

ABSTRACT

Massively Multiplayer Online Role-Playing Games: Problematic Use

by

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Massively Multiplayer Online Role Playing Games (MMORPGs) are a form of mass media with potential for behavioral addiction among some users. In past literature on internet addiction, MMORPG users have been included alongside other internet users. The outcomes of MMORPG participation, usage frequency, and demographics have not been adequately analyzed apart from users of other internet-based functions. Screening instruments developed for internet addiction have not been validated on MMORPG users. This study addressed the lack of screening research on MMORPG users, using the Internet Addiction Test (IAT), the most used screening instrument for this media. It also explored demographic and frequency traits on a robust sample of MMORPG users.

The population sampled was 5313 users of the MMORPG, *World of Warcraft*. Three research questions resulted from the literature search: an exploratory factor analysis, demographic and frequency exploration, and face validity. The first research question asked, “What is the factor structure for the IAT when administered to a sample of MMORPG internet users?” The exploratory factor analysis yielded a two-factor oblique factor structure which included 18 of the original 20 IAT questions. The second research question asked, “What is the relationship of demographic variables (age, race, gender, weekly playing/gaming, and length of

experience playing/gaming) to the final IAT score?” Weak and moderate main effects on IAT score were found for age and weekly hours playing. The third research question asked, “What is the relationship between score severity as reported by the IAT and respondents’ impressions on whether they identify themselves as ‘addicted to MMORPGs?’” The IAT was found to be predictive of respondent perceptions of addiction.

This research was the first to explore a factor structure for MMORPG users on a behavioral addiction instrument, and among the largest validation studies on the IAT in English. The results were conceptualized through Uses and Gratifications theory as unique user media choices, and consistent with elements of behavioral addiction. The results also provided a distinct profile for MMORPG users. This research demonstrated the importance to counselors and counselor educators of robust sampling of homogeneous media user groups and individualized screening for addiction.

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CHAPTER 1: INTRODUCTION

Introduction to the Study

This chapter provides an introduction to the study examining addiction to Massively Multiplayer Online Role Playing Games. Further, the chapter includes the background of the study, statement of the problem, justification for the study, research questions, definitions of terms, significance of the study, theoretical rationale, and a brief summary of the chapter.

Background of the Study

Of the world's population, 30.2% use the internet (Internet Users in North America, 2011). In the United States, up to 78.2% of individuals are on the internet (US Census Bureau, 2011). Internet usage can take the form of email, web surfing, video streaming, file transfer, social networking, shopping, information gathering, online gaming, and countless other forms of media which address a variety of user gratifications.

Between 17 and 47 million people play Massively Multiplayer Online Role-Playing Games (MMORPGs) worldwide (White, 2008; Woodcock, 2009). Massively Multiplayer Online Role-Playing Games are defined as games where players assume roles of characters and interact with hundreds of thousands of other players in a virtual world (Annisimov, 2007; Castronova, 2005). Massively Multiplayer Online Role-Playing Gaming is one facet of internet use. The phenomenon known as internet addiction would, in theory, apply to problematic gaming on the internet punctuated by difficulty in stopping or cutting back (Young, 2004). Currently there is no diagnosis for internet addiction or MMORPG addiction, nor are there formalized criteria in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000; 2007). The American Psychiatric Association (2007) has cited a lack of research on the subject when considering it for inclusion in the fifth edition of the DSM.

Negative consequences linked with internet use

Problematic use of MMORPGs and the internet is linked to physical, psychological, and social consequences. Prolonged internet use is associated with neck, shoulder, and back pain (Hakala et al., 2006); obesity and insufficient sleep (Bélanger, Akre, Berchtold, and Michaud, 2010); fatigue (Young & Case, 2004); and seizures (Harding, 1994; Chuang, 2006). Physical disorders can result from extended periods in a sedentary position. For instance, thrombosis has been documented for decades among patients who sit for long periods of time (Homans, 1954; Hitosugi, Niwa & Takatsu, 2000). Seventy percent of MMORPG players have played for at least 10 hours in a row, at least once (Yee, 2002). Literature suggests that problematic use of the internet and online gaming is associated with psychosocial issues such as strained relationships, depression, anxiety, vocational problems, and academic difficulties (Caplan, Williams & Yee, 2009; Spada, Langston, Nikcevic, & Moneta, 2008; LaRose, Lin, & Eastin, 2003; Caplan, 2005). Symptoms of internet addiction are also found along with bipolar disorder and obsessive compulsive disorder (Shapiro, Goldsmith, Keck, Khosla, & McElroy, 2000).

Incidents of Problematic Online Videogame Use

Incidents of problematic use of video games on the internet are well documented in the media. In South Korea, a couple allowed their infant to starve while playing a video game (Salmon, 2010). In Florida, domestic violence involving choking and shooting erupted after a dispute over a man's continued play in the video game *World of Warcraft* (Herald Tribune, 2010). A murder in China was reported in 2005 where a gamer took revenge on a fellow gamer for stealing an in-game sword (BBC News, 2005a). A youth in Vietnam reported his reason for killing an elderly woman as the need for money to play his online video game (Bac, 2012). Further, there is documentation of gaming-related deaths in China (iTnews.com.au, 2007a; BBC

News, 2011) and South Korea (Naughton, 2005). *World of Warcraft* was cited by FCC commissioner Deborah Taylor Tate as a major causal factor in college drop-outs in the United States (Tate, 2008). Online video gaming is such an issue in China that in 2005, a national limit on game play was enforced electronically by the Chinese government (BBC News, 2005b).

With the rise in problem gaming, treatment centers for video game addiction now exist in Massachusetts (Wolf, 2003), and Washington (Geranios, 2009), as well as the Netherlands (Kuo, 2006), and China, (Cheung, 2007). The suicide of gamer Sean Woolley in 2001 (Spain & Vega, 2005) prompted his mother Elizabeth Woolley to found Online Gamers Anonymous, a twelve-step support and recovery program based on the internet (CyberSightings, 2003).

Statement of the Problem

Pathological overuse of MMORPG's is a type of internet addiction (Young, 1998a; Zhu & Deng, 2006) which has been compared diagnostically to pathological gambling (Young, 1998a, Young 1998b; Gentile et al., 2011). Young's (1998b) Internet Addiction Test (IAT) uses 20 questions based on pathological gambling criteria (American Psychiatric Association, 2007) to measure the existence and severity of problematic internet use. The test was validated in the United Kingdom by Widyanto and McMurrin (2004), in Italy by Ferraro, Caci, D'Amico and Di Blasi (2007a, 2007b), in France by Khazaal et al. (2008), and in Finland by Korkeila, Kaarlas, Jääskeläinen, Vahlberg, and Taiminen (2009). Validation of the IAT on a population of UK internet users yielded six factors from an exploratory factor analysis, reflecting multiple facets of impairment, which vary depending on the particular use of the internet (Widyanto & McMurrin). For instance, an internet shopper might sacrifice work performance, while an internet gamer may neglect social interaction. The factor structure for MMORPG users rated by the Internet Addiction Test has not been researched in the United States.

A limitation of the research conducted by Widyanto and McMurrin (2004) involves the varied uses of the internet, both synchronous versus asynchronous and interactive versus non-interactive. Massively Multiplayer Online Role-Playing gaming contains a social element through which synchronous communication and interaction is essential. The game cannot be paused, because thousands of users are logged on simultaneously. In contrast, asynchronous internet use is not dependent upon people interacting at the same time. In social networking, for instance, a user may interact with a friend online via text, photo upload, posting videos, or sharing hyperlinks. In these cases, the recipient does not need to be online with the sender. Email, web surfing, online shopping, and online banking are similarly asynchronous as these activities do not involve being online with other users. Research has neglected to examine MMORPG internet users apart from other internet users, whose desired gratifications and intended and unintended consequences seem to differ. For example, Widyanto and McMurrin (2004) collected 86 Internet Addiction Test surveys based on various uses of the internet, which included a subset of only 12 synchronous interactive users. In a similar study, Widyanto, Griffiths and Brundsen (2011) surveyed (n = 221) respondents which included only one online gamer. Current research identifies factors related to the unintended consequences of internet use based on mostly asynchronous users. Of the 4 million synchronous MMORPG gamers playing *World of Warcraft* in the United States (Woodcock, 2009), the factor structure and gamer characteristics reflected by the IAT is unknown.

Purpose of the Study

This research builds upon the work of Widyanto and McMurrin (2004) who sought to validate Young's (1998b) Internet Addiction Test as a psychometrically sound screening and diagnostic instrument. One purpose of this study is to isolate players of the MMORPG *World of*

Warcraft and measure their scores on the Internet Addiction Test using an exploratory factor analysis. A second purpose for this study is to explore which demographic traits exhibited by *World of Warcraft* players are associated with IAT score. Finally, this study will consider the face validity for the Internet Addiction Test by asking respondents whether they consider themselves addicted to MMORPGs.

The study's findings may have implications for the treatment needs of gamers who are addicted. That is, treatment can be individualized to meet the desired gratifications without the unintended consequences of gaming. For instance, if a gamer craves social interaction and fulfills this desire through online gaming while neglecting other areas of function, he or she may benefit from treatment geared toward identifying other salient outlets for socializing.

Research Questions and Definitions of Terms

There are three research questions for this study:

1. What is the factor structure for the Internet Addiction Test when administered to a sample of MMORPG internet users?
2. What is the relationship of demographic variables (age, race, gender, weekly playing/gaming, and length of experience playing/gaming) to the final Internet Addiction Test score?
3. What is the relationship between score severity as reported by the Internet Addiction Test and respondents' impressions on whether they identify themselves as "addicted to MMORPGs"?

Definitions of Terms

Massively Multiplayer Online Role-Playing Games (MMORPG): a computer-based role playing game (RPG) which takes place online in a virtual world with hundreds of thousands of other players. In a MMORPG, a player uses a computer to connect to a server, usually run by the publisher of the game, which hosts the virtual world and memorizes information about the player

(Anissimov, 2007). The “massively” term can be traced to the idea of “mass” media (Katz, 1959) which is targeting large groups of people at once.

World of Warcraft (WOW): the most played MMORPG worldwide, with approximately 11 million players (Woodcock, 2009). *World of Warcraft* was developed and is provided by Blizzard, which is a division of Blizzard-Activision, a subsidiary of Vivendi Games.

Player or Gamer: a user of a computer game.

Behavioral Addiction: “a repetitive habit pattern that increases the risk of disease and/or associated personal and social problems” (Marlatt, Baer, Donovan, and Kivlahan, 1988, p. 224).

Internet Addiction: a form of behavioral addiction. Used interchangeably with problematic internet use.

Justification of the study

This study seeks to fill a gap in research concerning internet addiction and MMORPG’s. Widyanto and Griffiths (2006) conducted a review of issues related to internet addiction. Included in this review were various surveys and screening assessment tools and their psychometric properties. The authors found a lack of research which defines internet addiction and measures its prevalence. Kimberly Young recognized widespread symptoms of internet addiction in 1995 and began research leading to a diagnostic tool based on the diagnostic criteria for gambling addiction (1998b). Young’s *Internet Addiction Test* (IAT, 1998b) is the most utilized and researched assessment instrument for internet addiction, with psychometric studies in the United Kingdom (Widyanto & McMurrin, 2004), France (Khazaal et al., 2008), Italy (Ferraro et al., 2007), Hong Kong (Chang & Law, 2008), and Finland (Korkeila et al., 2009).

Limitations of previous research on internet addiction have included low respondent rates (n = 86, Widyanto and McMurrin, 2004), as well as sampling that did not take into account the

varied uses of the internet. For example, Widyanto and McMurrin (2004) obtained their sample from varied sources (posters in internet chats, search engine keywords, and online forums) which reflects many uses of the internet (web surfing, shopping, online chatting, message boards, and gaming). The current study will focus on MMORPG users which will standardize the IAT using a more homogeneous sample: volunteers obtained from one source, tested for one type of internet use.

Uses and gratifications theory asserts that certain media will fulfill the needs of a particular audience (Katz, Gurevitch & Haas, 1973). If MMORPG is a distinct type of internet media, the symptoms experienced by habitual users, according to UG theory, should also be distinct and merit study. Due to the unique gratifications sought by an online gamer versus the gratifications sought by users of other internet media, MMORPG can be seen as meeting different desires for the user, such as synchronous social interaction, and strategic challenge, which would not be part of watching videos online or sending email. For this reason, previous research has not adequately looked at individual uses of the internet for their unique gratifications and desired or undesired consequences.

Significance of the Study

This study is significant in two aspects. First, there is no research specific to internet addiction diagnosis and MMORPG players. The research up to this point in time has conceptualized internet addiction as one category of behavioral addiction, and the literature reflects sampling which includes varied uses of the internet. Some of the research establishes subgroups which lose statistical significance due to the possibility that emailing, for example, may be a substantially different behavior from gambling or viewing pornography. The gratifications sought through these activities differ. This study seeks to build upon previous

research on internet addiction with a more robust sample, in size and in homogeneous population representation. Second, exploration of demographics and population characteristics will be useful in defining internet addiction's dimensions within the context of MMORPGs. Chang and Law (2008) noted that certain types of internet users show levels of impairment in different domains. As the IAT is prescribed for internet users of all types (Young, 1998a; 1998b), this research establishes a starting point for using the IAT for MMORPG internet users by exploring which dimension(s) of internet addiction are most frequently found among this population.

Theoretical Rationale

The theoretical background for this study is the Uses and Gratifications (UG) theory. Blumler and Katz (1974), analyzed mass media usage (newspapers and television) and found that media users' unique needs indicate different expectations for media. In other words, consumers intentionally seek media to meet a perceived need, which can lead to consequences both intended and unintended. An example of an intended consequence could be alleviation of boredom, while an unintended consequence may include the cost of using media. The theory was revisited by Morris and Ogan (1996) who established the internet as a mass medium. The current study explores the unintended consequences of MMORPGs as a form of mass media, in terms of addiction.

Addiction is described as "overwhelming involvement" (Ray & Ksir, 2004, p. 45). Overwhelming involvement is an unintended consequence of mass media use, such as playing MMORPGs. A MMORPG gamer may begin playing the game for a particular reason such as boredom, but experience unintended consequences such as loss of sleep or impaired social relationships. For this reason, UG theory serves as a framework for understanding how the use of

the internet as a mass media may become an addiction. The IAT accordingly measures addiction severity via unintended consequences.

Chapter Summary

This chapter provides information on the problem of Internet addiction which focused specifically on the playing of MMORPGs and justifies the need for research in screening for internet addiction among MMORPG internet users. The chapter also highlights the importance of validating Young's (1998b) Internet Addiction Test as well as exploration of MMORPG users' demographic traits. Finally, this chapter utilizes Uses and Gratifications Theory to explain internet addiction as an unintended consequence of MMORPG as consumption of mass media.

CHAPTER 2: LITERATURE REVIEW

Introduction

In this chapter, the uses and gratifications theory will be reviewed and placed in context for internet addiction and MMORPG addiction. Research on internet addiction screening instruments and the Internet Addiction Test will be reviewed.

Review of Relevant Theory

Uses and Gratifications Theory

Uses and Gratifications (UG) theory was developed from the work of Blumler and Katz (1974), to study the behaviors of mass media consumers. Since the internet had not been established yet, Blumler and Katz focused on newspapers and television. Uses and Gratifications theory posits that media users' unique needs indicate different expectations for each type of media. After the media is used, two types of outcomes occur: consumers' intended outcomes, and consumers' unintended outcomes. For example, a consumer may view a particular television show in order to address boredom. The intended outcome is to be entertained. The television show may be sponsored by a food company, whose intention is to advertise and lead the consumer to buy a food product. The consumer purchasing this food product, having seen the commercial, experiences the will to purchase as an outcome over and above entertainment. The desired purchase is an unintended consequence of having watched the television show. An essential tenet for this theory is that not every consumer experiences the same outcomes, intended or unintended. The audience of a mass media is not controlled or forced to make consumption choices, but is individually motivated and affected (McQuail, 1994). This explains why two people may view a television program, but only one will act upon the television commercial and make a purchase.

Research in the area of UG theory is widespread. Lazarsfeld and Stanton (1942; 1944; 1949) conducted early research related to identifying the gratifications that mass media audiences sought. Blumler and Katz (1974) cited Lazarsfeld and Stanton (1942; 1944; 1949), Herzog (1942), Suchman (1942), Wolfe and Fiske (1949), and Berelson (1949) as pioneers in developing possible reasons for consumers' uses of radio, television, comics, and newspapers. Blumler and Katz point out that these early studies did not explore relationships among gratifications and audience or media type. These studies also did not address the consequences, intended nor unintended, of media uses. For instance, a person might have listened to the radio all day and been surveyed on the reasons for this habit, but never on the result. Ruggiero (2000) noted that these early studies paid little attention to frequency distribution or other inter-relationships, which led to skepticism toward UG as a theory. Early research focused on individual consumption choices rather than "technological, aesthetic, [or] ideological" terms (Blumler & Katz, 1974, p.21) which laid a foundation for more specific research in the 1960s.

Klapper (1963) proposed that mass media research consider questions less "dichotomous" (p. 517) and more complex than whether media causes a particular outcome. For example, Klapper explored why people seek a particular gratification through media and what happens as a result. He suggested that the intended gratification sought by consumers viewing soap operas was help in handling their own real-life problems. Klapper also pointed out that some people continue to listen to the newscast every half hour, admitting the content is redundant, but continue to tune in, nonetheless. Such habitual use of the media was not providing its audience with a desired outcome of varied news, but continually tuning in was, to this audience, a salient activity.

Klapper's (1963) new focus on consequences was shared by other researchers who began to shift focus to the traits of certain users and predicting how users would use the media. For example, race was found to be a predictive variable in adolescent media uses (Gerson, 1966; Greenberg & Dominick, 1969).

The needs of media consumers were examined throughout the 1970s (Katz, Gurevitch, & Haas, 1973). Tying the specific needs of media users to personal/environmental traits and then associating these with mass media gratifications was researched by Palmgreen and Rayburn (1979). However, not every gratification desired by a user is realized (McLeod, Bybee, & Durall, 1982). It became obvious that a complex series of factors which varied on an individual level were responsible for media users' motivations in using a given type of media (Eastman, 1979). In this way, Ruggiero (2000) describes "active audience" as the phenomenon of multivariate audience traits which are dynamic and varied (p. 8). Ruggiero cites audience variances as the reason for dynamic levels of media attachment. One of the variables which Ruggiero credits for the active user phenomenon is level of user interactivity. For instance, in computer mediated communication, synchronous voice chat is more interactive than email, which is asynchronous because the users are not interacting simultaneously in real time. For MMORPG users, the desired gratifications reflect high interactivity and synchronous content as opposed to less interactive internet media, as an MMORPG is highly interactive and continually available.

The Internet as Mass Media

Traditionally, media types are defined as interpersonal, group and public, or mass communication (Cathcart & Gumpert, 1983). Cathcart and Gumpert referenced the need for media to cover more than one category. Morris and Ogan (2006) note that internet usage in the

1980s was limited in scope, but that its current classification is related to producer and audience uses. To this end, Morris and Ogan propose four categories of internet usage:

- “(a) one-to-one asynchronous communication, such as e-mail;
- (b) many-to-many asynchronous communication, such as Usenet, electronic bulletin boards, and Listservers that require the receiver to sign up for a service or log on to a program to access messages around a particular topic or topics;
- (c) synchronous communication that can be one-to-one, one-to-few, or one-to-many and can be organized around a topic, the construction of an object, or role playing, such as Multi-User Dungeons (MUDs, and their transformations such as MOOs [Multi-User Dungeon Object Orientated], MUCKs [Multi-User Created Kingdoms] and MUSHs [Multi-User Shared Hack] , Internet Relay Chat, and chat rooms on commercial services; and
- (d) asynchronous communication generally characterized by the receiver's need to seek out the site to access information, which may involve many-to-one, one-to-one, or one-to-many source-receiver relationships (e.g., Web sites, gophers, and FTP [File Transfer Protocol] sites)” (p. 42).

These uses of the internet indicate user-specific expectations for chosen interactions. Each interaction can be categorized as either asynchronous or synchronous. According to Morris and Ogan (2006), Massively Multiplayer Online Role Playing Games are a synchronous mass media.

Problematic Internet Usage as a Behavioral Addiction

Marlatt, Baer, Donovan and Kivlahan (1988) define behavioral addiction as “a repetitive habit pattern that increases the risk of disease and/or associated personal and social problems” (p. 224). Griffiths (1998) identified six criteria for behavioral addiction: (a) salience which is the

conceptualization of the behavior as the most important aspect of the person's immediate life; (b) mood modification which marks a person's sense of emotional change as a result of the behavior. For example, the behavior brings about a feeling of escape, or social acceptance; (c) tolerance which marks increased quantities of the behavior needed in order to achieve the desired effect; (d) withdrawal which is experienced as the user misses or cuts back on the behavior and feels badly as a result; (e) conflict which can be internal or external, between the user and his or her biopsychosocial environment; including other activities of self-care, fatigue, family and social obligations, and work or school; and (f) relapse which occurs when the activity is repeated despite the persistence of negative consequences classified in the above. Griffiths' criteria define behavioral addiction similarly to other addictions which are both behaviorally and biologically defined. Some of the consequences, like escape and social acceptance, are intended and specifically sought by the user as stress relief (Yee, 2006). A number of these consequences are obviously undesired, such as biological impairments like fatigue and social impairments like strained family relationships. Uses and gratifications theory suggests that internet or video game use is not necessarily addictive by nature. Instead, an individual may continually and problematically engage in internet use in order to fill needs, and experience unintended consequences. Ray and Ksir (2004) sum up the construct of internet addiction as "overwhelming involvement" (p. 45) citing behavior as addictive in addition to chemical ingestion. Involvement that is overwhelming is often an unintended consequence of media usage, such as playing a MMORPG.

Negative Consequences Linked with MMORPG

Uses and Gratifications theory highlights intended and unintended consequences of media use. For MMORPG, intended positive consequences can include online relationships,

escape from anxiety, and entertainment (Caplan et al. 2009), and ability to learn new skills (Clark, Frith, & Demi, 2004). A negative consequence of MMORPGs can include biological impairments (Young & Case, 2004) associated with characteristically long gaming sessions (Yee, 2006). Psychosocial impairments are also among the unintended consequences. Caplan, Williams and Yee (2009) cited problems of preoccupation, loneliness, depression, anxiety, aggression, and social skill deficits associated with problematic MMORPG use (2009). Young (2004) suggested that the internet may contribute to extramarital affairs, describing online affairs as “potentially more seductive” than “real-life” affairs (p. 406). These consequences exemplify Griffiths’ (1998) behavioral addiction criteria of salience and mood modification.

