January 2012

Video Game Engagement And Pathology: Relationships Between Gaming Habits And Gaming Experience, Psychopathology, And Personality Variables

John Adam Campbell

VIDEO GAME ENGAGEMENT AND PATHOLOGY: RELATIONSHIPS BETWEEN GAMING HABITS AND GAMING EXPERIENCE, PSYCHOPATHOLOGY, AND PERSONALITY VARIABLES

by

John Adam Campbell
Bachelor of Science, Illinois College, 2008

A Thesis
Submitted to the Graduate Faculty

of the

University of North Dakota

In partial fulfillments of the requirements

for the degree of

Master of Arts

Grand Forks, North Dakota
December
2012

This thesis, submitted by John Adam Campbell in partial fulfillment of the requirements for the Degree of Master of Arts from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done, and is hereby approved.

_____
Dr. Alan King

_____
Dr. Joseph Miller

_____
Dr. Richard Ferraro

This thesis is being submitted by the appointed advisory committee as having met all of the requirements of the Graduate School at the University of North Dakota and is hereby approved.

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Wayne Swisher
Dean of the Graduate School

_____
Date

Title	Video Game Engagement and Pathology: Relationships between Gaming Habits and Gaming Experience, Psychopathology, and Personality Variables
Department	Psychology
Degree	Master of Arts

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John Adam Campbell
September 2012

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ACKNOWLEDGMENTS

I wish to express my sincere appreciation to the members of my advisory committee for their guidance and support during my time in the doctoral program at the University of North Dakota. I also express my gratitude to my wonderful wife for her continued patience, love, and support throughout this endeavor.

ABSTRACT

With the rise in video game play, many experts have become concerned about negative consequences from game play, such as aggression, decreased academic performance, and even addiction. It has been very difficult to establish criteria for video game addiction or even to distinguish addicted gamers from recreational gamers. This relates to considerable conceptual overlap between the concepts of addiction and that of engagement or flow. Using multiple online questionnaires, this thesis examines the relationships between video game play habits over the life span, acute psychopathology, personality factors, and positive outcomes. Results indicate that the experience of flow during game play may serve as a critical predictor of gaming pathology and that flow should be included whenever trying to study and characterize gaming pathology. Results also indicate that no single factor predicts gaming pathology. Rather, an individual's gaming history, gaming experience, personality factors, and psychopathology all uniquely influence the possibility of gaming pathology. Also, there were significant differences between males and females for predictors of gaming pathology. For example, depressive symptoms were strongly predictive of gaming pathology for males while anxious symptoms were more predictive of gaming pathology for females. Ultimately, the interaction of a variety of factors relating to flow, psychopathology, and personality factors are each likely to contribute to the development of gaming pathology.

CHAPTER I

INTRODUCTION

Since the invention of video games in the late 1950's, they have become an increasingly common aspect of life, especially in developed countries such as the U.S., Canada, the U.K., Japan, and South Korea (Eigenfeldt-Nielsen, Smith, & Tosca, 2008; Wolf & Baer, 2002). It has been suggested that computer games are the first qualitatively new form of play to have been created in centuries and, as such, warrant thorough investigation into their positive and negative effects on human development and functioning (Salonius-Pasternak & Gelfond, 2005). Furthermore, some individuals play video games to such excess that it interferes with various aspects of their lives and may even reach the point of addiction (Hussain & Griffiths, 2009; Lemmens, Valkenburg & Peter, 2009). Before delving into the effects of video game play it is valuable to first briefly describe what video games are and how they can be played.

Video game play is a fairly heterogeneous phenomenon which can occur in a variety of settings and media (Eigenfeldt-Nielsen, Smith & Tosca, 2008; Kent, 2001). Individuals often play video games on specifically designed consoles similar to a personal computer but designed expressly for gaming purposes. These consoles may connect to a television (i.e. Playstation 3, Xbox 360), may be self-contained handheld devices with built in video and audio components (i.e Nintendo DS, Playstation Portable) or may be arcade devices which contain the hardware and software for at least one game as well as visual and audio media components. Video games are also commonly played

on personal and laptop computers as well as mobile electronic devices such as cellular phones. Those who play video games, commonly referred to as gamers, may play alone or simultaneously with others in their immediate physical proximity and/or around the world connected via internet (Ducheneaut, Yee, Nickell & Moore, 2006). There are also a variety of video game interfaces such as keyboards, "controllers", life-like interactive devices (i.e. guitar for Guitar Hero), or infrared sensitive devices (such as the Wii controller) (2008).

Video game content is even more diverse than the methods of play, with games predominantly designed for recreation (Eigenfeldt-Nielsen, Smith & Tosca, 2008; Loguidice & Barton, 2009) although a growing number of games have been developed for educational purposes as well (2008). The diversity of game content is too great to explore completely, but various authors have attempted to group the content into genres; a simple classification system was devised by Eigenfeldt-Nielsen, et. al. (2008) dividing games into four categories: Action, Adventure, Strategy, and Process-Oriented. Action games tend to revolve around various forms of simulated fighting, including martial arts, military combat, and gang warfare, along with other components, such as solving puzzles or exploring worlds; sports games are a popular subset of action games. Adventure games revolve around intensive exploration and immersion in an artificial world and a deep storyline; they may overlap considerably with action games. Strategy games tend to have turn-based or real-time battle systems in which the player must coordinate a range of characters and variables to reach a specific goal, often in competition with other players or an artificial intelligence. Process-oriented games focus less on reaching an ultimate goal and more on the process involved in the game, such as building a city;

simulation games are the most common form of process-oriented games. Furthermore, many games are designed to increase in difficulty as the player progresses through the game; this allows/requires the player to enhance their skills over time much as would be the case for any recreational hobby or career pursuit (2008). Ultimately, video games have both the functionality and content to allow gamers to experience and simulate almost any real-world experience in the convenience of their own home, with a minimal investment of resources, and at virtually no risk in the event of failure and these are often regarded as a crucial structural elements for successful video games (Wood, Griffiths, Chappell, & Davies, 2004).

A nationwide Harris Poll survey conducted in 2007 confirmed the widespread popularity of video games, finding that approximately 88% of adolescents between the ages of 8 and 18 played video games occasionally, averaging 13.2 hours of play time per week across all gender and age groups while 3% of boys and 21% of girls reporting never playing video games (Gentile, 2009). Other research also suggests that the popularity of gaming has been increasing across all demographics and has particularly increased among children and adolescents due to increased access to various forms of gaming (Greenberg, Sherry, Lachlan, Lucas & Holmstrom, 2010; Griffiths, Davies & Chappell, 2004; Lucas & Sherry, 2004; Rideout, Foehr & Roberts, 2010; Wright, Huston, Vandewater, Bickham, Scantlin, Kotler, et. al., 2001). Internationally, studies from the Netherlands (Van Schie & Wiegman, 1997), Japan (Colwell & Kato, 2003), Britain (Colwell & Payne, 2000), and Singapore (Gentile et al., in press), also suggest that only a small minority of children have never played video games while the vast majority play on at least a weekly basis in their own residence (Marshall, Gorely, & Biddle, 2006). Video

games are played by members of all age groups and the mean age of gamers is in the late 20's to mid 30's although the distribution is positively skewed with more gamers from younger generations than older generations (Griffiths, et. al. 2004; Khand, 2007). Gamers are a highly diverse group in other aspects, with a large amount of variability in terms of educational and socioeconomic status (Williams, Yee & Caplan, 2008). In the last decade, video games have undergone another revolution with the advent of online gaming and massively multiplayer online role playing games (MMORPG) which allow players to immerse themselves in an online game world as a different character while being able to maintain social interactions with other players from around the world during game play (Meredith, Hussain & Griffiths, 2009). The most well known and well-researched game in this genre, World of Warcraft (WoW) was released in 2006 and currently has over 10 million members worldwide (Eigenfeldt-Nielsen, Smith & Tosca, 2008; Meredith, Hussain & Griffiths, 2009; Yee, 2006). With the advent of online gaming, a growing number of players have been interacting on an international stage and spending increasing amounts of time playing online compared with traditional, offline games (Griffiths, Davies & Chappell, 2004).

It should also be noted that there are many different reasons that individuals may choose to play video games and often gamers play for multiple reasons varying across age and gender (Greenberg, et. al. 2010). Olson et al. (2007) suggested that video games are most frequently played for their entertainment value but may also be played to alleviate boredom or to help gamers escape from their problems. Wood, Gupta, Derevensky, and Griffiths (2004) found that the most common reasons for playing video games are enjoyment, excitement and relaxation. Williams, Yee and Caplan (2008)

conducted a factor analysis of the responses of over 7000 participants to a survey assessing the motivations for gaming and found that the three most important reasons for gaming were to develop a sense of achievement, to socialize, and to become immersed in the world of the relevant video game. Also, a variety of scholars have noted that flow or optimal experience (Csikszentmihalyi, 2008) may be achieved during video game play (Charlton & Danforth, 2007; Faiola & Vioskounsky, 2007). A deeper understanding of the concept of flow and its occurrence during video game play is essential to developing a greater understanding of the phenomenological experience of video game play, and may provide critical insight into the motivations for and consequences of playing video games which may be applicable to most video games and gamers in spite of the heterogeneity of video games and those who play them.

The Psychology of Flow

The study of "flow" or "optimal experience" (also referred to interchangeably as engagement and enjoyment) was pioneered and extensively studied by Csikszentmihalyi (2008) using a "phenomenological model of consciousness based on information theory" (p. 25) assuming that the definition of consciousness is "intentionally ordered information" (p.26). Flow is most simply defined as "the state in which people are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it" (2008; p.4). In other words, flow occurs when an individual is engaged in an activity that requires that individual to maximally utilize their cognitive resources and has the subjective experience of being enjoyable. Csikszentmihalyi also explained that flow has been reported across a wide range of cultures and is a universal aspect of the human

experience which may occur in a wide variety of activities, including work and play. Furthermore, flow may be broken down into eight components, describing both the conditions necessary for flow as well as the phenomenological experiences that are associated with flow. Typically all of these components are experienced simultaneously although it is also possible for flow to be achieved without all of these components present.

Elements of Flow and their Occurrence During Video Game Play

The first component of flow is that an individual must engage in an activity in which success is possible, yet challenging and which requires skills to complete (Csikszentmihalyi, 2008; pp. 48-53). The activity may be a primarily physical activity, such as rock climbing, or an activity which involves the manipulation of symbolic information; likewise, flow inducing activities may require physical skills, mental skills, or a combination of physical and mental skills. A challenge may be any activity in which the skills must be successfully employed and the individual must invest considerable effort in order to achieve success. Activities that are not sufficiently difficult are more likely to induce boredom, while activities that are excessively difficult are more likely to induce anxiety; furthermore, most people who experience flow do so when their level of skill is approximately equal to the level of difficulty. The aspect of challenge may also be conceptualized as competition. This competition may be intra-individual, in which case someone is always trying to improve on their own performance due to intrinsic motivation, or may be interpersonal, in which case the individual is trying to outperform a competitor.

There are various aspects of gaming which are directly relevant to this component of flow. First of all, the actual manipulation of the video game interface (i.e. controller, keyboard, etc.) requires considerable manual dexterity and proficiency with the interface requires considerable practice (Wolf, 2001). In most games, there is a "tutorial" section in which the player must learn individual commands and then learn to chain those commands in increasingly difficult configurations resulting in a state of constantly experiencing new challenges in the interface component of the game (Eigenfeldt-Nielsen, Smith & Tosca, 2008). Once the gamer is able to develop sufficient mastery of the basic skills required for interfacing with the game, they are then immersed into the game environment and often are required to complete increasingly complex and challenging tasks. Consequently, gamers are constantly facing new challenges throughout the progression of a game, much as a practicing musician would learn increasingly difficult and challenging pieces of music. Within the last decade, MMORPG's have added another component to this aspect of flow in that they allow for various forms of competition which also adds to the challenge of the game (Hussain & Griffiths, 2009; Meredith, Hussain & Griffiths, 2009). In fact, some gamers describe themselves primarily as "player vs. player" (PvP) gamers and these individuals frequently play the video games primarily for the purpose of competition with other gamers via online interaction.

The second component of flow is that the activity involves the "merging of action and awareness" (Csikszentmihalyi, 2008; pp. 53-54). In other words, the activity must require the individual to use all their relevant skills and focus all their attentional resources in order to achieve the desired outcome. When this occurs, the activity is often

experienced to occur almost automatically and the behaviors the individual performs seem to "flow" with what seems like minimal effort. However, the activity frequently requires maximal effort and the experience of flow may be easily disrupted if there is any lapse in concentration. This component of flow is also easily associated with playing video games as this activity often requires allocation of nearly all attentional resources (Dye, Green & Bavelier, 2009). This is because gaming requires constant visual and auditory monitoring of the gaming media to assess the progress of the game and constantly requires the gamer to make changes via the gaming interface. Many gamers report that when they are playing video games, they are unaware of the rest of the environment as all of their attention is devoted to the task at hand (Faiola & Vioskounsky, 2007).

