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The development of a self-report questionnaire to measure problematic video game play and its relationship to other psychological phenomena

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The Development of a Self-Report Questionnaire to Measure Problematic Video Game Play and its Relationship to Other Psychological Phenomena

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Dedication

I would like to dedicate this dissertation to my beloved Jiah and my always-supportive friends and family who have been there throughout the ups and downs of the graduate school process.

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Abstract

Problematic video game play is becoming a more frequent clinical presentation, and currently there is no standard way of measuring this phenomenon. This study operationalized this construct in a way that accurately reflects the existing literature and attempted to construct a valid measure based on this information. This new assessment instrument was evaluated by analyzing its factor structure on both 375 college-age participants and 314 online participants who endorsed being a regular video game player.

This area of research is still in its infancy, especially in regard to comorbid psychopathology. Consequently, this study surveyed participants' subjective experience of depression and anxiety in conjunction with problematic video game-playing behaviors. In addition to existing theoretical findings, the study explored the relationship between problematic patterns of video game-playing behaviors and absorption in addition to participants' general quality of life.

Results from this study supported that the Problematic Video Game Playing – Revised (PVGP-R) scale is a psychometrically sound and reliable method for measuring problematic video game play behaviors and shows much promise for future research. The results suggested that problematic video game play was correlated with absorption, depression, anxiety, and stress in men. Conversely, problematic video game play was only correlated with stress and absorption and was correlated weakly and in only one sample with depression and anxiety for women. The findings also suggested that quality of life was unrelated to problematic video game use regardless of gender in both samples. Finally, future directions for research were identified.

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Literature Review

Introduction

During the early 1970s, there was a breakthrough in electronic media. Although television and radio had been popular for several decades, never before had video media been combined with computer technology. This hybridization gave rise to a revolutionary wave of new video game entertainment (Williams, 2006). Whereas previous forms of media merely allowed the viewer to choose what television show to watch, video game technology gave users the ability to manipulate what they were observing. In other words, video game technology changed media from a passive to an interactive activity (Klimmt & Vorderer, 2003). This interactivity changed media in two substantial ways. First, it gave users the ability to not only play by themselves but also to play against the computer and/or other players (Sellers, 2006). Second, it allowed the creators of video games to integrate reinforcement schedules into the reward schemas of the games. In other words, users are reinforced for playing longer, for increasing their playing skills, and also earning points or some sort of digital tokens. Due to these reinforcement schedules, players often play these games for longer than anticipated (Wood, Griffiths, Chappell, & Davies, 2004a).

The earliest forms of video games were created in the form of large machines called arcade units. These bulky machines were roughly the size of refrigerators and were most often coin-operated (Williams, 2006). Not only were these early creations large in size, they also only housed one game that could not be changed without completely replacing the machine's internal circuitry. These early arcades were also quite expensive to own and could not be afforded by a majority of the population.

Much has changed in the realm of video game technology since the early 1970s. Video game systems have been miniaturized to the point that while some can be completely contained in a unit the size of a cellular phone, more popular games are often played with machines roughly the size of an average city telephone book. This reduction in size has the added benefit of increasing the portability of these devices (Lowood, 2006). Current video game consoles are also significantly more affordable and are profoundly more versatile than their arcade predecessors. In other words, current video game platforms can play many different games without having to change any physical circuitry. The user simply needs purchase a new game and it will work on whichever system it was created for. The consoles of present day even have hard drives onto which users can download literally thousands of games via the Internet and play at will.

Video game consoles have changed dramatically and so have the accompanying games. Early games such as “Pong” were composed of two-dimensional games represented by black and white pixels (Williams, 2006). These games were often of relatively limited duration, usually measured in minutes. In contrast, video games of today use a seemingly infinite spectrum of colors, often rendered in three dimensions. The graphics used in such games have reached a level of complexity and clarity that makes them almost indistinguishable from real life. Also, as opposed to earlier games, playing times with many modern video games oftentimes literally have no distinct endings.

Another interesting and major change involves the setting in which video game consoles are found. The original arcade units were placed mainly in bars alongside

pinball machines, darts, and sundry diversions. However, unlike these other games, modern video games are now most frequently played in the home (ESA, 2010).

This move from bars to homes is noteworthy for two reasons. First, bar-based video games were placed in environments that are associated with substance abuse and addiction (e.g., alcohol and nicotine dependence), sexual risk taking, and other problematic behaviors (Midanik & Clark, 1995). Second, nesting video game consoles in bar settings explicitly constrains access to these games both as a function of dividing the attentional focus of players across a range of potential diversion (e.g., drinking, socializing, etc) and due to the fact that bars generally have limited hours of operation; players who access video games at home have far fewer constraints on the amount of time they can dedicate such activity. Thus, it is not surprising that pathological video game playing is a growing problem.

Defining Problematic Video Game Play

To define problematic video game play (PVGP), one must first define what constitutes a video game. For this study, a "video game" was conceptualized as electronic games played on coin-operated machines, home computers, console systems (e.g., Xbox, Playstation, or PSone) and videogames for mobile devices such as smart phones and handheld console systems.

What is PVGP? Problematic video game play has been defined using many different terms including the following: "problematic videogame play" (Salguero & Moran, 2002), "pathological video-game use" (Gentile, 2009), and "video game addiction" (Griffiths & Meredith, 2009; Grusser & Thalemann, 2006). PVGP has been chosen mainly because there is still much debate over how truly "pathological" the

phenomenon appears to be (Tolchinsky & Jefferson, 2011; Wood, 2008). It still remains unclear whether PVGP is a diagnosable disorder or merely another hobby such as reading or knitting. This debate will be discussed in more detail further in this work.

PVGP has been described in terms of many different symptoms, depending on the author or the research group (Gentile, 2009; Salguero & Moran, 2002; Tolchinsky & Jefferson, 2011; Wood, 2008). This is mainly a result of different frameworks that will be described in detail further in this work. Regardless of which framework one uses to conceptualize PVGP, there is one constant among all previously mentioned camps of researchers. PVGP is defined in terms of the consequences that follow problematic usage as opposed to simply being based upon the frequency or duration of play. In other words, the actual number of hours that an individual plays is not necessarily indicative that he or she may be engaging in this behavior at a problematic or pathological level. Engaging in video game playing behaviors is only considered to be problematic when it begins to cause significant impairment in the player's daily life.

Known Correlates

Several relationships have been identified, including some very remarkable cases, such as blame being put on video game violence contributing to the Columbine massacre (Slater, 2003). There have also been reports of suicidal ideation and even sometimes successful suicide attempts as a result of individuals losing their gaming privileges or in some cases losing their character accounts (Golub & Lingley, 2008). Although these consequences are quite serious and should not be taken lightly, there is still questionable evidence as to whether PVGP was an antecedent to these grim occurrences. In other

words, the relationships that have been found thus far have been either correlational in nature or isolated cases that lack generalizability especially in regard to causation.

Many psychological symptoms and correlates have been reported in regard to PVGP, yet there is still a dearth of support for causation. Salguero and Moran (2002) constructed a self-report measure to assess the consequences of PVGP, which consisted of diagnostic criteria based on substance abuse and pathological gambling from the Diagnostic Statistical Manual (APA, 2000). These researchers found evidence of preoccupation, tolerance, loss of control, withdrawal, escape, lies and deception, disregard for physical or psychological consequences, and family or educational disruption in their sample. Although these findings were based on an adolescent sample in Spain, they were replicated with a modified version of the original scale in college-age American students (Tolchinsky & Jefferson, 2011) and in a sample of French children (Bioulac, Arfi, & Bouvard, 2008) using the original scale.

Another research group found similar results when conducting a national survey using a sample of 8- to18-year-olds (Gentile, 2009). This study was executed using a self-report measure, which was a series of questions derived from pathological gambling criteria and also Brown's (1991) core facets of addiction. These facets included salience, euphoria or relief, tolerance, withdrawal symptoms, conflict, and relapse and reinstatement.

Preliminary Prevalence and Incidence of PVGP

Before exploring the pathological form of video game playing, it is important to consider how popular video games have become and how their use has been increasing over time. For instance, The Kaiser Family Foundation reported that 49% of American

children ages 0-6 years old have a console in their home, 10% of whom have a console in their bedroom, which is considered to be particularly problematic (Kaiser Family Foundation, 2003). The Entertainment Software Association reported in 2008 that 50% of Americans played video games (ESA, 2008). This statistic has risen to 62% (ESA, 2012). Playing time by children has increased from about 4 hours per week in the mid-1980s (Harris & Williams, 1985) to more than 9 hours per week, with girls playing about 5.5 hours per week, and boys playing 13 hours per week (Gentile, Lynch, Linder, & Walsh, 2004). The Cooperative Institutional Research Program (1998, 2006) found that in 1998, 13.3% of men entering college played video games 6 hours or more a week as high school seniors. This statistic then rose to 20.8% by 2006. Although the data are limited mainly to children and adolescents, it is logical to assume that adults play video games as well, when you consider that the average age for video game players in America is 35 (ESA, 2012).

Information regarding the prevalence and incidence of PVGP is somewhat limited and varied. This is a result of two major factors. First, there is still no standard method of measuring the phenomenon in question. Second, this is still a considerably new phenomenon that has not been studied as thoroughly as other more traditional mental disorders.

Gentile (2009) found that in a national sample of 1,178 Americans ages 8 to 18, 8.5% of the sample exhibited pathological patterns of play. This statistic was based on participants' endorsement of 6 out of 11 symptoms of damage to family, school, social, or psychological functioning. Similarly, Lemmens, Valkenburg, and Peter (2009) found that in a sample of 721 Dutch children ages 12 to 18 years, 10.4% of the participants

involved in the study showed signs of pathological gaming. For this study, gamers were considered pathological if they endorsed 4 or more criteria that were derived from items assessing salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems. Similarly, a study by Salguero and Moran (2002) found that in a sample of 223 Spanish adolescents ages 13 to 18 years, 9.9% were considered to be engaging in pathological forms of gaming. These results were derived from the number of participants who endorsed 4 or more out of symptoms based on pathological gambling diagnostic criteria and substance abuse criteria. In a more dated study, Phillips et al. (1995) found that in a sample of 868 British adolescents ages 11 to 16 years old, 7.5% were considered to be engaging in problematic or pathological forms of video game-playing behaviors. This prevalence number was based on the participants' endorsement of problematic behaviors. More specifically, these behaviors included playing more than 6 hours of video games a week, playing more than an hour at a time, feeling like they played longer than intended, and also neglecting school work to play these games.

No Diagnosis for PVGP

Currently there is no diagnosis for PVGP in the DSM-IV-TR (APA, 2000), and there are a number of reasons for this absence. Aside from being a new phenomenon, there is much controversy regarding the conceptualization and operationalization of such a condition. For example, while some authors that believe that PVGP is most similar to substance abuse (Salguero & Moran, 2002; Grusser & Thalemann, 2006), others believe that PVGP is better conceptualized as belonging with impulse control disorders such as pathological gambling (Fisher 1994; Griffiths & Hunt, 1998; Grusser, Thalemann, Albercht, & Thaleman, 2005; Gupta & Derevensky, 1997; Salguero & Moran, 2002).

Finally, there are some who believe that PVGP is better explained as a product of individual difference variables such as poor time management skills and/or attention deficit symptoms (Tolchinsky & Jefferson, 2011; Wood, 2008). To better understand the current theories used to conceptualize this phenomenon, we must first explore each individually in depth.

Comparing PVGP to substance abuse. PVGP has been conceptualized as being similar to substance abuse and dependence in that it has been found to lead to the development of tolerance, withdrawal, increasing use, unsuccessful efforts to stop, and the cessation of previously enjoyed and important activities (Grusser & Thalemann, 2006; Salguero & Moran, 2002).

However, despite these similarities, it is important to note that they differ in one very important regard: Problematic gaming causes all of the aforementioned behavioral problems without the consumption of any substances. Thus, there is no foreign chemical agent that drives this process, and no physical addiction. Another major difference is that playing video games has become a widely accepted means of entertainment for children and adolescents, whereas the use of substances as a child or adolescent is both illegal and socially frowned upon.