Internet Addiction Assessment

In the literature, the construct of internet addiction is described in a number of ways including: “cyberspace addiction, internet addiction disorder, online addiction, net addiction, internet addicted disorder, pathological internet use, high internet dependency, and others,” (Byun et al., 2009, p. 204). The negative and unintended consequences of addictive behaviors are typically used in assessment instruments. There are a limited number of internet addiction assessment instruments available, some have been psychometrically tested, and others have not. The instruments available include the modified C.A.G.E. for Addictive behaviors (Thompson, 1996), the Internet-Related Addictive Behavior Inventory (Brenner, 1997), the Computer Use Survey (Pratarelli, Browne, & Johnson, 1999; Pratarelli & Browne, 2002), the Virtual Addiction Survey (Greenfield, 1999), the Internet-Related Problem Scale (Armstrong, Phillips, and Saling, 2000), the Online Cognition Scale (Davis, 2002), the Generalized Problematic Internet Use Scale (Caplan, 2002), the Chen Internet Addiction Scale (Chen, Weng, Su, Wu, & Yang, 2003), the Internet Consequences Scale (Clark, Frith & Demi, 2004), the Compulsive Internet Use Scale

(Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009), the Internet Addiction Diagnostic Questionnaire (IADQ, Young, 1998a) which is also referred to as Young's Diagnostic Questionnaire (YDQ, Dowling & Quirk, 2009) and the Internet Addiction Test (IAT, Young, 1998a).

The CAGE and Modified CAGE for Internet Addiction

The C.A.G.E. questionnaire (Ewing, 1984) is a brief, four-item screening instrument which many consider to be the gold standard in assessing alcoholism. The items focus on efforts to [C]ut down on the drinking of alcohol; [A]nnoyance from criticism; presence of [G]uilt in the user; and the salience of the addictive behavior as an [E]ye opener. The yes-or-no answered items of the CAGE indicate the presence of problem behavior if two or more responses are in the affirmative.

The CAGE has been extensively researched. In an early study, the CAGE was validated on a population of patients admitted for inpatient treatment related to psychiatric issues ($n = 366$) at a Veterans Administration Hospital (Mayfield, McCleod & Hall, 1974). While factor analysis was not used, correlation procedures were conducted. The results yielded no false positives (being classified as having an alcohol problems when no problem was present), but there was only a 37 percent sensitivity for those who had an alcohol problem. The correlation coefficient for the four-item test was not considered by the authors to be robust ($r = -.65$). However, when two or three criteria were considered, the correlation coefficient improved dramatically ($r = .89$, $r = .89$). Mayfield et al. (1974) also found that patients experiencing psychotic symptoms related or unrelated to alcoholism, (e.g. persons with schizophrenia) were not accurately diagnosed. A limitation of the Mayfield et al. study was that 99% of the subjects were male. In response, the CAGE alcoholism questionnaire has undergone a number of studies among various populations.

For example, Dhalla and Kopec (2007) compared three reliability studies and 16 validity studies of the CAGE, and found high reliability ($r = .80-0.95$) but varying correlation with other instruments ($r = .48$ to 0.70). However, the CAGE was not adequately sensitive when applied to freshmen in college (Smith, Collins, Kreisberg, Volpicelli, & Alterman, 1987; Heck & Williams, 1995) and women, (Waterson & Murray-Lyon, 1989) both groups where problematic binge drinking may occur but at low frequency (O'Hare & Tran, 1998).

The CAGE's use is not limited to alcohol screening. The CAGE has been modified to include other drug use (Brown and Rounds, 1995) as well as internet addiction (Thompson, 1996). Thompson's questionnaire asked, "Have you ever felt that you should [C]ut down on your Internet Activity? Have people [A]nnoyed you by criticizing your Internet connectivity habits? Have you ever felt bad or [G]uilty about your Internet connectivity? Have you ever connected to the Internet [E]arly in the morning?" Thompson asked additional questions to find correlations between participants' time spent on the internet and test severity, and the types of consequences experienced by people rated as "addicted or dependent" (p. 12). Thompson also asked whether participants considered themselves addicted, a self-report question used in later studies to establish face validity (Petrie & Gunn, 1998; Widyanto et al., 2011).

In a study of 32 respondents, Thompson (1996) sought to address the differences between two groups separated by median scores as internet-dependent and internet-addicted. Variables examined included internet use frequency, which was used to compare addiction and dependence, along with self-classification. While Thompson was not focused on internet users who did not classify themselves as addicted, this early research speaks to the CAGE's recurrent role in addictions screening, in addition to respondent self-report.

Internet-Related Addictive Behavior Inventory

One of the first attempts to measure addictive symptoms related to internet usage, the Internet-Related Addictive Behavior Inventory (IRABI, Brenner, 1997) consists of 32-items which assess analogically relevant experiences to the diagnostic criteria for substance abuse from the DSM-IV (2000). Each question can be answered true or false. Some examples of items from the IRABI include: “I have spent at least 3 hours on the net at least twice,” “I have attempted to spend less time connected but have been unable to,” and “My work and/or performance has not deteriorated since I started using the net” (Brenner, 1997, p. 880).

Brenner (1997) sought to answer the need cited in early research (e.g. Peele, 1985) for “evidence for withdrawal, tolerance, and craving by users,” (Brenner, 1997, p. 879). Respondent recruitment was conducted via hyperlinks on the internet, leading to the survey which was also housed on the internet. The first 90 days’ responses yielded 563 completed surveys from over 25 different nations. Robust internal consistency (Cronbach’s alpha = 0.87) was found through statistical analysis which stopped short of a factor analysis procedure. This study found respondents used the internet for an average of two years, with a mean weekly use of 19 hours. The research questions of tolerance, interpreted as too much time on the internet; withdrawal, interpreted as preoccupation with internet use when not online; and craving, interpreted as unsuccessful attempts to cut down on internet usage, were found at 55%, 28%, and 22% respective. Another finding was a skewed score distribution among respondents, meaning that a certain proportion of respondents scored with more negative consequences than the average survey-taker, which could indicate a subpopulation of people showing behaviors more consistent with addiction. This early research measured users of a relatively new phenomenon, as

evidenced by the mean length of usage being only two years, as well as being limited by less developed uses of internet access than the more interactive options offered today. Brenner reported that the majority of respondents were world-wide-web internet users as opposed to gamers. However, the study opened a line of inquiry by defining addiction to include internet related behaviors.

Computer Use Survey

The Computer Use Survey (CUS, Pratarelli, Browne, & Johnson, 1999) began as a 94-item, true/false questionnaire but was later modified to a 74-item Likert scale (Pratarelli & Browne, 2002). Examples of questions on both versions are: “Only my net friends really know who I really am,” “I have downloaded or viewed sexually oriented pictures on the net,” “People say my personality has changed since I went on-line.” (Pratarelli & Browne, 2002, p. 64). The questions were developed and included for their face validity by a number of experts working with the authors (Pratarelli, Browne, & Johnson, 1999).

Pratarelli, Browne, and Johnson (1999) sought to identify internet addiction as a construct composed of behaviors and personality attributes. Their survey had 341 respondents (163 males, 178 females) from Oklahoma State University. The results were submitted to an exploratory factor analysis. Four factors were obtained which explain 31% of the total variance: (a) “hard-core computer/Internet user” (p. 307); (b) “utilization and usefulness of computer technology in general and of the Internet in particular” (p. 308); (c) “sexual applications” (p. 309); and (d) “absence of concern over problem use” (p. 309). The first two factors accounted for 18% (Eigenvalue 11.26) and 6% (Eigenvalue 3.79) of the variance. The third factor accounted for 4% of the variance and the fourth, 3% of the variance with Eigenvalues not reported. The authors indicated that the fourth factor can be considered a non-problematic construct, as it focused on

potentially positive cognitions about the internet. Pratarelli and Browne (2002) noted that addiction measurement is not only based on negative consequences (Davis, 2002) but also, inversely through the presence of positive cognitions toward the healthy or unproblematic use of the internet.

Limitations to the Pratarelli et al. (1999) research include the number of items needed for a robust factor analysis. With 94 items, this study had 341 respondents where Hair, Black, Babin, and Anderson (2009) recommend a ratio of 10 respondents per survey item, or a minimum of 5 respondents, which would have required nearly 500 completed surveys. Due to the sample size, it is not likely that the sample was representative of users of MMORPG games in 1999.

Pratarelli and Browne (2002) study included a confirmatory factor analysis which addressed the multidimensionality of internet addiction, an increased the sample size ($n = 527$) and the true/false format was changed to Likert scale items. The confirmatory factor analysis resulted in a three-factor model: “(1) [i]nternet addiction, (2) a sexual factor, and (3) an [i]nternet use factor” with Cronbach’s alpha values of 0.8929, 0.7202, and 0.5707 respectively (p. 53). The fourth factor identified from the Pratarelli’s (1999) study was discarded, due to its focus on positive cognitions about internet usage. Rather than an orthogonal factor structure, the confirmatory factor analysis showed considerable relatedness between the variables. The authors addressed this deficiency in two ways. First, they posited that one or more of the factors were causative of the other(s), and second, they noted the high number of items on the questionnaire. A third possible explanation is the inclusion of items which seem to have face validity but may represent different fundamental understandings of internet addiction. The authors identified respondents as using the internet for email, file transfer, internet relay chat, and web surfing, but not for gaming.

Virtual Addiction Survey

Greenfield's (1999) Virtual Addiction Survey (VAS) was constructed in conjunction with ABCNEWS.com. The VAS has 36-items covering demographics, descriptive computer and internet uses and frequencies, and clinical questions based on pathological gambling criteria from the DSM-IV (2000). Examples of demographic-items are ethnicity or education level. A descriptive-item on computer and internet use and frequency is "In an average week, how much time do you spend in your computer at home and what percentage of time is spent on the internet?" An example of a diagnostic question is, "Do you find yourself jeopardizing or losing a significant relationship, job, educational or career opportunity because of your internet use?"

Respondents were invited to complete the VAS through the ABC's website in connection with a story published there, about Internet addiction. The sample included respondents from the United States, Canada, and other nations. The researchers found that approximately 6% of internet users fit the study's criteria for addiction to the internet. Underlying dimensions were not statistically processed, but the variables were found to explain 42% of the variability among addiction scores. This survey was perhaps the largest ever conducted (n = 17,251). However, the preemptive suggestion of Internet addiction to prospective respondents is an example of selection error (Campbell & Stanley, 1963) and might have threatened the validity of the results. Further, while data was collected on respondents' uses of the internet, the results were not reported and MMORPGs were not common in 1999.

Internet-Related Problem Scale

The Internet-Related Problem Scale (IRPS, Armstrong et al., 2000) is made up of four sections, the first was adapted from Brenner's (1997) Internet-Related Behavior Inventory

(IRABI) (20 items). Two additional sections collect demographic (8-items) and internet usage frequency data (6-items). The final section of the IRPS uses three personality scales: the Minnesota Multiphasic Personality Inventory (MMPI) Addiction Potential Scale (Hathaway & McKinley, 1989), the Sensation Seeking Scale (Zuckerman, 1979), and the Coopersmith Self-Esteem Inventory (Coopersmith, 1991). The MMPI Addiction Potential Scale was utilized as a validation control for the IRABI, while the Sensation Seeking Scale and Coopersmith's Self-Esteem Inventory were included as the authors sought theoretical correlates with other addictive behaviors.

Armstrong and colleagues (2000) solicited respondents through an emailed invitation, as well as an advertisement to an Internet addiction support group, yielding fifty participants. Similar to Brenner's (1997) findings concerning the IRABI, the IRPS showed internal consistency (Cronbach's $\alpha = 0.878$). The MMPI score results were similarly associated with scores on the IRPS ($r = .297, p < 0.05$). Results from the two remaining personality instruments, the Sensation Seeking Scale and Coopersmith's Self-Esteem Inventory, were reviewed using multiple regressions for predictive power on time spent online, and for predicting scored results on the IRPS. Researchers found self-esteem was predictive of internet usage frequency [$F(1, 49) = 9.023, p < 0.004, 15.8\%$ variance explained] and IRPS scores [$F(1, 49) = 10.895, p < 0.002, 18.5\%$ variance explained]. The IRPS predicted hours of Internet usage ($r = .759, p < 0.01$) showing that higher frequency of internet usage predicts a more severe score on the IRPS. However, time spent online is not necessarily indicative of addictive symptoms such as withdrawal, tolerance, or craving (Peele, 1985) and is not predictive of symptomatic severity in later research (e.g. Widyanto & McMurrin, 2004). Although psychometric validation was not a part of this study, Armstrong et al. (2000) made an important connection between internet

addiction scales and the more established MMPI, grounding the study in addictions-related research. Another contribution of the Internet Use Survey was the inclusion of internet usage data (unique services such as chat rooms and web surfing). However, MMORPGs were not common at this time and the results of the internet usage data were not reported.

In 2007, the psychometric properties of the IRPS were investigated in a pilot study by Widyanto, Griffiths and Brundsen, using exploratory factor analysis. There were 79 completed surveys (14 males and 65 females). Recruitment was done through online chat rooms, newsgroups, an auction site, and an online game. The survey was also available through search engines with keywords like “internet usage survey” and “internet addiction” (p. 207). The IRPS was found internally reliable (Cronbach’s alpha = 0.88) with a six-factor solution. The six factors (eigenvalue > 1.0) were extracted: salience ($r = .84$, 34.7% variance explained), negative effects ($r = .72$, 8.68% variance explained), mood enhancement ($r = .77$, 7.14% variance explained), productivity ($r = .62$, 6.44% variance explained), lack of control ($r = .64$, 5.79% variance explained), and lack of information (one question loaded on this factor, explaining 5% of the variance). Salience (e.g. “when not connected, I find myself wondering what is happening on the internet,” or “I find myself connecting for longer periods of time than intended”) was the predominant factor in analyzing the Internet Addiction Test (Widyanto & McMurrin, 2004). Another research question was whether duration of internet use would correlate with instrument score severity. The hypothesis was that more experienced internet users would be less likely impaired. This was moderately supported with a significant negative correlation ($r = -0.39$, $p < 0.001$) between experience on the internet and problems as measured by the IRPS.

A limitation of this study was its sample size ($n = 79$) which was below the 5 subjects per question recommendation made by Hair et al. (2009). Additionally, this study did not report what

proportion of the sample were MMORPG users. However, the IRPS research by Widyanto et al. (2007) addressed paucity for validated instruments measuring internet addiction.

Online Cognition Scale

Davis (2001) proposed a cognitive-behavioral model for pathological internet use (PIU) which focused on the presence of “maladaptive cognitions” (p. 191) and two types of pathological internet use: specific and generalized. According to Davis’ model, maladaptive cognitions are causative thoughts users have about themselves or about the world, which lead to negative behaviors. Examples of maladaptive cognitions include, “I am only good on the internet,” and “I am a failure when I am offline” (2002, p. 191). Specific PIU refers to negative uses of content-specific internet features, such as gambling, shopping, or pornography, which occur with or without the use of the internet. Generalized PIU behaviors, however, are uniquely based on the “experience of being online” (Caplan, 2002, p. 556). The essential feature of Davis’ model was its attribution of problematic behaviors, including PIU, to individual cognitions which are not necessarily internet-specific. From this model, Davis (2002) compiled the Online Cognition Scale (OCS).

Davis’ Online Cognition Scale (OCS, 2002) addressed a lack of valid problematic internet usage instruments. The OCS’ 36-items were developed from commonly reported symptoms in the literature and were divided among four subscales measuring “loneliness/depression, diminished impulse control, social comfort, and distraction” (Davis, 2002, p. 334). Examples items and underlying dimensions are: “People accept me for who I am online” exemplifies social comfort. “I am less lonely when I am online” is representative of loneliness/depression. “People complain that I use the Internet too much” reflects diminished impulse control. “When I have nothing better to do, I go online” indicates distraction.

The OCS was validated on a sample of 211 Canadian undergraduate students; 104 males and 107 females and yielded high internal consistency (Cronbach's alpha = 0.94).

Davis (2002) conducted a confirmatory factor analysis in order to establish the four dimensions as appropriate subscales. The variance explained by the subscales was: social comfort 65%; loneliness/depression 80%; diminished impulse control 72%; and distraction 52%. Similar to the factor analyses conducted by Pratarelli, Browne, and Johnson (1999) and Pratarelli and Browne (2002), Davis' (2002) sample (n = 211) was insufficient for a 36-item questionnaire (Hair et al., 2009). Despite this limitation, demographic correlations were notable. The OCS scores of interactive internet applications (e.g., online gaming and web surfing) users were higher than the scores of non-interactive application (e.g., email) users. While gaming was not reported separately from other activities seen as interactive, the level of interactivity for respondents' primary internet uses was associated with higher problematic behavior. Additionally, the data showed that problematic internet use is a multifaceted issue. While Davis' work was based on a cognitive behavioral model, the factors were unintended consequences arising from excess internet use.

Generalized Problematic Internet Use Scale

The Generalized Problematic Internet Use Scale (GPIUS) developed by Caplan (2002) was based on Davis' (2001) model of cognitive behavioral theory. Caplan developed a questionnaire to explore whether problematic use of the internet was multidimensional. The Generalized Problematic Internet Use Scale (GPIUS) has 29-items based on problematic internet use cognitions found in the literature. Examples of items include: "I use Internet to make myself feel better," "I am more comfortable with computers than with people," and "I spend more time

online than I expect to” (Caplan, 2002, p. 560). Items are rated on a Likert scale of 1 to 5, measuring level of agreement versus disagreement.

The GPIUS was validated on undergraduate students ($n = 386$) of whom 270 were female and 116 were male. Caplan’s (2002) exploratory factor analysis yielded seven dimensions: “mood alteration, perceived social benefits available online, negative outcomes associated with internet use, compulsive internet use, excessive amounts of time spent online, withdrawal symptoms when away from the internet, and perceived social control available online” (p. 553). Validation of the GPIUS yielded high internal consistency (Cronbach’s $\alpha = .78-.85$) with the seven factors accounting for 68% of the variance. Similar to Davis’ (2001; 2002) work on the OCS, the GPIUS illustrates problematic internet usage as multidimensional. It is important to note that Caplan reported only a few individuals who showed symptoms of problematic internet use (e.g. mood alteration $\bar{x} = 1.95$, $SD=0.94$; compulsivity $\bar{x} = 1.60$, $SD = 0.71$; and withdrawal $\bar{x} = 1.77$, $SD = 0.77$). The highest mean score among respondents corresponded to questions related to excessive time spent on the internet ($\bar{x} = 3.00$, $SD = 1.05$). Excessive time items were based on the client’s perception of losing track of time, or more time spent online than originally intended. Caplan’s study did not report on various uses of the internet.

Chen Internet Addiction Scale

The Chen Internet Addiction Scale (CIAS, Chen et al., 2003) is another multidimensional instrument, measuring “symptoms of compulsive use, withdrawal, tolerance, and problems in interpersonal relationships and health/time management” (Ko et al., 2005, p. 546). The scale was developed in Chinese and normed in Taiwan against clinical interviews conducted by psychiatrists (Ko et al., 2005). The items are not available in English.

The original validation study was not available at the time of this review, but later research with adolescents in Taiwan (Ko et al. 2005) provides some insight on this addiction scale's development. Most importantly, among the results of Chen and his colleagues' work was a 5-dimensional outcome. The CIAS' dimensions of internet addiction were "symptoms of compulsive use, withdrawal, tolerance, problems in interpersonal relationships, and health/time management" (Chen et al., 2003 as cited in Ko et al., 2005). Ko et al., also collected data on respondents who played online games, reporting a sample size of one hundred and fifty-five (n = 155), 98 participants played online games, 62 of whom were diagnosed with internet addiction. The gamers with internet addiction composed approximately 70 percent of the total number addicted, more than the other internet usage categories combined.

Internet Consequences Scale

Clark et al. (2004) developed the Internet Consequences Scale (ICONS) based on negative consequences of problematic internet use found in the literature. The 38-item survey is broken down into "physical, behavioral, and psychosocial consequences of internet use" (p. 156). Examples of questions and Likert scale answers include "how often do you experience headaches during or after using a computer," (frequently = 1, never = 5), "When I am not online, doing my favorite Internet activities, I am thinking about doing it or planning the next time I can do it," (strongly agree = 1, strongly disagree = 5), and "My sense of being isolated from friends and family is," (much lower/much less = 1, much more/much more improved = 5).

In a validation study of the ICONS, 293 undergraduate students completed the survey, which is close to Hair et al. (2009) sampling recommendations for a factor analysis, of 10 respondents per item. Exploratory factor analysis yielded a Cronbach's alpha of 0.84 and 0.76, 0.92, and 0.84 for the physical, behavioral, and psychosocial factors. Respondents who spent

more time per week on the internet had more severe scores on the survey. This survey did not collect information on online gamers or MMORPGs.

Compulsive Internet Use Scale

Meerkerk et al. (2009) recognized a need for a brief and easily administered instrument. They developed a 14-item questionnaire based on the available literature. Examples of questions on the CIUS are; “Do you think you should use the Internet less often?” “Do you go on the internet when you are feeling down?” and “Are you short of sleep because of the Internet?” (p. 3).

To establish psychometric validation, the researchers conducted three separate studies on Dutch internet users, making the CIUS the second-most validated instrument for internet addiction, behind Young’s (1998a) Internet Addiction Test.

The first study (Meerkerk et al., 2009) on the CIUS utilized 447 heavy internet users (16+ hours per week). In addition to using the CIUS, respondents were administered Davis’ (2002) Online Cognition Scale for concurrent validity. Subjects were asked how much time they spent online per day, for how many days, and this was then reported as a total frequency per week. The scores between the CIUS and OCS were correlated ($r = .70, p < 0.001$). A confirmatory factor analysis was conducted on the CIUS and yielded a one-factor solution with high internal validity (Cronbach’s alpha = 0.89, eigenvalues not reported). Time spent online was correlated positively with severity on the CIUS ($r = .33, p < 0.001$).

A second study (2008), using only the CIUS, was conducted on 229 participants recruited from the previous study’s 447 person pool. Confirmatory factor analysis found high internal reliability (Cronbach’s alpha = 0.89).

The third study on the CIUS and time spent online was conducted with a larger sample ($n = 16,925$). Two additional questions were added: “Do you experience your internet use as a problem?” and “Do you feel or have you ever felt addicted to the internet?” (p. 4). These questions are similar to Petrie and Gunn’s (1998) single self-assessing question which seeks to establish whether respondents feel that they are addicted to the internet. Confirmatory factor analysis yielded a Cronbach’s alpha of 0.90 ($p < 0.001$). Time spent online correlated positively with CIUS score severity ($r = .42, p < 0.001$). The CIUS also correlated positively with participants reporting problematic internet use ($r = .42, p < 0.001$) and whether participants felt they were addicted ($r = .52, p < 0.001$).