The third component of flow is that the activity must involve clear goals while the fourth component of flow is that the activity must provide immediate feedback to confirm whether or not these goals are being achieved (Csikszentmihalyi, 2008; pp. 54-58). For example, in the game of tennis there is a clear set of goals which guide the overall play of the game, as well as the play by play movements of each player and the players can instantly assess whether or not these goals are being accomplished. There may also be activities in which there is minimal external influence in the establishment of goals and the provision of feedback. In these situations, individuals who are able to set goals for themselves and monitor their progress are still able to achieve optimal experience. These components of flow can also be clearly seen in gaming. For example, whenever the gamer uses the interface, it instantaneously results in changes in the gaming media (Eigenfeldt-Nielsen, Smith & Tosca, 2008; Wolf, 2001). Often times, these changes

indicate whether the choices made by the gamer were successful or unsuccessful and this feedback will influence future decisions made by the gamer in a constant feedback loop. Also, the gamer frequently has clear goals, which are game dependent. For example, some games require gamers to complete a very clearly defined task (such as saving a princess) and based on the feedback provided by the gaming media, the gamer can determine if he/she is successful or unsuccessful in this endeavor.

The fifth component of flow or optimal experience is that it requires complete and unwavering "concentration on the task at hand" (Csikszentmihalyi, 2008; pp. 58-59). A consequence of such intense concentration is that while in a state of optimal experience an individual rarely contemplates other information, which may help to decrease the frequency of negative thoughts. Furthermore, when in such a state, individuals rarely contemplate issues that are temporally distant from the flow inducing activity. Since most video games are designed to require maximal attentional resources for success in the game, many gamers become completely engrossed in the games they are playing (Eigenfeldt-Nielsen, Smith & Tosca, 2008). Furthermore, many gamers also report that when playing video games they are able to escape from the external world and have fewer negative cognitions and emotions about their life (Faiola & Voiskounsky, 2007).

Csikszentmihalyi refers to the sixth component of flow as the "paradox of control" (2008; pp. 59-62). This refers to the subjective experience of an increased sense of control of oneself and the external environment while experiencing flow. Consequently, a number of relatively dangerous and unpredictable activities may still induce a state of flow but because of the subjective sense of control an individual is able to deemphasize the amount of danger involved in the activity. More importantly,

Csikszentmihalyi explains that "what people enjoy is not the sense of *being* in control, but the sense of *exercising* control" during flow experiences (p. 61, 2008). Csikszentmihalyi also comments that this component is most clearly linked to the potentially addicting nature of flow like experiences, as it shelters the individual from the realization that they are not in control of the activity, much as those with substance dependence are commonly able to deny having lost control of their substance use. Clearly, gamers have a certain sense of control playing video games and can directly influence all of the actions of the character being used in their game (Eigenfeldt-Nielsen, Smith & Tosca, 2008; Wolf, 2001). While these actions are mediated and limited by the programming of the game, the gamer still has considerable flexibility in the choices made and gamers often feel a sense of control of the game whenever playing video games.

The seventh component of flow is that during such experiences one loses a sense of self-consciousness (Csikszentmihalyi, 2008; pp. 62-66). One aspect of this loss of self-consciousness is a correlated feeling of being one with the environment and especially with the part of the environment the individual is interacting with to achieve flow. Csikszentmihalyi elaborates that because of this aspect of flow an individual is able to expand their sense of self by incorporating elements of the flow inducing environment. Many gamers also report experiences of being so completely immersed in playing a video game that they lose track of their own sense of self-identity (King, Delfabbro, & Griffiths 2009). Also, an increasingly common component of many video games is the development of increasingly realistic and nuanced avatars (Meredith, Hussain & Griffiths, 2009). Some avid gamers even consider their identity to be intimately connected with their avatars in the game (Faiola & Vioskounsky, 2007).

The eighth and last component of flow is the "transformation of time" (Csikszentmihalyi, 2008; pp. 66-67). This refers to the fact that during flow most individuals are susceptible to considerable amounts of time distortion. Most people report that during optimal experience time seems to pass much quicker than normal, often resulting in an underestimation of the amount of time invested in the activity. However, there are also reports of time passing much more slowly during optimal experience. Many gamers report losing track of time while playing video games (Faiola & Vioskounsky, 2007) and some gamers even report playing video games for the purpose of passing the time more quickly. Furthermore gamers often underestimate the amount of time spent gaming, and the effects of this time distortion increases with increased amounts of time played (Faiola & Vioskounsky, 2007; Rau, Peng & Yang, 2006; Tobin & Grondin, 2009; Wood & Griffiths, 2007).

Consequences of Video Game Play

As the video game industry has become increasingly successful and expansive, there has been growing concern that some gaming may have negative consequences on the physical and psychological health of gamers, especially minors. The most widely cited consequence of video game play is an increase in aggression and various authors have demonstrated an increase in aggression following game play in laboratory settings (Anderson, 2004; Anderson & Bushman, 2001; Bartlett, Harris & Baldassaro, 2007; Bartholow, Bushman, & Sestir, 2006; Carnagey, Anderson & Bushman, 2007; Farrar, Krcmar & Nowak, 2006; Fleming & Rickwood, 2001; Sherry, 2001) and in correlational studies (Funk, Buchman, Jenks, & Bechtoldt, 2003; Gentile, 2009; Hauge & Gentile, 2003; Shibuya, Sakamoto, Ihori & Yukawa, 2008) although some authors argue that

these effects may be exaggerated due to publication bias (Ferguson, 2007) and may not generalize to real world violence (Ferguson, 2008) or may be a moderating, rather than a mediating, variable (Ferguson, Rueda, Cruz, Ferguson, Fritz, & Smith (2008). There is renewed concern for this area of research as it has been found that increasingly realistic video games have a greater impact on aggression among gamers (Bartlett & Rodeheffer, 2009). Concerns have also been raised that video game play may result in decreased academic performance (Anand, 2007; Gentile & Stone, 2005; Hauge & Gentile, 2003; King, Delfabbro, 2009) although recent research suggests that such academic problems may not be present among average gamers but may be severe among gamers with addictive tendencies (Skoric, Teo, & Neo, 2009). There is also research to suggest that there is an inverse relationship between time spent playing video games and physical and mental well-being, such that gamers may be more prone to depression, introversion, and greater BMI as their amount of gaming increases (Weaver, Mays, Weaver, Kannenberg, Hopkins, Eroglu & Bernhardt, 2009).

It should also be noted that video game play may have positive impacts on various aspects of development (Durkin & Barber, 2002) including problem solving skills (Blumberg, Rosenthal, & Randall, 2008), certain cognitive skills such as attentional resources (Dye, Green & Bavelier, 2009), mental rotation (Boot, Kramer, Simons, Fabiani & Gratton, 2008), visual memory (Ferguson, Cruz & Rueda, 2008), and other areas of cognition (Barlett, Vowels, Shanteau, Crow & Miller, 2009) and are likely to become increasingly utilized in educational settings (Bodemer, Ploetzner, Bruchmuller & Hacker, 2005; Galarneau, 2005; Gee, 2005; Moreno-Ger, Burgos, Martinez-Ortiz, Sierra & Fernandez-Manjon, 2008; O'Connor & Menaker, 2008).

Video Game Addiction/Pathological Gaming

Another concern of growing interest is the concept of video game addiction or pathological gaming (used synonymously throughout). The concept was originally suggested in the 1980's (Soper & Miller, 1983) and has been discussed since (Fisher, 1994; Griffiths, 2000; Ng & Wiemer-Hastings, 2005; Reddy, 2008) but has only been researched in the last decade (Carbonell, Guardiola, Beranuy & Belles, 2009). While there is no clear cut disorder for pathological gaming, in recent years the AMA has suggested that such a classification should be developed (Khan, 2007) and efforts have been made to create such a classification in the DSM (Fisher, 1994; Block, 2008) or a general operational definition of pathological gaming and its symptom presentation (Lemmens, Valkenburg & Peter, 2009). There is little consensus regarding the classification, description or etiology of pathological gaming (Charlton & Danforth, 2007; Chiu, Lee & Huang, 2004; Gentile, 2009; Hart, Johnson, Stamm, Angers, Robinson, Lally & Fagley, 2009; Ng & Wiemer-Hastings, 2005; Wood, 2008) or even if the disorder exists (Ng & Wiemer-Hastings, 2005; Wood, 2008; Yellowlees & Marks, 2007). At present, it appears that such a disorder will not be included in the DSM-V due to a paucity of empirical research, although it may be considered for future editions as increasing research becomes available (Weinstein, 2010). Presently, most research draws heavily from pathological gambling criteria and characteristics to establish an operational definition for pathological gaming as the two share many common characteristics (Delfabbro, King, Lambos & Puglies, 2009; Gentile, 2009; Parker, Taylor, Estabrook, Schell, & Wood, 2008; Salguero & Moran, 2002; Wood, Gupta, Derevensky & Griffiths, 2004) and this often has considerable overlap with the concept of internet addiction

(Block, 2008; Griffiths, 2000; Khan, 2007; Ko, Yen, Chen, Chen & Yen, 2005; Niemz, Griffiths & Banyard, 2005; Whang, Lee & Chang, 2005; Yang & Tung, 2007). On a related note, there is growing concern that online video games may be more addictive than traditional offline video games (Hussain & Griffiths, 2009; Kim, Namkoong, Ku & Kim, 2008; Ng & Wiemer-Hastings, 2005) suggesting that pathological gaming may be a growing problem in the future as online based games become increasingly prevalent.

There are a number of different factors associated with a typical presentation of pathological gaming, as elucidated in the model developed by Lemmens, Valkenburg & Peter, (2009) and shared with various other models of video game addiction as well as other models of addiction in general (Griffiths, 2000; Griffiths & Davies, 2005). Lemmens et. al. model includes seven factors (salience, tolerance, mood modification, withdrawal, relapse, conflict, and problems) which load onto the second order factor of video game addiction. Salience refers to a person's preoccupation with gaming and is associated with pathology when gaming becomes the most important activity in one's life, resulting in cravings and excessive use (Gentile, 2009; Hussain & Griffiths, 2009; King & Delfabbro, 2009; Yee, 2006). Tolerance refers to the process whereby gamers require a greater amount of time played to get the same enjoyment from gaming, sometimes playing for five, ten, or even twenty hours of consecutive game play and/or without receiving the same enjoyment as before, regardless of the time investment (Hussain & Griffiths, 2009; Kim, Namkoong, Ku & Kim, 2008; King & Delfrabbro, 2009; Salguero & Moran, 2002; Yee, 2006). Mood modification refers to the subjective enjoyment of games and may refer to either a euphoric high or buzz associated with game play or with a sensation of relaxation often associated with escapism (Griffiths, 2000;

Hussain & Griffiths, 2009; Wood, Gupta, Derevensky & Griffiths, 2004). Withdrawal refers to the undesirable physical and psychological consequences which result after game play is significantly reduced or discontinued; the most common symptoms include irritability and moodiness but may also be physiological in nature, including trembling of the extremities (Hussain & Griffiths, 2009; King & Delfabbro, 2009). Relapse refers to the tendency to revert to previous patterns of pathological gaming after legitimate attempts have been made to decrease gaming frequency/intensity (Hussain & Griffiths, 2009; Lee, Yu & Lin, 2007). Conflict refers to interpersonal conflict, such as arguments or neglect, which result from pathological gaming (Chiu, Lee, Huang, 2004; Gentile, 2009; Hauge & Gentile, 2003; King & Delfabbro, 2009). Problems refer to any disability, impairment, or significant disruption in social, academic, or vocational areas of functioning as a result of gaming behavior (Gentile, 2009; Hauge & Gentile, 2003; King & Delfabbro, 2009). A critical aspect of all of these factors is that video game addiction involves a considerable investment of time with pathological gamers playing at least twice as often as casual gamers (Charlton & Danforth, 2007; Hussain & Griffiths, 2009) usually averaging at least 20-30 hours of game time per week and up to 80-100 hours per week in extreme cases (Gentile, 2009; Hauge & Gentile, 2003; Kim, et. al. 2008; King & Delfabbro, 2009). In fact, some pathological gamers report playing so excessively that the games become more like work than recreation yet they are still unable to pull themselves away; this has been reported as being similar to losing control or binging on video games (King & Delfabbro, 2009; Lee, Yu & Lin, 2007; Yee, 2006). However, it should also be noted that criticisms of this model exist. Specifically, Charlton and Danforth (2007) suggest that pathological gaming may be difficult to distinguish from the

concept of high engagement or flow and that when one is highly engaged in an activity (which is usually considered to be a healthy behavior) they also experience tolerance, euphoria, and cognitive salience, three of the seven factors listed above (Lemmons et. al. 2009; Reddy, 2008).