Comparing PVGP to impulse control disorders, specifically pathological gambling. As mentioned previously, most researchers conceptualize PVGP as being akin to impulse control disorders (Fisher, 1994; Griffiths & Hunt, 1998; Grusser et al., 2005; Gupta & Derevensky, 1997; Salguero & Moran, 2002; Wood, Gupta, Derevensky, Griffiths, 2004b). Impulse control disorders can be loosely defined as a failure to resist a highly reinforcing behavior that may be harmful to self or others. Currently, there are

several disorders that have been placed into this category. These disorders include intermittent explosive disorder, kleptomania, pathological gambling, pyromania, and trichotillomania.

More specifically, recent research has compared PVGP to pathological gambling (Jogansson & Gotestam, 2004). Both pathological gambling and PVGP have much in common. For example, Griffiths and Wood (2000) suggest that slot machine gambling and video gaming are similar in terms of both their psychological and behavioral impacts. Both forms of entertainment use similar intermittent reinforcement schedules (e.g., money and points are frequently used as prizes) augmented by captivating light, color, and sound displays. Although the behaviors are similar, the negative consequences tend to differ in terms of severity. Unlike pathological gambling, excessive video game play does not typically require significant financial investment and is not known to cause marked legal or rapidly occurring financial problems.

Although substantial financial investment is not required during most gaming as opposed to gambling, excessive video game play can still cause problems at work due to neglecting sleep, missing workdays, and overall lower productivity. These events may eventually lead to an employee losing her/his job, which can precipitate serious long-term financial difficulties (Chappell, Eatough, Davies, & Griffiths, 2006; Griffiths, Davies, & Chappell, 2004; Salguero & Moran 2002).

Finally, video games differ conceptually in that they are considered to be games of skill whereas gambling is a game of chance (Griffiths, 2005). Although individuals learn skills while gambling, ultimately the outcome is left to chance, which is always in the favor of the sponsors of the gambling venue. In other words, video game players

consistently improve their skills and, as a result, experience success more regularly as their skills increase. Thus, the reinforcement schedule is potentially stronger for video games than gambling.

Comparing PVGP to other "cyber disorders." Although the literature would suggest that PVGP is most similar to pathological gambling, there is a growing body of literature that supports the idea that PVGP belongs in a distinct category of disorders called cyber disorders (Young, 1996; Young, Pistner, O'Mara, & Buchanan, 1999). This group of disorders is characterized by excessive or problematic use of the Internet in many different forms. These forms include the following conditions: cybersexual addiction; addiction to cyber-relationships or social networking; net compulsions such as online gambling, shopping, and stock trading; compulsive web surfing; and, finally, obsessive computer game playing (Young, 1996). Clearly the latter would apply most directly to PVGP.

The main criticism of labeling PVGP a cyber disorder is that while all cyber disorders require some form of Internet activity, not all video game players play games online (ESA, 2012). Keeping this in mind, it would be more accurate to place PVGP in a group of disorders called technological addictions. Widyanto and Griffiths (2006) present the most general definition of this construct as a non-chemical or behavioral addiction that involves human-machine interaction. These addictions can either be passive, such as viewing television, or active, such as playing computer games or texting (Widyanto & Griffiths, 2006).

Argument for and Against Including PVGP in DSM – V

As mentioned previously, researchers have found evidence of negative consequences of PVGP behaviors (Salguero & Moran, 2002; Gentile 2009). Some countries have opened specialized clinics to treat a variety of technological addictions including PVGP. The existence of such clinics and the recent increases in the incidence of cyber disorders and technological would support the need for such diagnoses in the DSM – V (Young et al., 1999).

Although Wood (2008) acknowledges that some individuals experience significant social and psychological difficulties concomitant with PVGP, he argues that this association is spurious (i.e., both PVGP symptoms and the other problems in living are caused by characteristics within these individuals rather than the games they play). Wood et al. basically assert that no particular feature of video games nurtures addictive patterns of behavior (Wood, Griffiths, Chappell, & Davies, 2004a); rather, PVGP symptoms result from poor time management skills (Wood, 2008). Thus, individuals who show signs of PVGP are actually individuals who simply fail to prioritize their daily activities efficiently and, as a result, show signs of dysfunction in their lives. Support for this view can be gleaned from the work of Tolchinsky and Jefferson (2011), who found that time management skills moderated the association between the number of hours male respondents reported playing video games and PVGP behaviors.

Although there are divided camps regarding the validation of PVGP as a diagnosable disorder, the current plan for the proposed DSM-V is to consider PVGP as a phenomenon that requires further research to substantiate its existence as a clinically relevant syndrome (APA, 2013).

Assessment of PVGP

PVGP is a relatively new phenomenon that has not been researched extensively, especially in regard to assessment. Current instruments rely primarily on self-report and, as with other addictive or impulse control disorders, self-report methods of assessment can be problematic and unreliable. Additionally, current assessment tools use somewhat varied criteria for determining whether or not playing behaviors are problematic or excessive.

Assessment of Related Disorders

Pathological gambling. As mentioned earlier in this work, PVGP has been conceptualized as being considerably similar to pathological gambling (Griffiths & Wood, 2000; Jogansson & Gotestam, 2004). The evaluation of behaviors and symptoms is typically carried out in a multi-modal approach (Raylu & Oei, 2002) that includes self-report, collateral report, and direct observation. Strikingly, this multi-modal approach has not been replicated for the evaluation of PVGP. Perhaps this is a result of there being no unanimous consensus in regard to the conceptualization of PVGP, or possibly this is simply a result of this area of research being in its infancy.

Cyber disorders. As previously stated, PVGP is sometimes conceptualized as being similar to cyber disorders (Young, 1998), irrespective of the fact that not all video game players do so online (ESA, 2012). Currently cyber disorders are being evaluated clinically mainly by self-report (Huang et al., 2006; Yoder, Virden, & Amin, 2005; Young, 1998; Zhou & Yang, 2006). The main exception to this trend is in the realm of Compulsive Cybersex Behavior (Schneider, 2003). This subtype of cyber disorder is one in which individuals communicate with others over the Internet in an intimate or sexual

nature. For this subtype of cyber disorder, often clinician use collateral reports. More specifically, they use the collateral reports of significant others and former significant others of the individual who is engaging in Compulsive Cybersex Behavior.

Current Assessment Instruments Used in PVGP Research

Few instruments have been thoroughly examined, and, therefore, they lack support in regard to psychometric properties. Moreover, there needs to be considerably more research in regard to the conceptualization and diagnosis of PVGP to illuminate specificity and sensitivity. The following are the most frequently used measures and also measures that show promise for future PVGP assessment.

Problematic Videogame Play (PVP). The PVP scale is a nine-item self-report measure derived from the DSM-IV criteria for pathological gambling and substance dependence which was administered to 223 Spanish adolescents ages 13-18 (Salguero & Moran, 2002). This measure evaluates preoccupation, tolerance, loss of control, withdrawal, escape, lies and deception, disregard for physical or psychological consequences, and family/school disruption with dichotomous “yes/no” answers. This measure has been shown to have a high internal consistency when administered to Spanish adolescents ages 13-18 (α =.69; Salguero & Moran, 2002), French children and adolescents ages 6-16 (α. =.79; Parker et al., 2008), and American adolescents and adults ages 14-18 and 23-55, respectively (α.=.69; Hart et al., 2009). In terms of convergent validity, this measure showed a significant positive relationship with the Severity of Dependence Scale (r = .47, p < .001; Salguero & Moran, 2002).

Video-Game Use (VGU). Created by Gentile (2009), the VGU is based on the previously discussed PVP scale (Salguero & Moran, 2002). This self-report instrument

consisted of 11 items to which respondents could endorse “yes,” “no,” or “maybe.” All items were based on the diagnostic criteria for pathological gambling (APA, 2000) and Brown’s (1991) core facets of addiction. These facets include salience, euphoria or relief, tolerance, withdrawal symptoms, conflict, and relapse and reinstatement. This instrument was tested on 1,178 Americans ages 8 to 18. Results from this study indicated an acceptable level of internal consistency (α =.78).

Problem Video Game Playing Test (PVGT). Created by King, Delfabbro, and Zajac (2011), the PVGT is an adaptation of the Likert type, 20-item, Internet Addiction Test (Young, 1998) with the addition of several items that related specifically to the conflicts caused by problematic patterns of play. Similar to the previously discussed measures, this instrument also uses items derived from Brown’s core facets of addiction (1991). One major difference between this measure and its predecessors is that items regarding criminal acts for the purpose of maintaining the problematic behavior were removed. The authors of this study argue that these items should be kept because they will potentially serve as an indicator of the severity of an individual’s PVGP. In other words, perhaps the most “high risk” or “problematic” players are ones who are willing to commit socially unacceptable and even punishable behaviors to continue their maladaptive patterns of video game play. This scale’s psychometric properties were examined by surveying two separate samples: 373 university video game players and 416 video game players from video game outlets and video gaming businesses (i.e., local area network gaming cafes). The results suggested high levels of internal consistency for both studies (α = .93, .92).

Although the aforementioned measures are the most replicated assessment instruments to date, they have some substantial problems that compromise their utility. First, these measures have several double-barreled questions in which an endorsement of "yes" or "always" does not lend any insight into the participant's problematic behaviors. For instance, in the PVP, one of the items states "When I feel bad, nervous, or angry, or when I have problems I use video games more often." In this case, endorsing "yes" could mean a number of things.

Another shortcoming of these instruments is that engaging in video game-playing behaviors is conceptualized as being both an antecedent and a consequence. In other words, playing video games is being used as a cause of dysfunction and also a result of other phenomenon such as mood alteration. This unfortunately contradicts the way PVGP has been conceptualized by several researchers in area of literature (Gentile, 2009; Hart et al., 2009; Tolchinsky & Jefferson, 2011; Wood, 2008), including the creators of this measure (Salguero & Moran, 2002). More specifically, the aforementioned authors are in consensus that PVGP behaviors are only the consequence or side effect of engaging in problematic patterns of play and not the cause.

Problematic Video Game Play (PVGP) scale. Created by Tolchinsky and Jefferson (2011), this measure was loosely based on the PVP scale created by Salguero and Moran (2002) called the Problematic Videogame Play scale. This measure also examines preoccupation, tolerance, loss of control, withdrawal, escape, lies and deception, disregard for physical or psychological consequences, and family/school disruption. This instrument was tested on 216 college students ages 18-48 (M = 23). The results of this study suggested that this measure has strong internal consistency (α =.92).

The new version was modified in several ways. First, all items were transformed from a "yes/no" dichotomy to a 5-point Likert-type scale (e.g., 1 = Never, 3 = Sometimes, 5 = Often). This was done to allow for more nuance in both participants' ability to respond to these items as well as examiners' ability to interpret responses to this measure. Second, all double-barreled questions were edited to ensure that the face validity of each item addressed only one theoretical construct at a time. Finally, some items were rephrased so that while playing video games was always the antecedent in each sentence, the negative effect of this behavior (e.g., poor hygiene, difficulty in school, social isolation, etc.) was always the consequence. For example, "When I feel sad, I play more video games" was changed to "When I play video games, my sadness goes away." Although this measure shows potential, there is still a need for replication because it is still new.

This leads us to the primary goal of this study. To further support the validity and reliability of the PVGP-R scale, this study was used to replicate the findings of the original work of Tolchinsky and Jefferson (2011), with the addition of several items based on recent findings in the literature (such as using video games for escape, sleep problems, physical problems, etc). A three-stage factor analysis was used to add to the credibility of this measure so that it can be used for future research in the area of problematic video game play.

Predisposing Factors for PVGP

Impulsivity. There is a dearth of research in the area of individual differences as they pertain to PVGP. For example, although impulsivity is likely positively correlated with PVGP, there is currently limited empirical support for this hypothesis. Lin and

Lepper (1987) found that among a sample of 210 fourth-, fifth-, and sixth-grade computer and video game users, video game usage was positively correlated with impulsivity. Tolchinsky and Jefferson (2011) found a similar association with a sample of college-age students. Although these studies alone do not imply causation, they serve as support that impulsivity is related to PVGP. These findings also lend more evidence to support that PVGP may indeed be classified as an impulse control disorder much like pathological gambling.