One of the stated strengths of the CIUS noted by Meerkerk et al. (2009) is its brevity, with only 14 items (p.5). It correlates moderately ($r = .42, r = .52$) with internet users’ self-report of being addicted. However, research on the CIUS did not address the varied uses of the internet (e.g. MMORPG, chatting, shopping) which indicates the need for further research.

The Internet Addiction Test

The Internet Addiction Diagnostic Questionnaire (IADQ, Young, 1998a), also known as Young’s Diagnostic Questionnaire (YDQ, Dowling & Quirk, 2009) preceded the OCS, GPIUS, and CIAS but was not validated until it was expanded from its 8-question format (Young, 1998a) to its current 20-question format. The Internet Addiction Test is one of the first and most widely used internet addiction screening instruments (Widyanto & McMurrin, 2004). The IAT items were adapted from the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000) criteria for pathological gambling. Appendix B provides a comparison of the criteria for pathological gambling and Young’s (1998a) criteria for internet addiction. Young (1998a) justifies this comparison based on both behaviors being marked by

compulsive activity without an ingested agent (i.e., alcohol or other drugs). The IAT was scored in two ways, from the literature. The IAT test manual (Young, 2007) offered a 6-point Likert scale which includes 0 as “not applicable”. The manual established instrument score interpretation as follows: 0 to 30: normal, 31 to 49: mild, 50-79: moderate, and 80 to 100: severe dependence. The manual referenced Widyanto and McMurrin (2004) for norm related information, which used a different scoring rubric: minimum score: 20, 20 to 39: average with complete control; 40-69: frequent problems; 70-100: significant problems. The Widyanto and McMurrin study did not use “not applicable” as “0” on its Likert scale, which meant that respondents had to answer at least 1 out of 5 on each of the 20 IAT items, where “1” was “not at all.” Widyanto, Griffiths and Brundsen used the IAT again in 2011, retaining the same scoring criteria. Korkeila and colleagues’ (2009) Finnish IAT translation used 6 possible responses, similarly to Young’s test manual.

Young (1998a) used pathological gambling to assure face validity since pathological gambling and internet addiction are similar. However, she eliminated two of the ten pathological gambling criteria which reference financial loss. Beard and Wolf (2001) cite the omission of financial loss related criteria as a limitation and suggest that slight modification of the criteria may have been useful. After developing the 8-item questionnaire, Young (1998b) revised the instrument by adding an additional twelve questions. Widyanto and McMurrin (2004) conducted the first validation study of the IAT and noted several improvements in the 20-question instrument including: stronger face validity, a simplified format, and better assessment of life areas affected by problematic internet use. Other validation studies conducted on the IAT include: populations in Italy (Ferraro et al., 2007), France (Khazaal et al. 2008), Hong Kong (Chang & Law, 2008), and Finland (Korkeila et al., 2009). The Internet Addiction Test is the

most widely used and validated instrument for assessing internet addiction. The remainder of this chapter reviews the validation studies performed on the IAT.

The Internet Addiction Test Validation in the United Kingdom

The first study published on the psychometric properties of Young's (1998b) 20-item Internet Addiction Test (IAT) was conducted by Widyanto and McMurrin (2004). Widyanto and McMurrin conducted an internet-based survey using volunteers solicited through chat platforms, psychology-related newsgroups, auction sites, an online gaming site, advertisements by keyword in search engines, and a physical poster in a cyber-café. In addition to the twenty questions of the IAT, fifteen demographic and use tracking questions were added to define the population and their internet use. See Appendix A for a copy of the IAT Questionnaire licensed by Young (2007).

Widyanto and McMurrin's (2004) study included 86 complete questionnaires, 57 females and 29 males with mean ages of 31.44 and 25.45 respectively. Fifty-one of the respondents reported that their employment required the use of the internet, while personal use of the internet surpassed professional use by more than double for both genders. Respondents used the internet for varied reasons including, searching and surfing on the World Wide Web, downloading, and gaming. There were 29 participants whose primary use of the internet was non-interactive. Forty-one users were in the asynchronous interactive category, which allows users to interact with one another, but not at the same time. Examples of asynchronous interactive internet functions include email and message boards. Synchronous interactive internet functions were the primary internet use for only 12 respondents which included internet chat and gaming with chat. Four of the IAT respondents did not specify their uses of the internet.

Widyanto and McMurrin found no significant differences among duration of internet use and the type of internet function.

An exploratory factor analysis generated six factors which explained 68.16% of the variance. Reliability and internal validity were verified through this procedure, with significant correlation among the six factors (ranging between $r = .62$ and $r = .226$) and Eigenvalues greater than 1.0. The factors were: salience (five questions), excessive use (five questions), neglect of work (three questions), anticipation (two questions), lack of control (three questions), and neglect of social life (two questions). The highest Cronbach's alpha was attached to salience (.82) which correlated positively with respondents' general overall and personal use of the internet. All inter-factor correlations were positive and significant (two-tailed) at $p < .01$, except for the factor on neglecting work, which was significant at the $p < .05$ level. Raw scores were not made available by the authors.

The items show face validity as the factors of salience, excess use, neglecting work, anticipation, lack of self control, and neglecting one's social life are symptoms of addiction (Griffiths, 1998). The test shows construct validity as measured by factor analysis; the highest factor (salience) and the second highest, (excess use) are correlated with respondents' average general and personal internet usage. Further, salience has a high Cronbach's alpha, ($r = .82$) which indicates reliability. Internal validity is supported in the factors' positive inter-correlations as well.

Widyanto and McMurrin (2004) cited several limitations including the use of a self-selected sample, a small sample size, overrepresentation of females and the sample's diverse uses of the internet. Hair et al. (2009) recommend a sample size of 100 or more for a factor analysis. The participants were self-selected and recruited through a number of methods, each

with unique applications of the internet. The respondents' diverse use of the internet may have affected the study's results. For instance, the 12 synchronous interactive internet users made up 14% of the 86 person sample. While the authors noted that no significant differences existed based on internet usage, 12 is not a large enough sample for a group comparison (Manly, 2009). If subpopulations delineated by internet function type are to produce reliable results, their samples must be increased. Differences among the reasons for internet use may be reflected in factor variances. The sample's homogeneity can be addressed by separating respondents based on their particular uses of the internet (e.g. users of massively multiplayer online games). Another limitation of the study is the question of whether the overall sample is representative of the population it sought to measure. A sample size of 86 is small considering that 74% of American adults use the internet (Rainie, 2010).

Widyanto and McMurrin (2004) noted another symptom related to internet use which they coined as the "newbie syndrome" (p. 444). A "newbie" is described as an internet user with less experience. The researchers found that the more severe the internet user's IAT score, the less the user's internet experience, with a weak correlation of ($r = -0.18, p < 0.05$). The "newbie effect" implies that internet addiction symptoms may reduce or disappear as a result of user experience with the technology. No other significant effects based on demographics were reported, although the low sample size and diverse respondent traits might have obscured other possible effects. Despite its limitations, the Widyanto and McMurrin's study was the first psychometric validation of the IAT on an English speaking population.

Widyanto et al. revisited the IAT in 2011, using the Internet-Related Problem Scale (Armstrong et al., 2000) as well as Petrie and Gunn's (1998) single self-assessing question on whether respondents feel they are addicted to the internet. They performed exploratory factor

analysis on the IAT and IRPS and examined correlations among the instruments and the self-assessing question. A total of 221 respondents, mostly from the United Kingdom, reported using a variety of internet applications including email (n = 63), forums (n = 3), web (n = 63), search engines (n = 27), work-related (n = 3), online gaming (n = 1), auctioning and shopping (n = 6), file transfer (n = 5), chatting (n = 21), and other (n = 2).

The IRPS exploratory factor analysis resulted in four factors with eigenvalue > 1.0 with 60.2% of the total variance explained. The factors were “negative effects” (41% variance explained), “mood modification” (7.3% variance explained), “loss of control” (6.3% variance explained), and “increased internet use” (5.6% variance explained) (p. 144). Cronbach’s alpha values were not reported for items per factor.

The IAT exploratory factor analysis yielded a three factor solution with eigenvalue > 1.0, explaining 56.3% of the total variance. The factors were “emotional/psychological conflict” (42% variance explained), “time management issues” (8% variance explained), and “mood modification” (5.6% variance explained) (p. 143). Cronbach’s alpha values were not reported among items per factor.

Widyanto et al., (2011) found a strong ($r = .90, p < 0.01$) correlation between the IRPS scores and the IAT scores. The self-assessment question was correlated with the IRPS scores ($r = .4; p < 0.01$); and IAT ($r = .4; p < 0.01$). No association among length of use of the internet and severity of scores was found for any of the instruments.

Strengths of this study include the establishment of construct validity using the self-assessment question, and a robust sample size (n = 221) which meets the recommendations of Hair et al. (2009) that 10 participants per question be used for a factor analysis. Additionally, this was the second study on the IAT administered in English. Further research is needed to secure

robust sample sizes for each of the uses of the internet. While there was only one online gamer in this study, the gamer scored higher on the IAT (66) and IRPS (117) than the mean scores (mean IAT = 44.4, mean IRPS = 64.7) and higher than any other category of internet user on either test. Further research is merited on the unique attributes and scores of online gamers.

The Internet Addiction Test Validation in Italy

Ferraro et al. (2007a, 2007b) translated the IAT to Italian and completed two separate studies. One of these studies (Ferraro et al., 2007b) is not available in English. However a second study, published in English, surveyed Italians ($n = 236$) whose primary uses of the internet were chat-related. There were 139 males and 97 females, of which 55.1% were students. Respondents were recruited via internet chat rooms. The study did not provide information on the factor analysis, except that it explained 55.6% of the total variance.

Ferraro et al. (2007a) does, however, identify a few risk factors in the Italian sample. First, younger users were more likely to score higher on the IAT. Additionally, higher IAT scores correlated positively with average time spent online. The Italian studies helped establish the importance of isolating a sample for its particular uses of the internet by using a more homogenous sample.

The Internet Addiction Test Validation in Hong Kong

While previous psychometric studies of the IAT were conducted as exploratory factor analyses, Chang and Law (2008) completed a study with the largest sample size ($n = 410$) in an exploratory factor analysis, and a confirmatory factor analysis. The researchers recruited respondents from 8 universities in Hong Kong and provided 480 IAT surveys with both English and Chinese translations. Four hundred and ten (410) of the questionnaires were completed (187 males and 223 females). Completed questionnaires were randomly assigned to two groups: an

exploratory factor analysis group, in order to analyze the dimensions of the questionnaire, and a confirmatory factor analysis in order to validate the exploratory factor structure. Variables on gender, academic outcomes, particular uses of the internet, and amount of internet experience were examined for correlation with IAT scores.

Using an exploratory factor analysis, (with Eigen values of at least 1.0), 59.3% of the total variance was explained with a 4-factor structure. One item, “How often do you check your e-mail before something else that you need to do?” loaded on its own factor. Chang and Law (2008) noted that this is the only question that applies to a particular internet function, and accordingly removed the item from the questionnaire. The 19-item questionnaire was analyzed and loaded on 3 factors, with one question, “How often do you find yourself anticipating when you will go online again?” not loading on any of the three. The 18 questions were then analyzed to result in 3 factors which the authors observed as a more robust structure in terms of both reliability and validity. Chang and Law then conducted a confirmatory factor analysis on the previously identified factor structure, using the second portion of completed questionnaires. This resulted in a confirmed three-factor structure. The factors were “withdrawal and social problems,” “time management and performance,” and “reality substitute.” The “withdrawal and social problems” factor structure of this study contained the items from “salience” and “neglecting social life” factors of the Widyanto and McMurran (2004) factor structure.

Several additional correlation analyses were conducted. In contrast to Widyanto and McMurran’s (2004) “newbie effect”, the Hong Kong IAT results did not identify a significant ($p < 0.05$) correlation between internet level of experience and IAT score severity. The amount of weekly internet usage was also not significantly ($p < 0.05$) associated with IAT score severity. However, poor academic performance was correlated ($r = -0.25$, $p < 0.05$) with IAT score

severity. Forty-four (44) of the respondents reported using the internet for synchronous interactive online gaming.

Chang and Law's (2008) research is important due to its larger sample size, the homogeneity of respondents (all students) and its factor structure. With regard to the latter, Chang and Law cited (Byrne, 1989) the assertion that the dimensions for an instrument are robust if they load across multiple demographics. Additionally, Chang and Law's findings included a comparison among various uses of the internet, which noted activities like "online gambling" ($\bar{x} = 55.33$), "cyberrelationships" ($\bar{x} = 59.91$) and "interactive gaming" ($\bar{x} = 51.68$) were significantly ($p = 0.05$) associated with higher mean scores on the IAT as compared to less interactive uses like "information searching" ($\bar{x} = 41.99$) and online shopping ($\bar{x} = 42.21$). This result highlights the possibility that the gratifications sought through more interactive uses of the internet, like MMORPG use, may result in different consequences, both intended and unintended.

The Internet Addiction Test Validation in France

Young's (1998a) IAT was translated to French for a psychometric study on French ($n = 246$) adults (165 female, 81 male). Like Chang & Law, (2008), Khazaal and colleagues (2008) performed exploratory and confirmatory factor analyses. Of the 246 respondents, 195 were asked two additional questions which measured daily time online, and whether they were online gamers. The range for time spent online was 0 to 390 minutes with a mean of 60.42 and a standard deviation of 62.85. Twenty respondents reported online gaming.

The exploratory factor analysis explained 45% of the total variance. The one-factor solution was more robust than the six factor structure of Widyanto and McMurrin (2004), which is similar to Chang and Law (2008) 3-factor solution. In running an exploratory factor analysis,

however, Khazaal and colleagues (2008) identified a 6-factor solution, similar to previous research (Widyanto & McMurrin, 2004).

For the French respondents, daily internet use was positively correlated ($r = .53$) with severity of IAT score. Online gaming was less related ($r = .18$) to higher IAT scores, although only 20 of the respondents were gamers. Online gamers were also found to have higher daily internet use ($r = .18$) compared to non-gamers. Age was negatively correlated ($r = -0.23$) with IAT score severity, meaning younger internet users were more likely to have severe symptoms. No significant differences were found in IAT scores between genders. Khazaal et al. (2008) also distinguished gamers from other internet users, although the subsample ($n = 20$) was not a robust size for group comparison. In this case, online gamers were identified as longer daily internet users, but a correlation between more synchronous, interactive internet usage and IAT score severity was not found.

The Internet Addiction Test Validation in Finland

Another validation study on Young's (1998a) Internet Addiction Test (IAT) was conducted using a Finnish translation (Korkeila et al., 2009). A sample of 1825 respondents completed the questionnaire. The exploratory factor analysis yielded a single factor model, and a two-factor model. For the single factor model, the Eigenvalue was 14.0, with a Cronbach's alpha of 0.92. The two-factor solution was run retaining Eigenvalues of greater than 1.0. These two-factors had Eigenvalues of 15.0 (salience) and 1.5 (loss of control) with Cronbach's alpha values of $r = .91$ and 0.81 respectively. In the two-factor solution, "salience" explained most of the variance (statistic not provided). This is similar to the salience factor from Widyanto and McMurrin (2004).

Similar to Khazaal et al. (2008), younger respondents were likely to have more severe IAT scores than older respondents ($\bar{x} = 36.5-37.2$ versus $\bar{x} = 32.7$; $p < 0.05$, Korkeila et al., 2009). Five-hundred twenty-eight (528) respondents identified as gamers. Their scores were in the top 10% of score severity (OR = 3.37; 95% CI 2.49-4.56).

Several themes are apparent from past research on internet addiction. First, there are few valid instruments for measuring internet addiction. The homogeneity of these samples is in question since internet users are often grouped together rather than separately based on internet use. In addition to chosen uses for the internet, MMORPG users may differ in terms of demographics such as gender or age. Williams, Consalvo, Caplan and Yee (2009) surveyed 7129 players of the MMORPG *Everquest* on player behavior, and noted that females made up 19.72% of the participant pool. In a player behavior related survey of *World of Warcraft* players, Yee, Ducheneaut, Shiao and Nelson (2012) reported 26.33% of the 1037 respondents were female. The mean age of players in the Williams et al. study was 33, and 27 (SD = 8.21) for Yee and colleagues. As a distinct subpopulation of internet users seeking high levels of synchronous interactivity and content, MMORPG internet users have not been surveyed sufficiently for normative data related to behavioral addiction factors and associations.

Chapter Summary

Uses and gratification theory was reviewed as a theoretical backdrop for Internet addiction research among massively multiplayer online role playing gamers experiencing unintended consequences as a result of internet use. Assessment instruments developed for measuring problematic internet use and addiction were discussed. These included the modified CAGE for Internet Addiction (Thompson, 1996), the Internet-Related Addictive Behavior Inventory (Brenner, 1997), the Computer Use Survey (Pratarelli, Browne, & Johnson, 1999;

Pratarelli & Browne, 2002), the Virtual Addiction Survey (Greenfield, 1999), the Internet-Related Problem Scale (Armstrong et al., 2000), the Online Cognition Scale (Davis, 2002), the Generalized Problematic Internet Use Scale (Caplan, 2002), the Chen Internet Addiction Scale (Chen et al., 2003), the Internet Consequences Scale (Clark et., al., 2004), the Compulsive Internet Use Scale (Meerkerk et al., 2009), the Internet Addiction Diagnostic Questionnaire (IADQ, Young, 1998a) which is also referred to as Young's Diagnostic Questionnaire (YDQ, Dowling & Quirk, 2009) and the Internet Addiction Test (IAT, Young, 1998a). The need for research on a sufficient sample of MMORPG users due to highly interactive and synchronous gratifications was highlighted.

Chapter 3 will establish the instrumentation and methodology for surveying MMORPG gamers including demographic information, self-assessment of internet addiction, and the Internet Addiction Test (Young, 1998a).

Chapter 3: Methodology

Introduction

This chapter presents the research questions and the research design for the study. The population is delimited and defined and a process for sampling this population is discussed. Instrumentation is reviewed and justified for its inclusion in the study. The procedures for collecting and analyzing the data are discussed. Finally the ethical considerations for this study and its procedures are addressed.

Research questions and Hypotheses

Standardizing the Internet Addiction Test.

(1) What is the factor structure for the Internet Addiction Test when administered to a sample of MMORPG internet users?

Demographic correlations between the MMORPG population and the IAT.

(2) What is the relationship of demographic variables (age, race, gender, weekly playing/gaming, and length of experience playing/gaming) to the final Internet Addiction Test score?

Because this population has not been tested before, these research questions were exploratory in nature.

Face validity of Internet Addiction among MMORPG users.

(3) What is the relationship between score severity as reported by the Internet Addiction Test and respondents' impressions on whether they identify themselves as "addicted to MMORPGs"?

Hypothesis: Respondents who self-identify as internet addicted will score higher on the IAT than those who do not. Null: There is no relationship between respondents self-identifying as internet addicted and their scores on the Internet Addiction Test.

Research design

This study used a descriptive self-report survey administered to a sample of convenience recruited through online message boards and in-game advertisements, geared toward users of the MMORPG *World of Warcraft*. The survey included: (a) the Internet Addiction Test modified for MMORPG users, (b) demographic questions, and (c) a self-screening question all housed on an internet survey website. The exploratory factor analysis sought to investigate the relationships among 20 Internet Addiction Test (IAT) questions (variables) and how well the factors extracted through exploratory factor analysis explained these relationships. Respondents' total scores on the IAT were subjected to an analysis of variance to identify associations with demographic traits, and also with whether respondents identify themselves as addicted to the internet.

Variables

The variables in this study included the items of the Internet Addiction Test, demographic variables, and the self-screening question:

Internet Addiction Test: A 20-item Likert scale instrument designed to measure internet addiction severity.

Demographic and usage frequency questions: Five (5) questions identified respondents' gender, racial-ethnic makeup using National Institutes of Health (2001) recommended categories, age, total length of time playing *World of Warcraft*, and average weekly gaming time.

The Self-screening question asked respondents whether they feel that they are addicted to the internet/playing MMORPG's.

Population - Sample and Sampling

The population for this study was players of MMORPGs. Due to the sampling method of self-selection through forum-posted invitations, the population was a sample of convenience.

Sample selection was intentionally conducted to keep the respondent pool as homogeneous as possible in relation to the game *World of Warcraft* as opposed to other uses of the internet.

The sample size was designed to represent the American players of *World of Warcraft*, estimated by Woodcock, (2009) to be about 6 million persons. Hair et al. (2009) recommends a minimum of 50 samples/respondents for conducting a factor analysis, with 100 being preferable; with a ratio of 10 respondents per questionnaire item. Therefore, at least five respondents per variable are required for a factor analysis. This study has 20 questions, for a target of a minimum of 100 respondents.

Instrumentation

The Internet Addiction Test. The Internet Addiction Test (1998b) is a 20-item Likert scale questionnaire developed by Kimberly Young, who began with the 8 criteria for pathological gambling (4th ed.; DSM-IV; American Psychiatric Association, 1994), and added twelve additional questions to better describe the constructs. Widyanto and McMurrin (2004) cite high face validity and a simplified format, in addition to the 20-item questionnaire's improved assessment of the areas of one's life affected by problematic internet usage. It should be noted however that the test's author did not provide normative data or psychometric properties for the 20-item test. Widyanto and McMurrin performed a research study in 2004 to address this shortcoming.

Psychometric validation. The first study published on the psychometric properties of Young's (1998b) 20-item Internet Addiction Test (IAT) was conducted by Widyanto and McMurrin (2004). Factor analysis generated six-factors rotated to a position of maximum orthogonality to explain a total 68.16% of the variance. The six factors' correlations ranged between $r = .62$ and $r = .226$ with Eigen values greater than 1.0 retained. The factors were:

salience (five questions), excessive use (five questions), neglect of work (three questions), anticipation (two questions), lack of control (three questions), and neglect of social life (two questions). The highest Cronbach's alpha was attached to salience (.82) which also correlated positively with respondents' general overall and personal use of the internet. All inter-factor correlations were positive and significant (two-tailed) at $p < .01$, except for the factor on neglecting work, which was significant at the $p < .05$ level. Raw scores were not made available. Widyanto and McMurrin administered the IAT in 2011 with significantly different results yielding a three factor solution which explained 56.3% of the total variance.