As there is no standardized assessment instrument or operational definition for pathological gaming, estimates of its prevalence vary but most authors agree that it is more common in males than females (Chiu, Lee & Huang, 2004; Hauge & Gentile, 2003; Ko, Yen, Chen, Chen & Yen, 2005; Parker, Taylor, Estabrook, Schell & Wood, 2008) occurring in approximately 8-12% of males and 1-3% of females (Gentile, 2009; Salguero & Moran, 2002). The prevalence has been estimated to be approximately 6-8% among 8-18 year-olds (Gentile, 2009; Salguero & Moran, 2002), and as high as 12%-16% among the general population (Griffiths & Hunt, 1998; Grusser, Thalemann & Griffiths, 2007) and as high as 38% among online gaming communities (Charlton & Danforth, 2007). Potential risk factors for video game addiction include family dysfunction (Chiu, Lee & Huang, 2004; Ko, et. al. 2005), boredom (Chiu, Lee & Huang, 2004); social skills deficiencies (Chiu, Lee & Huang, 2004; Griffiths, 2000; Kim, Namkoong, Ku & Kim, 2008; King & Delfabbro, 2009), sensation seeking (Chiu, Lee, & Huang, 2004; Wood, Gupta, Derevensky & Griffiths, 2004), narcissistic personality traits (Kim, et. al., 2008), poor self-control (Kim, et. al. 2008; Lee, Yu & Lin, 2007) and having a video gaming console in one's bedroom (Gentile, 2009; King & Delfabbro, 2009). Common negative outcomes associated with pathological gaming include aggressive tendencies, especially since pathological gamers have greater exposure to violent video games (Chiu, Lee & Huang, 2004; Gentile, 2009; Hauge & Gentile, 2003;

Kim, et. al., 2008) decreased academic performance (Chiu, Lee & Huang, 2004; Gentile, 2009; Hauge & Gentile, 2003; Skoric, Teo & Neo, 2009), attention problems (Gentile, 2009), subjective feelings of addiction (Gentile, 2009; Lee, Yu & Lin, 2007; Salguero & Moran, 2002) internet addiction (Griffiths & Wood, 2000; Parker et. al. 2008), and pathological gambling (Griffiths & Wood, 2000; Parker et. al, 2008). With the growing prevalence of MMORPG's there is now growing evidence that pathological gamers have a greater reliance on video games and the internet to fulfill social needs (Faiola & Vioskounsky, 2007; Weaver, Mays, Weaver, et. al., 2009). However, it should also be noted that few experimental studies have been conducted to evaluate the directionality of the risk factors and correlates of video game play so it is also possible that pathological gaming may be a result, rather than a cause, of the above mentioned problems (Gentile, 2009).

Presently, there is an insufficient body of research to conclusively determine the mechanistic nature of pathological gaming either etiologically or in the course of the addiction although there is a growing amount of literature about multiple pieces of this puzzle. Some speculate that there are structural characteristics of game play, such as interactivity, anonymity, control, empowerment, recognition, and accomplishment as well as the facilitation of social interactions for online games which may contribute to the development of addiction (Griffiths, 2000; King & Delfabbro, 2009; Liu & Peng, 2009). The structural characteristics of game play may be increasingly important for online play (MMORPG's) as many games in this genre do not have a natural ending within the game or can be replayed many times over (Hussain & Griffiths, 2009; King & Delfabbro, 2009; Lee, Yu & Lin, 2007; Meredith, Hussain & Griffiths, 2009).

From a behavioral perspective, the structure of online game play is conducive to operant conditioning by means of a variable-ratio reinforcement schedule and provides social reinforcement during online player to player interactions (Charlton & Danforth, 2007; Liu & Peng, 2009). Furthermore, a recent study using SPECT neural imaging techniques discovered that video game play may have a dopaminergic effect of similar magnitude to that of psychostimulant drugs and that this reward mechanism may play into addictive gaming behavior (Weinstein, 2010). Others suggest that pathological gaming may be used as a coping mechanism to deal with other psychological issues such as depression, loneliness or social anxiety (Caplan, 2003; Davis, 2001; Liu & Peng, 2009; Wood, 2008; Wood, Gupta, Derevensky, & Griffiths, 2004). It has also been suggested that poor self-regulation skills are at the core of pathological gaming, contributing to factors such as distorted time perception as well as negative consequences such as physical, psychosocial, and academic/vocational problems which may result from excessive play (Kim, Namkoong, Ku & Kim, 2008; Liu & Peng, 2009). In a similar vein, poor time management skills may be a critical factor contributing to pathological gaming (Wood, 2008) or that excessive gaming results from distorted time perception among gamers (Wood & Griffiths, 2007; Wood, Gupta, et. al. 2004). However, there is growing research suggesting that distortions in time perception are commonly associated with video game play, and the degree of time perception increases as the length of gaming sessions increases. Consequently, those who play video games typically underestimate how much time they have been playing and the longer they play, the more they underestimate their current play time. It is also likely that the interaction of some or all of these factors are tied into an etiological model such that individual differences

combined with gaming factors and behavioral conditioning may interact to gradually result in the development of pathological gaming.

In order for video game addiction to be clearly defined and its etiology better understood, there must also be a way to distinguish recreational, non-pathological gaming which has minimal or no negative consequences from pathological gaming with all the negative consequences that may accompany it. It is possible that a thorough exploration of the experience of flow or engagement during game play may illuminate such a distinction and prove to be critical to developing an appropriate model for the etiology and diagnosis of pathological gaming. More specifically, Charlton and Danforth (2007) found that avid, non-pathological gamers endorse criterion consistent with the factors of cognitive salience, tolerance, and euphoria but do not experience the negative consequences seen in other behavioral addictions, including conflict, withdrawal, relapse, and behavioral salience. Essentially, Chalrton and Danforth argue that cognitive salience, tolerance, and euphoria are inappropriate criteria for a diagnosis of video game addiction and more appropriately describe video game engagement. In other words, it would seem that time played and amount of enjoyment may only be related to pathological gaming if negative consequences such as academic or social conflict occur as a result of the gaming; however, pathological gamers would still be likely to play considerably more than gamers who are highly engaged but not addicted. It has also been suggested that players who become highly engaged in game play are more likely to develop other characteristics of video game addiction (Charlton, 2002). Charlton and Danforth (2007) also suggest that including engagement related criteria in the diagnostic criteria for video game addiction could result in inflated estimates by as much as 25-40% as a large

number of avid gamers would meet the engagement related criteria without having the negative consequences associated with other aspects of addiction.

Objectives

Clearly, more work needs to be done to develop a valid and reliable method for identifying individuals with pathological gaming habits with enough specificity and sensitivity to differentiate between recreational video game play and pathological video game play. One important component of this distinction is separating individuals with flow experiences and non-pathological gaming habits from pathological gamers. Charlton and Danforth (2007) have suggested that the presence of cognitive salience, tolerance, and euphoria among avid gamers in the absence of negative consequences is indicative of healthy gaming habits and the experience of flow. In order to assess this using the video game addiction scale (VAS; Lemmens, et. al., 2009) gamers who only report elevations on the scales of salience, tolerance, and mood modification (classified as engaged gamers), will be compared against those with elevations on the negative consequences scales, including withdrawal, relapse, conflict, and problems (classified as pathological gamers). Using this approach, the following hypotheses will be tested.

Hypothesis 1: Pathological gamers will differ from engaged gamers in terms of:

Game Time: pathological gamers will invest more time in games than engaged gamers

Psychopathology: pathological gamers will have greater degrees of psychopathology than engaged gamers

Engagement/Flow: pathological gamers will have lesser degrees of flow/engagement than engaged gamers

Hypothesis 2: Pathological gamers will differ from non-pathological gamers in terms of:

Game Time: pathological gamers will invest more time in games than non-pathological gamers

Psychopathology: pathological gamers will have greater degrees of psychopathology than non-pathological gamers

Engagement/Flow: pathological gamers will have lesser degrees of flow/engagement than non-pathological gamers

Hypothesis 3: Flow will be more strongly correlated with online game sessions than offline game sessions regardless of pathological or engagement status.

CHAPTER II

METHODS

Participants

803 participants from the University of North Dakota were recruited via the SONA system. Participants were compensated with extra credit in a registered course at UND. Participants were provide informed consent and the project had IRB approval.

Measures

Demographics Questionnaire

A demographics questionnaire was created for the purposes of this study to assess the following demographic issues: age, ethnicity, gender, and years of education (see appendix).

Video Game History Questionnaire

The video game history questionnaire is partially based on other video game history questionnaires (Ainley, Enger, & Kennedy, 2008; Colwell & Payne, 2000; Dye, Green & Bavelier, 2009; Greenberg, Sherry, Lachlan, Lucas & Holstrom, 2008). The questionnaire assesses the following topics: age of first playing video games, accessibility to video games, and gaming activity for the past six months (including games played and quality of experiences while gaming) (see appendix).

Gaming Engagement Questionnaire

The gaming engagement questionnaire (Brockmeyer, Fox, Curtiss, McBroom, Burkhart & Pidruzny, 2009) was developed using Rasch and classical analyses to assess

various aspects of the phenomenological experience of playing violent video games. The scale consists of 19 Likert scale items which assess various aspects of engagement during gaming (see appendix).

Video Game Addiction Scale

The video game addiction scale (Lemmens, Valkenburg, & Peter, 2009) is a 21 item, 5-point Likert scale inventory normed on two independent samples of Dutch adolescent gamers (N=352 and N=369) to assess the extent of pathological gaming (see appendix). Using structural equation modeling the scale is divided into seven first order factors (salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems) which load onto a second order factor of game addiction. Each item has adequate loadings on its intended first order factor and each factor has adequate loadings on the factor of game addiction. The scale had a Cronbach alpha of .94 with the first sample and .92 with the second sample. Furthermore, the VAS demonstrated adequate concurrent validity when compared to measures of time spent on games, loneliness, life satisfaction, social competence, and aggression as well as adequate convergent validity across multiple studies and overall the scale has good construct validity (Lemmens, et al., 2009; Lemmens, Valkenburg & Peter, 2011). There is also a short-form of the scale, which includes one question from each factor and has psychometric properties similar to the full form. Although the creators of the scale did not establish specific cut-off scores to define pathological gaming, it has been suggested that respondents with mean scores above 3 across the entire questionnaire can be considered likely to demonstrate significant symptoms of pathological gaming (Lemmens et. al. 2011). Others have suggested using a cut-off of a mean score of at least three on at least four of the seven

factors (Arnesen, 2010). The VAS has been used by multiple researchers in several industrialized countries largely because of its theoretical foundations and psychometric properties (Arnesen, 2010; Griffiths, 2010; Lemmens et. al., 2011; Sanders, Chen, Zahra, Dowland, Atkinson, Papadaki & Furnell, 2010).

Center for Epidemiological Studies Depression Scale

The Center for Epidemiological Studies Depression Scale (CES-D) is a 20 item 4 point Likert scale self-report measure designed to assess the frequency of depressive symptoms in the general population (Nezu, Ronan, Meadows & McClure, 2000; Radloff, 1977). The 20 items load onto four general constructs, including depressed affect, positive affect, somatic and retarded activity, and an interpersonal factor. The CES-D was originally designed for epidemiological studies of depression and has been heavily utilized for research purposes with strong internal consistency for the general populations and moderate stability across time, as would be expected for measures of a changing state such as depression. The CES-D has also demonstrated strong concurrent validity as well as strong discriminant validity and has strong sensitivity and specificity. Although the scale was originally designed to assess the frequency of depressive symptoms over the past week, it will be slightly modified to assess the frequency of depressive symptoms over the past six months, in order to be more directly comparable to other measures used in this study.

Positive and Negative Affect Scales

The positive and negative affect scales (PANAS) is a 20 item 5 point Likert scale self-report measure consisting of two subscales consisting of ten items designed to measure positive affect and negative affect (Nezu, Ronan, Meadows, & McClure, 2000;

Watson, Clark, & Tellegen, 1988). The scale is also designed to assess affect over a variety of different time frames; a time frame of six months will be used for this study, consistent with the other measures used. The PANAS is frequently used in research and is a good way to measure both positive and negative affect. The scale has strong internal consistency and moderate test-retest reliability, as would be expected for a scale designed to assess a dynamic construct, such as affect. Each scale has demonstrated strong convergent and discriminant validity.

State-Trait Anxiety Inventory

The State Trait Anxiety Inventory (STAI) is a 40 item 4 point Likert scale self-report measure designed to assess long-lasting anxious tendencies (trait anxiety) and present anxious symptoms (state anxiety) (Groth-Marnot, 2003). The STAI is composed of two subscales of 20 items each which assess either state anxiety or trait anxiety. The STAI has strong validity and reliability and is generally psychometrically sound and can be applied with a variety of populations, including the general population and non-psychiatric samples.

State-Trait Anger Expression Inventory, 2nd Edition

The State Trait Anger Expression Inventory, 2nd Edition (STAXI-2) is a 57 item, 4 point Likert scale self-report questionnaire designed to assess current feelings and thoughts of anger (state anger), general tendencies to feel and/or express anger (trait anger) and patterns of regulating anger in terms of control and direction of expression (i.e. inward or outward) (Spielberger, 1999). It is a psychometrically validated measure with adequate validity and reliability.