Absorption. The construct of absorption can be considered both a trait that one may possess or a state that occurs due to a particular situation or stimulus (Carleton, Abrams, & Asmundson, 2010). It is important to note that this construct is distinctly different from dissociation. Dissociation is considered to be a process in which there is disruption of one or more nominal integrated cognitive processes, such as those involving consciousness, memory, identity, or perception of the environment. Absorption, on the other hand, is a phenomenon in which, due to a focus on limited stimuli, other stimuli are not consciously perceived. Absorption is often used interchangeably with a construct called "flow" (Csikszentmihalyi, 1975). An example of absorption would be losing track of time or not being conscious of what is happening around you because you may be concentrating so intently on one thing (e.g., reading an engaging book) to the exclusion of all other stimuli.

Not surprisingly, absorption occurs when one engages in high stimulation activities such as video game playing (Wood et al., 2004a). Chou and Ting (2003) found that games that induce absorption or flow are associated with addictive or problematic forms of video game playing behaviors. However, currently there is only one study that

has explored specifically this area. Dauphin and Heller (2010) found that absorption as measured by the Tellegen Absorption Scale (TAS; Tellegen & Atckinson, 1974) did not have a statistically significant relationship with video game engagement. One possible reason for the lack of support for the relationship between the aforementioned phenomena was that it used an unstandardized instrument that evaluated many different areas of video game engagement, several of which pertained to playing preferences (i.e., first-person versus third-person, playing alone versus with others). Although this measure certainly uncovers stimulating qualitative data, it does not coincide with the aforementioned conceptualization of PVGP. Consequently, a secondary aim of the present study was to explore how trait measures of absorption relate to PVGP.

Environmental factors. Little is known about the predisposing environmental factors of PVGP. McClure and Mears (1984) found that children in their sample endorsed significantly more problematic behaviors as a result of video games if they endorsed a more tumultuous home environment. Similarly, Feng et al. (2003) found that children with family conflicts also played significantly higher levels of video games. This is commensurate with the findings that some children and adolescents play video games to escape from stress (Colwell, 2007; Wood et al., 2004b).

Wenzel, Bakken, Johansson, Gotestam, and Oren (2009) found that there are strong correlations between high level video game usage and certain environmental factors. More specifically, the results suggested that the level of an individual's subjective financial situation is strongly related to the level of said individual's video game play. Another study by King and Deflabbro (2009) found that in an Australian sample of 411 college-age individuals deemed "heavy" video game players, there was a

significant relationship between video game usage and lower physical functioning, mental health, vitality, and social functioning. The limitation of both of these studies is that they use merely video game use and did not explore these constructs with a measure of PVGP.

The aforementioned constructs support the hypothesis that quality of life measures are correlated with PVGP behaviors. By doing so, more information was uncovered about the potentially salubrious and detrimental correlates of video game play.

Comorbid Disorders

As mentioned earlier in this work, PVGP is a relatively new area of research. As a result, there is little that is known about problematic gamers and other comorbid disorders. The following is a summary of the findings thus far.

ADHD. Much like preliminary findings for Internet addiction (Yoo et al., 2004), traces of ADHD symptomology can be found for users who play video games (Chan & Robinowitz, 2006). This study found that in a sample of ninth- and tenth-graders, participants who played in excess of an hour a day had significantly higher levels of inattention, as reported by their parents using the Conners' Parent Rating Scale (Conners, Sitarenios, Parker, Epstein, 1998). Although this study does not offer proof of causation, it helps illustrate that the two phenomena have a relationship that calls for further study.

A study by Bioulac et al. (2008) compared the game-playing frequencies and problematic video game play behaviors of a sample of children age 6 to 16 years. This sample was divided into 29 children diagnosed with ADHD and 21 control children who did not meet criteria for ADHD. The results of this study indicated no significant differences between the two groups in duration or frequency of video game play.

Although time spent playing video games was very similar between the two groups, the ADHD group reported having significantly higher problematic video game play scores. The authors concluded that this might suggest that ADHD makes children more vulnerable to PVGP. Again, although this study does not necessarily suggest causation, it does warrant further research in the area.

Problem gambling. A study exploring the relationship between PVGP and problematic gambling behaviors in a sample of 676 Canadian participants 13-18 years of age yielded an interesting finding. The results of this study suggest that there is a statistically significant relationship between these two phenomena ($r = .30$, $p < .05$; Parker et al., 2008). Similarly, Wood et al. (2004b) found in that in a sample of 996 participants ages 10-17, problem gamblers were significantly more likely to play video games excessively than non-gamblers. Although these findings do not support a causal pathway, they suggest that there may be an overarching construct that makes children and adolescents more vulnerable to problematic forms of these behavioral patterns. It also provides more evidence that PVGP may have much in common with impulse control disorders such as PG.

Depression. A study by McClure and Mears (1985) found that video games offered players an escape from the pressures of everyday life. The literature also suggests that according to self-report, children and adolescents engage in these behaviors deliberately as a conscious coping mechanism for emotional difficulties they experience. Grusser et al. (2005) found that players who played excessively reported that they mainly engaged in this behavior because it was a means of coping with stress. According to Griffiths and Hunt (1995), participants in their study reported that they engaged in video

game play to change their negative mood into a positive one after having problems with their peers. Although these studies are somewhat anecdotal, they still offer some support that suggests that children and adolescents may be using video games to combat depressive symptomology.

Recently, there have been a small number of studies that have looked at this phenomenon empirically. Pezzeca (2009) found that when comparing a group of high usage video game players to low usage video game players, the higher usage group endorsed significantly higher levels of depressive symptoms and feelings of loneliness. It is important to note that this study was conducted with 160 male, college-age participants, which may compromise the generalizablility of these findings to general populations of gamers or to women.

A nationally representative study found similar results (Messias et al., 2011). The aforementioned researchers used the Youth Risk Behavior Survey (YRBS) collected during 2007 and 2009 (N = 14,041 and N = 16,410, respectively) to evaluate the relationship between high-level video game usage and depressive symptomology with a focus on suicidality. The findings suggest that there is a significant relationship between excessive video game usage and sadness, suicidal ideation, and suicide planning. Although this study was considerably representative of adolescents ages 14-18, it relied on merely the number of hours spent engaging in video game-playing behaviors.

One of the only longitudinal studies in the literature also suggested that there is a connection between PVGP and psychopathology. Gentile et al. (2011) followed a group of 3034 children in 3rd, 4th, 7th, and 8th grades for two years and surveyed several factors yearly from 2007 to 2009. Their findings suggested that there is a reciprocal relationship

between anxiety, depression, and social phobia. The authors stated, “Depression, anxiety worsen after a youth becomes a pathological gamer and improves if an individual stops being a pathological gamer” (p. 322). Although this evidence was important in adding to the field’s understand of the link between PVGP and psychopathology, it was only conducted with children and may lack the external validity to generalize to an adult population of video game players.

This leads us to the next goal of the proposed study. Another aim of the study was to further evaluate the relationship between PVGP and depressive symptomology. The few studies conducted in this area have relied solely on the number of hours spent engaging in video game play behaviors, which contradicts the most common conceptualization of this phenomenon. In other words, when exploring the relationship between problematic patterns of play and depression, the consequences associated with the phenomenon were overlooked. Therefore, this study surveyed a group of gamers using a scale first seen in Tolchinsky and Jefferson (2011), which measures the identified consequences of PVGP (Gentile, 2009; Salguero & Moran, 2002).

Anxiety. Depression and anxiety are often observed as being comorbid disorders (APA, 2000). As a result, there is good reason to believe that if there are preliminary findings between depression and PVGP, there may also be an association between anxiety and PVGP as well. The results from Gentile et al. (2011) would suggest similar findings. Additionally, a study conducted by Lo, Wang, and Fang (2005) examined the perceived quality of interpersonal relationships and levels of social anxiety among 174 college-age players of online games. Results from this study suggest that there is a statistically significant positive relationship between the level of social anxiety and the

amount of time spent playing video games. Similar to depression, the limited research in this area has relied solely on the actual number of hours played as opposed to the constellation of symptoms that are associated with PVGP.

Another study found similar results. Wenzel et al. (2009) conducted a study in which 3,405 Norwegian adult respondents reported their video game-playing behaviors and their endorsement of several psychological constructs. The findings of this study suggest that there is a positive relationship between how many hours participants reported playing video games each day and symptoms of anxiety, depression, substance abuse, and obsessive-compulsive tendencies. Although these findings are thought-provoking, it is important to note that, once again, these findings measure time spent playing video games rather than PVGP behaviors. The final goal of the study was to evaluate anxiety symptoms of participants in the study in relation to PVGP behaviors so that the findings correspond with the same conceptual framework previously discussed.

Hypotheses

1) The PVGP-R was expected to yield a psychometrically acceptable factor structure based on the data collected from stage one using an exploratory factor analysis procedure.

2) Through the use of a confirmatory factor analysis, the PVGP-R factor structure was expected to be replicated using the data collected during a second phase of data collection.

3) Absorption was expected be positively correlated with PVGP symptoms.

4) Quality of life was expected to be negatively correlated with PVGP symptoms.

5 & 6) PVGP was expected to be positively correlated with self-reported symptoms of both depression and anxiety.

Method

Participants

A portion of participants were recruited from Eastern Michigan University's undergraduate student population. Specifically, students were recruited from various disciplines and organizations across the EMU campus (e.g., psychology, engineering, computer science, and video game related clubs and events on campus). Additionally, the primary investigator recruited video game players from the Internet via video game related websites and social networking sites.

Procedure

For the initial phase of data collection, participants were approached via video game-related websites such as TwinGalaxies.com, Gamespot.com, and various video game-themed Facebook pages. For the second phase of data collection, the investigator used the web-based campus research site SONA to recruit undergraduate participants. Additional efforts included visiting selected classes in person and soliciting participation through direct appeal. In these aforementioned classes, the instructors were asked to disseminate information regarding the web-based link to access the survey. This study was presented as an exploration into video game-playing behaviors in a college population. The only eligibility criterion was that the participants had to acknowledge that they engaged in video-gaming behavior on at least a once-a-week basis. Regardless of the recruitment method, all participants completed the items of this study via the online survey program, SurveyMonkey.com. This method is considered to be an effective

means of studying video game players (Wood, Griffiths, & Eatough, 2004). We believed an additional benefit of this approach was that it might allow us to recruit problematic players who may not be willing to complete surveys in person. Finally, respondents were entered into a random drawing for a single $100 gift certificate for Amazon.com. The winner was determined by using a random number generator.

Measures

The literature in this area suggests that online versus paper-and-pencil versions of surveys have been generally found to be equally valid (Crawford, McCabe, & Pope, 2005; Huang, 2006). Consequently, this study used online versions of the following instruments:

Demographic questionnaire. This questionnaire assessed demographic information including but not limited to gender, ethnicity, age, socioeconomic status, years of education, current marital status, current employment status, economic status of current household, and annual household income (see Appendix A).

Video game usage questionnaire. This questionnaire was created to gather information regarding the average number of hours played per week, average duration of each playing session, what time of day the player typically plays, and an estimate of how much of each player's life is spent engaged in these games, preference for MMORPGs, preference for online interaction and playing games over real life interactions, and whether or not the participant identified as a "gamer" – i.e., someone who is an avid video game player (see Appendix B).

Tellegen Absorption Scale (TAS; Tellegen & Atckinson, 1974). The TAS is a 34-item measure that has been used to assess individuals' capacity for deep attentional

involvement in a task or stimuli. Items are scored on a Likert-type scale ranging from 0 (never) to 4 (always). In regard to psychometric properties, the TAS has exhibited acceptable test–retest reliability and internal consistency (α = .95; Kihlstrom, Register, Hoyt, & Albright, 1989). The average inter-item correlation was .37 (see Appendix C).

Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). The DASS assesses symptoms of depression, anxiety, and stress in adults. This assessment instrument consists of 42 items rated on a 4-point Likert-type scale, ranging from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). The scale has high internal consistency for the depression (α = .91), anxiety (α = .81), and stress (α = .89) scales and has shown substantial concurrent validity when compared to the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988) and the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, J., 1961; see Appendix D).

Manchester Short Assessment of Quality of Life (MANSA; Priebe, Huxley, Knight, & Evans, 1999). The MANSA is a shortened version of the Lancashire Quality of Life Profile (Oliver, Huxley, Priebe, & Kaiser, 1997; Van Nieuwenhuizen, Schene, Boevink, & Wolf, 1998). This instrument is normally administered as a structured interview and includes the individual's subjective rating of general life satisfaction as well as satisfaction concerning different quality of life domains: work, economic situation, social relations, leisure, housing situation, safety, people one lives with, sexual relations, and family relations. These 12 items reflect self-reported quality of life, and the ratings are made on a seven-point scale ranging from 1 = "couldn't be worse" to 7 = "couldn't be better." The mean ratings from the different domains form an overall quality

of life score. According to Depla, Graaf, and Heeran (2006), this instrument has been shown to possess sufficient internal consistency (α = .78; see Appendix E).

Problematic Video Game Play – Revised (PVGP-R). This measure is based on the original Problematic Video Game Play scale (Tolchinsky & Jefferson, 2011). It was altered by adding new items that pertain to the consequences of engaging in problematic video game play behaviors. Results from the original version of this measure supported strong internal consistency (α = .92; Tolchinsky & Jefferson, 2011).

Several items were added to evaluate the impact of problematic patterns of play on the video game player's physical well-being. This addition was made because recent studies have suggested that individuals who endorsed pathological levels of play had significantly higher self-reported levels of hand or finger pain and wrist pain than participants who were considered non-pathological gamers (Gentile, 2009). Additionally, Griffiths & Meredith (2009) suggests that PVGP can result in many health complications such as carpal tunnel syndrome, dry eyes, migraine headaches, backaches, and sleep disturbances.

One extra item was added to the scale as a result of recent findings regarding the role of time management skills and its relation to problematic video game play (Tolchinsky & Jefferson, 2011). More specifically, it is important to explore how a video game player sets limits on how much he/she engages in video game playing. For instance, setting boundaries based on reaching a certain goal is thought to be more problematic than setting time limits. This is mainly because individuals who are setting limits to their play as a function of reaching goals are behaving in a conceptually similar way to chasing behaviors seen in pathological gambling (See Appendix F).

This measure has a total of 35 items, which were administered using a 5-point Likert-type scale (e.g., 1 = Never, 3 = Sometimes, 5 = Often). The final level of problematic play was determined based on the sum of each participant's score. As mentioned earlier, this measure did not have a cut-off point originally, but as a result of this study, a preliminary cut-off point was found for both samples; the details of this selection process will be discussed in later sections of this paper.

Data Analysis

All descriptive statistics, t-tests, and simple correlations were analyzed using SPSS 17.0. Factor analyses were conducted using Mplus 7.0 (Muthen & Muthen, 2012). Data were cleaned and validated using the techniques described in Tabachnick and Fidel (2007). In order to assess the sampling accuracy, I administered Bartlett's test of sphericity and also the Kaiser-Meyer-Olkin measure of sampling adequacy to both samples collected.

Sample Size

The proposed study included two phases of recruitment. The first phase anticipated recruiting a minimum 300 participants to support adequate sampling size. The data from this wave were used to conduct an initial Exploratory Factor Analysis (EFA). Subsequent to this EFA, a Confirmatory Factor Analysis (CFA) was used to support the factor structure unearthed during the initial EFA. Subsequent to this CFA, data from a new sample of at least 300 participants were collected and used to replicate the results of preceding analyses.

The sample size for each wave was based upon three considerations. First, Comrey and Lee (1992) suggested that in order to have a "good" sample size for factor

analysis, the project should aim to recruit at least 300 participants for each of the two phases of recruitment. Second, Bryant and Yarnold (1995) suggest that the subject-to-variable ratio should be no less than 5:1. Finally, we also tried to generally approximate the sample sizes used in other studies on similar topics (Kestenbaum & Weinstein, 1985; King et al., 2011; Lin & Lepper, 1987; Salguero & Moran, 2002).

Factor Analyses

In order to further support the validity of the PVGP-R, a three-stage factor analysis was used for the proposed study. The initial EFA and the two proceeding CFA procedures used the recommended Weighted Least Squares Mean and Variance (WLSMV) estimation method (Muthen & Muthen, 2012). These types of estimation approaches were used because they are suggested to be most useful for Likert-type scales.

The EFA during the first stage made use of an oblique Geomin rotation because it is designed to minimize cross-loading, while alleviating interfactor correlation (Browne, 2001). In order to evaluate the model fit, I used Chi Square (χ^2), the Standardized Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and the Tucker Lewis Index (TLI) for the initial EFA. All of the aforementioned model fit indices were used for the CFA procedures that followed, with the exception of SRMR being replaced with the weighted root mean square residual (WRMR) as directed by Muthen and Muthen (2012).

A majority of the factor structure decision-making process for this study was statistical in nature. As suggested by Thompson and Daniel (1996), the number of factors that were chosen in the initial EFA and retested in the third stage CFA were determined based on four criteria: (a) magnitude of eigenvalues (Kaiser, 1950), (b) scree plot method

(Cattell, 1966), and (c) model of fit indices. Additionally, each factor must have had at least three items (Anderson & Rubin, 1956; Comrey, 1988; Cook et al., 1981; Costello & Osborne, 2005; Floyd & Widaman, 1995; Hinkin, 1995). Little weight was placed on theoretical consideration regarding factor solutions because PVGP is still a reasonably new phenomenon that has not been studied exhaustively. As mentioned earlier, there is still no overwhelming agreement regarding when PVGP patterns become pathological or clinically relevant. Additionally, there is still disagreement in the literature regarding typical factors, unlike traditional addictions, which involve the ingestion of substances (Brown, 1991).

Once a valid number of factors were chosen to extract, items were removed based on criteria in the following order: (a) items that have a loading of <.32 (Comrey & Lee, 1992) and (b) items that were found to have significant cross-loadings across factors (Norberg, Wetterneck, Sass, & Kanter, 2011; Raubenheimer, 2004).

The second stage of analysis used a CFA based on the adopted factor structure on the first set of data. The results of the CFA were analyzed using similar model of fit statistics as the aforementioned EFA. The main purpose of the second stage was to evaluate the model of fit indices post-item removal before continuing onto the third stage, which involved the second data set.

The third and final stage of the proposed study involved using the identified factor structure from the CFA in stage 2 to replicate the findings on a second group of participants. Additionally, construct validity was supported by analyzing the correlation between total PVGP-R scores and number of hours played weekly.

Results

Hypothesis 1

Using Mplus 7.0, an EFA was used to evaluate the factor structure of the PVGP-R on participants in phase one of data collection. As described in Tabachnick and Fidel (2007), tests of sampling adequacy were applied to data sample one and yielded results suitable for factor analysis. More specifically, the sample yielded a Kaiser-Meyer-Olkin value of .88 and a Bartlett's test of sphericity of (χ^2 (595) = 4388.81, $p<.001$), which suggests adequate sampling.

As mentioned in the methods section, we adopted a three-pronged strategy for identifying our factors. First, factors were extracted using the WLSMV method and the Oblique Geomin rotation. Thus, factors with eigenvalues greater than 1 were retained (Kaiser, 1960). Consequently, this method yielded a seven-factor solution (see Table 1 for eigenvalues).

Table 1

Eigenvalues for PVGP-R

Factor	1	2	3	4	5	6	7	8
Eigenvalue	12.25	3.12	2.51	2.19	2.03	1.82	1.03	.95

The second stage for the selection of the number of factors to extract consisted of identifying an appropriate factor structure based on Cattell's (1966) scree plot method. According to the scree plot, an "elbow" can be found at both factors two and seven (see Figure 1). Based on this method, the data would suggest either a one- or a six-factor structure.

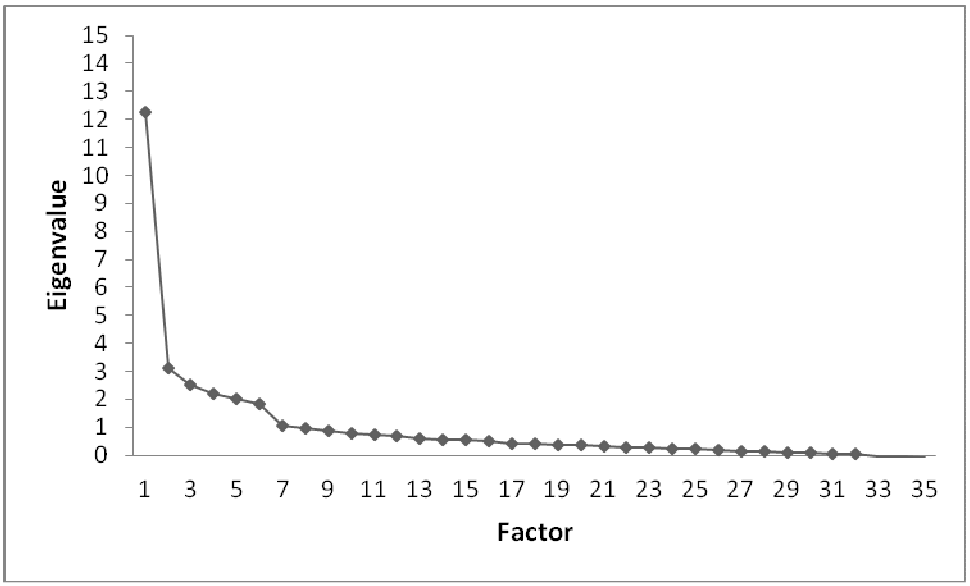

Figure 1. Scree Plot for PVGP-R

Finally, our factor winnowing process examined the model of fit statistics for these data. We used this method to examine the one-, six-, and seven-factor structures. Based on this method, a one-factor solution was ruled out because it did not have adequate indices of fit (χ^2 (560)=2030.07, *p<.001,* SRMR = .13, RMSEA = .10, CFI = .79, and TLI = .78 (see Table 2 for model of fit acceptable ranges). Therefore, the six- and seven-factors solutions were chosen to extract for further inspection.

Table 2

Model of Fit Indices and Acceptable Score Criteria

Model of Fit Indices	Acceptable Score Range
Chi Square (χ^2)	*p>.05*
Standardized Root Mean Square Residual (SRMR)	SRMR <.08
Weighted Root Mean Square Residual (WRMR)	WRMR<1.0
Root Mean Square Error of Approximation (RMSEA)	RMSEA <.08
Comparative Fit Index (CFI)	CFI >.90
Tucker Lewis Index (TLI)	TLI >.90

Note: All acceptable score range values were taken from Hu and Bentler (1999) and Yu (2002).

Initial exploration of the seven-factor solution produced adequate model of fit characteristics with the exception of χ^2 (χ^2 (371)=475.515, $p<.001$, SRMR = .04, RMSEA = .03, CFI = .99, and TLI = .98). Due to the large sample size and complexity of the model, little weight was placed on χ^2 in terms of guiding the factor solution process (Hu & Bentler, 1995; Norberg et al., 2011). In other words, due to the nature of the data sample, χ^2 is not considered an essential model of fit characteristic that should dictate the evaluation process of the aforementioned factor solutions. Upon evaluating the factor loadings, it quickly became apparent that in addition to needing to eliminate eight items based on the aforementioned item removal criteria, one factor consisted of only two items. These items included "Because of my video game playing, my wrist(s) hurt" and "Because of my video game playing, my hand(s) hurt." We endorse the view advanced by Comrey (1988) that factors consisting of only two items should be rejected because this lack of variables compromises the factor's overall stability. However, to avoid losing unique content in the measure, these items were investigated more thoroughly. Initial face validity of these items suggested that they ought to fall into a clustering of items related to physiological consequences of PVGP patterns.