Exploratory factor analyses on the IAT were also conducted using Chinese (Chang & Law, 2008), French (Khazaal et al. 2008), and Finnish (Korkeila et al. 2009) translations. The Chinese IAT translation administered in Hong Kong resulted in four factors explaining 59.3% of the total variance with Eigen values greater than 1.0. The French validation study explained 45% of the total variance among six factors with Eigen values greater than 1.0. In Finland, a single factor model with Eigen value 14.0 explained 92% of the total variance, while a two factor solution using Eigen values greater than 1.0 yielded two factors explaining 86% of the total variance.

Modified IAT for MMORPGs. Where the IAT refers to the internet, the IAT modified for MMORPGs (Appendix C) used the words "game," "gaming," and "gamers," to address this use of the internet.

Demographic Questionnaire. The Demographic Questionnaire is a 5-item, researcher-developed demographic survey. The information collected on the Demographic Questionnaire included respondents' gender, age, race, total length of time playing *World of Warcraft*, and average weekly gaming time. Total length of playing *World of Warcraft* was expressed

numerically in months. Average weekly gaming time was expressed in hours. A self-screening question which asks respondents if they feel addicted to internet gaming was expressed as a “yes / no” forced choice answer.

Procedures. This study was submitted through East Carolina University’s Institutional Review Board. The 20-item Internet Addiction Test (Young, 1998b) modified for MMORPG users was combined with the 5-item demographic and self-screening question. The total questionnaire was constructed with forced-response for use on the internet. SurveyMonkey was used to house the questionnaire and collect the data. A link to the survey was distributed in a uniform message board posting which targeted the *World of Warcraft* Realm Forums, as well as in the game on national servers. *World of Warcraft* has 213 realms, or servers, in the United States, operating for approximately 4 million players (Woodcock, 2009). This includes 69 servers in the pacific time zone, 12 servers in the mountain time zone, 61 servers in the central time zone, and 71 servers in the eastern time zone. Survey invitations were posted on several United States server forums, in an effort to establish a robust national sample.

Statistical Analyses

Factor Analysis. Exploratory factor analysis was used for this research study. Statistical analysis began with analyzing Likert scale responses, kept together per respondent, and rendering a correlation matrix. The correlation matrix showed the relationship among the variables (i.e., the 20 questionnaire items). The data was run using an exploratory factor analysis, since previous research (Widyanto and McMurrin, 2004) may have had sampling errors due to respondents’ varied uses of the internet, reflecting a different population. The exploratory factor analysis sought to identify a preliminary underlying structure for the IAT on this new population. An eigenvalue of 1 was considered satisfactory (Manly, 2009) for retained factors. This means

while several factors were extracted, only factors with eigenvalues greater than or equal to 1 were retained. Accompanying the factor analysis output was a value that showed what proportion of the variance was reflected from the data, which is cumulative as each factor was added to the solution. Each IAT questionnaire variable had a loading which indicated how influential this variable was on the corresponding factors. The factor analysis rotations to be attempted were techniques for adjusting the factor solution to maximize variables' assignments to respective factors. Each factor is considered a dimension or domain of internet addiction according to this questionnaire. The factors are named in order to reflect face validity from the questionnaire items.

Because factor analysis involves using correlations, the assumptions applicable to correlation are applicable here. These include respondents that are representative of the overall population, and a sample size reasonable for the number of questionnaire items.

Demographic Questionnaire. Participants' responses to the 5-item demographic questionnaire and IAT score severity were processed for descriptive statistics and considered for associations using a general linear model, in order to account for high significance levels driven by high sample size and variable interactions. This data provides a profile of MMORPG gamers. The general linear model assumes that samples were randomly selected, and that the value in each cross tabulation cell is 5 or greater, based on the sample size. This concern was addressed by seeking a sample of over 50 respondents, and alleviated through the participation of $n = 5313$.

Self-Screening Question. Respondent answers to the self-screening question of whether they feel addicted to the internet were compared against their IAT scores in order to assess face validity for the 20-question screening instrument, using a Student's independent t-test procedure. The independent variable is the binary answer to the self-screening question, with the dependent

variable being the IAT score. Assumptions underlying T-tests include that respondents' scores on the Internet Addiction Test are normally distributed. Also, the sample sizes of IAT score and self-screening question were paired to address the threat of unequal variance between "groups" (IAT score and self-screening question response).

Limitations

This survey study had a number of limitations. First, an assessment given at any time on internet usage only captures a snapshot rather than a breadth of time. One control to this mono-operation bias (Campbell & Stanley, 1963) is to measure length of time playing the game, although such a variable only locates this survey's single point of reference, rather than capturing a cycle or qualitative story.

Another limitation was that of the instrument administration history, or multiple testing. Three components, the Internet Addiction Test, the demographic questions, and the self-diagnostic question, run the risk of convincing respondents that they are addicted to playing MMORPGs.

Subject selection was another threat to validity. Participants self-select, so this was a sample of convenience. The 20-question instrument was designed for internet users of all purposes, while the respondents were all gamers. While this helps to provide a homogeneous sample, the results are not generalizable to users of other internet mediums including the other games.

A potential limitation to factor analysis is its reliance on a robust sample, which in this case is at least 50, with over 100 respondents being preferable, or 5-10 participants per question (Hair et al., 2009). This concern was alleviated through its high response rate: $n = 5313$. Additionally, different rotations of the factor analysis and decisions on eigenvalue have the

potential to yield different factor loadings. Confirmatory factor analyses must be conducted and repeated in order to address reliability on the procedure.

Exploratory factor analysis assumes a lack of both hypothesis and theory. The factor structure cannot be hypothesized due to a lack of previous research on the MMORPG population (Stapleton, 1997). Additionally, the application of a theory to exploratory factor analysis is typically limited to generating theory, rather than interpreting theory (Stevens, 1996 cited by Stapleton, 1997). Uses and Gratifications theory bridges the intended and unintended consequences found on the IAT, with criteria for behavioral addiction described by Griffiths (1998). However, further research is required to confirm a factor structure and theory for internet addiction among MMORPG users.

The general linear model procedure reveals associations but not causality, meaning an extraneous variable not being measured in the study may be responsible for correlated outcomes. The T-Test procedure assumes that paired samples are independent measures, or that taking the IAT doesn't influence one's perception of whether he or she is addicted to MMORPGs.

Ethical considerations

This study posed no known risk to the respondents. To protect the confidentiality of the respondents, their identities were not be collected. Feedback from the automated test were made available to the respondents based on Young's diagnostic criteria, which included the recommendation for respondents to seek help from their medical providers if their IAT score was 50 or greater.

Chapter Summary

The purpose of this study was to survey MMORPG players of *World of Warcraft* and identify factors associated with their responses on the Internet Addiction Test; to make

associations with respondents' demographic and usage related traits; and to establish face validity for the Internet Addiction Test by asking respondents whether they consider themselves addicted to MMORPGs. The population studied was players of the MMORPG *World of Warcraft*, recruited as a self-selecting sample of convenience via in-game advertisement and forum post invitations, and by high-traffic gaming websites who wrote about the study of their own volition. The design was survey research. Limitations included sample selection, possible test bias, and lack of generalizability to users of other games and internet mediums.

CHAPTER 4: RESULTS

Introduction to the Chapter

This chapter begins with a description of sampling procedures. A description of data preparation follows. Descriptive statistics on demographic constructs and other variables collected are then reported. Data analysis addressing the factor analysis of the Internet Addiction Test is reviewed, followed by an exploration of the relationships found among variables and IAT score. Finally, the IAT score variable is examined against results from participant responses to the self screening question. The results are then summarized to conclude the chapter.

Sampling Procedures

The online survey was open between November 9, 2012 and November 14, 2012 on Qualtrics. During this time, 5676 responses were gathered. Attrition and incomplete data were avoided by designing the survey with forced completion. The large sample resulted in the alleviation of concerns about getting enough participants for factor analysis, while exercising caution about high rates of significance. While the survey was advertised on gaming forums, two high-traffic MMORPG news websites wrote stories about the research study. The response generated from these websites resulted in a large sample.

Data Preparation

Several steps were taken in data preparation, including deletion of the internet protocol (IP) addresses for respondents, extreme unlikely response removal, test score tabulation, and coding label variables into numbers.

The survey software collected IP addresses for respondents, which do not identify recipients; but could be used for such activity, so these data were deleted from the dataset. Also, unlikely responses were removed. Criteria for removal included samples with at least two

extreme values at maximum or minimum for both the variable of age, and at least two of the variables IAT score, hours played, and months of experience. For example, respondents who were 100 years old with 164 hours per week of gaming time were removed. Samples who reported no gaming time per week and/or no gaming experience overall were also removed from the dataset, as these participants are not considered current MMORPG users. After the data was cleaned, 5313 samples remained in the set. Respondents' answers to the internet addiction test were tabulated to create a new variable, reflecting an IAT score for each respondent. Finally, nominal variables were converted to numeric code.

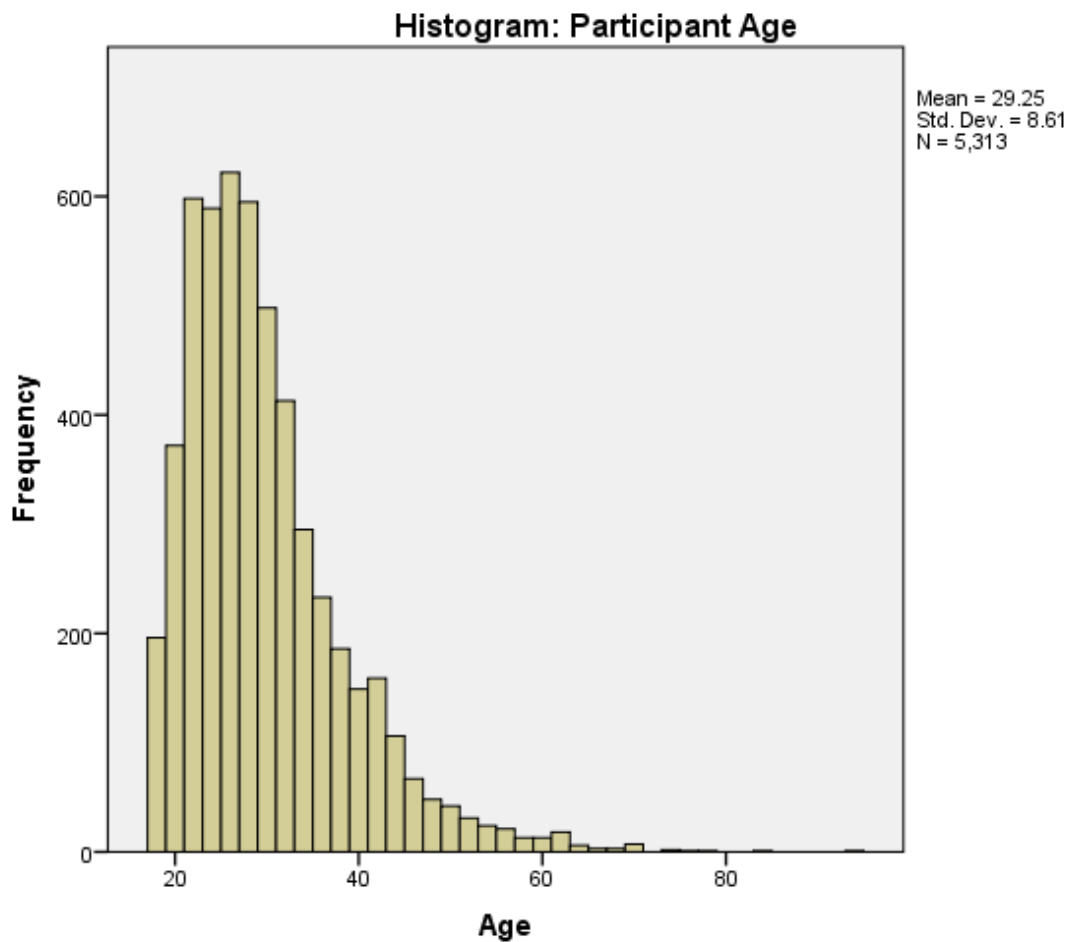
Descriptive Statistics

The descriptive statistics for each variable collected are noted in this section. After data cleaning, there were 5313 completed surveys.

Gender and Age

From this data, 966 participants identified as female (18 %) and 4347 as male (81.8%). Participants reported ages ranging from 18 to 94 years, with a mean age of 29.3, median of 27, and the standard deviation was 8.6. The histogram (Table 1) showed a positive skew (1.5), indicating more players in their 20s than at other ages.

Table 1
Respondents' Ages



Race and Ethnicity

Participants were asked which one of the National Institutes of Health endorsed racial/ethnic groups they identified with the most. The groups, from most represented to least represented, were Caucasian (n = 4620, 87%), Hispanic or Latino (n = 287, 5.4%), Asian (n = 273, 5.1%), Black or African American (n = 68, 1.3%), American Indian or Alaska Native (n = 39, 0.7%), and Native Hawaiian or Other Pacific Islander (n = 26, 0.5%).

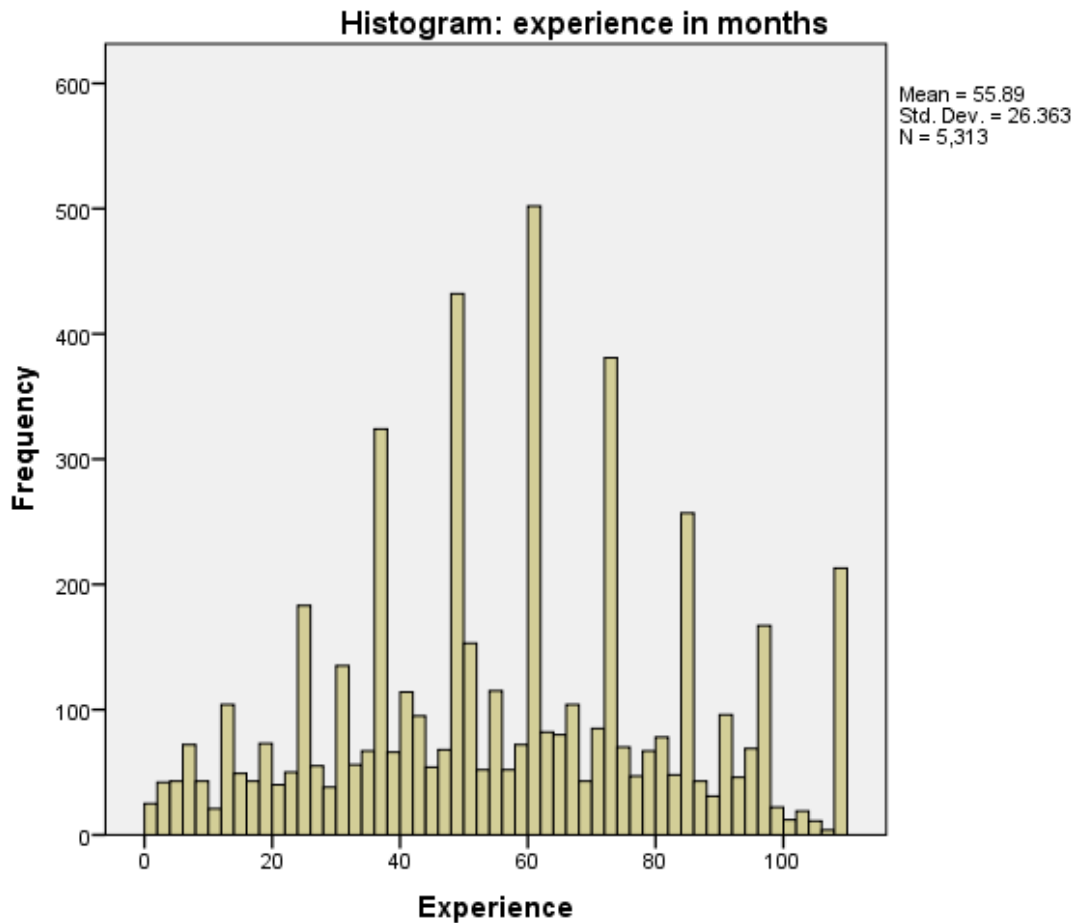
Experience Playing *World of Warcraft*

Data included how many months of experience gamers had playing *World of Warcraft*, which existed for 108 months at the time of the survey. While the question asked for the number

of months, respondents tended to respond in yearly increments (12 months, 24 months, 36 months, etc.). The mean amount of experience was 55.9 months, or approximately 4.7 years, with a median of 57 months, or 4.8 years, and a standard deviation of 26.4 months. The histogram (Table 2) showed that respondents tended to stack on one-year increments.

Table 2

Respondents' Experience Playing World of Warcraft



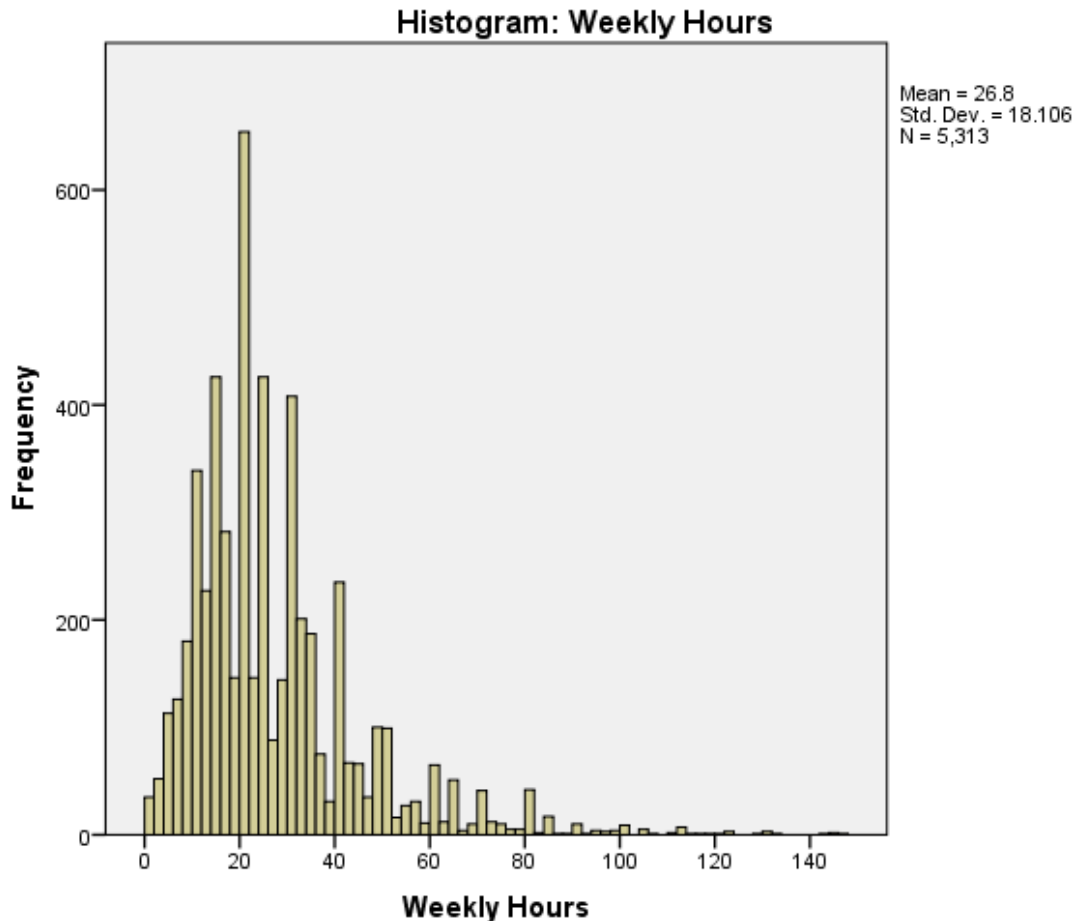
Weekly Hours

The time participants reported playing per week was a mean of 26.8 hours, a median of 22 hours, and a range of 1 to 147 hours. The data were positively skewed (1.82; Table 3).

Considerable response stacking occurred with regard to hours played per week, at 5, 10, 20, 30, and 40 hour intervals in particular.

Table 3

Respondents' Hours Playing World of Warcraft



Internet Addiction Test

The 20-questions of the Internet Addiction Test were measured on a Likert scale of 0 to 5 (Table 4). The IAT, as scored via its test manual (Young, 2007) offers a 6-point Likert scale which includes 0 as “not applicable”. The manual establishes instrument score interpretation as follows: 0 to 30: normal, 31 to 49: mild, 50-79: moderate, and 80 to 100: severe dependence. Nearly half, 2027 of the 5313 respondents to this research survey, scored 30 or below on the

IAT; reflecting normal use. The mean score was 35 with standard deviation of 13.8, and a median score of 33; 35 is considered “mild” (Young, 2007). Scores on this dataset showed a positive skew (Table 5), indicating stronger outlying tendencies for severe IAT scores than for those in the normal range. Further score interpretation information is covered in Chapter 5.

