and videogame addiction to depression may also be interpreted as gamers with higher scores of videogame addiction also reported feeling depressed, useless, unsuccessful, or incompetent within their real lives and reported motivations and desires to feel competent and capable through in-game successes and accomplishments. Exploring the influence of mediating and moderating variables, such as academic achievement for students or career competencies for employees, could clarify or better explain the relationships between motivations, psychological symptoms, and videogame addiction. Similarly, the need to feel competent, capable, and fulfilled through success may serve as a stronger motivation for those with higher depressive symptoms, as these needs may not be met in real life. Individuals with depressive symptoms may also seek to fulfill needs of social acceptance in the game that are difficult to accomplish in the real world.

Given the nature of depressive symptoms and the motivations captured by the Accomplishment motivation factor, when feeling depressed, individuals may increase maladaptive gaming behaviors as a means of coping and gaining control or finding success within a virtual environment. Videogame addiction occurs when one continues dysfunctional patterns of game play despite persistent, recurrent, and maladaptive real world consequences. As these consequences mount within the real world, individuals with depressive symptoms may look to virtual worlds to fulfill their desires for support or

comfort, as many guilds and gaming communities provide social interactions without judgment. Those with mental health issues and symptoms may experience social stigmas and stereotypes, and within the anonymous virtual world, these judgments can be escaped.

Future investigations of the influence of specific mental health symptoms, such as impulsivity, distractibility, apathy, isolation, etc., could provide valuable information, as these specific symptoms may increase as videogame addiction develops and maladaptive game play increases. It may also be informative to assess the unique and combined contribution of motivations and psychological symptoms to videogame addiction in order to better understand the interrelatedness of these constructs.

Research Limitations

This study had several limitations that should be considered in future videogame addiction research. First, the sample for this study was one of convenience, as the participants were solicited through online forums. Those who are active on gaming forums are typically highly involved in the videogame community and represent a specific type of gamer. Therefore, findings of the study may not generalize to gamers who do not participate in online forums. Second, the use of a survey limited the analyses to correlational designs. Therefore, no causal inferences can be made regarding the relation of gaming motivational factors and symptoms of depression and ADHD to videogame addiction.

In addition, there were complications related to the survey itself that were not foreseeable, but may be avoided by future researchers. The website that hosted the survey was updated between the time that the survey was created and the time that it was

released. As a result, the formatted answer choices for gender and ethnicity were no longer available within the new version of the website. The formatting issues were not recognized until several days after the data collection had begun. Therefore, it was not possible to examine gender and ethnic groups differences in the variables included in the study. Future researchers using websites to host online surveys may want to preview the survey several times throughout the collection process to verify the formatting, especially when updates to the websites are conducted.

Co-occurring behavioral addictions within study samples may also have skewed the results, and therefore may need to be screened for in future research. While the factors of Affiliation and Prestige did not contribute unique variance to videogame addiction individually, they significantly and positively related to addiction.

Investigations into the relationships between all four factors and addiction as moderated by age or the length of time an individual has played MMORPGs could provide valuable insights into the experiences and motivations of gaming as the player matures, both in real and virtual environments. As gamers develop and become more experienced, it is likely that motivations for playing would change.

Finally, there is a vast amount of resistance to participating in research within the gaming community. While this was a known factor prior to this study and various precautions were taken, historical events that occurred during the time of data collection may have hindered the sample size. Following a mass shooting at an elementary school, that occurred 13 months after data collection for the study had begun, various agencies attributed the violence to videogames, and the communities and forums that hosted the survey banned all research from their sites, so data collection had to stop at that time.

Chapter VI

Conclusion

Videogame addiction can intensify problems and stressors within one's life. Motivations of Accomplishment and Fantasy were identified as significant predictors of videogame addiction, as were symptoms of depression and ADHD. Individuals with such mental health symptoms may be more likely to impulsively seek adventure and escape while desiring to establish control amidst chaos. While it is easy to escape from their real life problems into a virtual world of fantasy, this may intensify dysfunction.

Chapter VII

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