Thus, when these two items were included in an analysis of a six-factor solution, not only did this analysis yield adequate model of fit characteristics (with the exception of χ^2)(χ^2 (400)=568.134, $p<.001$, SRMR = .05, RMSEA = .04, CFI = .98, and TLI = .96), but the aforementioned items loaded most strongly on a single factor with five other items that clearly tap a construct related to physiological dysfunction. Due to these promising findings, the six-factor model was analyzed further (See Table 3).

Table 3

Exploratory Factor Analysis Factor Loadings and Item Removal for PVGP-R Using WLSMV Extraction and Oblique Geomin Rotation Method for 6 Factor Solution

Factor	F1	F2	F3	F4	F5	F6
Factor 1 (F1): Psychological Dysfunction/Addiction Criteria						
1) When I am not playing video games, I keep thinking about games I have played	.80					
2) Because of my video game playing, I have spent less time with my friends and family ●	.48			.40		
3) When I can't play video games, I get irritable	.64					
6) I spend an increasing amount of time playing video games	.39					
11) When I am not playing video games, I am planning how I will play my next game	.68					
31) When I can't play video games, I get restless	.37					
Factor 2 (F2): Mood Regulation						
5) When I play video games, it makes my nervousness go away		.70				
9) When I play video games, it makes my anger go away		.63				
10) Because of my video game playing, I have missed meals ▲						
12) When I play video games, it makes my sadness go away		.82				
15) When I play video games, it makes my worries go away		.83				
Factor 3 (F3): Physical Dysfunction						
7) Because of my video game playing, my neck hurts			.70			
14) Because of my video game playing, my wrist(s) hurt			.55			
17) In order to play video games I have stolen ▲						
20) In order to play video games I get into arguments with people ●			.42	.35		
22) Because of my video game playing, I experience headaches			.70			
24) Because of my video game			.61			

playing, my hand(s) hurt				
27) Because of my video game playing, my eyes hurt or feel strained ●	.47			.43
30) Because of my video game playing, I experience migraines	.73			
32) Because of my video game playing, I have trouble falling asleep	.43			
34) Because of my video game playing, my back hurts	.67			
Factor 4 (F4): Concealing Behaviors				
13) I conceal my video game playing from my significant others		.80		
19) I conceal my video game playing from my parents●	.37	.45		
21) I conceal my video game playing from my friends		.50		
28) In order to play video games I have lied		.40		
29) I conceal my video game playing from my significant other (romantic partner)		.90		
Factor 5 (F5): Failure to Limit Play				
8) I have tried to stop playing video games			.54	
16) I have tried to cut back on playing video games			.91	
26) I have tried to control how much I play video games			.60	
Factor 6 (F6): Time Management Difficulties				
4) When I have not obtained the desired results while playing, I need to play again to achieve my target				.37
18) Because of video game playing, I have gone to bed late				.60
23) I play video games over a longer time period than I intended				.61
25) In order to play video games I have skipped class or work●	.43			.47
33) Because of video game				.52

playing, I have neglected my homework/schoolwork	
35) When I play video games, I play until I have reached my goal (for example, defeated a boss, finished a chapter, gained a level, acquired a special item) instead of setting a time limit	.53

Note 1: Factor loadings < .32 were removed for clarity
Note 2: Items were dropped from inclusion in the final version of this measure due to several criteria including the following: (1) if the item loaded significantly on two factors (denoted by "●" in this table), or (2) if the item loaded < .32 on all factors (denoted by"▲" in this table).

To summarize, a total of seven items were removed after our initial EFA was completed, based on the previously mentioned criteria (see Table 3). More specifically, five items were removed because they had significant cross-loadings, and two items were removed because they did not load significantly on any factors.

As mentioned in the methods section, Data Set 1 was then reanalyzed using a CFA to provide support by validating the psychometric properties of the adopted factor structure, which was updated as a result of the aforementioned item analysis. Results from these analyses generally yielded satisfactory findings; however, χ^2 was significant. This was not considered to be problematic in the current study because with larger sample sizes and greater factor complexity (as is the case with the current project), this statistic is commonly significant and not thought to be problematic (Hu & Bentler, 1999; Norberg et al, 2011; χ^2 (335)=1398.48, $p<.001$, WRMR = .92, RMSEA = .06, CFI = .92, and TLI = .92). Additionally, the factor intercorrelations for this nascent measure were theoretically consistent with the oblique rotational methods used in the EFA upon which these results were based (Tabachnick & Fiddell, 2007; see Table 4).

Factors were named based on the interpretation of each factor's item themes. Factor one contained five items (see Table 3) and was named "Psychological

Dysfunction/Addiction Criteria" because it contained items similar to the following traditional addiction criteria: withdrawal (i.e., "When I can't play games, I get irritable"), tolerance (i.e., "I spend increasing amount of time playing video games"), and preoccupation (i.e., "When I am not playing video games I keep thinking about games I have played"). Based on the results, this factor accounted for 40.32% of the variance and appeared to have acceptable internal consistency (α=.80).

Factor two consisted of four items and was named "Mood Regulation" because all of the remaining items queried a common theme of using video game play as a means of reducing negative emotions. Sample items from this factor include: "When I play video games, it makes my nervousness go away" and "When I play video games, it makes my anger go away." This factor accounted for 10.37% of the data's variance and had adequate internal consistency (α=.85).

Factor three consisted of seven items (see Table 3) and was named "Physical Dysfunction" because all of the items in this subscale tapped a general construct related directly to the negative physiological consequences respondents acknowledged experiencing as a consequence of playing video games. Representative items from this factor included the following: "Because of my video game playing, my neck hurts," and "Because of my video game playing, I have headaches." This factor accounted for 8.21% of the variance and had acceptable internal consistency (α=.84).

The fourth factor consisted of four items (see Table 3) and was named "Concealing Behaviors" because all of the items related to deceiving others or concealing the fact that one plays video games. Sample items from this subscale included the following: "I conceal video game playing from my significant others," and "In order to

play video games, I have lied." This factor accounted for 7.51% of the overall variance and also had acceptable internal consistency (α=.83).

Factor five included three items (see Table 3) and was named "Failure to Limit Play" because all of the items pertained to an inability to limit the amount of time spent engaging in video game-playing behaviors. Representative items from this factor included such statements as the following: "I have tried to cut back on playing video games," and "I have tried to stop playing video games." This factor accounted for 5.83% of the total variance and had an adequate internal consistency (α=.76).

The sixth and final factor was reduced to five items (see Table 3) and was named "Time Management Difficulties." Sample items of this factor included statements such as, "Because of video game playing, I have gone to bed late," and "I play video games over a longer time period than I intended." This factor seemed to tap a general theme related to a respondent endorsing that she/he experiences difficulties with time management related to video game-playing behaviors. This final factor accounted for approximately 5.12% of the overall variance and possessed an acceptable level of internal consistency (α=.76). Consequently, these results support our first hypothesis, that the PVGP-R exhibits a psychometrically sound factor structure. Further, these findings justified the collection of a second set of data for further factor analytic consideration (i.e., Phase 3 of this study).

Table 4

Factor Intercorrelations and Descriptives for PVGP-R factors and Their Relation to TAS, MANSA, and DASS Subscales in Data Set 1

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1.PVGP-R sum scores	(.91)	-	-	-	-	-	-	-	-	-	-	-
2.PVGP-R psychological symptoms	.78***	(.80)	-	-	-	-	-	-	-	-	-	-
3.PVGP-R Mood Regulation	.72***	.54***	(.85)	-	-	-	-	-	-	-	-	-
4.PVGP-R Physiological Symptoms	.73***	.41***	.33***	(.84)	-	-	-	-	-	-	-	-
5. PVGP-R Concealing	.67***	.48***	.33***	.47***	(.83)	-	-	-	-	-	-	-
6.PVGP-R Failure to Limit Play	.64***	.35***	.35***	.41***	.37***	(.76)	-	-	-	-	-	-
7.PVGP-R Time Management Difficulties	.76***	.42***	.42***	.42***	.41***	.34***	(.76)	-	-	-	-	-
8.Absorption (TAS)	.36***	.24***	.24***	.28***	.17*	.22**	.28***	(.96)	-	-	-	-
9.Quality of Life (MANSA)	-.09	-.11	-.07	-.03	-.03	-.06	-.10	-.06	(.84)	-	-	-
10. Depression (DASS)	.21**	.13*	.20**	.13*	.20**	.07	.05	.20**	-.59***	(.96)	-	-
11. Anxiety (DASS)	.32***	.17**	.30***	.35***	.17**	.18**	.02	.36***	-.36***	.61***	(.90)	-
12. Stress (DASS)	.32***	.16*	.31***	.31***	.20**	.15*	.09	.25***	-.30***	.60***	.68***	(.94)
M	51.98	8.80	8.44	10.14	5.19	5.32	14.29	83.35	5.17	20.15	19.01	21.89
SD	14.58	3.26	3.95	4.14	2.29	2.61	4.05	27.03	.78	8.61	6.71	8.78

Note: Internal consistency coefficients (α) displayed in diagonal. *p < .05. **p <.01. ***p <.001.

Hypothesis 2

Before completing the final step of this study, the second data set (Data Set 2) was validated regarding adequate sampling—i. e., a Kaiser-Meyer-Olkin value of .89 and a Bartlett's test of sphericity of (χ^2 (378) = 4765.303, p<.001) were indicative of adequate sampling. The final analysis involved testing the adopted factor structure from our analysis of Data Set 1 and verifying this structure using a CFA on responses from Data Set 2.

Confirmatory factor analysis of Data Set 2 revealed that the factor structure stayed intact and that all of the aforementioned indices of model fit (except for χ^2) were validated. More specifically, χ^2 (335) = 926.16, p<*.001*, WRMR = .91, RMSEA = .07, CFI = .93, and TLI = .92. Similar to the previous factor analyses, χ^2 was not used for testing the hypothesis due to the size of our sample and the number of factors in this analysis (Hu & Bentler, 1999; Norberg et al., 2011). These findings support Hypothesis 2, that the factor structure of the PVGP-R could be replicated using a second sample. Again, as was found with Data Set 1, the factor intercorrelations for Data Set 2 were also consistent with the theoretical assumptions of oblique rotational methods from which this factor structure was derived (Tabachnick & Fiddell, 2007; see Table 5).

Table 5

Factor Intercorrelations and Descriptives for PVGP-R factors and Their Relation to TAS, MANSA, and DASS Subscales in Data Set 2

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. PVGP-R sum scores	(.91)	-	-	-	-	-	-	-	-	-	-	-
2. PVGP-R psychological symptoms	.81***	(.78)	-	-	-	-	-	-	-	-	-	-
3. PVGP-R Mood Regulation	.73***	.57***	(.84)	-	-	-	-	-	-	-	-	-
4. PVGP-R Physiological Symptoms	.79***	.52***	.39***	(.87)	-	-	-	-	-	-	-	-
5. PVGP-R Concealing	.65***	.52***	.35***	.51***	(.78)	-	-	-	-	-	-	-
6. PVGP-R Failure to Limit Play	.60***	.38***	.39***	.38***	.36***	(.78)	-	-	-	-	-	-
7. PVGP-R Time Management Difficulties	.72***	.55***	.46***	.43***	.26***	.27***	(.80)	-	-	-	-	-
8. Absorption (TAS)	.48***	.38***	.49***	.29***	.19***	.28**	.41***	(.95)	-	-	-	-
9.Quality of Life (MANSA)	-.04	-.07	-.11	-.06	-.04	-.02	-.09	-.05	(.87)	-	-	-
10. Depression (DASS)	.31***	.27***	.23***	.29***	.24***	.13*	.16**	.30***	-.53***	(.95)	-	-
11. Anxiety (DASS)	.30***	.21***	.18**	.34***	.22***	.20***	.11*	.34***	-.40***	.64***	(.90)	-
12. Stress (DASS)	.29***	.17**	.24***	.29***	.18**	.13*	.16**	.34***	-.43***	.70***	.76***	(.95)
M	56.48	8.94	9.53	11.50	5.71	5.85	15.08	87.10	5.02	21.67	20.54	23.95
SD	16.35	3.34	3.91	5.15	2.75	2.87	4.46	27.70	.94	9.24	7.27	10.24

Note: Internal consistency coefficients (α) displayed in diagonal. *p < .05. **p <.01. ***p <.001.