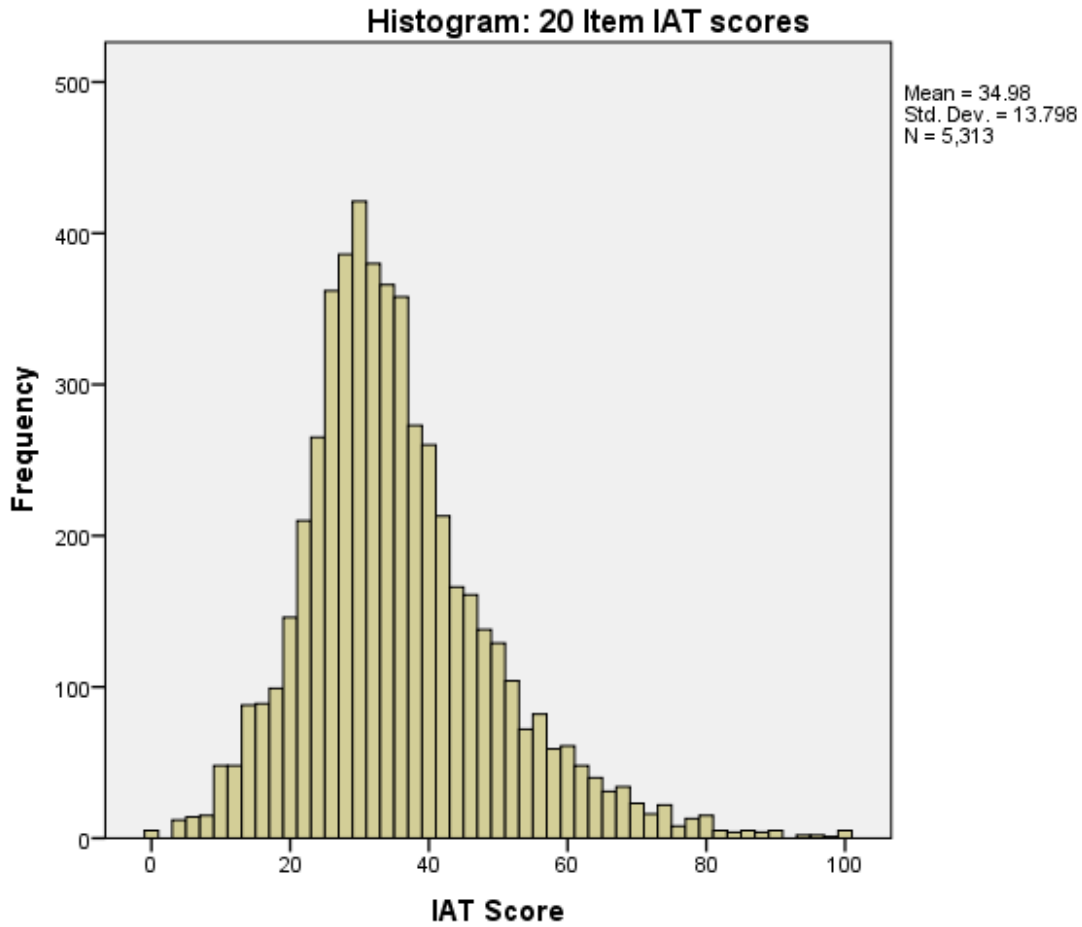
Table 4

Respondents' IAT Responses

	Mean	Std. Deviation
Q1	2.68	1.14
Q2	2.36	1.25
Q3	1.09	1.08
Q4	2.21	1.16
Q5	1.60	1.15
Q6	1.11	1.21
Q7	2.30	1.21
Q8	1.23	1.00
Q9	1.27	1.05
Q10	1.84	1.33
Q11	2.25	1.15
Q12	1.29	1.11
Q13	1.58	1.10
Q14	2.19	1.29
Q15	1.76	1.06
Q16	2.34	1.25
Q17	1.37	1.05
Q18	1.27	1.13
Q19	2.02	1.29
Q20	1.23	1.07

Table 5

Respondents' 20-Item IAT Scores



Due to the omission of two items during factor analysis, the IAT as administered for this study was modified. A new variable “IAT_new” was created to reflect the 18-item test and its updated scores. The highest score was 90, and the mean score was 33 with standard deviation of 13.5 and a median of 31. According to the Kolmogorov-Smirnov test, the new 18-item scale did not improve in normality ($p < 0.001$). With this large a sample, however, normality was not an issue for statistical procedures.

Self Screening Question

Participants were asked whether they feel addicted to internet gaming, with possible answers “yes” or “no”. Of the participants, 1430 (26.9%) reported feeling addicted (CIs 13.75, 15.32), while 3883 (73.1%) responded that they did not feel they were addicted.

Factor Analysis of the IAT

The first research question asked for the factor structure for the Internet Addiction Test when administered to a sample of MMORPG internet users. The purpose for this exploratory factor analysis was to identify a latent factor structure with dimensions that underlie and explain groups of questionnaire items. Solutions were attempted using both orthogonal and oblique rotations, which orthogonally manipulate factors to the least correlation, and alternatively allow correlation between factors, respectively. The steps taken included 1) examining the relationships among test items and also with total score, 2) a principal components analysis to establish potential factors, and then 3) rotation attempts with examinations of the factor loadings and variance explained by each model.

Relationships among Test Items

Test items’ correlations were examined for redundant questions, and to assess items’ relationships to the IAT score outcome. Pearson correlations were tabulated for the 20-items on the IAT and the total IAT score. All correlations were found significant at the 0.01 level (2-tailed). The highest correlation among the IAT questions was 0.6, between questions 11 and 15. The lowest correlation among items was 0.03, between questions 18 and 4. No two items were redundant. The strongest relationship between the IAT questions and total score was 0.68, and the weakest was 0.26. Questions 3 and 4 showed the lowest correlations among other questions and against the total IAT score ($r = .47$, $r = .26$), indicating they were the least predictive. The

Cronbach alpha statistic for the 20-item test was 0.91 indicating high internal reliability.

Removing item 4 did not reduce the Cronbach alpha. This item was revisited later in the process and is addressed in Chapter 5.

Table 6

Correlations among items of the Internet Addiction Test and Respondents' Scores

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	
Q2	.51																				
Q3	.25	.31																			
Q4	.13	.12	.07																		
Q5	.34	.36	.28	.16																	
Q6	.29	.35	.19	.14	.34																
Q7	.47	.54	.24	.14	.37	.39															
Q8	.32	.39	.29	.08	.32	.46	.41														
Q9	.25	.26	.23	.05	.31	.28	.28	.34													
Q10	.29	.32	.22	.14	.32	.29	.35	.31	.32												
Q11	.36	.37	.27	.12	.33	.24	.43	.31	.29	.42											
Q12	.28	.32	.28	.14	.34	.27	.34	.31	.32	.44	.42										
Q13	.28	.34	.25	.12	.40	.28	.34	.30	.31	.31	.33	.40									
Q14	.42	.42	.23	.17	.35	.34	.43	.36	.25	.33	.38	.32	.37								
Q15	.36	.40	.30	.12	.35	.30	.45	.36	.33	.43	.60	.46	.38	.41							
Q16	.51	.44	.25	.09	.33	.27	.45	.32	.27	.34	.44	.32	.37	.44	.45						
Q17	.40	.36	.22	.08	.33	.33	.38	.35	.32	.31	.30	.32	.31	.35	.35	.47					
Q18	.29	.30	.26	.03	.33	.30	.32	.33	.50	.32	.31	.30	.30	.28	.34	.35	.47				
Q19	.29	.38	.29	.11	.33	.24	.37	.31	.29	.36	.37	.39	.37	.33	.40	.33	.30	.31			
Q20	.32	.36	.32	.09	.37	.33	.36	.38	.36	.49	.41	.53	.40	.37	.47	.38	.41	.41	.45		
Score	.62	.66	.47	.26	.60	.56	.68	.60	.54	.62	.65	.62	.60	.64	.69	.66	.61	.59	.61	.68	

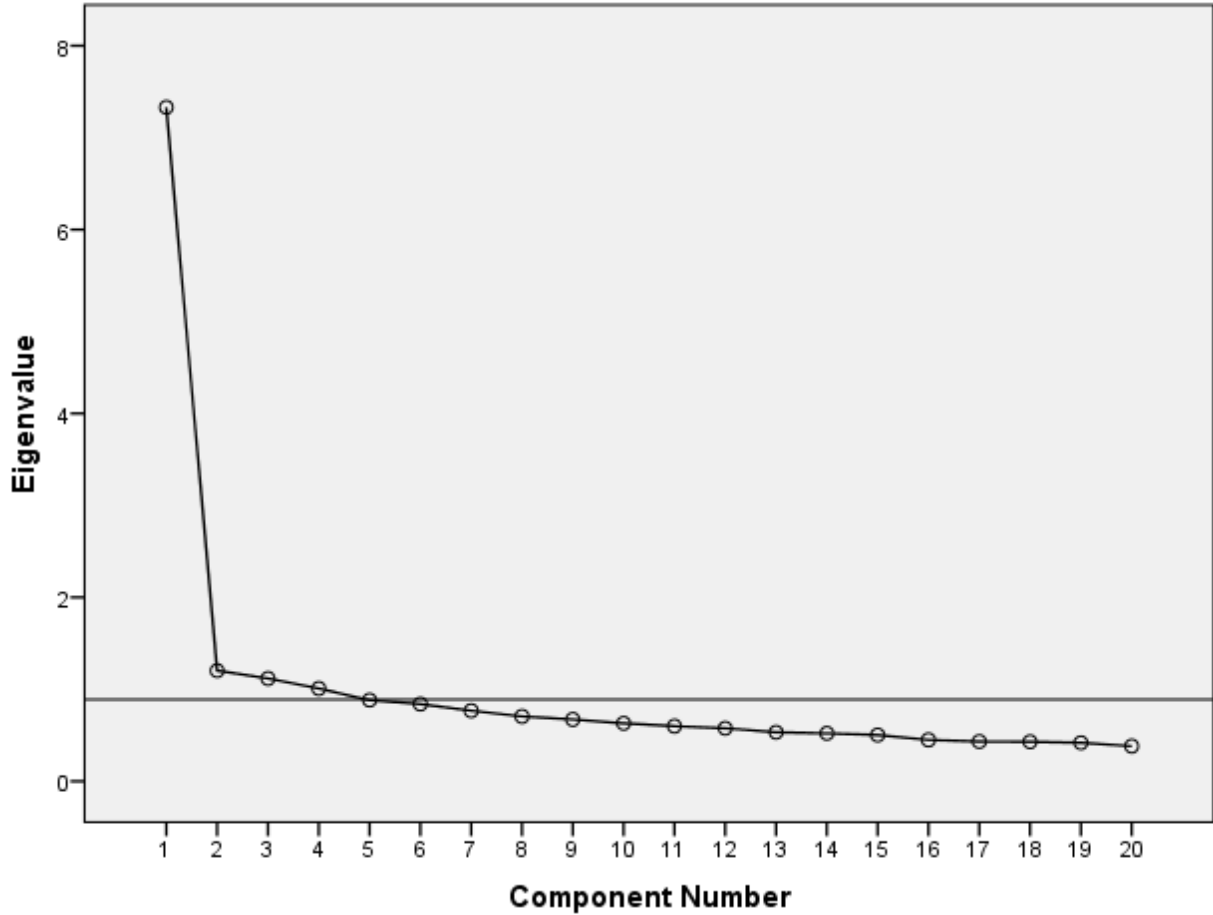
Note. All correlations are significant at the 0.01 level, in part due to high sample size.

Principal Components Extraction of Factors

A principal components analysis was undertaken in order to assess the data's appropriateness for factor analysis, and to suggest potential numbers of factors to try in rotated processes. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was 0.95, which indicated "meritorious" (Hair et al., 1998, p. 99) correlation among variables, and that the sample was adequate for factor analysis. Bartlett's Test of Sphericity ($p < 0.001$) indicated a strong relationship among at least some of the variables in the correlation matrix. This was confirmed with all values on the anti-image matrix diagonal as having values greater than 0.8, with most over 0.9. The high significance is likely due to the high sample size ($n = 5313$). The scree plot (Table 7) showed graphically the extracted factors and their respective eigenvalues. The variance explained was low after the first factor, as represented by the scree plot's elbow, where the data points began to flatten out. Four factors are shown over an eigenvalue of 1.

Table 7

Scree Plot for Principal Component Extraction for the Internet Addiction Test



The communalities (Table 8) measured how much of the variance for each question item was explained by the principle component extraction of 4 factors with eigenvalues over 1. Only 23.1% of question three's variance was explained by the principle factor, making question three a possible candidate for removal. Question four's variance was the most explained by the factor, with 75.4%.

Table 8

Communalities for Principal Component Extraction for the Internet Addiction Test

	Extraction
Q1	.61
Q2	.56
Q3	.23
Q4	.75
Q5	.42
Q6	.57
Q7	.57
Q8	.49
Q9	.57
Q10	.48
Q11	.59
Q12	.58
Q13	.39
Q14	.48
Q15	.60
Q16	.59
Q17	.50
Q18	.62
Q19	.43
Q20	.59

The scree plot's ambiguous data was represented in a more exact fashion using a chart of total variance explained (Table 9). The variance explained by each of the four factors in the model was 36.65%, 6.01%, 5.59%, and 5.04%. These four factors were established based on having eigenvalues over 1 (Bandalos & Boehm-Kaufman, 2009), which, by the "Kaiser rule," was reliable for between 20 and 50 variables (Hair et al. 1998, p. 103). The total variance among questionnaire items explained in Table 9 by four unrotated factors was 53.3%.

Table 9

Extraction Sums of Squared Loadings for Principle Components Extraction

Total Eigenvalue	Percent of variance	Cumulative percent of variance
7.33	36.65	36.65
1.20	6.01	42.66
1.12	5.59	48.25
1.01	5.04	53.30

The component matrix in Table 10 indicated factor loadings for the unrotated solution. It was notable that question 4 of the Internet Addiction Test, which measures new relationships online, loaded as its own factor. Because question 4 correlated lower with overall IAT score ($r = .26$) than the other items, it was considered not predictive of overall score, which indicated that the lone factor on which this item loaded was not a good fit for the data. Reliability testing indicated a negligibly higher overall Cronbach's alpha without question 4 (0.909) than with it (0.905). Question 4 was thus removed based on its lack of explanatory power for overall score and internal reliability. Hair et al. (1998) note that with fewer than 20 variables, the Kaiser rule for eigenvalues greater than 1 is no longer reliable, as it has a tendency to extract "too few" factors (p. 103).

Table 10

Component Matrix for Unrotated Solution

	Component			
	1	2	3	4
Q15	.70	-.09	.24	-.20
Q20	.69	-.32	.10	-.01
Q7	.68	.33	-.01	-.06
Q16	.66	.26	-.03	-.30
Q2	.66	.36	-.05	-.09
Q11	.65	-.04	.32	-.25
Q14	.63	.28	.07	.02
Q12	.63	-.32	.29	.02
Q1	.62	.44	-.08	-.18
Q17	.62	.04	-.33	-.06
Q10	.62	-.24	.22	.01
Q19	.61	-.16	.20	-.03
Q8	.60	.04	-.29	.20
Q5	.60	0	-.01	.23
Q13	.60	-.11	.12	.09
Q18	.59	-.29	-.44	0
Q6	.55	.13	-.28	.41
Q9	.54	-.38	-.34	.12
Q3	.47	-.12	.02	-.01
Q4	.21	.25	.41	.70

Rotation Attempts

The next step taken was to extract possible factor solutions using oblique and orthogonal rotations via principal axis factoring. These procedures were run sequentially in order to determine the factor structure which maximized item response variance explained by each factor solution, while yielding factors that delineated test items' factor assignments most meaningfully. The reason for using both oblique and orthogonal rotations was to allow for factors that do and do not correlate with one another, respectively. The implications for factor correlation would be that the underlying dimensions of the questionnaire would be related to one another. Previous research on the IAT using oblique and orthogonal rotations is discussed in Chapter 5. For this

reason, rotation attempts sought to provide a parsimonious factor structure with well defined factor loadings, factors that meaningfully explain questionnaire items' variance, and which account for question correlations.

With regard to factor loadings, Hair et al.(1998) recommends primary factor loadings over .75 for sample sizes of 50, and .30 for sample sizes of 350 (p.112) based on effect size. The primary factor loading was thus sought to be over .30 in this research study, with definitively lower secondary factors. An absolute value of .30 as a difference between primary and secondary loadings was preferred, although Hair and colleagues warn that “most factor solutions do not result in a simple structure solution” (p. 113). In this way, questions would apply more meaningfully to one factor or another based on participant response. The factor solutions sought to reduce questionnaire items to interpretable factors. The estimated correlations from each rotation, after assigning questionnaire items to factors, would then be compared with the actual correlation matrix for the least possible residual values.

Five-factor solutions. While four factors were established by eigenvalues greater than 1.0, there was a chance, due to only 19 test items, that a factor was missed. A five-factor solution on the 19-item questionnaire with an orthogonal varimax rotation was completed first. This explained 59.68% of the variance (Table 11). The first factor was made up of questions 10, 11, 12, 13, 15, 19, and 20, and most clearly described salience. Questions 1, 2, 7, 14, and 16 loaded on the second factor of time sacrifice. Questions 9 and 18 loaded on the third factor, which represented defensiveness. Questions 6 and 8 loaded on a fourth factor, which represented school and work impairment. Question 3 loaded by itself on a fifth factor, referring to romantic impairment. Question 5 loaded on two factors, including romantic impairment and school/work impairment, and question 17 loaded on both the time sacrifice and defensiveness factors. The

Cronbach's alpha values for factors 1 through 4 were ($r = .83, 0.81, 0.67, \text{ and } 0.62$) respectively. The eigenvalues for the five factors, after rotation, were 3.32, 2.95, 1.93, 1.79, and 1.35 respectively. Close factor loadings for some of the questionnaire items indicated the potential for factor correlation, so an oblique rotation would be attempted next.

Table 11

Rotated Component Matrix for a Five Factor Orthogonal Rotation

<i>Item</i>	F1	F2	F3	F4	F5
10	<u>.68</u>				
11	<u>.65</u>	.41			
12	<u>.71</u>				
13	<u>.43</u>				
15	<u>.66</u>	.37			
19	<u>.52</u>				.36
20	<u>.64</u>				
1		<u>.76</u>			
2		<u>.63</u>		.31	
7		<u>.60</u>		.36	
14	.33	<u>.53</u>		.31	
16		<u>.71</u>			
9			<u>.69</u>		
18			<u>.79</u>		
6				<u>.81</u>	
8				<u>.67</u>	
3					<u>.87</u>
5*				.32	.36
17*		.47	.59		

Note. Items 5 and 17 loaded on two factors based on differences less than 0.1. Rotation converged in 6 iterations. Loading values are underlined. Values under 0.10 are suppressed.

The 19-item questionnaire was subjected to oblique model rotations, which allow for factors to correlate. This was done in order to see if questionnaire items would more distinctly load on a primary factor versus the secondary factors. The item correlations for the factor loading assignments when applying the oblique rotation were not the same as for the orthogonal (Table 11) rotation. The oblique rotation explained 55.19% of the total variance. This matrix maintained some of the structure from the orthogonal 5-factor rotation, while achieving more distinct factor loadings in overall comparison. For this model, the salience factor included items 5, 10, 12, 13, 19, and 20. The time sacrifice factor included items 1, 2, 14, and 16. The third factor, defensiveness, included questions 8 and 18. Items 6 and 8 loaded on the school and work impairment factor. While items 11 and 15 had been part of the salience factor in the orthogonal model, the oblique rotation placed them in their own factor on preoccupation. Items 7 and 17 could not be distinctly loaded, and item 3 did not load on any factor. Cronbach's alpha values for the factors were ($r = .79, 0.77, 0.67, 0.62, \text{ and } 0.75$) respectively. The eigenvalues for this rotation were 7.29, 1.19, 1.09, 0.91, and 0.85 respectively. A promax rotation, which does not assume inter-factor correlation, was also utilized with five factors, yielding slightly different item assignments, with only item 17 not loading (Table 12). The promax structure explained 46.17% of the overall variance with eigenvalues of 6.77, 0.69, 0.63, 0.40, and 0.27 for the factors. Cronbach's alpha values for the five promax rotation generated factors were $r = .79, 0.81, 0.67, 0.62, \text{ and } 0.75$ respectively. The oblique factor structures also differed from the orthogonal rotation in that at least two items were loaded on each of the five factors.

Table 12

Rotated Pattern Matrix for a Five Factor Oblique Rotation: Oblimin (left) and Promax (right)

Oblimin rotation						Promax rotation					
Item	F1	F2	F3	F4	F5	Item	F1	F2	F3	F4	F5
5	.34					3	.28				
10	.44					5	.33				
12	.71					10	.48				
13	.51					12	.77				
19	.54					13	.52				
20	.75					19	.55				
1		-.63				20	.79				
2		-.46				1		.81			
14		-.32				2		.59			
16		-.56				7		.47			
9			.44			14		.42			
18			.81			16		.71			
6				.64		9			.46		
8				.59		18			.84		
11					-.78	6				.67	
15					-.56	8				.62	
3*						11					.77
7*		-.36		.32		15					.54
17*		-.34	.36			17*		.42	.35		

Note. Because factors are allowed to correlate, the pattern matrix only indicates factor loadings, and not correlations. Oblimin rotation converged in 12 iterations. Promax rotation converged in 7 iterations. Values under 0.10 are suppressed.

Because questions in both of the five-factor models loaded on multiple factors, a four factor model would be attempted, in both an orthogonal and an oblique rotation.

Four-factor and three-factor rotations. In order to address insignificant factor assignments for questionnaire items, a four-factor model was attempted. The four factors yielded cumulative variance of 44.21% using an orthogonal varimax rotation. As with the five-factor

model, items 5 and 17 could not be distinctly assigned to one factor. Acknowledging again that the factors appear to correlate, the data was run with an oblique rotation on four factors, explaining 59.68% of the variance, in which items 3 and 5 did not load on any factor, as their loadings for each factor were less than 0.1.

When the process was repeated with 3 factors, items 3 and 5 continued not to load on any factor. The continued factor loading failures indicated that perhaps a simpler factor structure would accommodate such high component correlation tendencies.

Two-factor rotations. A two-factor orthogonal rotation was run with a cumulative explanatory variance of 38.6%. Items 5, 8, and 17 loaded on two factors, again indicating factor correlation and necessitating an oblique rotation.

A two-factor model in oblimin and promax rotations loaded the same sets of items on the same two factors, explaining 44.7% and 38.6% of the total variance respectively (Table 13). For the oblimin rotation, the eigenvalues were 7.29 and 1.19, while the promax rotation produced eigenvalues of 6.70 and 0.64. A high correlation between the two factors ($r = -.74$) reinforced the need to recognize them through an oblique rotation (Tabachnick & Fidell, 2007). The factors were salience and neglect (Table 13). The first factor, with items 3, 5, 9, 10, 11, 12, 13, 15, 18, 19, and 20, had a robust Cronbach's alpha of 0.86. The second factor, with all the remaining items, 1, 2, 6, 7, 8, 14, 16, and 17, had another robust Cronbach's alpha of 0.84.

Table 13

Rotated Pattern Matrix for a 2 Factor Oblique Rotation

Oblimin rotation			Promax rotation		
<i>Item</i>	F1	F2	<i>Item</i>	F1	F2
3	.34		3	.32	
5	.37		5	.35	
9	.56		9	.54	
10	.64		10	.61	
11	.46		11	.44	
12	.76		12	.74	
13	.47		13	.45	
15	.55		15	.52	
18	.50		18	.48	
19	.52		19	.50	
20	.82		20	.80	
1		-.77	1		-.79
2		-.71	2		-.73
6		-.33	6		-.35
7		-.66	7		-.69
8		-.32	8		-.34
14		-.49	14		-.52
16		-.58	16		-.60
17		-.36	17		-.38

Note. Oblimin rotation converged in 10 iterations. Promax rotation converged in 3 iterations. Oblique loadings are not the same as correlations. Loading values below 0.30 were suppressed.