Young Schema Questionnaire Short Form 3rd Edition

Schema theory uses a combination of cognitive, behavioral, experiential, and psychoanalytic approaches to assess and treat characterological flaws and early maladaptive schemas similar to those seen in personality disorders (Young, Klosko & Weishaar, 2003). The Young Schema Questionnaire is a self-report instrument which assesses the presence of each of these early maladaptive schemas and is available in short and long forms. The short form consists of 90 questions in a 6 point Likert scale format while the long form consists of 232 questions in a 6 point Likert scale format. The short and long forms both have similar psychometric properties although the short form is more theoretically pure and psychometrically sound as it only lists the five highest loading items for each schema factor; the short form is increasingly used in research settings and will consequently be used for these purposes (Schema Therapy Institute, 2004). The Young Schema Questionnaire 3rd edition, short form (YSQ-S3) consists of 90 items which individually load onto one of 18 early maladaptive schemas; each schema has 5 items specific to the schema and the measure is designed to give equal weight to each schema.

Procedures

Students were recruited from a pool of undergraduate and graduate students at the University of North Dakota, primarily within the psychology department. Students completed all questionnaires online in a single session of approximately 45-75 minutes. Upon consenting to the study, participants were presented via SONA system the questionnaires described above in the following order: Demographics Questionnaire,

Video game History Questionnaire, Gaming Engagement Questionnaire, Video Game Addiction Scale, CES-D, PANAS, STAI, STAXI-2, and YSQ-S3. All participants were allocated extra credit for the course of their choosing based on the amount of time taken to complete the questionnaires.

Statistical Procedures

Operational Definitions

It is essential to distinguish gamers who do and do not experience flow while gaming and it is essential to distinguish pathological from non-pathological gamers. However, these classifications are not mutually exclusive, i.e. there may be pathological gamers who experience flow and pathological gamers who do not experience flow. In situations where a participant could be classified as both engaged and pathological, the classification of pathological will take precedent. The statistical definitions for each of these categories are as follows:

Pathological Gamer vs. Non-Pathological Gamer: The VAS subfactors of withdrawal, relapse, conflict, and problems were combined into an addiction factor and respondents with mean scores of 3 or greater across these four factors were classified as pathological gamers, regardless of scores on the other factors. Non-pathological gamers were defined as those not meeting criteria for pathological gaming, based on the operational definition stated above.

Engaged Gamer vs. Non-Engaged Gamer: The VAS factors of salience, tolerance, and mood modification were combined into an engagement/flow factor and respondents with mean scores of 3 or greater across these three factors were classified as engaged gamers, regardless of scores on the other factors. However, the above described

operational definitions regarding gaming pathology and engagement were untenable with obtained data (unequal and excessively small cell sizes), and both variables were treated as continuous variables with gaming pathology measured by the total raw score of the VAS and gaming engagement measured by the total raw score of the GEQ, in addition to the original variable definitions.

Variables of Interest

The following variables will be created for data analysis:

Pathological Gamer: As defined above, pathological gamer is a dichotomous categorical variable; gamers were classified as non-pathological (0) or pathological (1) based on the criteria established above.

Engaged Gamer: As defined above, engaged gamer is a dichotomous categorical variable; gamers were classified as non-engaged (0) or engaged (1) based on the criteria established above.

Gamer Pathology: This continuous variable is the total raw score on the VAS.

Gamer Engagement: This continuous variable relates to the typical degree of engagement experienced by the gamer across all gaming experiences as measured by the total raw score on the gaming engagement questionnaire.

Gamer Time: There were several variables related to time spent on video games.

Total Gaming Time: This continuous variable measures the total allocation of time to video games per week.

Total Time Online: This continuous variable measures the total allocation of time to online games by gamers per week as reported in the Gaming History Questionnaire.

Total Time Offline: This continuous variable measures the total allocation of time to offline games by gamers per week as reported in the Gaming History Questionnaire.

Gaming Engagement: This continuous variable relates to the typical degree of engagement reported by respondents for more specific gaming experiences based on mean raw scores of the flow related questions of the gaming history questionnaire.

Statistical Analyses

Hypothesis 1: In order to test hypothesis 1 regarding differences between pathological gamers and engaged gamers, a one-way MANOVA was to be conducted examining group differences between engaged and pathological gamers for each of the following variables: Gamer Time, Gamer Engagement, and Gamer Pathology. A one-way MANOVA was also to be conducted examining group differences between engaged and pathological gamers for each of the scales relating to psychopathology including the CES-D, PANAS, STAI, STAXI-II and YSQ-S3. Due to problems with cell size a multiple regression analysis was substituted as described below.

Hypothesis 2: In order to test hypothesis 2 regarding differences between pathological gamers and non-pathological gamers, a one-way MANOVA was to be conducted examining group differences between pathological and non-pathological gamers for each of the following variables: Gamer Time, Gamer Engagement, and Gamer Pathology. A one-way MANOVA was also to be conducted examining group differences between pathological and non-pathological gamers for each of the scales relating to psychopathology including the CES-D, PANAS, STAI, STAXI-II and YSQ-S3. Due to problems with cell size a multiple regression analysis was substituted as described below.

In the original design, the rationale for using MANOVA in the above hypothesis tests was to determine if pathological gamers are a distinct group from engaged gamers as well as from non-pathological gamers and if this distinction can be made based on the measures used in this study. It should also be noted that two separate MANOVAs were to be conducted within Hypothesis 1 and Hypothesis 2 as the DV's relevant to the MANOVA should be conceptually related (Mertler & Vannatta, 2005). Essentially, each hypothesis is conducting one MANOVA examining group differences for variables related to gaming experiences and one MANOVA examining group differences for variables related to psychopathology.

Hypothesis 3: In order to test hypothesis 3, a T-Test was conducted comparing the level of gaming engagement across online gaming experiences vs. offline gaming experiences. This was intended to determine if online vs. offline gaming are two qualitatively distinct gaming experiences, at least in terms of flow, which may be highly relevant to future research involving pathological gaming. Refer to the table below for a list of relevant variables of interest and their statistical definitions.

Table 1:

Variables of Interest

Variable	Name of Variable	Source of Variable	Calculation of Variable
ENG-VAS	Engagement using VAS subscales	VAS subscales of mood modification, tolerance, and salience	Average of raw scores from scales (range 1-5)
ENG-GEQ	Engagement using GEQ	GEQ, all questions	Total raw score from all GEQ questions
Game-ON	time spent gaming per week on-line	Self-report for time spent gaming online for each game	Sum of time spent gaming online for 3 most played games plus all other gaming time online
Game-OFF	time spent gaming per week off-line	Self-report for time spent gaming offline for each game	Sum of time spent gaming offline for 3 most played games plus all other gaming time offline
Depression	Depression	CES-D	raw score of responses to CES-D
Anxiety	Trait Anxiety	STAI-II	percentile score from STAI-II
Anger-Trait	Trait Anger	STAXI-II	percentile score from STAXI-II
Anger-Index	Anger-Index	STAXI-II	percentile score from STAXI-II
PATH-VAS	Pathology using VAS subscales	VAS subscales of conflicts, problems, relapse, and withdrawal	Average of raw scores from scales (range 1-5)
PATH-Total	Pathology using all of VAS	All items on VAS	Total raw score from the scales
IAPsd	Impaired Autonomy and Performance	YSQ3-S	Total raw score from all scales loading onto IAP schema domain
OIsd	Overvigilance and Inhibition	YSQ3-S	Total raw score from all scales loading onto OI schema domain
ILsd	Impaired Limits	YSQ3-S	Total raw score from all scales loading onto IL schema domain
DRsd	Disconnection and Rejection	YSQ3-S	Total raw score from all scales loading onto DR schema domain
ODsd	Other-Directedness	YSQ3-S	Total raw score from all scales loading onto OD schema domain
Life-Sat	Life satisfaction	SWLS	Total raw score from SWLS
First-Play	Age to first play a video game	Self-report	Age reported to have first played a videogame
Games Owned	Number of Games currently owned	Self-report	Number of games reported to currently own
Money Spent	Amount of money spent gaming yearly	Self-report	Total money spent on games, systems, accessories, and access per year
Affect	Difference between positive and negative affect	PANAS	Differences between total raw score for positive affect items and total raw score for negative affect items

CHAPTER III

RESULTS

Participants

College students (545 females, 258 males, M_{age}= 20.25, age-range: 18-47) enrolled in psychology courses at the University of North Dakota were recruited via an online research system. Nineteen participants' responses were screened out due to missing data and/or inconsistent responding. Participants were primarily Caucasian (88.4%) and more than half of participants were freshman (53.3%). Participants were recruited during the 2011-2012 academic year and were compensated for their time with course credits or extra credit.

Gaming History and Current Gaming Habits

The vast majority of participants (96%) reported playing video games at some point in their life; among those individuals most (98.3%) reported playing video games since prior to age 18. Men (M_{age}= 8.8) and women (M_{age}=9.2) did not significantly differ for age of first playing a video game. Men owned an average of two gaming systems while women owned just one, $F(1,799) = 54.933$, $p<.001$. Men also owned significantly more video games, $F(1,801) = 53.003$, $p<.001$ with men owning an average of 21 video games and women owning an average of 10. Men (M_{money}= \$180.34) also spent significantly more money per year on video games than women (M_{money}= \$43.40), $F(1,793) = 148.528$, $p<.001$. However, women (M_{age}=10.4) reported having video games in their bedroom at a significantly earlier age than men (M_{age}=11.9), $F(1,392) = 17.344$,

p<.001. Due to the various differences between men and women with regard to their gaming history, analyses were conducted for the entire sample as well as for each gender separately.

Participants were also asked about the three games they have played the most often over the past six months as well as how much time was spent playing any other games. The vast majority of men (96.5%) and women (81.3%) reported playing at least one game in the past six months. The amount of time spent playing video games per week online and offline was assessed. A one-way MANOVA revealed that men spent significantly more time than women playing video games, Pillai's Trace=0.024, F(2, 800)=67.805, p<.001. Further analysis shows that men (M=34.39 hours) spent significantly more time per week than women (M=12.89 hours) playing video games in total, F(1,801)=131.004, p<.001, online (M_{males}=16.53 hours, $M_{females}$=8.435 hours), F(1,801)=122.993, p<.001, and offline (M_{males}= 17.9 hours, $M_{females}$=8.3 hours), F(1, 801)=80.352, p<.001.

Gaming Engagement and Pathology

Participants were asked about the phenomenological qualities of their gaming experiences in general and for each game in online and offline modes. In general, males reported higher levels of flow during gaming (M_{GEQ}= 41.0736) than did females (M_{GEQ}= 27.8606), F(1,801)=92.556, p<.001. Flow experiences were compared for gaming experiences in which the game could be played both online and offline. In offline modes there was no significant difference between males and females for levels of flow during gaming, F(1,446)=0.264, p=0.608. In online modes there was a significant difference

between males (M=15.8475) and females (M=15.2972), $F(1,446)=6.251$, p=0.013, with males reporting a stronger flow experience during online gaming than females.

Responses on the VAS were also used to assess gaming engagement and gaming pathology. An average score of 3.0 (5 point scale) or greater on the VAS is considered to indicate the presence of pathological video game habits (denoted hereafter as PATH-Total). Among males (N=247) and females (N=395) who played games in the past 6 months and completed the VAS there were 14 males (5.67%) and 7 females (1.77%) who met criteria for pathological gaming. The VAS consists of seven scales; three of these scales (salience, tolerance, and mood modification, denoted hereafter as ENG-VAS) may be more indicative of flow during gaming while the remaining four scales (withdrawal, relapse, conflict, and problems, denoted hereafter as PATH-VAS) may be more indicative of pathological gaming. Gamers were also classified independently on each of these groups of scales if their mean score was greater than 3.0. Using this classification 40 males (16.2%) and 30 females (7.59%) could be classified as engaged gamers (ENG-VAS) while 14 males (5.67%) and 8 females (2.03%) could be classified as pathological gamers (PATH-VAS). When comparing average scores across gender, males were found to have greater levels of engagement (ENG-VAS; M_{males}=2.2218, $M_{females}$=1.8124), $F(1,640)=51.782$, $p<.001$, greater levels of pathology as determined by the four pathological scales (PATH-VAS; M_{males}=1.6761, $M_{females}$=1.3652), $F(1,640)=44.398$, $p<.001$, and greater levels of overall pathology as determined by the full VAS (PATH-Total; M_{males}=1.9100, $M_{females}$=1.5568), $F(1,640)=57.027$, $p<.001$.

Each gamer was classified as being either a casual gamer (mean of ENG-VAS and PATH-VAS <3.0), an engaged and non-pathological gamer (mean of ENG-VAS

>3.0 and mean of PATH-VAS <. 3.0), an unengaged and pathological gamer (mean of ENG-VAS <3.0 and mean of PATH-VAS > 3.0) or an engaged and pathological gamer (mean of ENG-VAS and PATH-VAS > 3.0). Due to small cell size (290 casual gamers, 48 engaged and non-pathological gamers, 6 unengaged and pathological gamers, and 10 engaged and pathological gamers) a 2x2 (gender x gamer classification) MANOVA was not a sound statistical approach.