Construct Validity for PVGP-R

As mentioned in the methods section, PVGP-R sum scores were correlated with the average number of hours spent playing video games weekly to establish preliminary evidence for construct validity. The findings from Data Set 1 suggested that PVGP-R sum scores are positively correlated with the self-reported total number of hours of video games played weekly for both men (r = .28; p <.001) and women (r = .42; p <.001). Similarly, the positive relationship was replicated in Data Set 2 for both men (r = .35, p < .001) and women (r = .38; p < .001).

Correlational Hypotheses

It is important to note that the correlational hypotheses of this study were evaluated in both Data Sets 1 and 2, using the final scoring method identified through our iterative process of factor analysis. This was done to further replicate and validate the final version of the PVGP-R.

Data Set 1.

Demographics. A total of 329 participants were recruited from various gaming websites and Facebook fan pages for Data Set 1. After data cleaning, 314 participants remained: 203 males and 111 females. Notably, this gender ratio is commensurate with national gaming statistics for gamers over age 18 (ESA, 2012). The mean age for this sample was 25.4 years (SD = 6.5). For information regarding the racial breakdown of participants in this study, please see Table 6.

Table 6

Racial Distribution in Data Set 1

Racial Group	Percentage in Sample
White/European American	73.5%
African American	10.4%
Asian American	7.8%
Latino/Hispanic	3.9%
Arabic	2.6%
Native American	1.0%
Other	1.0%

The subjects of this study were 73.5% White/European American, 10.4% African American, 7.8% Asian American, 3.9% Latino/Hispanic, 2.6% Arabic, 1% Native American, and 1% other. It is noteworthy to mention that although these participants were recruited via the Internet, a vast majority of participants had completed at least a high school education (98%).

Gender differences in video game-playing patterns. Previous research suggests that there are substantial gender differences with regard to video game-playing behaviors (Elliot, Golub, Ream, & Dunlap, 2012; King et al., 2011; Tolchinsky & Jefferson, 2011; Williams, Consalvo, Caplan, & Yee, 2009). The current study supports these differences and used several t-tests to substantiate the statistically significant discrepancies between the two subgroups. For instance, men (M = 14.48 hours, SD = 12.61) in this study reported playing significantly more hours of video games weekly than women (M = 8.89 hours, SD = 10.47; $p < .001$) and have been doing so for far longer (Men, M = 17.71 years, SD = 6.87; Women, M = 12.61, SD = 7.09; $p < .001$). In regard to the number of video game-playing sessions, men (M = 7.16 sessions, SD = 7.01) played significantly more times during an average week than women (M = 4.79 sessions, SD = 4.6; $p < .01$). The length of a typical session also varies, with men (M = 2.56 hours, SD = 1.63) playing

significantly longer than women (M = 2.04 hours, SD = 1.52; $p < .01$). Additionally, it is noteworthy to mention that men (M = 54.06, SD = 14.57) and women (M = 48.89, SD = 13.80) varied significantly on their PVGP-R total sum scores ($t(312)= 2.67$, $p<.05$). Further evaluation of this discrepancy using Levene's test for equality of variance produced non-significant results suggesting that men and women both respond to the PVGP-R in similar patterns but at different rates.

How male and female participants ranked their preferred video game format also differed between these groups. Out of a total of eight choices, the largest percentage of women in the sample (37.8%) reported that they prefer single player console games over other formats. This contrasted with what men in the sample ranked as the most popular gaming format: online console games (i.e., 27.3% of all men in this sample ranked this the highest). There were also some differences in regard to genre preference. Out of nine possible choices, the most popular genres for men included role-playing games (32.4%), first person shooter games (27.0%), and sports games (13.5%), whereas women preferred role-playing games (25.3%), puzzle games (25.3%), and adventure games (12.1%). It is important to note that although the second and third most common choices of preference were different, it appears that men and women in this sample still prefer role-playing games over the other video game genres.

Due to the current and previous research findings that consistently support the existence of significant gender differences in video game play patterns, unless otherwise specified, all subsequent analyses relating to video game usage patterns or the correlational hypotheses of this study were split based on gender. Although we believe that our measures are valid for both men and women, we also believe that the outcomes

for these groups may vary sufficiently that performing our analyses for these respective gender groups should better capture a more accurate picture of the phenomena of interest.

Hypotheses 3-6. The findings for men and women in our first sample were mixed. As predicted in Hypothesis 3, there was a significant positive correlation between PVGP-R scores and deep attentional involvement for subgroups of both men ($r = .30$; $p < .001$) and women ($r = .46$; $p < .001$). In other words, endorsing higher levels of problematic play appears to be associated with experiencing higher levels of mental absorption, irrespective of gender. Contrastingly, with regard to the association between PVGP-R scores and negative affect, an initial gender difference was found. That is, a significant positive correlation was found between PVGP-R scores and both self-reported symptoms of depression ($r = .29$; $p < .001$) and anxiety ($r = .46$; $p < .001$) for men; but the correlations between PVGP-R and both depression ($r = .17$; $p > .05$) and anxiety ($r = .18$; $p > .05$) for women were not significant. This discrepancy between men and women suggests that moderation may be occurring; however, this could not be determined through tests of simple correlation. Thus, formal tests of moderation were performed to substantiate the potential gender discrepancies regarding the relationship between PVGP-R and both depression and anxiety, respectively. Moderation was tested using the methods proposed by Frazier, Tix, and Barron (2004). First, the PVGP-R sum scores were converted into a z-score. Next, gender was "dummy coded." After this, an interaction term was created by multiplying the standardized PVGP-R scores by the dummy coded gender variable. The data were then analyzed using a two-step, hierarchical regression (this regression was performed twice: once with depression as the dependent variable and once with anxiety as the dependent variable). Specifically, for our

analysis with depression as the dependent variable, we formatted our first step of the two-step regression by including both the dummy-coded gender variable and the standardized PVGP-R scores as our predictor variables. For the second step of this regression, we added the interaction term that was created for this analysis. The results of this regression revealed that gender does not in fact act as a moderator between PVGP-R and depression (see Table 7 & 8 for relevant statistics).

Table 7

Test of Gender as a Moderator Between PVGP-R Sum Scores and Depression (DASS)

Dummy coding (women coded 0, men coded 1)

Step and Variable	*B*	*SE B*	*B*	R^2
Step 1				
PVGP-R	.08	.05	.17	
Gender	-3.39	3.91	-.87	.07**
Step 2				
PVGP-R X Gender	.06	.07	.24	.07

Note. ** $p < .01$.

Table 8

Test of Gender as a Moderator Between PVGP-R Sum Scores and Depression (DASS)

Dummy coding (women coded 1, men coded 0)

Step and Variable	*B*	*SE B*	*B*	R^2
Step 1				
PVGP-R	.14	.04	.30***	
Gender	3.39	3.91	.21	.07**
Step 2				
PVGP-R X Gender	-.06	.07	-.21	.07

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

Identical procedures were used to explore the moderating effects of gender on the relationship between PVGP-R scores and anxiety. The results of this analysis offered

only marginally significant support for the hypothesis that gender moderates the association between PVGP-R scores and anxiety ($p = .07$; see Tables 9 & 10 for additional moderation statistics).

Table 9

Test of Gender as a Moderator Between PVGP-R Sum Scores and Anxiety (DASS)

Dummy coding (women coded 0, men coded 1)

Step and Variable	*B*	*SE B*	*B*	R^2
Step 1				
PVGP-R	.07	.04	.20	
Gender	-7.28	2.99	-.56*	.15***
Step 2				
PVGP-R X Gender	.09	.05	.47	.16

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

Table 10

Test of Gender as a Moderator Between PVGP-R sum scores and Anxiety (DASS)

Dummy coding (women coded 1, men coded 0)

Step and Variable	*B*	*SE B*	*β*	R^2
Step 1				
PVGP-R	.16	.03	.45***	
Gender	7.28	2.99	.56*	.15***
Step 2				
PVGP-R X Gender	-.09	.05	-.42	.16

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

Additionally, although not a specific hypothesis of the current study, self-endorsed levels of stress were found to be significantly correlated with PVGP behaviors for both men ($r = .33$; $p < .001$) and women ($r = .34$; $p < .01$; see Table 11 for descriptive information). Finally, quality of life ratings were not found to be significantly associated with PVGP-R for men ($r = -.14$; $p > .05$) or women ($r = -.15$; $p > .05$).

Table 11

Summary of Intercorrelations and Descriptives for PVGP-R, TAS, MANSA, and DASS in Data Set 1

Note: Internal consistency coefficients (α) displayed in diagonal. *p < .05. **p <.01. ***p <.001

Data Set 1								
				Men				
Measure	1	2	3	4	5	6	M	SD
1. PVGP-R sum scores	(.91)	-	-	-	-	-	54.06	14.57
2. Absorption (TAS)	.30***	(.96)	-	-	-	-	82.83	27.05
3. Quality of Life (MANSA)	-.14	-.07	(.84)	-	-	-	5.21	.72
4. Depression (DASS)	.28**	.28**	-.52***	(.96)	-	-	19.88	8.04
5. Anxiety (DASS)	.46***	.41***	-.26**	.54***	(.90)	-	18.33	6.21
6. Stress (DASS)	.32***	.23**	-.28**	.63***	.67***	(.94)	20.99	7.68
				Women				
Measure	1	2	3	4	5	6	M	SD
1. PVGP-R sum scores	(.93)	-	-	-	-	-	48.89	13.80
2. Absorption (TAS)	.46***	(.94)	-	-	-	-	85.76	28.59
3. Quality of Life (MANSA)	-.15	-.15	(.87)	-	-	-	5.12	.77
4. Depression (DASS)	.17	.15	-.59***	(.95)	-	-	20.41	8.89
5. Anxiety (DASS)	.18	.33**	-.40***	.69***	(.92)	-	20.22	7.26
6. Stress (DASS)	.34**	.27*	-.39***	.63***	.70***	(.91)	23.90	10.39

Data Set 2

Demographics. A total of 396 participants were recruited in Sample 2. This was a convenience sample collected from a midsized Midwestern university. After data cleaning, 375 participants remained (214 males and 161 females). Much like the participants from Sample 1, this gender ratio was also somewhat similar to national gaming statistics for gamers over the age of 18 (ESA, 2012). The mean age for this sample was 20.9 years (SD = 4.80). For information pertaining to racial background, see Table 12.

Table 12

Racial Distribution in Data Set 2

Racial Group	Percentage in Sample
White/European American	62.1%
African American	22.6%
Asian American	3.2%
Latino/Hispanic	2.4%
Arabic	1.1%
Native American	1.1%
Other	5.3%

Gender differences in video game-playing patterns. According to our analyses, men (M = 11.52 hours, SD = 10.15) play significantly more hours of video games weekly than women (M = 7.47 hours, SD = 7.88; $p < .01$) and have a longer history of playing (Men, M = 13.61 years, SD = 5.10; Women, M = 10.36 years, SD = 5.38). In regard to the number of video game-playing sessions, men (M = 6.70 sessions, SD = 8.74) played significantly more times during an average week than women (M = 4.19 sessions, SD = 3.21; $p < .01$). The length of a typical session also varied, with men (M = 2.63 hours, SD = 3.28) playing significantly longer than women (M = 1.96 hours, SD = 1.42; $p < .05$). Similar to Data Set 1, there was a statistically significant difference between men (M = 58.12, SD = 15.90) and women (M = 54.33, SD = 16.72) on the PVGP-R ($t(373)= 2.21$, $p<.05$). As with Sample 1, Levene's test suggested that the variance between these subgroups was non-significant.

Much like the first sample, the methods by which participants reported playing video games varied drastically by gender. In the second sample, out of eight possible methods, 39.8% of women preferred single player console games, whereas for men, the most common response was online console games, with 36.3% of total responses. The

results from the second sample also suggested that there are gender differences regarding genre preferences. From a choice of nine different genres, the most popular genres for men included sports games (30.7%), first person shooter games (25.9%), and role-playing games (23.1%), whereas women preferred puzzle games (18.6%), adventure games (17.4%), and role-playing games (16.8%). Interestingly, it appears that similar to the Data Set 1, role-playing games are still in the top three most preferred game genres for both men and women.