Questionnaire item number 3, which measures the frequency that respondents prefer gaming to intimacy with their partners, was the next lowest influential item in the correlation table, with 23% of its variance explained in the principle components analysis. The extractions above were repeated without question number 3, in search of a more explanatory factor structure. The procedures resulted in both orthogonal and oblique rotations in which various questions loaded on more than one factor, with weak loading values, similar to the procedures already conducted, with the exception of the two-factor model (table 14). This meant that removing question 3 supported the notion that factors related to the construct of problematic use of MMORPGs are correlated. Removal of question 3 increased the variance explained from 44.67% to 46.05%. The eigenvalues for the 2-factor oblique rotation on the 18 IAT items were 7.10 and 1.19. The overall Cronbach's alpha was 0.91; 0.86 for the first factor - salience; and 0.84 for the second factor - neglect. The residual values in the reproduced correlation matrix (Table 15) were relatively low, accounting for as much variance as possible. The two-factor oblique rotation which allows the factors to correlate appeared to be the best model, with factors of salience and neglect.

Table 14

Rotated Pattern Matrix for a 2 Factor Oblique Rotation item 3 omitted

<i>Item</i>	F1	F2
5	.36	
9	.55	
10	.64	
11	.46	
12	.75	
13	.46	
15	.54	
18	.49	
19	.50	
20	.80	
1		-.78
2		-.72
6		-.34
7		-.67
8		-.34
14		-.50
16		-.59
17		-.37

Note. Oblimin rotation converged in 11 iterations.

Table 15

Reproduced Correlation and Residuals for Two-Factor Oblimin Rotation

	Q1	Q2	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20		
Reproduced Correlation	Q1	.49 ^a	.49	.34	.33	.49	.36	.25	.28	.36	.26	.31	.42	.38	.46	.38	.30	.30	.31	
	Q2	.49	.50 ^a	.36	.35	.50	.38	.28	.32	.38	.30	.34	.43	.41	.47	.40	.33	.33	.35	
	Q5	.34	.36	.32 ^a	.29	.37	.32	.29	.34	.36	.35	.32	.34	.39	.36	.34	.32	.33	.39	
	Q6	.33	.35	.29	.27 ^a	.36	.30	.25	.29	.32	.29	.29	.32	.34	.34	.31	.28	.29	.33	
	Q7	.49	.50	.37	.36	.51 ^a	.39	.30	.34	.40	.33	.35	.44	.43	.48	.41	.34	.35	.38	
	Q8	.36	.38	.32	.30	.39	.33 ^a	.28	.33	.35	.33	.32	.35	.38	.38	.34	.31	.32	.37	
	Q9	.25	.28	.29	.25	.30	.28	.30 ^a	.34	.33	.36	.31	.28	.37	.29	.29	.31	.32	.40	
	Q10	.28	.32	.34	.29	.34	.33	.34	.39 ^a	.38	.42	.35	.33	.42	.34	.34	.35	.36	.46	
	Q11	.36	.38	.36	.32	.40	.35	.33	.38	.40 ^a	.40	.36	.37	.43	.39	.37	.36	.37	.44	
	Q12	.26	.30	.35	.29	.33	.33	.36	.42	.40	.45 ^a	.37	.32	.44	.33	.34	.37	.38	.49	
	Q13	.31	.34	.32	.29	.35	.32	.31	.35	.36	.37	.33 ^a	.33	.39	.35	.33	.33	.33	.41	
	Q14	.42	.43	.34	.32	.44	.35	.28	.33	.37	.32	.33	.39 ^a	.40	.42	.37	.32	.33	.37	
	Q15	.38	.41	.39	.34	.43	.38	.37	.42	.43	.44	.39	.40	.47 ^a	.42	.40	.39	.40	.49	
	Q16	.46	.47	.36	.34	.48	.38	.29	.34	.39	.33	.35	.42	.42	.45 ^a	.39	.34	.34	.38	
	Q17	.38	.40	.34	.31	.41	.34	.29	.34	.37	.34	.33	.37	.40	.39	.36 ^a	.33	.33	.38	
	Q18	.30	.33	.32	.28	.34	.31	.31	.35	.36	.37	.33	.32	.39	.34	.33	.33 ^a	.33	.41	
	Q19	.30	.33	.33	.29	.35	.32	.32	.36	.37	.38	.33	.33	.40	.34	.33	.33	.34 ^a	.42	
	Q20	.31	.35	.39	.33	.38	.37	.40	.46	.44	.49	.41	.37	.49	.38	.38	.41	.42	.55 ^a	
	Residual ^b	Q1		.02	.00	-.04	-.02	-.04	.00	.01	.01	.02	-.03	-.00	-.02	.05	.03	-.01	-.01	.02
		Q2	.02		.00	-.00	.04	.01	-.02	.01	-.02	.02	.00	-.02	-.01	-.03	-.04	-.02	.05	.01
Q5		.00	.00		.05	-.01	.00	.01	-.02	-.02	-.01	.08	.00	-.04	-.03	.00	.01	.01	-.02	
Q6		-.04	.00	.05		.03	.16	.03	.00	-.07	-.02	-.01	.02	-.04	-.08	.02	.02	-.04	.00	
Q7		-.02	.04	-.01	.03		.01	-.02	.01	.03	.01	-.01	-.01	.02	-.03	-.03	-.02	.02	-.02	
Q8		-.04	.01	-.00	.16	.01		.06	-.02	-.05	-.03	-.02	.01	-.02	-.05	.01	.02	-.01	.00	
Q9		.00	-.02	.01	.03	-.02	.06		-.02	-.04	-.04	.00	-.03	-.04	-.02	.02	.19	-.03	-.04	
Q10		.01	.01	-.02	.00	.01	-.02	-.02		.04	.02	-.04	.01	.01	.00	-.02	-.04	.00	.03	
Q11		.01	-.02	-.02	-.07	.03	-.05	-.04	.04		.02	-.03	.01	.17	.05	-.07	-.05	.01	-.04	
Q12		.02	.02	-.01	-.02	.01	-.03	-.04	.02	.02		.03	-.00	.02	-.02	-.02	-.07	.01	.03	
Q13		-.03	.00	.08	-.01	-.01	-.02	.00	-.04	-.03	.03		.04	-.02	.02	-.02	-.03	.04	-.01	
Q14		.00	-.02	.00	.02	-.01	.01	-.03	.01	.01	.00	.04		.01	.02	-.02	-.05	.00	.00	
Q15		-.02	-.01	-.04	-.04	.02	-.02	-.04	.01	.17	.02	-.02	.01		.03	-.04	-.05	.00	-.02	
Q16		.05	-.03	-.03	-.08	-.03	-.05	-.02	.00	.05	-.02	.02	.02	.03		.07	.01	-.02	.00	
Q17		.03	-.04	.00	.02	-.03	.01	.02	-.02	-.07	-.02	-.02	-.02	-.04	.07		.15	-.04	.03	
Q18		-.01	-.02	.01	.02	-.02	.02	.19	-.04	-.05	-.07	-.03	-.05	-.05	.01	.15		-.03	-.01	
Q19		-.01	.05	.01	-.04	.02	-.01	-.03	-.00	.01	.01	.04	.00	.00	-.02	-.04	-.03		.03	
Q20		.02	.01	-.02	.00	-.02	.00	-.04	.03	-.04	.03	-.01	.00	-.02	.00	.03	-.01	.03		

Note. Extraction Method: Principal Axis Factoring.

a. Reproduced communalities

b. Residuals are computed between observed and reproduced correlations. There are 14 (9.0%) nonredundant residuals with absolute values greater than 0.05.

Demographic Relationships to the IAT

The second research question asked, “What is the relationship of demographic variables (age, race/ethnicity, gender, weekly playing/gaming, and length of experience playing/gaming) to the final Internet Addiction Test score?” The continuous variables (age, experience, weekly hours) and categorical variables (gender, race/ethnicity) were submitted to general linear, correlation, and t-test procedures to answer this research question.

A general linear procedure was run in order to account for inter-variable effects and effect size. Age, experience, and weekly hours were measured as covariates; while gender and race/ethnicity were entered as fixed factors. The ANCOVA procedure (Table 16) identified a significant main effect for gender ($F = 5.7, p = 0.17$) with a low effect size ($\eta^2 = .001$) and race/ethnicity ($F = 2.79, p = .016$) with low effect size ($\eta^2 = .003$). There was not a significant interaction between gender and race/ethnicity ($F = 1.37, p = .232$). This means that genders of different race/ethnicities do not differ significantly on the IAT. All covariates were significant, ($p < .001$) based on the large sample size. However, of the covariates, only weekly hours played ($F = 684, p < 0.001$) had a notably sizeable ($\eta^2 = .11$) effect, followed by Age ($F = 67.3, p < .001, \eta^2 = .013$). Cohen (1988) recommended describing the strengths of correlation coefficients as *large* ($r > 0.5$), *moderate* ($r = .3$ to 0.5), and *small* ($r = .1$ to $.3$). Square roots for effect sizes below 0.1 in the current study were accordingly not considered as viable relationships.

Table 16

Tests of Between-Subjects Effects on IAT Score

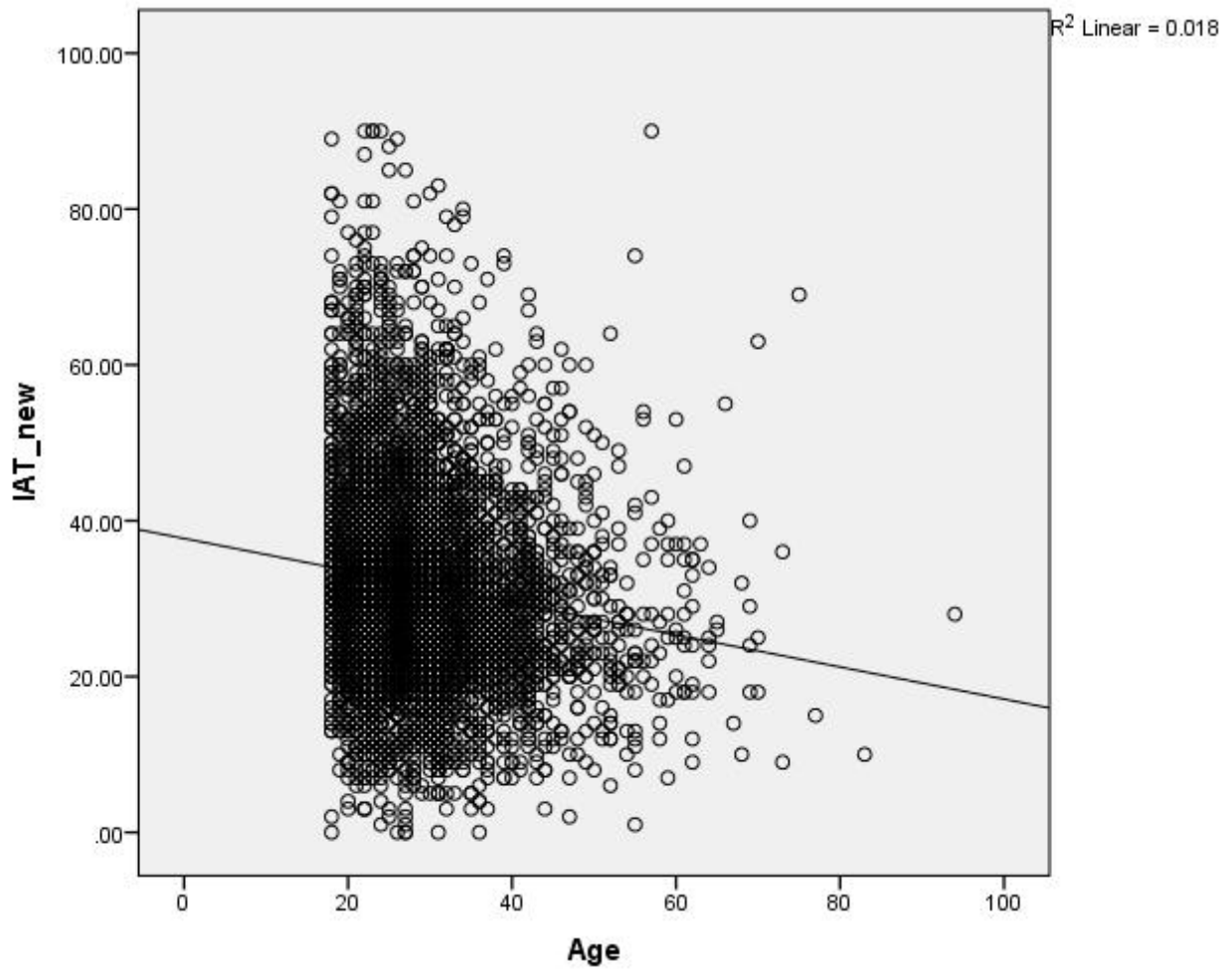
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	128888.532 ^a	14	9206.324	62.773	<.001	.142
Intercept	145545.912	1	145545.912	992.393	<.001	.158
Age	9863.904	1	9863.904	67.256	<.001	.013
Experience	4423.866	1	4423.866	30.164	<.001	.006
WeeklyHours	100355.471	1	100355.471	684.266	<.001	.114
Gender	835.871	1	835.871	5.699	.017	.001
RaceEthnicity	2043.262	5	408.652	2.786	.016	.003
Gender * RaceEthnicity	1004.778	5	200.956	1.370	.232	.001
Error	777012.935	5298	146.662			
Total	6241009.000	5313				
Corrected Total	905901.467	5312				

a. R Squared = .142 (Adjusted R Squared = .140)

Age. Age was found to have a small, negative correlation (Table 17) with IAT score ($r = -.14$, $p < 0.001$) indicating younger players may be more likely to be impaired.

Table 17

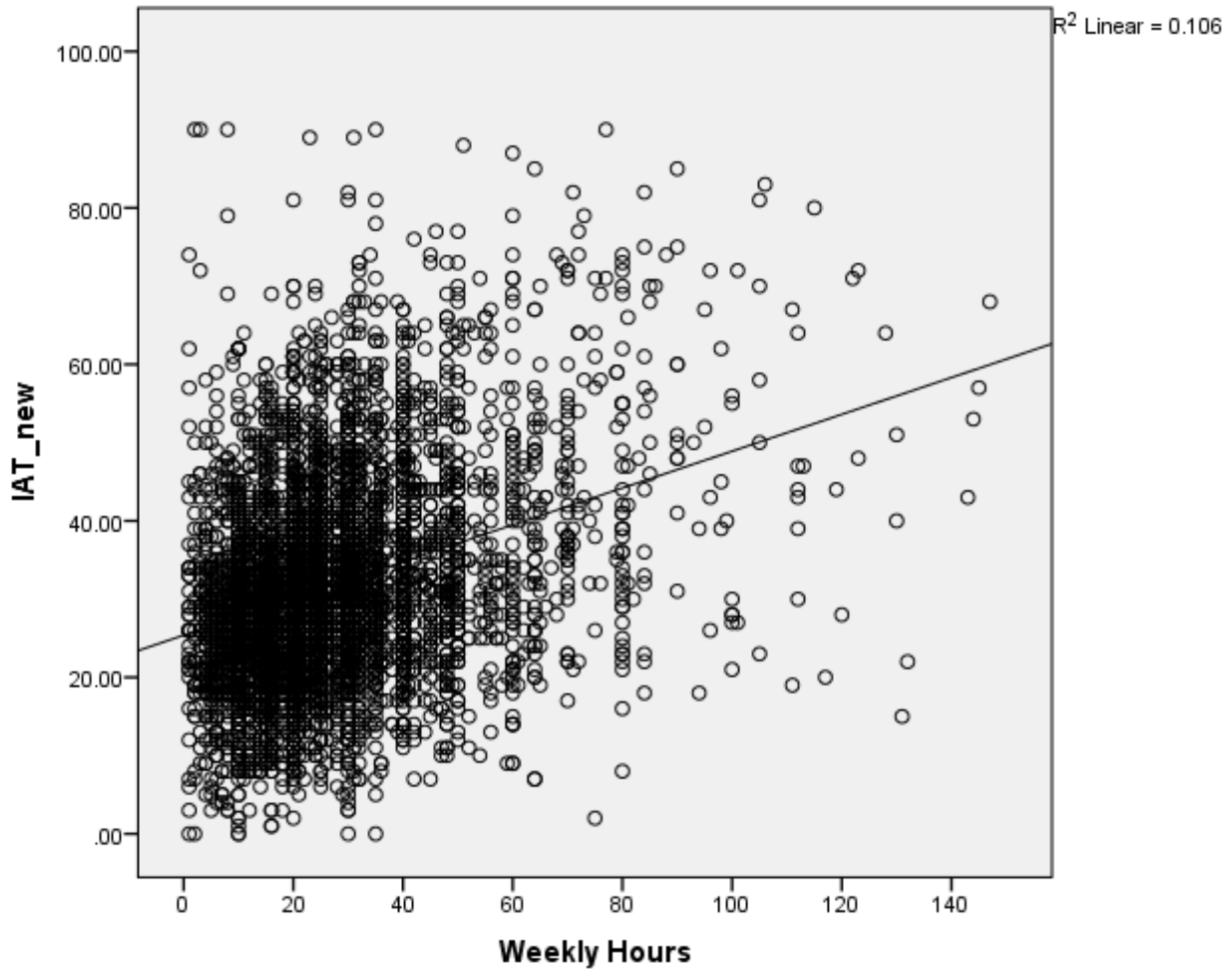
Scatterplot: Age and IAT Score



Weekly hours playing. Participants' weekly time spent playing *World of Warcraft* had a weak ($r = .33$, $p < 0.001$) association with IAT scores for the 18-item questionnaire (Table 18).

Table 18

Scatterplot: Weekly Hours Playing and IAT Score



Race and Ethnicity. A multiple comparisons procedure yielded pairwise comparisons via a Tukey HSD procedure in order to determine values for the differences among group means. There were significant differences in mean IAT score between Asian and White respondents (Mean difference = 4.8, Std. Error 0.81, $p < 0.001$). The other groups' mean IAT scores did not differ significantly according to the ANOVA procedure. However, the pairwise comparisons performed through a Bonferoni procedure yielded no significant differences in mean IAT scores among any of the race and ethnicity groups.

Self Screening Question Relationship to the IAT

The final research question asked for the relationship between score severity as reported by the Internet Addiction Test and respondents' impressions on whether they identify themselves as "addicted to MMORPGs". The null hypothesis being tested was that there is no difference in mean IAT score for those who do feel addicted, versus those who do not. The self screening question was tested for its ability to predict scores for the 18-item IAT and the original 20-item version. The 18-Item IAT mean score for people who believed they were addicted was 42.31. For those who did not feel addicted, it was 27.78 ($t = 36.45$, $df = 2060$, $p < 0.001$). For the original IAT, the mean score for those who felt addicted was 46.07, versus 30.90 for those who did not feel they were addicted ($t = 35.70$, $df = 2045$, $p < 0.001$). Both procedures assumed unequal variances. The null hypothesis for equal mean IAT scores between groups was rejected.

Summary of Results

Three exploratory research questions were addressed through statistical analysis: the factor structure of the Internet Addiction Test, the relationships among demographic variables and final IAT score, and the relationship between participants' self screening opinions and final IAT score.

The factor analysis of the IAT sought to identify latent factors underlying the items on the questionnaire in uncorrelated and correlated analysis using oblique and orthogonal solutions. Questionnaire items tended to load on multiple factors. Removing two of the 20 items' increased internal reliability (Cronbach's $\alpha = 0.91$) and variance explained (46.05%), resulting in a two-factor oblique oblimin rotated solution for an 18-item IAT with two factors: salience and neglect.

Demographic general linear procedures yielded a weak, negative association between age and the 18-item IAT score ($r = -0.14$, $p < 0.001$), and a moderate, positive association between hours played per week ($r = .33$, $p < 0.001$) and the 18-item IAT score. No other significant effects were identified between variables and IAT score.

The self screening question asked respondents whether they feel addicted to MMORPG gaming. Those who felt they were addicted had a mean score of 42.31 on the 18-item IAT and 46.07 on the 20-item IAT, while those who did not feel addicted had mean scores of 27.78 and 30.90 on the 18 and 20 item IAT respectively.

Chapter Summary

This chapter covered the sampling procedures, data preparation, descriptive statistics, and statistical procedures of the research study. The statistical procedures included an exploratory factor analysis, which established a two-factor oblique rotated solution for 18 items from the Internet Addiction Test. Associations were obtained between some of the demographic variables and IAT score. Finally, participant responses to the self-screening question on whether they felt addicted to MMORPGs was compared with IAT score severity. The chapter concluded with a summary of results. The next chapter will discuss findings in relation to the literature, the strengths and limitations of the research, and possible directions for future research.

CHAPTER 5: DISCUSSION

Introduction to the Chapter

In this chapter, a summary of the results of the research study is presented and interpreted in light of current literature. A review of the theoretical constructs underlying the methodology and method of participant recruitment is discussed. Results of data collection and statistical processing for each of the three research questions is provided. Limitations of the research are presented (research design, sampling, and instrumentation), and recommendations and implications for future research in counselor education for rehabilitation and addictions fields are offered.

Summary of the Study

Concise Review of the Study

This study surveyed 5313 players of the massively multiplayer online role playing game (MMORPG) *World of Warcraft* as a population of internet users. The survey established a factor structure for Young's (1998b) Internet Addiction Test (IAT), profiled gamers demographically, and identified relationships between frequency of usage, length of gaming experience, and self screening against IAT score severity.

A review of the literature from Chapter Two established the Internet Addiction Test (IAT) as a valid test instrument for screening internet users' levels of impairment. Uses and Gratifications theory (UG) was the theoretical background for this research, with a focus on the intended and unintended consequences from internet use experienced by MMORPG gamers. While the IAT has been examined in validation studies for internet users, UG theory would identify MMORPG as a separate form of mass media with unique consumers who seek particular results from gaming. Because MMORPG is a unique use of the internet with different user-

desired outcomes from online shopping, email, or gambling, this research study sought to explore this specific group of internet users.

Theoretical constructs investigated. Uses and gratifications theory formed the theoretical rationale for the construct of internet addiction as a mass media. According to the literature reviewed in Chapter Two, the motivations of media consumers are intentional toward desired outcomes and result in both intended and unintended consequences (Katz, 1959). The resultant constructs of salience, mood modification, tolerance, withdrawal, conflict, and relapse identified by Griffiths (1998) were measured using the IAT in terms of addiction symptomology. Chapter Two's literature review notes that previous validation research on the IAT did not offer a robust representation of MMORPG users among study participants, with the exception of a study conducted in Finland (Korkeila et al. 2009). Widyanto and McMurrin (2004) surveyed one gamer, Chang and Law (2008) surveyed 44 gamers, Khazaal and colleagues (2008) surveyed twenty gamers; and Korkeila and colleagues used a Finnish translation of the IAT with five-hundred twenty-eight gamers. The literature review indicated that previous research assumes that MMORPG users are equivalent to other internet users, such as those who use social networking, email, or online shopping. The purpose of this research study was to address paucity in the literature on exploratory IAT test validation for a population of MMORPG gamers.