Consequently, multiple regression equations were created to determine the most important predictors for gaming engagement and gaming pathology. Average PATH-VAS scores were used as a continuous variable to indicate degree of pathological gaming and average ENG-VAS scores were used as a continuous variable to indicate degree of engagement while gaming. An additional analysis was conducted using all twenty one questions from the VAS (PATH-Total) to explore similarities and differences between the full scale and the subscales related to engagement and pathology separately. Due to differences between men and women with regard to gaming characteristics, an analysis was conducted for each gender separately and for both genders combined.

Prior to conducting analyses, further data screening was conducted. Participants were removed from analysis if they failed to respond to more than ten percent of any given scale or more than five percent of all questions. Participants were also screened if their responses appeared random (i.e. same response for all items). Participants who failed to complete all items of the Video Game Addiction Scale were also removed. Multivariate outliers were removed using the Mahalanobis Distance method. This left a total of 592 participants (229 males, 363 females) for regression analyses.

Next, variables of interest were examined for normality, linearity, and homoscedasticity. Substantial non-normality was found and corrected using log10 transformations for the variables of PATH-VAS (average value for 3 VAS subscales related to pathology), PATH-Total (total raw score for all 21 items of the VAS), age of first play (First-Play), number of gaming systems owned, number of video games owned (Games Owned), time spent in offline gaming per week (Time-OFF), total time spent gaming per week, emotional deprivation, social isolation/alienation, defectiveness/unlovability, enmeshment, disconnection and rejection (DRsd), impaired autonomy and performance (IAPsd), and negative affect. Substantial non-normality was also found and corrected using square root transformations for the variables of money spent per year on gaming (Money Spent), time spent in online gaming (Time-ON), depression scores (Depression), abandonment, failure to achieve, and vulnerability to illness/harm. Linearity was within acceptable limits for variables of interest. Residual scatter-plots conducted within each regression analysis indicated that homoscedasticity was within acceptable limits.

Variables entered into regression analysis include variables related to gaming habits and history, schema elevations, anxiety, depression, life satisfaction, and anger. After assessing for multicollinearity final variables used in regression analyses were determined. Variables included in each analysis are specified in their respective sections. For labels and explanations of specific variables, refer to table 1.

Predictors of Engagement in Multiple Regression

Two sets of analyses were conducted to identify predictors of engagement (ENG-VAS). In one set of analyses, the variable of overall engagement, a continuous variable

using the total raw score for the Gaming Engagement Questionnaire (ENG-GEQ) was included in analyses. Due to conceptual overlap between the ENG-GEQ and ENG-VAS a second set of analyses was conducted with this variable (ENG-GEQ) excluded to better isolate the role of other variables related to gaming habits, psychopathology, and personality factors. Other variables included in all analyses related to gaming habits were time spent gaming per week on-line (Time-ON), time spent gaming off-line per week (Time-OFF), number of games currently owned (Games Owned), amount of money spent on gaming per year (Money Spent), and age to first play a video game (First-Play). Variables related to psychopathology included overall Life Satisfaction (Life-Sat), difference between positive and negative affect (Affect), Anger-Index (Percentile scores from STAXI-II), Anger-Trait (Percentile Scores from STAXI-II), Anxiety (Percentile scores from STAI-II) and Depression (raw score from CES-D). Variables related to psychopathology were the five schema domains identified by the YSQ-3-SQ, which included impaired autonomy and performance (IAPsd), overvigilance and inhibition (OIsd), impaired limits (OLsd), disconnection and rejection (DRsd), and other-directedness (ODsd). Subscales from the STAXI-II and individual schema domains were eliminated in order to minimize multicollinearity and conceptual redundancy as well as to decrease the number of unnecessary variables entered into the analysis.

The first set of analyses included all variables discussed above, including gaming engagement (ENG-GEQ). Three separate analyses were conducted, one using the entire sample and one each for female or male participants. Backward regression analyses were conducted in order to exclude irrelevant variables using a cutoff criteria of $p<.05$. The

second set of analyses was identical to the first except the variable of gaming engagement (ENG-GEQ) was not included.

Regression #1: Full Sample, ENG-GEQ included, Engagement (ENG-VAS) as DV

Regression results indicate an overall model of eight predictors (ENG-GEQ, Time-ON, Games Owned, Money Spent, Anxiety, Depression, Affect, and IAPsd,), that significantly predicted gaming engagement (ENG-VAS), R^2=0.679, R_{adj}^2=0.674, F(9,582)=136.632, p<.001. This model accounted for 67.9% of the variance in gaming engagement (ENG-VAS) within the sample and would be expected to account for 67.4% of the variance in a randomly selected sample.

Regression #2: Female Sample, ENG-GEQ included, Engagement (ENG-VAS) as DV

Regression results indicate an overall model of four predictors (ENG-GEQ, Time-ON, Anxiety, and Games Owned), that significantly predicted gaming engagement (ENG-VAS), R^2=0.655, R_{adj}^2=0.651, F(4,358)=169.653, p<.001. This model accounted for 65.5% of the variance in gaming engagement (ENG-VAS) within the sample and would be expected to account for 65.1% of the variance in a randomly selected sample.

Regression #3: Male Sample, ENG-GEQ included, Engagement (ENG-VAS) as DV

Regression results indicate an overall model of five predictors (ENG-GEQ, Time-ON, IAPsd, ILsd, and Money Spent), that significantly predicted gaming engagement (ENG-VAS), R^2=0.631, R_{adj}^2=0.623, F(5,223)=76.341, p<.001. This model accounted for 63.1% of the variance in gaming engagement (ENG-VAS) within the sample and would be expected to account for 62.3% of the variance in a randomly selected sample.

Regression #4: Full Sample, ENG-GEQ excluded, Engagement (ENG-VAS) as DV

Regression results indicate an overall model of eight predictors (Time-ON, Time-OFF, Depression, Anxiety, Anger-Trait, Games Owned, Money Spent, and Affect), that significantly predicted gaming engagement (ENG-VAS), R^2=0.409, R_{adj}^2=0.401, $F(8,583)=50.354$, $p<.001$. This model accounted for 40.9% of the variance in gaming engagement (ENG-VAS) within the sample and would be expected to account for 40.1% of the variance in a randomly selected sample.

Regression #5: Female Sample, ENG-GEQ excluded, Engagement (ENG-VAS) as DV

Regression results indicate an overall model of five predictors (Time-ON, Time-OFF, Games Owned, Anxiety, and Anger-Trait) that significantly predicted gaming engagement (ENG-VAS), R^2=0.405 R_{adj}^2=0.397, $F(5,357)=48.601$, $p<.001$. This model accounted for 40.5% of the variance in gaming engagement (ENG-VAS) within the sample and would be expected to account for 39.7% of the variance in a randomly selected sample.

Regression #6: Male Sample, ENG-GEQ excluded, Engagement (ENG-VAS) as DV

Regression results indicate an overall model of five predictors (Time-ON, Money Spent, Depression, Anxiety, and Affect) that significantly predicted gaming engagement (ENG-VAS) R^2=0.308, R_{adj}^2=0.292, $F(5,223)=19.835$, $p<.001$. This model accounted for 30.8% of the variance in gaming engagement (ENG-VAS) within the sample and would be expected to account for 29.2% of the variance in a randomly selected sample.

Regression equations utilizing ENG-GEQ were able to account for much more variance (average R_{adj}^2= 0.6493) than regression equations not utilizing ENG-GEQ (average R_{adj}^2=0.3633). Across all equations predicting ENG-VAS, Time-ON was a significant predictor. Variables that did not significantly predict ENG-VAS in any of the

equations included current age, Life-Sat, OIsd, Anger-Index, First-Play, DRsd, and ODsd. Variables that did significantly predict ENG-VAS in at least one, though not all of the equations included IAPsd, Depression, Anxiety, ILsd, Anger-Trait, Games Owned, Money Spent, Affect, and Time-OFF. Full listing of Beta weight and partial correlation coefficients for each variable are included in tables 2 (equations 1-3) and 3 (equations 4-6).

Predictors of Pathology in Multiple Regression

Two sets of regressions were computed for pathology, one set using the average score of the four VAS (PATH-VAS) subscales related to pathology as the dependent variable of pathology, and one set using the full total raw score of the VAS (PATH-Total). The same sets of variables were used in each and consisted of the same variables used in the regression equations for engagement, including the GEQ (ENG-GEQ). Analyses were run for both genders combined and each gender separately, resulting in 6 separate equations.

Regression #7: Full Sample, ENG-GEQ included, PATH-VAS as DV

Regression results indicate an overall model of eight predictors (ENG-GEQ, Time-ON, Time-OFF, First-Play, Depression, Anger-Index, IAPsd, and OIsd) that significantly predicted gaming pathology (PATH-VAS) R^2=0.644, R_{adj}^2=0.639, F(583,8)=131.691, p<.001. This model accounted for 64.4% of the variance in gaming pathology (PATH-VAS) within the sample and would be expected to account for 63.9% of the variance in a randomly selected sample.

Regression #8: Female Sample, ENG-GEQ included, PATH-VAS as DV

Regression results indicate an overall model of seven predictors (ENG-GEQ, Time-ON, Depression, Anger Index, Anxiety, IAPsd, and OIsd,) that significantly predicted gaming pathology (PATH-VAS) R^2=0.608, R_{adj}^2=0.600, F(7,355)=78.683, p<.001. This model accounted for 60.8% of the variance in gaming pathology (PATH-VAS) within the sample and would be expected to account for 60.0% of the variance in a randomly selected sample.

Regression #9: Male Sample, ENG-GEQ included, PATH-VAS as DV

Regression results indicate an overall model of seven predictors (ENG-GEQ, Time-ON, First-Play, Money Spent, Depression, IAPsd, and OIsd,) that significantly predicted gaming pathology (PATH-VAS) R^2=0.679, R_{adj}^2=0.669, F(7,211)=66.719, p<.001. This model accounted for 67.9% of the variance in gaming pathology (PATH-VAS) within the sample and would be expected to account for 66.9% of the variance in a randomly selected sample.

Regression #10: Full Sample, ENG-GEQ included, PATH-Total as DV

Regression results indicate an overall model of ten predictors (ENG-GEQ, Time-ON, Time-OFF, Games Owned, Money Spent, Depression, Anger-Index, Affect, ODsd, and IAPsd,) that significantly predicted gaming pathology (PATH-Total) R^2=0.741, R_{adj}^2=0.737, F(10,581)=166.227, p<.001. This model accounted for 74.1% of the variance in gaming pathology (PATH-Total) within the sample and would be expected to account for 73.7% of the variance in a randomly selected sample.

Regression #11: Female Sample, ENG-GEQ included, PATH-Total as DV

Regression results indicate an overall model of seven predictors (ENG-GEQ, Time-ON, Time-OFF, Games Owned, Depression, IAPsd, and ODsd,) that significantly

predicted gaming pathology (PATH-Total) R^2=0.716, R_{adj}^2=0.710, F(7,355)=127.910, p<.001. This model accounted for 71.6% of the variance in gaming pathology (PATH-Total) within the sample and would be expected to account for 71.0% of the variance in a randomly selected sample.

Regression #12: Male Sample, ENG-GEQ included, PATH-Total as DV

Regression results indicate an overall model of six predictors (ENG-GEQ, Time-ON, Money Spent, Depression, IAPsd, and OIsd) that significantly predicted gaming pathology (PATH-Total) R^2=0.726, R_{adj}^2=0.719, F(6,222)=98.106, p<.001. This model accounted for 72.6% of the variance in gaming pathology (PATH-Total) within the sample and would be expected to account for 71.9% of the variance in a randomly selected sample.

Utilized variables accounted for a greater amount of variance in PATH-Total (average R_{adj}^2=0.722) than in PATH-VAS (average R_{adj}^2=0.636). Across all equations, four variables (ENG-GEQ, Time-ON, IAPsd, and Depression) significantly predicted pathology as defined by three or all seven subscales of the VAS. Variables of Life-Sat, ILsd, DRsd, Anger-Trait, and current Age did not significantly predict pathology across regression equations. Variables that did significantly predict pathology in at least one, though not all, regression equations included Anxiety, OIsd, Anger-Index, Games Owned, Money Spent, Affect, ODsd, Time-OFF, and First Play. Full listing of Beta weight and partial correlation coefficients for each variable are included in tables 4 (equations 7-9) and 5 (equations 10-12).

Flow in Online vs. Offline gaming experiences

Gaming experiences in which gamers played a specific game online and offline were analyzed to determine differences in flow for each of these gaming formats. A total of 448 gaming experiences met these criteria. For each gaming experience participants were asked six questions about the quality of their gaming, about aspects of flow relating to challenge, time distortion, absorption, and control. Responses were combined to create a continuous variable of flow to describe the average flow experience for a specific game for both online and offline modalities. Using this data set, flow experiences as described during both online and offline formats were assessed for linearity, normality, and homogeneity, all of which were within normal limits. A paired samples T-Test found no significant difference between flow in online or offline formats.