Hypotheses 3-6. Many of the findings from the analysis of Sample 1 were replicated in Sample 2. As postulated in Hypothesis 3, there was a statistically significant positive correlation between PVGP and absorption for both women ($r = .49$; $p < .001$) and men ($r = .47$; $p < .001$). In other words, higher levels of problematic play symptoms are typically accompanied by higher levels of the tendency to be able to focus on certain stimuli to the exclusion of other; and this correlation was significant for both men and women. With regard to Hypothesis 4, no significant correlation was found between quality of life scores and PVGP symptoms for either women or men. Based on these results, quality of life has no meaningful relationship with PVGP for all participants in this study. Unlike the findings from Data Set 1, results from Data Set 2 suggest that there is a statistically significant positive relationship between PVGP and self-reported scores of depression for both men ($r = .41$; $p <.001$) and women ($r = .23$; $p <.01$). Regarding our last hypothesis, our analyses indicated that there is a statistically significant positive relationship between PVGP and self-reported scores of anxiety for both women ($r = .25$; $p <.01$) and men ($r = .41$; $p <.001$). Although not a specified hypothesis, the findings also suggested that self-endorsed levels of stress yielded a statistically significant

relationship with PVGP behaviors for both men (r = .41; p < .001) and women (r = .20; p < .05; See Table 13 for descriptive information).

Table 13

Summary of Intercorrelations and Descriptives for PVGP-R, TAS, MANSA, and DASS in Data Set 2

Data Set 2								
				Men				
Measure	1	2	3	4	5	6	M	SD
1. PVGP-R sum scores	(.92)	-	-	-	-	-	58.12	15.90
2. Absorption (TAS)	.47***	(.95)	-	-	-	-	88.26	27.37
3. Quality of Life (MANSA)	-.12	-.16*	(.87)	-	-	-	5.08	.88
4. Depression (DASS)	.41***	.37***	-.53***	(.95)	-	-	21.23	8.41
5. Anxiety (DASS)	.38***	.45***	-.38***	.64***	(.90)	-	19.95	6.78
6. Stress (DASS)	.41***	.41***	-.46***	.64***	.71***	(.95)	22.61	9.46
				Women				
Measure	1	2	3	4	5	6	M	SD
1. PVGP-R sum scores	(.90)	-	-	-	-	-	54.33	16.72
2. Absorption (TAS)	.49***	(.93)	-	-	-	-	85.55	28.15
3. Quality of Life (MANSA)	-.07	.01	(.85)	-	-	-	4.93	1.02
4. Depression (DASS)	.23**	.24**	-.53***	(.93)	-	-	22.25	10.25
5. Anxiety (DASS)	.25**	.23**	-.42***	.63***	(.93)	-	21.35	7.82
6. Stress (DASS)	.20*	.28***	-.38***	.74***	.79***	(.92)	25.74	10.99

Note: Internal consistency coefficients (α) displayed in diagonal. *p < .05. **p <.01. ***p <.001

Preliminary Analysis of Cut-off Scores

An additional strategy that could make this scale more useful would be to establish cutoff scores that indicate gradients of symptom severity or seriousness. Unfortunately, the literature on this scale is nascent, and a formal diagnostic category for problematic play did not exist in the DSM – IV - TR (APA, 2000) and is being labeled as "Internet Gaming Disorder" in the "conditions for further study" in the DSM-V (APA, 2013). As a result of the lack of an official diagnosis, information regarding national diagnostic statistics does not exist.

A promising a priori method that might serve as an initial means of determining cutoff scores for clinical vs. sub-clinical levels of problematic play with this scale might be to use prevalence statistics from similar studies on this topic. As mentioned in the introduction, similar studies of problematic video game-playing behaviors have found that between 8 and 11% of their samples qualified as "pathological" (Gentile, 2009; Gentile et al., 2011; Lemmens et al., 2009; Phillips et al., 1995; Salguero & Moran, 2002). These percentages likely vary because each of these studies used varied inclusion criteria as they attempted to identify "pathological players." However, the range seems relatively narrow. Thus, it seems reasonable to speculate that examining individuals who score at the 90th percentile (i.e., the average of percentile ranges uncovered by previous research on this topic) to see if this score distinguishes clinically significant problematic play from sub-clinical levels would be an excellent first step in determining cutoff for this scale.

Using this approach with Data Set 1 and the revised total scale score from our newly revised PVGP-R, we found that the 90th percentile for women and men in this sample was 68 and 72, respectively. For the combined sample of men and women, the 90th percentile was a score of 71. A similar effort for Data Set 2 was made to establish a preliminary cut-off score as seen in our speculative analyses of Data Set 1. Specifically, we again used the 90th percentile to tentatively explore where future research might begin in identifying cut-off scores for distinguishing clinical from sub-clinical groups. The 90th percentile scores for Data Set 2 on the PVGP-R were 77 and 79 for women and men, respectively. Based on these analyses, a score of 78 or greater on the PVGP-R was indicative of problematic video game play when evaluating male and female participants

together. It is extremely important to reiterate that due to the preliminary nature of these analyses, this score is an attempt to guide future research and does not currently possess the empirical support to be used in clinical practice.

Discussion

Scale Validation

Based on the findings of this study, the PVGP-R shows adequate psychometric properties that were validated using two separate samples. Although this scale does not yet have the ability to function as a diagnostic instrument, it shows excellent potential for the evaluation of the severity of problematic video game behaviors. Additionally, findings from the present study suggest that scores on previous and current iterations of this scale are reliably and significantly correlated with key forms of negative affect (e.g., depressive and anxiety symptoms).

In addition to being easily administered and interpreted quantitatively, this measure affords clinicians qualitative insights about clients experiences as well (i.e., the scale taps such constructs as mood regulation, physiological dysfunction, and sleep disturbances). For instance, suppose an individual attends an intake session at a short-term outpatient setting such as a college counseling center because she is underperforming academically. When this individual reports that she plays video games, the clinician could give the client the PVGP-R and glean insight into multiple facets of any potentially problematic video game-playing behaviors. These data could markedly help to guide the intervention if the client's play seems problematic. More specifically, if the screening instrument shows that the patient is having trouble falling asleep due to game playing, the clinician could administer a brief psycho-educational "sleep hygiene"

intervention to help the patient improve this behavior. Perhaps this individual also acknowledges that he neglects his schoolwork because of his video game-playing behaviors. In this case, a time management skill building intervention could be used. Another area that would be helpful to clinicians would be the endorsement of items that pertain specifically to mood regulation. Given this information, the clinician would have more insight into the reasons that the individual is using video games to alter his mood, and the clinician could intervene by helping the client improve his coping strategies.

Additionally, this measure might be useful in a variety of settings outside of purely clinical contexts (e.g., educational settings, specialized technological addiction treatment centers, as a self initiated pre-screening for players who worry about their level of play, and medical settings). And finally, although there are other measures available to evaluate this phenomenon, this is the first psychometrically supported measure that avoids the shortcomings of the previous established measures (double-barreled questions, circular logic, forced dichotomies, etc.) and incorporates some of the new areas of dysfunction found in the literature, such as sleep problems and physiological consequences.

It is important to add that the subscales of the PVGP-R in this study were all significantly correlated with almost all of our dependent variables (with the exception of quality of life), and based on these findings, the overall scale appears to predict self-reported symptoms of depression, anxiety, stress, and absorption tendencies in a manner consistent with its underlying theoretical tenets (i.e., the theory behind this measure posits that displaying marked PVGP symptoms should be associated with negative affect in a manner similar to how other “addictive” or “low impulse control” behaviors appear

to be). Additionally, these results highlight the need for further research to clarify which, if any, of the subscales differentially predict other potential constructs (e.g., maybe an individual's time management skills may be better predicted by the "Time Management Difficulties" subscale of the PVGP-R rather than the overall scale). Based on our findings and evidence from past research, problematic video game play is a multifaceted construct that, like many other similar scales, will have validity as an overall assessment and as a more focused measure of subscale constructs. However, in the current study, the overall scale seems to be the most robust and valid approach because it integrates all of the theoretical facets of problematic play into a single, readily interpretable score.

According to the data of the present study, the 90th percentile in Data Sample 1 (using the revised items that resulted from the item analysis) was a score of 71 or higher, whereas the 90th percentile score for Sample 2 suggested that a score of 78 or higher suggests "problematic" or "pathological" patterns of play. It is important to reemphasize that this score threshold was identified for the purposes of guiding future research and should not be used for diagnostic purposes. The discrepancy in regard to the cut-off scores could be a result of the differences between the two groups surveyed in the study. For instance, participants in Sample 1 (self-selected gamers recruited online) reported an average PVGP-R score of 51.98 (SD = 14.58), whereas participants for Sample 2 (university students) endorsed an average PVGP-R score of 56.54 (SD = 16.33). Ironically, with regard to hours of weekly play, participants from Sample 1 reported playing an average of 12.71 hours (SD = 12.92) weekly, while participants from Sample 2 endorsed playing an average of 9.76 hours (SD = 9.43) of these games per week. Thus, although Data Set 1 reported playing more video games each week, their PVGP-R scores

were lower than participants from Data Set 2, who played video games for less time weekly. This contradictory finding is unusual because it is well accepted that there is a relationship between hours of play and PVGP (Salguero & Moran, 2002; Tolchinsky & Jefferson, 2011; Wood, 2008). Past empirical research and theory strongly support the contention that a group who plays more hours of video games should also demonstrate higher PVGP scores. However, this was not the case across our two samples.

What might explain this contradiction? Perhaps the second sample of university students reported higher levels of PVGP while playing fewer hours/sessions of video games weekly due to a mediating variable such as time management skills (Tolchinsky & Jefferson, 2011; Wood, 2008). In other words, perhaps if a video game player has strong time management skills, they can play more video games every weekly yet have less dysfunction in their daily functioning. Additional support for this alternative explanation also comes from the discrepancy in age between the two samples. It would not be surprising that the younger group of undergraduate students had poorer time management skills because it has been previously established that this skill improves with age (Trueman & Hartley, 1996). Unfortunately, this variable was not evaluated in the current study but suggests clear areas for future study.

Another noteworthy contribution of this study involves the pattern in which the factors account for the total variance explained using the adopted factor structure. Based on the findings, Factor 1 (Psychological Dysfunction/ Addiction Criteria) accounted for 40.32% of the cumulative 77.36% total variance explained. These results suggest that this phenomenon may truly follow a similar conceptual framework as traditional substance abuse disorders (Grusser & Thalemann, 2006; Salguero & Moran, 2002) as opposed to an

an impulse control disorder such as pathological gambling (Fisher 1994; Griffiths & Hunt, 1998; Grusser et al., 2005; Gupta & Derevensky, 1997; Salguero & Moran, 2002; Wood, Gupta, Derevensky, Griffiths, 2004b). Regardless of which framework this construct is most accurately conceptualized in, this variance pattern suggests that PVGP may indeed be an addictive behavior. Additionally, this suggests that the items from the aforementioned factor may serve as a reasonable starting point for the creation of a short version of the PVGP-R.

Correlational Hypotheses

The results of this study suggest that there is a strong positive relationship between the personality facet of absorption and problematic video game play behaviors. These finding were contrary to the findings of Dauphin and Heller (2010); but as previously discussed, this is mainly a result of our different evaluation procedures. More specifically, Dauphin and Heller surveyed video players using a measure that included dysfunction and also personal preferences (i.e., preferring games that are aggressive or exhibit a certain level or realism). In other words, the aforementioned measure appeared to be too broad, and due to the authors' different conceptualization of problematic video game play, their results did not coincide with ours.