Research based on the prevalence and measure of internet addiction has provided, through the use of demographic and internet exposure and frequency data, a profile of an internet user. The literature review from Chapter two also recounted the relationships found across these variables in relation to measured internet addiction severity. Another purpose for the current study was to explore and profile pertinent traits for MMORPG internet users, and seek relationships accordingly with IAT scores. The variables in this research study, in addition to the

IAT, included age, gender, racial/ethnic group, weekly gaming frequency, and experience playing the game.

Finally, face validity for the IAT was bolstered through the work of Widyanto and colleagues (2011) using a self-screening question on whether users felt addicted. This question was adopted as the final variable for the current research study.

Participants and data collection. As reported through the literature review in Chapter Two and the discussion of the methodology in Chapter Three, the intended population was MMORPG internet users of the most-played game, *World of Warcraft* (WOW). Participants were recruited through postings on MMORPG related forums in the United States, for WOW on November 9, 2013. Within one day of the advertisement, a high-traffic gaming website dedicated to WOW picked up the story, expanding the participant pool from WOW players who read WOW forums to WOW players who read game-related articles. The following day, a second gaming website referenced the research study. Between November 9th and November 14th, 5676 respondents completed the survey. Based on responses on November 9th (n = 28), the high-traffic website postings offered a robust rate, despite the associated limitations discussed later in the chapter.

Discussion

Review of the Results

The results of this research include descriptive data (demographics and frequency data) and outcome data of the Internet Addiction Test. Data collection instruments' measures of central tendency are compared to related literature, as are the results of statistical procedures. The statistical procedures reviewed include a factor analysis, general linear, correlation and t-test

procedures comparing demographic and frequency data with IAT scores, and a comparison between the self screening question and IAT outcomes.

Descriptive Data and Past Research

Descriptive data include gender, age, racial/ethnic group, and weekly usage frequencies as well as users' total length of experience playing the game. Variables are then compared to similar research on internet usage, and MMORPG usage where past information is available.

Gender and age. In this analysis, 5313 surveys were used. Nine hundred sixty-six (n = 966) of the participants identified as female (18%) versus 4347 as male (81.8%). Previous surveys of internet users for validation of the Internet Addiction Test examined samples in which females comprised 66% (Widyanto & McMurrin, 2004), 41% (Ferraro et al., 2007a), 54% (Chang & Law, 2008), and 67% (Khazaal et al., 2008) of the samples. Previous internet addiction studies, however, did not represent accurately the gender makeup of MMORPGs. Two studies on player behavior, but not on problematic gaming, provided the bases for gender and age comparison. Williams and colleagues (2009) surveyed 7129 volunteers who played MMORPG *Everquest*, of whom 19.72% were female. Yee and colleagues (2012) conducted a similar survey on *World of Warcraft* players in which 27% of the 1037 participants were female. The current survey yielded a mean age of 29, as compared to the mean ages from the Williams et al. (2009) and Yee et al. (2012) surveys, of 33 and 27 respectively. The demographics for the current research are not representative of all players because only adults were surveyed. However, it is clear that WOW is not simply a game for teenage males.

Racial/ethnic groups. In the current study, 4620 (87%) of participants identified as Caucasian, 287 (5.4%) as Hispanic or Latino, 273 (5.1%) as Asian, 68 (1.3%) as Black or African American, 39 (0.7%) as American Indian or Alaska Native, and 26 (0.5%) as Native

Hawaiian or Other Pacific Islander. The racial/ethnic categorical data collected for this study has no counterpart information for comparison, as the referenced IAT validation studies were collected in European and Asian nations where demographics are likely more racially and ethnically heterogeneous than those in the United States. According to the current research results, WOW is mostly, but not exclusively, a Caucasian preferred game in the United States, with notable Hispanic/Latino and Asian populations and relatively low representation from Black/African Americans, American Indian/Alaskan Natives, and Native Hawaiian or Other Pacific Islanders.

Measures of Central Tendency for Data Collection Instruments and Past Research

This study on MMORPG users utilized, in addition to demographic identifiers, the Internet Addiction Test, and questions pertinent to past research hypotheses for general internet users: weekly gaming time, and overall experience playing the game.

The internet addiction test. The IAT is scored in two ways, from the literature. The IAT test manual (Young, 2007) offers a 6-point Likert scale which includes 0 as “not applicable”. The manual establishes instrument score interpretation as follows: 0 to 30: normal, 31 to 49: mild, 50-79: moderate, and 80 to 100: severe dependence. To justify these cut points, the manual references Widyanto and McMurrin (2004). However Widyanto and McMurrin used a different scoring rubric: 20 to 39, average with complete control; 40-69, frequent problems; 70-100, significant problems. The Widyanto and McMurrin study did not use “not applicable” as “0” on its Likert scale, which meant that respondents had to answer at least 1 out of 5 on each of the 20 IAT items, where “1” was “not at all”, so the minimum score was 20. Widyanto, Griffiths and Brundsen used the IAT again in 2011, retaining the same scoring criteria as Widyanto and McMurrin from 2004. In the current research study, the choice of “not applicable” was retained

as a null value, per the instrument manual and the work of Korkeila and colleagues' (2009) Finnish IAT translation, since some of the symptoms may not exist for certain respondents, and to allow for more variability in item responses. Nearly half, 2027 of the 5313 respondents to the current research survey, scored 30 or below on the IAT; reflecting normal use. The mean score was 34.98 with standard deviation of 13.80, and a median score of 33. 34.98 is considered "mild" (Young). Scores on this dataset showed a positive skew (Table 5), indicating stronger outlying tendencies for severe IAT scores than for those in the normal range. The current research study did not pursue hierarchical analyses due to inconsistency from the literature on how severity labels correspond to the DSM-IV (TR, 2000) criteria for pathological gambling since the IAT expanded from 8 to 20 questions. The current study utilizes the scale without cut points, in order to answer questions without the need for hierarchical scores based on relative severity across the continuum.

Weekly gaming time. Weekly time spent on the internet is a possible predictor for problematic internet use or addiction (Young, 1998a; Widyanto & McMurrin, 2004). Brenner (1997) surveyed 563 internet users and used mean weekly internet use ($\bar{x} = 19$) to make comparisons with role functioning impairments. Likewise, Khazaal and colleagues (2008) reported a relatively low figure for mean hours per week ($\bar{x} = 7.05$), based on 60.42 minutes per day ($SD = 62.85$). In Widyanto and McMurrin's (2004) research on the Internet Addiction Test, mean weekly personal internet use was 20.53 hours. Caplan et al. (2009) reported the mean number of weekly hours gaming by 4278 players as 30 hours. Widyanto, Griffiths and Brundsen (2011) surveyed 225 internet users, of which only one was a gamer, and found internet users' mean weekly online time was 28 hours. The current study of 5313 MMORPG users found 26.8 as the mean number of hours players spent gaming, with a median of 22 hours. Williams et al.

found that self-reported gaming time was generally underreported, by a mean of 1 hour per week ($t = 2.09$, $df = 5418$, $p < 0.005$) among males and 3 hours per week ($t = 5.32$, $df = 1304$, $p < 0.001$) among females in a study of 7129 *Everquest* MMORPG users. This comparison of hours yields some consistency among research studies, particularly those focusing on gamers. Throughout the literature, there are generally higher hours associated with interactive internet functions. MMORPGs are by definition, highly interactive. As suggested in previous research and supported by the current research, increased weekly gaming hours may indicate problematic use.

Experience in playing the game. Experience on the internet (e.g., playing the game) is used to identify self-moderation of use (e.g. Widyanto & McMurrin, 2004; Widyanto et al., 2007; Widyanto, Griffiths & Brunnsen, 2011) or gaming cycles (e.g. Zhu & Deng, 2011). Widyanto and McMurrin (2004) identified the *newbie syndrome*, a hypothesized association between impairment and lack of experience using the medium, with a weak association ($r = -0.18$, $p < 0.05$) but did not report the mean experience statistic. Widyanto, Griffiths and Brunnsen reported mean experience as 6 years ($SD = 2.5$) for overall internet use. The current research study yielded a mean amount of experience at 55.89 months, or approximately 4.66 years, with a median of 57 months or 4.75 years ($SD = 26.36$ months) in playing *World of Warcraft*. As noted in Table 2, respondents tended to respond in yearly increments, which resulted in a stacking effect on 12 month intervals. The stacking effect indicates that respondents were more inclined to think in terms of years than months. It is likely that gamers in the current study have used the internet longer than they have used the game, due to the prevalence of internet-based activities. However, if MMORPG is a unique use of the internet, then it is possible that a savvy internet user is not necessarily a self-aware MMORPG user. Regardless, there is

limited information available in the literature about MMORPG users' levels of experience as it pertains to problematic behavior. Previous literature as it relates to addiction screening has not looked at MMORPG use separately from overall internet usage experience. However, both studies which highlight experience (Widyanto, Griffiths & Brunnsen, and the current study) have standard deviations greater than 2 years ($SD = 2.5$, $SD = 2.2$ respectively), so with a mean of 6 years from the literature or 4.75 years from the current study, the data varies considerably. Hence, gamers differ more widely in experience level than internet users.

Profile of the MMORPG user

The collected variables comprise a profile for typical adult users of MMORPGs who read high-traffic game-related websites and forums, since these were the methods of recruitment. MMORPG users are 87% likely to be of the White racial/ethnic identity, 5% likely to be Asian or Hispanic/Latino, 1.3% likely to be Black or African American, and less than 1% likely to be American Indian/Alaska Native or Native Hawaiian/Other Pacific Islander. MMORPG users are 82% male, at an average age of 29, with most players in their 20s compared to other ages. The average gamer has been playing for just over 4.5 years, and plays about 27 hours per week.

Research question 1

The first research question explored the factor structure of the Internet Addiction Test when administered to a sample of MMORPG internet users. The process yielded a two factor structure, therefore, questions three and four of the IAT were discarded. The factor analysis was different from previous analyses in the literature, reinforcing the unique function of MMORPGs in contrast to other internet-based activities and also the unique user-based gratifications sought from this type of gaming.

Questions three and four of the IAT are best described as relationship inferences. These questions were contextually important when Kimberly Young constructed the IAT for couples in which one partner was having an affair online (1998b). Young saw the internet as magnifying the possibilities for extramarital affairs (2004). Unlike UG theory (Katz, 1959), which posits that interactions with mass media are specific and unique to each user, Young (2004) wrote that “the internet can *create* [emphasis added] marital-, academic-, and job-related problems” (p. 402).

Question three of the IAT modified for MMORPGs asks how often respondents prefer the excitement of the game to intimacy with their partners. Question four of the IAT asks how often new relationships are formed with fellow gamers. The 20-item IAT was examined for correlations, and questions 3 and 4 had the lowest correlations ($r = .47$, $r = .26$) with total IAT score. This meant the two items were the least predictive of overall score on the IAT. Item 4’s removal also raised the Cronbach alpha statistic for the test from 0.905 to 0.909, a negligible increment. In the principle components extraction portion of the procedure, only 23.1% of question three’s variance was explained. The final decisions for removal of these items were made later on in the process.

Deciding on how many factors to retain required several attempts, due to an ambiguous scree plot (see Table 8), and relatively low eigenvalues (7.33, 1.20, 1.12, 1.01). Strict adherence to the Kaiser rule (Hair et al., 1998) would indicate a four-factor model, prior to rotation and interpretation. Four-factor models were attempted with orthogonal and oblique rotations. The reasoning for using an oblique rotation is to acknowledge that the factors defining a given construct can and will correlate. This means that addiction’s latent factors are meaningfully related; conflict and neglect, in the current study. Item four loaded as its own factor in both of these scenarios. Item four measured new relationships formed with gamers. Because the item had

low influence on the outcome of the test and forming new relationships is not necessarily a negative outcome of gaming, the question was considered of no value to the IAT's measure of MMORPG problematic use. The elimination of one of the items meant it fell below the 20 item threshold recommended by Hair et al. for using the Kaiser rule for eigenvalues greater than one, as too conservative a number of factors is possible. For this reason, a five factor model was considered; however the oblique and orthogonal models loaded items on multiple factors, or did not load items at all. An item loading on multiple factors meant the factors were likely correlated; meaning a lower number of factors was more appropriate. Four and three factor models in orthogonal and oblique rotations resulted in items 3 (How often do you prefer the excitement of the game to intimacy with partners?) and 5 (How often do others in your life complain to you about the amount of time you spend gaming?) not loading on any factor. Faced with high correlation tendencies among factors, a two factor solution was then run.

The two-factor oblimin and promax models explained 44.67% and 38.6% of the variance respectively. Item-to-factor assignments were the same between the two rotation methods. Item number 3 was reviewed from earlier in the procedure at this point, in order to see if more variance could be explained without measuring the frequency that gamers preferred the MMORPG to intimacy with their partners. With item number 3 removed from the model, the variance explained went up from 44.67% to 46.05%, with eigenvalues 7.10 and 1.19 for the two factor oblimin rotation (table 20). The two factors can be seen as measuring the constructs of conflict and neglect.

Table 20

Rotated Pattern Matrix for a 2 Factor Oblique Rotation

<i>Question</i>	Factor	Factor
“How often...”	1	2
5. do others in your life complain to you about the amount of time you spend gaming?	.36	
9. do you become defensive or secretive when someone asks you what you do in the game?	.55	
10. do you block out disturbing thoughts about your life with soothing thoughts of gaming?	.64	
11. do you find yourself anticipating when you will login to the game again?	.46	
12. do you fear that life without the game would be boring, empty, and joyless?	.75	
13. do you snap, yell, or act annoyed if someone bothers you while you are gaming?	.46	
15. do you feel preoccupied with the game when off-line, or fantasize about being online?	.54	
18. do you try to hide how long you’ve been gaming?	.49	
19. do you choose to spend more time gaming over going out with others?	.50	
20. do you feel depressed, moody, or nervous when you are not gaming, which goes away once you are back in the game?	.80	
1. do you find that you stay in the game longer than you intended?		-.78
2. do you neglect household chores to spend more time gaming?		-.72
6. do your grades or school work suffer because of the amount of time you spend gaming?		-.34
7. do you login to the game before something else that you need to do?		-.67
8. does your job performance or productivity suffer because of gaming?		-.34
14. do you lose sleep due to late-night gaming?		-.50
16. do you find yourself saying “just a few more minutes” when gaming?		-.59
17. do you try to cut down the amount of time you spend gaming and fail?		-.37

Note. Oblimin rotation converged in 11 iterations.

The factor analysis procedure followed contextual and mathematical lines of decision making in order to arrive at a structure that best measured the construct of addiction adopted from Griffiths (1998), which features salience, mood modification, tolerance, withdrawal, conflict, and relapse; as intended and unintended consequences of mass media use (Blumler & Katz, 1974). Identifying the syndrome of MMORPG problematic usage using the concepts of Griffiths which compare over-involvement on the internet with chemical addictions opens a line of questioning on other behavioral addictions which are also under researcher consideration. The assertion that Griffiths made in 1998, that people can be addicted to most anything, indicates further research should define addiction as a behavior rather than focusing on each medium or media as an addictive object.

The results to this factor analysis resembled those of the Finnish translation of the IAT (Korkeila et al., 2009) which was conducted on 1825 respondents, including 528 gamers. The research from Finland found a two-factor and a one-factor solution for the IAT. While both studies yielded a two-factor model, test items did not load on the same factors. In the current study, the two-factor solution explained more variance than a single factor. Difference in factor structures may be explained by the Uses and Gratifications theory. Blumler and Katz (1974) noted that mass media is sought for user-specific reasoning, and yields unique outcomes, both intended and unintended. Therefore, Uses and Gratifications theory's emphasis on user-specific decisions on unique types of media is affirmed. It is inferred from a review of the IAT validation literature that MMORPGs are a unique mass media which results in a distinct set of user experiences.

Research question 2

The second research question asked “what is the relationship of demographic variables (age, race, gender, weekly playing/gaming, and length of experience playing/gaming) to the final Internet Addiction Test score?” This question was answered through a general linear procedure in order to address effect size and inter-variable effects. Descriptive terms were used for each relationship according to recommendations by Cohen (1988): *strong* ($r > 0.5$), *moderate* ($r = .3$ to 0.5), *weak* ($r = .1$ to 0.3), and associations below 0.1 were considered invalid.

Age. Age was negatively associated with IAT score ($r = -0.14$, $p < 0.001$) which indicates a higher risk (weak correlation) for problematic behavior among younger gamers. Khazaal et al. (2008) findings ($r = .23$) were similar on a French version of the IAT administered to 246 internet users, 20 of which were gamers. While research on children and adolescents (e.g. Gentile et al., 2011) may gain media attention, this current study found little association between youth and problematic behavior.

Experience playing. A scenario where gamers who are new to the game may become obsessed before learning to self monitor was postulated by Widyanto and McMurrin (2004) and dubbed *the newbie effect*. A negative association was found in their 2004 research study ($r = -0.18$, $p < 0.05$) which confirmed, among their 86 participants, a weak *newbie effect*. The current study found no such association ($r = -0.07$, $p < 0.001$) between experience playing, and IAT score severity. The current results suggest that a one-time screening instrument administration is but a snap-shot, without the ability to trace oscillation between problematic and non-problematic consequences for game play. While extraneous factors may play a mediating role in MMORPG addiction, experience with the game was not a factor for the current sample.

Weekly hours playing. The number of hours participants spend gaming per week was compared with IAT score severity for possible association. There was a moderate, significant relationship ($r = .33$, $p < 0.001$) between impairment and weekly hours. The most commonly measured variable in addictions literature and internet addiction literature is arguably the quantity of usage. The hypothesis of whether people who are online at higher frequency show higher levels of addiction related consequence is well represented in the literature (Yee, 2002; Widyanto & McMurrin, 2004) as well as the news media (e.g. Naughton, 2005; BBC News, 2005b; Salmon, 2010). The current research reinforces that gamers who play more are at a slightly higher risk for problematic use.

Gender. Respondents identifying as female had a lower IAT score than respondents identifying as male (females: $\bar{x} = 29.42$, $std = 11.50$; males: $\bar{x} = 32.19$, $std = 13.33$) on the 18-item IAT, with a mean difference of 2.77, however the effect size (.001) was small. During factor analysis, two questionnaire items on the frequency of new relationships being formed in the game, and the frequency that gaming is preferred to intimacy with one's romantic partner, were not found predictive of overall score, nor contributory to the two-factor model. Traditional assumptions that perhaps females may be more susceptible to social impairment are not confirmed through the IAT's lack of influence on IAT outcome. While relationship impairment is a staple for measuring the construct of conflict (Griffiths, 1998) as an addiction component, intimacy and the tendency to form new relationships are not predictors for either gender of MMORPGs. This result speaks to the likelihood of MMORPG as a source, instead of a replacement, for social interaction, among both genders. Counselors, who screen for social withdrawal as a predictor of addiction, need to consider that MMORPGs provide social stimuli on a virtual platform.

Race and Ethnicity. At first glance, there appeared to be differences among racial/ethnicity identifiers in this study. Overall mean IAT scores were: Hispanic or Latino ($n = 287$, $\bar{x} = 33.07$), American Indian or Alaska Native ($n = 39$, $\bar{x} = 30.79$), Asian ($n = 273$, $\bar{x} = 36.12$), Black or African American ($n = 68$, $\bar{x} = 34.85$), Native Hawaiian or Other Pacific Islander ($n = 26$, $\bar{x} = 35.92$), and White ($n = 4620$, $\bar{x} = 31.28$). The overall mean score for the 18-item IAT was 31.69. Levene's test of homogeneity was 23.72 ($p < 0.001$), indicating variance equality could not be assumed. However, the general linear procedure found a negligible (.003) effect size, meaning there were no significant differences among race/ethnic groups. Additionally, Gender did not significantly interact with race/ethnicity either. This means that genders did not score differently on the IAT based on race/ethnicity. The results of racial/ethnic group comparison indicate two implications. First, an instrument may be considered more valid if it scores reliably across demographic groups. The current study finds that the IAT maintains cross-cultural consistency, but with radically different group sizes. Despite low sample sizes, there is reason to believe that MMORPG consequences vary more by other factors like gaming frequency and age, than by racial/ethnic group. Greater sample diversity and a fuller representation across age groups would be needed to verify this inference. A failure to identify significant differences among race/ethnicity groups may be explained through some of the smaller samples. Counselors can conclude that at this time, there is no evidence to suggest that any particular racial/ethnic group is at significantly greater risk for MMORPG addiction.

Research question 3

The final research question was “what is the relationship between score severity as reported by the Internet Addiction Test and respondents' impressions on whether they identify themselves as ‘addicted to MMORPGs?’” Petrie and Gunn (1998) used this face validity

technique on an early survey of respondents' levels of addiction, by asking participants whether they felt addicted, although they were not using it to validate a screening instrument. The self screening question would be revisited by Widyanto, Griffiths, and Brundsen (2011), who found that those who felt addicted and those who did not differed significantly ($p < 0.01$) on IAT score ($t = 7.28$, $df = 28.96$). The current study analyzed the original 20-item IAT and the 18-item IAT proposed from factor analysis, to identify relationships. The mean scores for those who did and did not believe they were addicted, on the 20-item version of the IAT, were 46.07 versus 30.90 respectively ($t = 35.7$, $df = 2046$, $p < 0.001$). The 18-item version yielded similar results with 42.31 and 27.78 respectively ($t = 36.45$, $df = 2060$, $p < 0.001$). This means that the IAT was moderately successful at predicting whether respondents felt addicted to MMORPGs. This result means that MMORPG users may be more likely to seek and comply with treatment for problematic MMORPG use if they agree with the results of the screening instrument. The IAT could be used at the beginning of an intervention to confirm and measure the severity of MMORPG user complaints, thereby providing empirical symptom measurement. Similar to Likert scaled instruments measuring pain and mood, the IAT provides a means to compare self-report symptoms across multiple clients with remarkable consistency based on its face validity and internal consistency.