Table 2

Variables of Interest Correlated with Engagement (ENG-VAS)

Engagement	Full Sample (N=592)		Males (N=229)		Females (N=363)	
IV	Beta	Partial	Beta	Partial	Beta	Partial
GEQ	0.634***	0.696	0.671***	0.704	0.652***	0.697
Online Time	0.140***	0.202	0.118**	0.171	0.145***	0.223
Impaired Autonomy and Performance schema domain	0.095*	0.095	0.214***	0.249	0.035	0.042
CES-D Depression Totals	0.093*	0.100	0.073	0.086	0.047	0.087
Trait Anxiety Percentile	0.128**	0.125	0.074	0.073	0.112***	0.173
Overvigilance and Inhibition	0.006	0.007	-0.010	-0.011	0.015	0.019
AngIndex Percentile	-0.007	-0.009	-0.043	-0.054	0.036	0.046
SWLS	0.033	0.042	0.011	0.013	0.023	0.029
Age to first play	-0.036	-0.061	-0.038	-0.061	-0.043	-0.072
Impaired Limits	-0.036	-0.046	-0.115*	-0.135	0.001	0.002
Disconnection and Rejection	0.017	0.015	0.095	0.085	0.011	0.012
Ttotal percentile	0.019	0.027	-0.030	-0.042	0.067	0.090
# Games Owned	0.102***	0.155	0.050	0.074	0.131***	0.210
Money spent yearly	0.069*	0.097	0.128**	0.187	0.031	0.047
PANAS Diff	0.131***	0.143	0.044	0.057	0.074	0.087
Other-directedness	-0.082	-0.099	0.019	0.021	-0.045	-0.061
Time offline	0.029	0.043	0.015	0.022	0.067	0.099
Age	-0.034	-0.057	-0.071	-0.113	-0.004	-0.006
This was a multiple regression, For Full Sample: R^2=0.679, R_{adj}^2=0.674, F(582,9)=136.632, p<.001 For Male Sample: R^2=0.631, R_{adj}^2=0.623, F(223,5)=76.341, p<.001 For Female sample: R^2=0.655 R_{ajd}^2=0.651, F(358,4)=169.653, p<.001 ***<.001, **<.01, *<.05						

Table 3

Variables of Interest Correlated with Engagement (ENG-VAS) excluding ENG-GEQ

Engagement	Full Sample (N=592)		Males (N=229)		Females (N=363)	
IV	Beta	Partial	Beta	Partial	Beta	Partial
Online Time	0.254***	0.271	0.231***	0.242	0.207***	0.237
Impaired Autonomy and Performance schema domain	0.048	0.040	0.063	0.043	0.037	0.033
CES-D Depression Totals	0.159**	0.129	0.306***	0.229	0.044	0.039
Trait Anxiety Percentile	0.196***	0.157	0.191*	0.152	0.180***	0.187
Overvigilance and Inhibition	0.043	0.042	-0.009	-0.008	0.072	0.069
AngIndex Percentile	-0.011	-0.009	0.006	0.005	-0.006	-0.005
SWLS	0.072	0.067	0.114	0.096	0.064	0.061
Age to first play	-0.049	-0.062	-0.074	-0.087	-0.036	-0.045
Impaired Limits	0.010	0.011	0.059	0.055	-0.011	-0.012
Disconnection and Rejection	0.036	0.029	0.056	0.042	0.031	0.026
Ttotal percentile	0.168***	0.183	0.100	0.105	0.212***	0.216
# Games Owned	0.123***	0.138	0.003	0.003	0.178***	0.214
Money spent yearly	0.132***	0.133	0.279***	0.294	0.059	0.066
PANAS Diff	0.174***	0.142	0.236**	0.179	0.100	0.089
Other-directedness	0.016	0.016	0.066	0.060	0.008	0.009
Time offline	0.130***	0.143	0.038	0.041	0.234***	0.267
Age	-0.014	-0.018	-0.073	-0.084	0.022	0.028
This was a multiple regression, For Total Sample: R^2=0.409, R_{adj}^2=0.401, F(583,8)=50.354, p<.001 For Male Sample: R^2=0.308, R_{adj}^2=0.292, F(223,5)=19.835, p<.001 For Female sample: R^2=0.405 R_{ajd}^2=0.397, F(357,5)=48.601, p<.001 ***<.001, **<.01, *<.05						

Table 4

Variables of Interest Correlated with Pathology (PATH-VAS)

Pathology	Full Sample (N=592)		Males (N=229)		Females (N=363)	
IV	Beta	Partial	Beta	Partial	Beta	Partial
GEQ totals	0.422***	0.518	0.452***	0.586	0.438***	0.520
Online Time	0.260***	0.357	0.129**	0.192	0.279***	0.372
Impaired Autonomy and Performance schema domain	0.175***	0.177	0.216**	0.226	0.245***	0.229
CES-D Depression Totals	0.216***	0.250	0.364***	0.417	0.217***	0.224
Trait Anxiety Percentile	-0.052	-0.048	0.063	0.062	-0.133*	-0.119
Overvigilance and Inhibition	-0.127***	-0.150	-0.141**	-0.181	-0.116*	-0.121
AngIndex Percentile	0.082**	0.108	0.082	0.109	0.100*	0.119
SWLS	0.015	0.019	-0.003	-0.004	-0.004	-0.004
Age to first play	0.051*	0.084	0.107**	0.183	0.002	0.003
Impaired Limits	0.052	0.061	0.063	0.072	0.019	0.022
Disconnection and Rejection	0.006	0.005	0.085	0.075	0.025	0.020
Ttotal percentile	-0.013	-0.016	0.054	0.081	-0.039	-0.042
# Games Owned	0.006	0.009	-0.011	-0.018	0.006	0.009
Money spent yearly	0.049	0.067	0.136**	0.209	-0.014	-0.021
PANAS Diff	0.046	0.052	-0.009	-0.011	0.039	0.039
Other-directedness	-0.043	-0.043	-0.029	-0.032	-0.039	-0.036
Time offline	0.094**	0.140	0.076	0.119	0.069	0.098
Age	-0.030	-0.049	-0.015	-0.025	-0.065	-0.103

This was a multiple regression,
For Total Sample: R^2=0.644, R_{adj}^2=0.639, F(583,8)=131.691, p<.001
For Male Sample: R^2=0.679, R_{adj}^2=0.669, F(211,7)=66.719, p<.001
For Female sample: R^2=0.608 R_{ajd}^2=0.600, F(355,7)=78.683, p<.001
***<.001, **<.01, *<.05

Table 5

Variables of Interest Correlated with Pathology (PATH-TOTAL)

VAS Total	Full Sample (N=592)		Males (N=229)		Females (N=363)	
IV	Beta	Partial	Beta	Partial	Beta	Partial
GEQ totals	0.561***	0.684	0.567***	0.702	0.591***	0.683
Online Time	0.204***	0.316	0.140***	0.224	0.197***	0.311
Impaired Autonomy and Performance schema domain	0.169***	0.188	0.200***	0.227	0.167***	0.192
CES-D Depression Totals	0.173***	0.205	0.240***	0.312	0.116**	0.156
Trait Anxiety Percentile	0.051	0.053	0.031	0.034	0.019	0.022
Overvigilance and Inhibition	-0.036	-0.043	-0.116*	-0.161	-0.011	-0.012
AngIndex Percentile	0.055*	0.082	0.013	0.019	0.046	0.069
SWLS	0.018	0.026	0.067	0.095	0.010	0.015
Age to first play	0.000	0.001	0.033	0.062	-0.023	-0.041
Impaired Limits	-0.019	-0.026	-0.039	-0.048	0.003	0.005
Disconnection and Rejection	0.003	0.003	0.037	0.035	0.021	0.015
Ttotal percentile	0.007	0.010	-0.007	-0.012	0.049	0.073
# Games Owned	0.059*	0.100	0.014	0.024	0.069*	0.122
Money spent yearly	0.060*	0.090	0.159***	0.261	-0.003	-0.005
PANAS Diff	0.076*	0.097	0.061	0.078	0.058	0.074
Other-directedness	-0.090**	-0.121	-0.029	-0.034	-0.092*	-0.118
Time offline	0.068**	0.111	0.055	0.093	0.084**	0.136
Age	-0.032	-0.060	-0.045	-0.083	-0.031	-0.055
This was a multiple regression, For Total Sample: R^2=0.741, R_{adj}^2=0.737, F(581,10)=166.227, p<.001 For Male Sample: R^2=0.726, R_{adj}^2=0.719, F(222,6)=98.106, p<.001 For Female Sample: R^2=0.716, R_{adj}^2=0.710, F(355,7)=127.910, p<.001 ***<.001, **<.01, *<.05						

CHAPTER IV

DISCUSSION

The vast majority of the sample provided a wealth of data regarding current and lifelong gaming habits and significant differences were found between men and women. Men and women did not differ in the age when they began playing video games but women reported having video games in the bedroom at a younger age than men. Men owned significantly more video games and consoles, and spent more money annually. Furthermore, men spent two to three times as much time playing games in general, online, and offline in the past six months. While this is largely consistent with the previous literature (Eigenfeldt-Nielsen, Smith, & Tosca, 2008, Rideout, Foehr & Roberts, 2010) there has been little research on the age at which individuals first have game systems in the bedroom or on gender differences in this regard.

Men also reported significantly greater flow when gaming in general and online while there was no significant difference for offline gaming. However, there was no significant difference in the amount of flow experienced for online or offline games when considering flow experiences based on the game, rather than the gamer. Although the concept of flow has recently been identified as a crucial component of game play (Charlton & Danforth, 2007; Faiola & Vioskounsky, 2007) and efforts have been made to develop a measure of flow during gaming (Brockmeyer, Fox, Curtiss, McBroom, Burkhart & Pidruzny, 2009) little research is available to document gender differences between men and women. The finding that men report greater levels of flow than women

in online but not offline modalities should receive further attention in future research. This difference may be better understood by examining the reasons for online gaming in men vs. women; for example, are there gender differences in the pursuit of social interactions?

When using the VAS, males were also found to have greater levels of both engagement and pathology than females. Males were about two times more likely to be classified as engaged gamers than females and about 3 times more likely to be classified as pathological gamers than females. This relatively new instrument has little research available, and most current data were collected in other countries (Arnesen, 2010; Lemmens, Valkenburg & Peter, 2009; Lemmens, Valkenburg & Peter, 2011). In general, these findings are consistent with those of other researchers; primarily that only a small subset of the population report pathological gaming habits but that males outnumber females in this population. This suggests that the VAS is a useful tool for comparing the phenomenology of pathological gaming across cultures. Although there are clearly cross-cultural differences and factors which come into play, it should also be noted that the gaming experience may have strong similarities across cultures (Eigenfeldt-Nielsen, Smith & Tosca, 2008). For example, online games such as World of Warcraft are played by millions of players around the world and the content for all of these gamers is relatively similar (Meredith, Hussain & Griffiths, 2009). On the other hand, this could suggest that the concept of pathological gaming used in the design of the VAS is generally valid and should be further considered if a specific diagnosis of video game addiction were to be added to diagnostic manuals.

Hypotheses 1 and 2 could not be tested using MANOVA due to small cell sizes. While group differences could not be directly determined, it was possible to use regression analyses to identify specific predictors of engagement and pathology as related to video game play. Regression analyses revealed that the Gaming Engagement Questionnaire (ENG-GEQ) was a strong predictor of flow during gaming as indicated by the Videogame Addiction Scale (ENG-VAS) and throughout the sample was the best predictor of VAS levels of engagement and pathology, even after accounting for other variables. Furthermore, this measure indicates that flow is a critical component of the experience of gaming. For example, regression analyses using ENG-VAS as the dependent variable were able to account for 63.1-67.9% of the variance in the sample when ENG-GEQ was included, while only accounting for only 30.8-40.9% of the variance in the sample when this single variable was removed. This would suggest that future studies designed to assess the phenomenon of flow during video game play would be well advised to include this measure regardless of whether or not gaming pathology is being investigated. This also suggests that a thorough investigation of videogame play should not exclude the critical aspect of flow and how it can impact gamers' habits. Overall, this strong relationship between flow and gaming pathology corroborates current research indicating the strong overlap between these two concepts and the need to better distinguish pathological from engaged gamers (Charlton & Danforth, 2007).

To date, no studies have specifically examined the engagement related scales of VAS, let alone examined for gender differences using these scales. This study found distinct differences between males and females in predicting the extent of engagement (ENG-VAS). For both males and females, the phenomenology of game play was

strongly correlated with this variable. For example, ENG-GEQ, Game-ON, Games Owned, and Money Spent were all significant variables in the regression equation. However, it may be more appropriate to consider these variables, at least in part, as descriptors rather than purely as predictors. In essence, when discussing the idea of gaming, all of these variables tend to be necessary conditions for gaming, regardless of the presence or degree of flow experienced during gaming (Eigenfeldt-Nielsen, Smith & Tosca, 2008).

However, these variables do not independently account for all of the variance, and some variables relating to personality factors and psychopathology are also significant. For men, personality factors are more substantial predictors, with the schema domains of Impaired Autonomy and Performance (IAPsd) and Impaired Limits (ILsd) being significant predictors. Of note, IAPsd is a stronger predictor of engagement for males than time spent gaming online. This domain relates to personality factors in which an individual struggles to develop a sense of independence and self-sufficiency over the course of childhood. One interpretation of this strong relationship is that males who have struggled to differentiate from their families have found greater reprieve in videogames and therefore play them for greater amounts of time or establish a stronger connection with the games they play. It has also been noted that many avid gamers consider their identity to be intimately linked with the games they play (Faiola & Vioskounsky, 2007). These gamers are less likely to have thoroughly developed a sense of self in familial and social interactions, and they may find identification with video game characters and experiences an appropriate alternative. Interestingly, the impaired limits domain is inversely correlated with game play. Elevations in this domain are seen among

individuals who have been nurtured in overly indulgent or permissive environments and have not developed a strong sense of self-control or self-discipline. An inverse correlation is somewhat counterintuitive, as previous research has found significant associations between game play and sensation seeking (Chiu, Lee & Huang, 2004) as well as poor self-control (Kim, et. al, 2008; Lee, Yu, & Lin, 2007). A possible explanation for this is that gamers who are nurtured in such an environment are less inclined to become as engaged while gaming. This may be due to the inherent rules and structure consistently present throughout gaming, which may be unpleasant for an individual who has grown up in a less structured environment. However, for males none of the psychopathology measures are significant predictors for engagement.

Among females, none of the schema domains are significant predictors for gaming engagement although anxiety is a significant predictor. This may suggest that females who have a tendency to become anxious in real-world situations may be less inclined to become anxious in gaming situations. This is likely due to the decline in negative consequences which may arise during playing videogames as compared to during social interactions; this is likely to be especially true for online gamers, as these gamers have a greater reliance on video games and the internet to fulfill their social needs (Faiola & Vioskounsky, 2007; Weaver, Mays, Weaver, et. al., 2009). Another possible explanation is that females with higher levels of trait anxiety are able to find reprieve in gaming and may use it as a coping mechanism, coinciding with higher levels of engagement during gaming. If this is the case, these individuals may have multiple reasons for increasing game time and engagement. There could be a negatively reinforcing quality as a result of anxiety reduction during gaming experiences. There

could also be a positively reinforcing quality as a result of the experience of flow. If, over time, these individuals are habituated to these reinforcing qualities of game play, then they may deal with tolerance by playing video games for increasing amounts of time, potentially contributing to gaming pathology. These potential mechanisms for the development of engagement, and potentially pathological gaming, have also been proposed by other researchers, although no experimental or longitudinal research is yet available to thoroughly investigate the potentially causal nature of these relationships (Liu & Peng, 2009; Wood, 2008; Wood, Gupta, Derevensky, & Griffiths, 2004).

However, when ENG-GEQ is not included in a regression equation to predict ENG-VAS, it is apparent that variables necessary for gaming (i.e. Game-ON, Games Owned, Money Spent, and Game-OFF) are still significant predictors and anxiety continues to be a significant predictor of engagement for females. When considering males, personality factors fail to reach statistical significance and acute psychopathology becomes significant. Specifically, depression and trait anxiety both become significant predictors of engagement for males. This may suggest that there is some conceptual overlap between personality factors and flow experiences, at least for males. A possible explanation for this finding could be that alleviation of depressive and anxious symptoms and augmentation of mood during gaming contribute to gaming habits and increased amounts of flow. However, given the correlational nature of this study, it is also possible that with increased gaming exposure and flow individuals also experience increased depressive and anxious symptoms. This may be an indirect effect; as gamers spend more time with games, they may isolate themselves from social interactions, vigorous physical activities, and other protective factors against acute psychopathology. Further studies to

explore the causal relationship between these variables in males would be useful, given that this relationship exists as a part of the gaming experience, not just as a part of gaming pathology. In other words, most males play video games, often for extensive periods of time (Greenberg, et. al., 2010; Rideout, Foehr, & Roberts, 2010); if these experiences are risk factors for depressive and anxious symptoms then males should be informed of this risk and approaches should be developed to help males monitor these symptoms and adjust their gaming habits in accordance with psychopathology. On the other hand, if gaming is a form of coping for depression and anxiety, as some have suggested (Caplan, 2003; Liu & Peng, 2009; Wood, 2008), then it could be an excellent vehicle for treatment of these conditions; videogames could be designed with the purpose of helping individuals with cognitive restructuring, errorless learning, exposure, psychoeducation and potentially even behavioral activation, not to mention countless other aspects of psychotherapy. This potential will only grow as video games become increasingly realistic and interactive.

When shifting from pure gaming engagement (ENG-VAS) to pure gaming pathology (PATH-VAS) fewer gaming factors serve as significant predictors, while personality factors and psychopathology become more important predictors. Regarding gaming conditions, only ENG-GEQ and Game-ON are significant predictors. This is consistent with literature which finds that online gaming is much more engaging and time consuming, and with online gamers having much higher rates of pathological gaming (Hussain & Griffiths, 2009; King & Delfabbro, 2009). While part of this may be descriptive, the non-significance of other factors, such as game ownership, may suggest that the qualities and experiences of the gamer are more important for pathology than the

qualities and experiences of the game itself. For example, if owning 100 video games is no more predictive of pathology than owning 10 video games, this would suggest individual and phenomenological differences playing a significant role in the etiology of gaming. In other words, games are not inherently addictive and the characteristics of the individual and how they experience game play are more important in understanding the development and maintenance of gaming pathology. Nonetheless, research shows that gamers who spend more time gaming online are more likely to develop pathological gaming habits (Hussain & Griffiths, 2009). Since online games are more conducive to flow than offline games, as well as providing a number of different aspects of social interaction (Meredith, Hussain, & Griffiths, 2009), this would suggests that games which are more conducive to flow and which have a strong online component may be more conducive to pathological gaming habits, and/or may be more attractive to gamers who are more likely to develop pathological habits.

When comparing significant predictors of gaming pathology for males and females, some differences arise in gaming factors. For example, Game-ON is a much stronger predictor of gaming pathology in females than in males. Reasons for this difference merit further attention. For example, social interactions are typically a strong component of online game play (Eigenfeldt-Nielsen, Smith, & Tosca, 2008); it is possible that females find this aspect of online game play particularly alluring and are more prone to engage in excessive or unhealthy amounts of game play due to this factor than are males. On the other hand, gaming history becomes more important for males, with the age of first playing a game and the amount of money spent on gaming becoming significant predictors. This may suggest gender differences in risk factors, with females

being more likely to game excessively because of the social reinforcement and anxiety reduction as opposed to males, who may be more likely to game excessively over time as a natural consequence of strong investment in a gamer life-style.

When considering personality factors, IAPsd is once again a significant factor, this time for predicting gaming pathology. However, the Impaired Limits domain does not significantly predict pathology (unlike engagement) while the overvigilance and inhibition domain is significantly inversely correlated with pathology. Thus, for both engagement and pathology the IAPsd is a significant predictor, and may have similar mechanisms in both situations. Another way of interpreting these relationships is that elevations in the IAP domain are predictive of flow experiences, which are also predictive of gaming pathology; hence IAP may have both direct and indirect effects contributing to gaming pathology. However, the Overvigilance and Inhibition domain relates to factors of cognitive rigidity and inflexibility. An inverse correlation may suggest that individuals who score low on this domain (less pessimistic, critical, and punitive and more emotionally open) are more prone to developing pathological gaming habits. This relationship also merits further attention in future research. Also, these personality variables have similar effects for both males and females, suggesting that there may be underlying personality factors that increase any gamers' probability of developing a pathological gaming habit.

When considering psychopathology, depression, anxiety, and anger expression are significant variables. For males depression is the strongest predictor of gaming pathology, after gaming engagement. While this variable is significant for females as well, it is not as strong of a predictor. This may suggest that males suffering from

depression may be more likely to spend excessive amounts of time playing video games than females suffering from depression. This may be due, at least in part, to sociocultural factors, in which males are less likely to seek help for depressive symptoms, and may be more likely to use gaming as an attempt to cope with depressive symptoms. On the other hand, it is also possible that excessive gaming could result in depressive symptoms and that this is more substantial in males than females. However, a recent longitudinal study of youth gamers found that subjective levels of depression increased over time among gamers and was significantly correlated with the amount of time spent gaming (Gentile, et. al., 2011). When considering anxiety, another counterintuitive relationship is found. Anxiety does not significantly predict gaming pathology for males and is significantly inversely correlated for females. This would suggest that lower levels of trait anxiety predict an increased risk of gaming pathology. However, higher levels of anxiety predict an increased likelihood of flow experiences during gaming, which are also predictive of gaming pathology. Further analysis of these relationships merits attention. In any case, there are significant correlations between gaming pathology and both depression and anxiety, consistent with other findings (Weaver, et. al. 2009).

Anger expression fails to serve as a significant predictor of gaming pathology for males while weakly predicting gaming pathology in females. Again, this relationship could go in either direction. Excessive gaming may, over time, increase the likelihood of inappropriate and problematic displays of anger; on the other hand, individuals with problems with anger expression may be more likely to use gaming as a coping mechanism, possibly to excess. The weak relationship between gaming pathology and aggression and between gaming engagement and aggression may suggest that

pathological gamers are at no greater risk of developing anger problems as a result of chronic game play; this may also be a reflection of fewer opportunities to engage in overt aggressive behavior, due to the excessive amount of time spent in the gaming world. On the other hand, these individuals may actually engage in more aggression but this aggression may be carried out through their video games, thereby causing no harm and generally being disregarded. It may be worthwhile to compare aggressive actions and cognitions among gamers while gaming as well as in simulated environment, to determine if there are significant changes to aggression associated with excessive gaming, and if these changes are context specific or can generalize to other situations. In spite of the massive amount of research exploring the relationship between videogames and aggression (Anderson, 2004; Arriaga, Gaspar & Esteves, 2011; Gentile, 2009; Hauge & Gentile, 2003), no research has yet examined this specific aspect of how aggression may result from or be displayed in video games other than to examine the violent structural characteristics of games.

For the last regression equation, all of the subfactors of the VAS, including those relating to both engagement and pathology are used. In this equation it appears that once again Game-ON, ENG-GEQ, IAPsd, and depression remain significant predictors throughout the sample. The next significant predictor for males is the amount of money spent, while the next significant predictor for females is the amount of time spent gaming offline. In general, the regression equation resembles an amalgam of the regression equations for ENG-VAS and PATH-VAS. Conceptually, this makes sense and suggests that the VAS assesses both engagement and pathology. Practically, what this suggests is that the full VAS may be overly sensitive to factors relating to gaming engagement,

thereby classifying some engaged gamers as pathological gamers. However, the VAS may not be as likely to be overly specific, and fail to classify pathological gamers due to lack of engagement. A conceptual argument for this case is that the VAS assesses flow, which is most likely a pre-condition for gaming pathology. Hence, few gamers would exist who have achieved pathological gaming habits yet experience little or no flow. Therefore, gamers who are elevated for pathological questions of the VAS would also likely have elevations for engagement related questions on the VAS. Consequently, changes to improve the sensitivity of the VAS may be considered to better identify potentially pathological gamers. For example, only a small portion of the sample could be classified as pathological by common practice (mean score of 3 across all scales; Arnesen, 2010; Lemmens et. al. 2011). While this may be an accurate representation of the prevalence of gaming pathology in the population represented by this sample, it is also possible that the VAS lacks sensitivity and is failing to identify individuals with mild to moderate gaming pathology. Therefore, it may be wise to explore and research additional guidelines for interpreting responses on the VAS. For example, individuals with a mean score of 3 across all scales may be classified as having severe gaming pathology. However, gamers with a mean score of 2.0 to 2.99 may be classified as having mild to moderate gaming pathology or being at risk for severe gaming pathology. Another important consideration is the face valid nature of the VAS and its reliance on self-report data (Lemmens, Valkenburg & Peter, 2009). Essentially, individuals who have substantial gaming pathology may be unaware of the consequences of their pathology, presenting as potentially engaged gamers, or may be in denial of the severity of these consequences. Therefore, the VAS may not, individually, be a suitable tool for

detecting gaming pathology. Modifications to include parental, spousal, or other forms of report could be used to detect the presence of gaming pathology among individuals who lack insight or deny their problems.

It should also be noted that a number of factors were not significantly correlated with gaming engagement or pathology. For example, life satisfaction (as measured by the satisfaction with life survey) was not significantly correlated with engagement or pathology in any of the twelve regression equations utilized in this study. This is a striking finding, especially given that frequent flow experiences are highly predictive of life satisfaction and quality of life (Csikszentmihalyi, 2008). A number of explanations for this unexpected finding are possible. This could reflect a true lack of a relationship between gaming habits and life satisfaction. On the other hand, this questionnaire may not be appropriate for a collegiate population, given the changes they continue to undergo in their lives. Another possible explanation is that neither gaming engagement nor gaming pathology has a significant impact on subjective assessment of quality of life; in other words, the impact of gaming on life satisfaction is no greater than that of other recreational activities on non-gamers. This would mean that gaming in and of itself does not uniquely account for increasing the amount of satisfaction in one's life. Nonetheless, one would expect at least a weak negative relationship between gaming pathology and life satisfaction due to the negative consequences of excessive gaming for those with gaming pathology. The absence of this relationship may indicate that those who demonstrate substantial gaming pathology may either lack insight into the decline in their quality of life or that these individuals feel that their gaming habits are an adequate replacement for other sources of life satisfaction and therefore do not report lower levels

of life satisfaction. In any case, while direct report of life satisfaction did not have a significant relationship with gaming habits, other indicators of life satisfaction, such as depression, were directly correlated with gaming habits.