Limitations of the study

Limitations of this study were found in research design, sampling, and instrumentation. The research design was limited in that users might have been profiled on a number of variables not included in the study, such as career, other uses of the internet, other recreation outlets, socioeconomic status, education level, and experience playing games other than *World of Warcraft*. Research design was also exploratory in nature, so it cannot confirm theory in this new

area of behavioral addiction, without further study. A third limitation for the research design was its use of correlations to identify relationships which cannot be seen as causal. For instance, the circumstance in which respondent scores are seen as higher for those who believe they are addicted may be better explained by an extraneous variable not measured in the current research study. Sampling was limited with regard to the sample of convenience and the viral nature of the websites which attempted to provocatively elaborate on the otherwise carefully worded recruitment advertisement, as well as controls for who responded to the survey. Instrumentation might have been limited in terms of its modification for MMORPG users, since a modification referring to a particular use of the internet has not been done in past research on the IAT. This means what while the IAT can be seen as confirming the unique gratifications and consequences experienced by MMORPG users, the modifications preempt this version from being used on uses of the internet other than gaming.

Research Design Limitations

This research study provides a profile of MMORPG gamers for the purpose of classifying MMORPG problematic use. Responses to the Internet Addiction Test were accompanied by data on age, racial/ethnic identification, gender, experience playing the game, and weekly gaming frequency. Exploring other variables, such as comparing MMORPG users' gaming time versus time spent on other uses of the internet may have provided additional insight. Also, a comparison of internet use and other forms of media such as frequencies of television viewing may have provided a fuller picture of respondents' routines. The methodology might have benefitted from a more sophisticated processing of respondent grouping categories in relation to some of the other variables and the extracted factors. For instance, while years of gaming experience was collected, a person who has played other games previously or simultaneously is not identifiable

from this data. Such a multi-gaming respondent with increased gaming experience compared to a first-time gamer might have presented with different results based on the multi-game experience. Education level and employment statuses might have given more credence to weekly gaming frequency, as people who work or attend school full-time may have answered differently, or yielded impairment in those domains if they experienced problem behavior. People more involved in education and employment may have explained more of the variance in question 6 (How often do your grades or school work suffer because of the amount of time you spend gaming?) or question 8 (How often does your job performance or productivity suffer because of gaming?). Also, the scope of the survey is narrow with reference to MMORPGs other than *World of Warcraft*, which were not represented in this study. While *World of Warcraft* is the most prevalent MMORPG by millions of subscribers, some of these subscribers are likely to play more than one game, increasing potential reports of gaming frequency and gaming experience. In the case of gaming frequency, the moderate association ($r = .33$) between impairment as measured by the IAT and weekly hours of gaming might be strengthened if multiple-MMORPG users (users who play more than one game) were surveyed on all of their gaming. Associations between multiple-MMORPG users or multiple-internet-function users (users who play games, use social networks, and shop online) and IAT severity may reveal a subpopulation of “polyinternet” addictions.

This study’s scope was purposely limited to users of one MMORPG, *World of Warcraft*, which by virtue of its widespread popularity, represents the vast majority of players worldwide with over 10 million players (Woodcock, 2009). While this established a homogenous sample, the results may not be generalizable to the players of other MMORPG games. Further, the research was limited only to adult gamers. The descriptive statistics show a mean age of 29,

which may have been different if players under 18 years of age were included, although this is unlikely due to the progressively lower frequencies of respondents below age 29 through age 18 in the current study. The prevalence related data offered by this study is thus limited only to adults. Finally, participant responses were all based on self-report and cannot be verified for accuracy. As highlighted in Chapter 3, exploratory factor analysis tends to yield hypotheses and theories, rather than confirm them. For this reason, the results and steps are open to interpretation based on the constructs represented by each item, each factor, and the phenomenon being measured. To this end, confirmatory factor analysis would be necessary in order to assess theoretical fit and external validity through reliable replications.

Correlations among variables were identified in this research study as weak or moderate, but their relationships are not causative. Variables extraneous to those collected may be responsible for some of the effects measured in this research. To avoid false positives, categorical hierarchies such as generation clusters were not used- however these might have yielded more meaning as a subgroup may share characteristics relative to MMORPGs that was lost across the entire sample. For instance, an age group might be at greater risk for addiction, based on the weak negative association found overall in the current research ($r = -0.17$) between age and IAT score severity. Furthermore, respondents who answered that they believe they are addicted might have done so as a result of how they read the questions of the IAT.

Sampling Limitations

There are several sampling limitations due to online news articles highlighting the study. The advertisement method attempted to convey as little pretest bias as possible. The recruitment advertisement read as follows: *Research participants needed for a study on healthy and unhealthy use of Massively Multiplayer Online Role-Playing Games like World of Warcraft.*

Your identity will not be collected. If interested, please click on this link:

<http://www.mmorpgresearchstudy.com>. The advertisement was posted on forums specifically designated for *World of Warcraft* players representing servers across the United States. While the forum postings were deleted (some immediately and some after several days) by volunteer forum moderators who are players of the game, they were seen by a MMORPG online journalist who wrote about the research study on a *World of Warcraft* dedicated news site with high daily traffic, whose story was picked up by another gaming website within 24 hours. The news articles' referral of respondents to the survey means that the sample is more representative of gaming website readers who game, than simply gamers. These articles and their content were not anticipated in proposing this research, and they may have impacted how participants answered the survey. First, online articles on gaming may serve to polarize readers who either agree or disagree with current notions of MMORPG addiction. For instance, the most read article, entitled *Are MMORPGs addictive? East Carolina University wants to find out* (Van Allen, 2012) poses a theoretical stance wherein the addiction lies with the MMORPG, rather than with gratifications sought uniquely among its users, as in Uses and Gratifications theory. The conception that the game itself is addictive may be viewed as provocative. There were 99 comments posted to the news article site while the survey was open, many of which criticized the content of Young's IAT. Polarized readers may have sought the survey in hopes of disrupting the data with unlikely answers, and the article content might have influenced respondents' thoughts on whether they were addicted. Indeed, 363 surveys were cleaned from the data based on extreme answers across questions including age, gaming duration, impairment, etc. and outliers still persist in the data.

Second, online articles and several blog posts provided readers with an opportunity to comment on the survey. These comments were not included in the survey design. They will

provide thematic qualitative data for follow-up research. The criticisms of the IAT's content may reveal a gamer culture that struggles against labels like "addiction" attached to high involvement in virtual community. Survey question 4 (how often do you form new relationships with fellow gamers?) represents the now questionable notion that high social involvement in virtual communities is synonymous or predictive of addiction. Similarly, respondents may feel a need to "defend" gaming against a building body of literature which labels MMORPGs as addictive. Despite the possible bias, this survey's status among the largest validations of the IAT and the largest addiction survey of MMORPG gamers is attributable to these journalists' generous coverage of the survey.

The sampling methodology intended to collect data from MMORPG gamers within the United States by posting advertisements on US *World of Warcraft* forums; however the readership for the websites where the survey advertisement was described was international. The player populations on US *World of Warcraft* servers also vary slightly with people logging on from other nations. The current research was not able to verify the geographic origins of its respondents. For this reason, there may have been geographic trends within the US and North America which were not picked up as subtleties within the survey. Such geographic variance is not collected, and may explain more differences among respondents' answers than the variables that were collected, such as race/ethnicity, age, and gaming frequencies in establishing a profile for gamers. While geographic origin might have been determinable through the internet protocol (IP) addresses collected by the survey software, that information was cleaned from the data in order to assure respondent identities were not inadvertently collected.

Instrumentation Limitations

Test modification for MMORPG users is another possible limitation. The IAT was written initially by Kimberly Young in 1998 with questions which reflected internet uses typical for the time. For example, question 7 (How often do you check your e-mail before something else that you need to do?) refers to a specific use of the internet that is not really found in MMORPGs, so it was rewritten (How often do you login to the game before something else that you need to do?) to reflect the MMORPG content. Where Young's instrument mentioned "online" activities, the IAT modified for MMORPG users substituted "in the game" for "online", and "gaming" for "internet". Both instruments are included for comparison in Appendices A and C for Young's (1998b) IAT and the current study, respectively. Substantial changes in IAT content made specifically for MMORPGs or other specific use of the internet had not been done prior to the current study. This means that the IAT modified for MMORPGs is limited in its scope and its means for comparison against the rest of the literature in terms of generalizability.

Recommendations for Future Research

MMORPGs are played for hours each week, for months and years at a time, by millions of users. Each user has personal reasoning, understood as cognition (e.g. Davis, 2001) or intended consequences (Blumler & Katz, 1974) for participating in this mass media. The outcomes can include intended and unintended consequences (Blumler & Katz) which are measured and conceptualized in the context of addiction (e.g. Griffiths, 1998). For instance, Griffiths posits that playing the game in order to improve one's mood is analogous to consuming a substance for the same reason. However, there may be a benefit in conceptualizing this research on a continuum acknowledging its benefits simultaneously with its contextual pitfalls. This more ecological framework can result not only in greater understandings of human

motivation for MMORPG usage and overwhelming involvement, but also in harnessing such widespread commitment for positive outcomes. Future research on this topic can focus on both negative and positive consequences for the MMORPG phenomenon. Counselors and counselor educators should consider mass media theories such as Uses and Gratifications as an option for conceptualizing overwhelming involvement in technology. Counseling practice will need to reconsider other addiction models such as abstinence when considering internet related activities, in favor of moderation based interventions which will allow for technology's presence in the workplace, home and classroom. Behavioral addiction assessment will need to either acknowledge the uniqueness of activity-based addictions more specifically from instrument to instrument (e.g. MMORPGs versus online gambling), or conceptualize addiction more widely as unique to the individual with broad terms and generalizable screening instruments. Counselors and counselor educators can further focus on thorough clinical interviewing skills due to a lack of normed screening instruments. It is apparent from this research that there is no substitute for individualized diagnostic interviewing.

Reliability and validity for the IAT. The negative consequences experienced by a proportion of the users of MMORPGs as a mass medium housed on the internet is documented in the current research as well as the literature at large. The IAT, as the most used and most validated screening instrument (Widyanto & McMurrin, 2004) would benefit from further factor analyses on sizeable samples, as well as confirmatory factor analyses to assure its reliability across demographics. The current study's sample should be submitted to confirmatory factor analysis in order to verify its factor structure. Considerations for more current uses of the internet should influence the re-wording of items of the IAT. For instance, one of the questionnaire items refers exclusively to email. When the IAT was developed in 1998, the prevalence of emailing

was comparably higher in comparison to other activities, than it is now. Email was the only specific internet-based activity referenced in the IAT, and was changed for the MMORPG study to logging into the game. Instruments for screening behavioral addictions which take place on the internet should engage respondents' behaviors being measured to ensure applicability to user outcomes tied to those particular uses. The internet delivers applications for productivity (e.g. email, cloud computing, banking), social interaction (e.g. social networking, MMORPGs), entertainment (e.g. streaming and downloadable video and audio, gambling, pornography), and general information (e.g. news, blogging) which attract varied clientele seeking differing outcomes. Screening for different behaviors is apt to be unique to the media user's choice in online content. It must therefore be either generalizable to all content, or easily interchangeable to apply to each area of content an online user might seek. The IAT has this flexibility if words can be changed, but its factor structures for these uses are bound to vary, based on the outcomes sought by users as discussed in Uses and Gratifications theory.

Demographic prevalence. The current research study recognized some diversity among the sample participants, but for some of the categories (e.g. American Indian or Alaska Native, n = 39; Native Hawaiian or Other Pacific Islander, n = 26) a robust subgroup sample was not obtained. It would be inappropriate to assume that 5.1% of all WOW players in North America identify as Asians, with a sample of (n = 273), or that 0.7% are Black or African American (n = 68). The typical profile of a gamer is frequently documented (e.g. Williams, Caplan & Yee, 2008) as continually evolving as gaming saturates the market, and as lower socioeconomic groups and regions gain access to broadband technology. Gamer demographics are destined to change as rapidly as broadband products and online media spreads to new groups. Uses and

gratifications theory posits that these new groups will have unique reasons for using the mass media.

Qualitative research. The online articles written about this research study's survey yielded over 100 comments made by survey participants, which were neither included in the methodology, nor anticipated as part of the planning. These unsolicited comments which were collected not by the researcher, but by the online gaming websites, related to Likert scale wording, situational qualifications for why certain questions were answered as they were, and attitudes toward the tone of questionnaire items and how they relate to gamer attitudes toward addictions research in general. The volume and diversity of the comments suggest that qualitative research may be useful in exploring MMORPG gamers' experience.

Defining addictions. While the current study approached the internet as a unique mass media with the potential for its users to become addicted, Uses and Gratifications theory was intentionally adopted in order to affirm that addiction results as one of many consequences for certain individual users. This is in theoretical opposition to notions that the mass media itself *causes* the addiction. For instance, Young (2004) stated, "the Internet can create marital-, academic-, and job-related problems," but noted also that "the internet itself is a neutral device originally designed to facilitate research among academic and military agencies" (p. 402). Young's two statements paradoxically presuppose problems originating within the media, versus within the person and simply hosted by the media. Groups such as Online Gamers Anonymous (CyberSightings, 2003) have adopted the theoretical position that addiction is caused by the gaming medium. There is a growing body of research which seeks connections between video games and problematic behaviors such as violence (e.g. Gentile et al., 2011). The current study focused instead on problematic usage as measured through common consequences proposed by

the IAT as part of a larger picture including both intended and unintended consequences. The lack of a universal factor structure identifiable with the literature reinforces the Uses and Gratification theory's emphasis on the uniqueness of each user's experience, whether addicted or not. This research reinforces the inadequacy of generalized addiction screening for "all people on the internet" as being the same, similarly to the false assumption that "all people on drugs" would experience the same consequences thereafter. More research is needed which focuses on the consequences of addiction experienced from person to person or across mediums and substances, rather than simply categorized through a given medium, like internet addiction or MMORPG addiction.

Harnessing MMORPGs. The participants in the current study are documented to have collectively engaged in roughly 135,000 hours of game play per week. Concepts such as the pressure, suspense, decision, achievement model (Zhu & Deng, 2006) which help to engage gamers in a cyclical motivational state that persists over the course of months can be applied to desirable enterprises such as therapeutic or educational progression. The achievements which are attainable through skill development, social dialogue, and collective effort bear similarities to group tasks and educational attainment away from the keyboard. The potential for MMORPGs to motivate people to persist and progress toward an ideal outcome with high commitment and few negative consequences is a positive outcome for this research.

Implications and summary of the study

This research study was among the largest validation studies for an internet addiction instrument (n = 5313). It was also the first to extensively survey MMORPG gamers as a subgroup of internet users, on addiction. The study confirms a moderate correlation between weekly gaming time and IAT score severity, and a weak relationship between age and IAT score

severity. It also reinforces the theoretical position of Uses and Gratifications theory that user experiences vary based on the media related desired outcomes of each user, by presenting a factor structure that is different from this study's predecessors in the literature. The factor structure indicates that MMORPG users' motivations are likely to be different from other people who experience overwhelming involvement related to internet activities. This research also highlights the strengths of MMORPGs to occupy and engage users, based on the number of hours consumed by gamers and the engaging structures used by MMORPGs.

Implications for MMORPG research

MMORPG use is a unique function of the internet which engages a distinct but sizeable population of users. Future prevalence research will need to focus on specifics related to MMORPG players rather than generalizing internet-based activities as a unified behavior. Addictions research concerning MMORPGs will need to take into consideration the updated meanings and expectations of social interaction, and whether those interactions are indicative of impairment. For MMORPG users, interaction online is considered a healthy social outlet.

The level of effectiveness with which MMORPGs engage players for long periods can be used to improve other areas of industrious behavior like school and work. For instance, a supported employment program could utilize achievements and motivational levels to challenge and retain clients with disabilities in suitable training and employment. Therapeutic interventions which apply mechanisms employed in MMORPGs could keep clients with behavioral or addiction related disabilities engaged in recovery and life-enhancing self actualization through applied gaming principles as well.

Conclusion

MMORPGs comprise a large pool of internet users, unique from consumers of other internet functions. A sizeable body of literature has documented the unique traits of MMORPG users, while the addictions literature has widely regarded internet addiction as a common experience screened for by internet-specific instruments. The current study applied Uses and Gratifications theory to highlight the intended and unintended (Blumler & Katz, 1974) consequences of MMORPGs as a mass media, named by Griffiths (1998) as salience, mood modification, withdrawal, conflict, and relapse found in the items of the Internet Addiction Test (Young 1998a). Its results provided a profile for MMORPG users as a unique subset of internet mass media users who encounter consequences on a distinct basis from other internet users, some of whom can be seen as problematically engaged in a similar manner to other behavioral addictions.

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Appendix A

Young's Internet Addiction Test (1998b)

Name _____

Male _____ Female _____

Age _____ Years Online _____ Do you use the Internet for work? _____ Yes _____ No

This questionnaire consists of 20 statements. After reading each statement carefully, based upon the 5-point Likert scale, please select the response (0, 1, 2, 3, 4 or 5) which best describes you. If two choices seem to apply equally well, circle the choice that best represents how you are most of the time during the past month. Be sure to read all the statements carefully before making your choice. The statements refer to offline situations or actions unless otherwise specified.

0 = Not Applicable

1 = Rarely

2 = Occasionally

3 = Frequently

4 = Often

5 = Always

1. ___How often do you find that you stay online longer than you intended?

2. ___How often do you neglect household chores to spend more time online?

3. ___How often do you prefer the excitement of the Internet to intimacy with your partner?

4. ___How often do you form new relationships with fellow online users?

5. ___How often do others in your life complain to you about the amount of time you spend online?

6. ___How often do your grades or school work suffer because of the amount of time you spend online?
7. ___How often do you check your e-mail before something else that you need to do?
8. ___How often does your job performance or productivity suffer because of the Internet?
9. ___How often do you become defensive or secretive when anyone asks you what you do online?
10. ___How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?
11. ___How often do you find yourself anticipating when you will go online again?
12. ___How often do you fear that life without the Internet would be boring, empty, and joyless?
13. ___How often do you snap, yell, or act annoyed if someone bothers you while you are online?
14. ___How often do you lose sleep due to late-night log-ins?
15. ___How often do you feel preoccupied with the Internet when off-line, or fantasize about being online?
16. ___How often do you find yourself saying "just a few more minutes" when online?
17. ___How often do you try to cut down the amount of time you spend online and fail?
18. ___How often do you try to hide how long you've been online?
19. ___How often do you choose to spend more time online over going out with others?
20. ___How often do you feel depressed, moody, or nervous when you are off-line, which goes away once you are back online?

Appendix B

Pathological Gambling Criteria compared to the
original 8-item Young's Diagnostic Questionnaire (1998a)

DSM-IV (2000) 312.31, Pathological Gambling:	Young's Diagnostic Questionnaire (YDQ)
Persistent and recurrent maladaptive gambling behavior as indicated by five (or more) of the following: Is preoccupied with gambling	Diagnosed through the presence of five (or more) of the following: Do you feel preoccupied with the Internet (think about previous on-line activity or anticipate next on-line session)?
Needs to gamble with increasing amounts of money in order to achieve the desired excitement	Do you feel the need to use the Internet with increasing amounts of time in order to achieve satisfaction?
Has repeated unsuccessful efforts to control, cut back, or stop gambling	Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?
Is restless or irritable when attempting to cut down or stop gambling	Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?
Gambles as a way of escaping from	Do you use the Internet as a way of

problems or of relieving a dysphoric mood	escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)?
After losing money gambling, often lies to family members, therapist, or others to conceal the extent of involvement with gambling	Have you lied to family members, a therapist, or others to conceal the extent of involvement with the Internet?
Returns another day to get even	Do you stay on-line longer than originally intended?
Has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling	-
Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling	Have you jeopardized or risked the loss of a significant relationship, job, educational, or career opportunity because of the Internet?
Relies on others to provide money to relieve a desperate financial situation caused by gambling	-

Note. Omissions from Young's (1998a) YDQ that do not correspond to Gambling criteria are signified with a dash [-] (American Psychiatric Association, 2000; Young, 1998a).

Appendix C

Young's Internet Addiction Test Adapted for MMORPG Internet Use

Female _____ Male _____ (1, 2)

Age _____ (continuous variable)

Which race or ethnicity most closely represents you? (choose only one)

1 Hispanic or Latino

2 American Indian or Alaska Native

3 Asian

4 Black or African American

5 Native Hawaiian or Other Pacific Islander

6 White

How many months total have you played *World of Warcraft* _____ (continuous variable)

How many hours do you average playing *World of Warcraft* on a weekly basis? ____ (continuous variable)

This questionnaire consists of 20 statements. After reading each statement carefully, based upon the 5-point Likert scale, please select the response (0, 1, 2, 3, 4 or 5) which best describes you. If two choices seem to apply equally well, circle the choice that best represents how you are most of the time during the past month. Be sure to read all the statements carefully before making your choice. The statements refer to offline situations or actions unless otherwise specified.

0 = Not Applicable

1 = Rarely

2 = Occasionally

3 = Frequently

4 = Often

5 = Always

1. ___How often do you find that you stay in the game longer than you intended?
2. ___How often do you neglect household chores to spend more time gaming?
3. ___How often do you prefer the excitement of the game to intimacy with your partner?
4. ___How often do you form new relationships with fellow gamers?
5. ___How often do others in your life complain to you about the amount of time you spend gaming?
6. ___How often do your grades or school work suffer because of the amount of time you spend gaming?
7. ___How often do you login to the game before something else that you need to do?
8. ___How often does your job performance or productivity suffer because of gaming?
9. ___How often do you become defensive or secretive when anyone asks you what you do in the game?
10. ___How often do you block out disturbing thoughts about your life with soothing thoughts of gaming?
11. ___How often do you find yourself anticipating when you will login to the game again?
12. ___How often do you fear that life without the game would be boring, empty, and joyless?
13. ___How often do you snap, yell, or act annoyed if someone bothers you while you are gaming?
14. ___How often do you lose sleep due to late-night gaming?
15. ___How often do you feel preoccupied with the game when off-line, or fantasize about being online?
16. ___How often do you find yourself saying "just a few more minutes" when gaming?
17. ___How often do you try to cut down the amount of time you spend gaming and fail?

18. ___How often do you try to hide how long you've been gaming?
19. ___How often do you choose to spend more time gaming over going out with others?
20. ___How often do you feel depressed, moody, or nervous when you are not gaming, which goes away once you are back in the game?

Do you feel addicted to internet gaming? “yes / no” forced choice answer

Appendix D

Institutional Review Board Authorization



EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review
Board Office
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2284 · www.ecu.edu/irb

Notification of Exempt Certification

From: Social/Behavioral IRB
To: [Andrew Byrne](#)
CC: [Shari Sias](#)
Date: 11/5/2012
Re: [UMCIRB 12-002064](#)
MMORPG Problematic Use

I am pleased to inform you that your research submission has been certified as exempt on 11/5/2012. This study is eligible for Exempt Certification under category #2.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification request at least 30 days before the end of the five year period.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418 IRB00004973