A number of schema domains also had few or no significant relationships with gaming engagement or pathology. For example, elevations of the disconnection and rejection domain can be indicative of childhood abuse and neglect, and development of poor self-concept and social alienation (Young, Klosko & Weishaar, 2003). One would expect elevations on this domain to be predictive of increased time in the gaming world as it can be construed as a safe environment, with clearly predictable rules and structure (Eigenfeldt-Nielsen, Smith & Tosca, 2008) , unlike chaotic homes which lead to neglect and abuse. One would also expect depression on this scale to be predictive of strong interpersonal skills, which may lead to less time spent gaming. However, neither of these relationships was observed for either gaming engagement or gaming pathology.

Another interesting finding is that anger expression and angry temperament were not predictive of gaming engagement or gaming pathology for males, yet these factors did have some predictive values for these measures for females. Given the large literature suggesting that playing video games is highly predictive of aggressive behaviors and cognitions (Anderson & Bushman, 2001; Gentile, 2009; Sherry, 2001) or that individuals with aggressive tendencies are more likely to play aggressive games (Ferguson, 2008; Fergeson et. al., 2008), especially in males, this finding is somewhat perplexing. This could be a reflection of the heterogeneity of the sample and their gaming habits. Further exploration of the relationship between aggressive tendencies and specific gaming habits (i.e. playing violent vs. non-violent video games) may reveal

significant relationships that are simply washed out due to the heterogeneity of this sample and their gaming habits.

Another interesting finding relates to age and gaming habits. No significant relationships were found between current age and gaming habits. A weak positive relationship was found between age of first gaming and gaming pathology for males, but not for females; however, no relationship was found between age of first gaming and engagement. This may suggest that age is not a useful predictor of risk for gaming pathology. This may also be a reflection of the widespread use of videogames across age groups (Eigenfeldt-Nielsen, Smith, & Tosca, 2008; Meredith, Hussain & Griffiths, 2009). Of note, this may suggest that allowing children to play videogames does not increase their susceptibility to gaming pathology. Rather, given the positive correlation for males, it is possible that a healthy level of exposure to video games from an early age may serve as a protective factor. For example, some males may not play video games until an older age, such as during their teens. At this age, they may be less likely to receive appropriate adult supervision to internalize rules necessary for monitoring and regulating gaming habits. In essence, these individuals may not learn about the potential dangers of excessive gaming, even if parents don't realize they are teaching this information, because they begin gaming at a later age. This phenomenon merits further attention in future research.

Another interesting finding occurs when considering change in affect and gaming habits. When considering the entire sample, elevation of affect was directly correlated to gaming engagement, but not to gaming pathology. However, this finding should be interpreted with caution due to conceptual overlap. Specifically, the engagement

measure used as a dependent variable in the regression analyses included the concept of mood modification, which directly relates to changes in affect (Lemmens, Valkenburg & Peter, 2009). When the GEQ was removed from the equation, this relationship was even more pronounced, especially for males. What may be more noteworthy is the lack of relationship between gaming pathology and affect. This may be an indication of tolerance. Overtime, individuals may experience smaller amounts of mood modification, requiring a greater amount of time spent gaming to achieve mood modification. This may be an important mechanism which could account for the transition from casual to pathological gamer. Longitudinal study of this finding may shed further light on this relationship and its potential causal relationship with gaming pathology.

Overall, this study has found a number of significant relationships between factors related to the gaming experience, acute psychopathology, maladaptive personality factors, and gaming habits. These findings suggest that the gaming experience is strongly correlated to both gaming engagement and gaming pathology. However, after accounting for the gaming experience, acute psychopathology and maladaptive personality factors are stronger predictors of gaming pathology than general gaming habits. This suggests that a combination of individual and experiential factors contributing to the development of gaming pathology. Future research into the causal links between these factors would be extremely valuable. For example, psychopathology is more predictive of gaming pathology than recreational gaming. Is this difference due to a reciprocal relationship between the gaming experience and psychopathology? A better understanding of this relationship, and the factors that predict vulnerability to and development of gaming

pathology would be well suited to a longitudinal study cutting across age groups. Consequently, this study could have benefitted from a longitudinal design.

APPENDICES

Appendix A
Demographics Questionnaire

What is your gender? _____
What is your current age? _____
Indicate your race ethnicity?
African American
Asian
Caucasian
Latino/Hispanic
Native American
Multiracial _____
How many years of formal education have you completed? _____

Appendix B

Video Game History Questionnaire (Part 1)

At what age did you first begin playing video games? _____

How many video games do you have access to in your current residence? _____

How many gaming systems do you have access to in your current residence? _____

How much money do you spend on video games per year? _____

When growing up, did you have the ability to play video games in your bedroom?

If yes then:

How old were you when you first began playing video games in your bedroom?

Consider all the games you have played in the past six months. Choose the three games you played most frequently and answer the following questions for each game.

Appendix C

Video Game History Questionnaire (Part 2)

Game 1:

Title _____

System/Console _____

Which of the following best describes the online features of this game:

Offline only Online only Offline and online features available

Regarding your offline experiences with this game:

Over the past six months:

how many times per week have you played this game?_____

how many hours per week have you played this game?_____

how many hours was your shortest gaming session?_____

how many hours was your longest gaming session?_____

How easy or difficult did you find this game to be? (1=too easy, 5=too difficult)

Did you have the skills to play the game successfully? (1=skills too low, 5=skills too high)

Did you feel absorbed by the game? (1=not at all, 5=very much)

Did you lose sense of time passing during the game? (1=not at all, 5=frequently)

Did you need to put in a lot of effort to stay focused? (1=not at all, 5=frequently)

Did you feel in control of the gaming situation? (1=not at all, 5=very much)

Regarding your online experiences with this game:

Over the past six months:

how many times per week have you played this game?_____

how many hours per week have you played this game?_____

how many hours was your shortest gaming session?

How many hours was your longest gaming session?

How easy or difficult did you find this game to be? (1=too easy, 5=too difficult)

Did you have the skills to play the game successfully? (1=skills too low, 5=skills too high)

Did you feel absorbed by the game? (1=not at all, 5=very much)

Did you lose sense of time passing during the game? (1=not at all, 5=frequently)

Did you need to put in a lot of effort to stay focused? (1=not at all, 5=frequently)

Did you feel in control of the gaming situation? (1=not at all, 5=very much)

Appendix D

Video Game History Questionnaire (Part 3)

Game 2:

Title _____

System/Console _____

Which of the following best describes the online features of this game:

Offline only Online only Offline and online features available

Regarding your offline experiences with this game:

Over the past six months:

how many times per week have you played this game?_____

how many hours per week have you played this game?_____

how many hours was your shortest gaming session?_____

how many hours was your longest gaming session?_____

How easy or difficult did you find this game to be? (1=too easy, 5=too difficult)

Did you have the skills to play the game successfully? (1=skills too low, 5=skills too high)

Did you feel absorbed by the game? (1=not at all, 5=very much)

Did you lose sense of time passing during the game? (1=not at all, 5=frequently)

Did you need to put in a lot of effort to stay focused? (1=not at all, 5=frequently)

Did you feel in control of the gaming situation? (1=not at all, 5=very much)

Regarding your online experiences with this game:

Over the past six months:

how many times per week have you played this game?_____

how many hours per week have you played this game?_____

how many hours was your shortest gaming session?

How many hours was your longest gaming session?

How easy or difficult did you find this game to be? (1=too easy, 5=too difficult)

Did you have the skills to play the game successfully? (1=skills too low, 5=skills too high)

Did you feel absorbed by the game? (1=not at all, 5=very much)

Did you lose sense of time passing during the game? (1=not at all, 5=frequently)

Did you need to put in a lot of effort to stay focused? (1=not at all, 5=frequently)

Did you feel in control of the gaming situation? (1=not at all, 5=very much)

Appendix E

Video Game History Questionnaire (Part 4)

Game 3:

Title _____

System/Console _____

Which of the following best describes the online features of this game:

Offline only Online only Offline and online features available

Regarding your offline experiences with this game:

Over the past six months:

how many times per week have you played this game?_____

how many hours per week have you played this game?_____

how many hours was your shortest gaming session?_____

how many hours was your longest gaming session?_____

How easy or difficult did you find this game to be? (1=too easy, 5=too difficult)

Did you have the skills to play the game successfully? (1=skills too low, 5=skills too high)

Did you feel absorbed by the game? (1=not at all, 5=very much)

Did you lose sense of time passing during the game? (1=not at all, 5=frequently)

Did you need to put in a lot of effort to stay focused? (1=not at all, 5=frequently)

Did you feel in control of the gaming situation? (1=not at all, 5=very much)

Regarding your online experiences with this game:

Over the past six months:

how many times per week have you played this game?_____

how many hours per week have you played this game?_____

how many hours was your shortest gaming session?

How many hours was your longest gaming session?

How easy or difficult did you find this game to be? (1=too easy, 5=too difficult)

Did you have the skills to play the game successfully? (1=skills too low, 5=skills too high)

Did you feel absorbed by the game? (1=not at all, 5=very much)

Did you lose sense of time passing during the game? (1=not at all, 5=frequently)

Did you need to put in a lot of effort to stay focused? (1=not at all, 5=frequently)

Did you feel in control of the gaming situation? (1=not at all, 5=very much)

Other than the three games mentioned above, for the past six months:

How many times per week have you played games online?_____

How many hours per week have you played games online?_____

How many times per week have you played games offline?_____

How many hours per week have you played games offline?_____

Appendix F

Game Engagement Questionnaire

Consider your gaming experiences for the past six months. On a scale of 1-5 (1=never, 2 =rarely, 3=sometimes, 4=often 5= very often) indicate how often the following statements apply to you.

I lose track of time.
Things seem to happen automatically.
I feel different.
I feel scared.
The game feels real.
If someone talks to me, I don't hear them.
I get wound up.
Time seems to kind of stand still or stop.
I feel spaced out.
I don't answer when someone talks to me.
I can't tell that I'm getting tired.
Playing seems automatic.
My thoughts go fast.
I lose track of where I am.
I play without thinking about how to play.
Playing makes me feel calm.
I play longer than I meant to.
I really get into the game.
I feel like I just can't stop playing.

Appendix G

Video Game Addiction Scale

Consider your gaming experiences for the past six months. On a scale of 1-5 (1=never, 2 =rarely, 3=sometimes, 4=often 5= very often) how often during the last six months:

Did you think about playing a game all day long?

Did you spend much free time on games?

Have you felt addicted to a game?

Did you play longer than intended?

Did you spend increasing amounts of time on games?

Were you unable to stop once you started playing?

Did you play games to forget about real life?

Have you played games to release stress?

Have you played games to feel better?

Were you unable to reduce your game time?

Have other unsuccessfully tried to reduce your game time?

Have you failed when trying to reduce game time?

Have you felt bad when you were unable to play?

Have you become angry when unable to play?

Have you become stressed when unable to play?

Did you have fights with others (e.g. family, friends) over time spent on games?

Have you neglected others (e.g. family, friends) because you were playing games?

Have you lied about time spent on games?

Has your time on games caused sleep deprivation?

Have you neglected other important activities?

Did you feel bad after playing for a long time?

Appendix G

CES-D

Circle the number for each statement which best describes how often you felt or behaviors this was DURING THE PAST SIX MONTHS (0=rarely or none of the time, 1= some or a little of the time, 2=occasionally or a moderate amount of the time, 3=most or all of the time)

1. I was bothered by things that usually don't bother me.
2. I did not feel like eating; my appetite was poor.
3. I felt that I could not shake off the blues even with help from my family or friends.
4. I felt that I was just as good as other people.
5. I had trouble keeping my mind on what I was doing.
6. I felt depressed.
7. I felt that everything I did was an effort.
8. I felt hopeful about the future.
9. I thought my life had been a failure.
10. I felt fearful.
11. My sleep was restless.
12. I was happy.
13. I talked less than usual.
14. I felt lonely.
15. People were unfriendly.
16. I enjoyed my life.
17. I had crying spells.
18. I felt sad.
19. I felt that people disliked me.
20. I could not get "going".

Appendix H
PANAS

This scale consists of a number of words that describe feelings and emotions. Read each item and then mark the appropriate answer in the space next to the word. Indicate to what extent you have felt this way during the past six months. Use the following scale to record your answers. (1=very slightly or not at all, 2=a little, 3=moderately, 4=quite a bit, 5=extremely).

Interested
Distressed
Excited
Upset
Strong
Guilty
Scared
Hostile
Enthusiastic
Proud
Irritable
Alert
Ashamed
Inspired
Nervous
Determined
Attentive
Jittery
Active
Afraid

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