The findings regarding absorption and PVGP in this study were supported for men and women in both samples. In other words, it appears that if a person has a higher tendency to daydream or to be consumed by a willful act such as reading a book or perhaps watching TV, they are then also more likely to exhibit higher level of PVGP. Although this study cannot establish causality due to the limitations of methods used, these findings certainly warrant further research to identify the role of absorption in

patterns of play that cause clinically relevant impairment. Future studies should evaluate this relationship further to identify if perhaps absorption is a risk factor or a factor that raises the addiction potential of individuals who partake in these types of activities.

Interestingly, across both data sets, there was no statistically significant relationship between PVGP and self-reported scores for quality of life as measured by the MANSA **(**Priebe et al., 1999). The MANSA is considered a sound and valid measure, and its psychometric properties have been supported for a variety of populations. Thus, we have confidence that PVGP is not directly strongly correlated with quality of life ratings. These results could also be explained by the fact that people engage in these sorts of behaviors for a plethora of reasons. Colwell (2009) developed a scale to evaluate why adolescents play video games, and he found that his participants played for four main reasons: (1) fun or a challenge, (2) because the player preferred it to playing with friends, (3) for stress relief, and (4) companionship. So, in other words, you may have two video game players who both endorse the same level of PVGP but do so as a result of completely different reasons. Perhaps some players may be satisfied with their lives overall and play merely for fun, while other players may have a considerably poorer quality of life and may be engaging in PVGP behaviors to escape their general stress and psychologically difficult environment.

Based on the results of this study, it appears as though PVGP bears a statistically significant relationship with self-reported symptoms of depression, anxiety, and stress for men in both groups of participants. However, this pattern was not replicated across both samples for female participants. More specifically, PVGP-R yielded a statistically significant positive relationship only with self-reported symptoms of stress in the first

sample. Regarding the second sample, the pattern that was uncovered was similar to that found in both samples of male participants (i.e., PVGP endorsment was significantly positively associated with self-reported symptoms of depression, anxiety, and stress). Although there was a discrepancy between the findings of the two data sets, there is still a noteworthy trend that warrants further thought. In both samples there was a clear and significant relationship between PVGP and depression, anxiety, and stress for men, whereas the interaction between depression and anxiety was either below accepted levels of significance or weak correlations for women. Although causality cannot be established due to the exploratory nature of this study, there may be a number of reasons that these relationships exist.

Perhaps women are not using video games for the same reasons that men are. These patterns may occur because while men may be using video games as an escape from anxiety in a manner similar to the self-medication patterns found in the behaviors of more traditional substance abuse disordered individuals (Khantzian & Albanese, 2008), women may be using video games as merely a form of stress relief for subclinical or transient dyphoria. This theory is also supported by the discrepancy in regard to the value placed in connectedness and socialization among women versus men (Hartmann & Klimmt, 2006). Specifically, many video games reinforce masculine norms that emphasize an interpersonal style premised on the value that one relates to others by engaging in competitive activities individually or in teams. Men who engage in such play (especially if they are successful in the games) may feel a greater sense of personal mastery and control as a consequence of this avocation. However, women who play these games may have a very different reaction. Because stereotypically female socialization

patterns emphasize relational scripts of personal disclosure and emotional connectedness over competitiveness and aggressive conflicts, women may not only play games for different reasons, but they may also experience different psychological effects as a function of such play. Regardless of the etiology behind this discrepancy, this highlights another reason to explore these constructs in future research to unravel some of the mixed findings from the present study.

Further Gender Differences

As mentioned in the results section, there are marked differences with regard to the format of video gaming men and women choose to play. Specifically, women prefer to play single player console games, while men appear to place a premium on playing video games online with many other real players. It is noteworthy that these findings were consistent across both of the samples in this study. Further, these findings are commensurate with the works of Hartmann and Klimmt (2006), who found that women in their study disliked playing online games because they did not offer gratifying means of socializing or connecting with others. Men in their study, contrastingly, reported enjoying connecting with others through competition individually or in teams; this was also supported by the findings of the current study.

Another gender difference was in the area of game preference. Interestingly, the three most preferred game types for men were role-playing games, first person shooter games, and sports games, whereas women preferred role-playing games, puzzle games, and adventure games. It is noteworthy that the same top three rankings of genres were found for men and women, respectively, across both data sets. This suggests that this is likely a valid finding that may be generalized to a variety of populations. Although there

are differences, a noteworthy similarity is that role-playing games are a preferred game genre by both men and women in both data sets. It is important to note that first person shooter games and role-playing games are accepted by researchers to be associated with the highest level of dysfunction (Elliott, Golub, Ream, & Dunlap, 2012) as was measured by the PVP (Salguero & Moran, 2002). Although these findings suggest that perhaps the higher levels of PVGP among men are a result of the types of games that are typically played by men versus women, this theory was not supported by post-hoc analyses administered on the collected data sets. It did not appear that an individual's video game preference was statistically significantly related to rates of PVGP.

In sum, although it appears that men and women differ in regard to game preferences and frequency and duration of play, it is important to conclude by revisiting the idea that men and women appear to be similar in regard to the consequences of play and other seemingly related constructs. The findings suggest that the rates at which men and women endorse negative effects of PVGP differ, but ultimately both subgroups endorse the same kind of symptoms, which speaks to the generalizability of the PVGP-R as a novel and promising assessment instrument.

Limitations and Future Directions

Like all studies, there are components of this project that could be improved in future work. Although this study did use self-selected gamers for roughly half of the participants, the other half were recruited from a convenience sample found in a Midwestern, mid-sized university. The problem regarding the latter recruitment method is that convenience samples can be unrepresentative to the general population (Black, 1999). It is important to note though, that the level of similarity between the two data sets

does alleviate some of the risks to compromising the external validity of the findings. In addition to these sampling limitations, the study surveyed only individuals ranging in age from 18 to 30 years, and our findings may not readily generalize to players from different age cohorts. Since the PVGP-R has been evaluated with both an EFA and two CFAs, the natural progression in scale development would be to standardize and replicate the psychometric properties of the measure using other age groups or populations where this phenomenon is relevant. Additionally, although a preliminary cut-off score was identified for the two distinctly different data sets, research is still needed to replicate the findings so that there is support suggesting that these cut-off scores are truly valid and useful. This highlights the importance of administering the measure on a population of gamers who have actually received treatment for their problematic play behaviors.

Similar to the vast majority of studies in this area of research, the study relied heavily on self-report. This process of collecting data and evaluating hypotheses has several drawbacks but are certainly appropriate for research of an exploratory nature. Future studies should aim to use some sort of tracking devices to monitor daily and weekly usage of video games. Devices such as personal data assistants (PDA), specific tracking applications for mobile devices, or perhaps software that can be installed on popular consoles (Such as Xbox 360 and Playstation 3) could be useful in identifying patterns of play and general usage with greater accuracy. The suggested methods for future research could also alleviate some of the general problems with reporting repetitive behaviors (e.g., people who report such data have been found to sometimes over- or underreport information regarding their activities). Although this study has some minor limitations, it contributes a much needed new assessment tool to quantify this unique

phenomenon, draws attention to mental health in relation to video games, and postulates questions to guide future research in this fascinating area.

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Appendix A

Demographics Questionnaire

1) Please check the racial/ethnic designation that best applies to you:

African American _____
Native American/American Indian _____
Asian American/Pacific Islander _____
Latina/o or Hispanic _____
White/European American _____
Other (specify) _____

2) Sex (Check one):

Female_____
Male _____

3) How old are you?

_____

4) If you are a student, what is your major field(s) of study?

_____

5) If you are a student, what is your overall GPA?

_____

6) Please rate how religious and/or spiritual you would consider yourself to be on the following scale:

1	2	3	4	5
	Not at all religious/ spiritual		Moderately religious/ spiritual	Very highly religious/ spiritual

7) Which, if any, religion do you practice?

_____

8) Please rate your current physical health.

1	2	3	4	5
Very poor		Fair		Very good

9) Please rate your current mental health.

1	2	3	4	5
Very poor		Fair		Very good

Appendix B

Video Game Usage Questionnaire

1) How many hours of video games do you play during a typical week? _____ hours

2) On an average day when you play video games, how many times during such a day do you play? _____ times

3) When you play video games, for how long do you typically play? _____ hours

4) How many times during a typical week do you play video games? _____ times

5) How many years have you been playing video games? _____ years

6) Do you own a video game console or a computer on which you play games? Yes / No

7) During what time of day do you usually play?
Morning 6am-11am ( )
Afternoon 12pm-5pm ( )
Evening 6pm-11pm ( )
Night 12am-5am ( )

	No, not at all		Somewhat		Yes, absolutely
8) Do you consider yourself to be a gamer?	1	2	3	4	5
9) Do you prefer to play video games instead of interacting with others in real-life?	1	2	3	4	5
10) Do you prefer to play Massively Multiplayer Online Role Playing Games (MMORPGs) such as World of Warcraft or Everquest over other kinds of games?	1	2	3	4	5
11) Do you feel socially awkward?	1	2	3	4	5

Appendix C

Tellegen Absorption Scale

	Never				Always
1) Sometimes I feel and experience things as I did when I was a child	0	1	2	3	4
2) I can be greatly moved by eloquent or poetic language	0	1	2	3	4
3) While watching a movie, a TV show, or a play, I may become so involved that I may forget about myself and my surroundings and experience the story as if it were real and as if I were taking part in it	0	1	2	3	4
4) If I stare at a picture and then look away from it, I can sometimes ‘‘see’’ an image of the picture almost as if I were still looking at it	0	1	2	3	4
5) Sometimes I feel as if my mind could envelop the whole world	0	1	2	3	4
6) I like to watch cloud shapes change in the sky	0	1	2	3	4
7) If I wish, I can imagine (or daydream) some things so vividly that they hold my attention as a good movie or story does	0	1	2	3	4
8) I think I really know what some people mean when they talk about mystical experiences	0	1	2	3	4
9) I sometimes ‘‘step outside’’ my usual self and experience an entirely different state of being	0	1	2	3	4
10) Textures—such as wool, sand, wood—sometimes remind me of colors or music	0	1	2	3	4
11) Sometimes I experience things as if they were doubly real	0	1	2	3	4
12) When I listen to music I can get so caught up in it that I don’t notice anything else	0	1	2	3	4
13) If I wish, I can imagine that my body is so heavy that I could not move it if I wanted to	0	1	2	3	4

14) I can often somehow sense the presence of another person before I actually see or hear her/him	0	1	2	3	4
15) The crackle and flames of a wood fire stimulate my imagination	0	1	2	3	4
16) It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily altered	0	1	2	3	4
17) Different colors have distinctive and special meanings for me	0	1	2	3	4
18) I am able to wander off into my thoughts while doing a routine task and actually forget that I am doing the task, and then find a few minutes later that I have completed it	0	1	2	3	4
19) I can sometimes recollect certain past experiences in my life with such clarity and vividness that it is like living them again or almost so	0	1	2	3	4
20) Things that might seem meaningless to others often make sense to me	0	1	2	3	4
21) While acting in a play I think I could really feel the emotions of the character and ‘‘become’’ her/him for the time being, forgetting both myself and the audience	0	1	2	3	4
22) My thoughts often don’t occur as words but as visual images	0	1	2	3	4
23) When listening to organ music or other powerful music I sometimes feel as if I am being lifted into the air	0	1	2	3	4
24) Sometimes I can change noise into music by the way I listen to it	0	1	2	3	4
25) Some of my most vivid memories are called up by scents and smells	0	1	2	3	4
26) Some music reminds me of pictures or changing color patterns	0	1	2	3	4

27) I often know what someone is going to say before he or she says it	0	1	2	3	4
28) I often have ‘‘physical memories’’; for example, after I have been swimming I may still feel as if I am in the water	0	1	2	3	4
29) The sound of a voice can be so fascinating to me that I can just go on listening to it	0	1	2	3	4
30) At times I somehow feel the presence of someone who is not physically there	0	1	2	3	4
31) Sometimes thoughts and images come to me without the slightest effort on my part	0	1	2	3	4
32) I can be deeply moved by a sunset	0	1	2	3	4
33) I often take delight in small things (like the five-pointed star shape that appears when you cut an apple across the core or the colors in soap bubbles)	0	1	2	3	4
34) I find that different odors have different colors	0	1	2	3	4

Appendix D

Depression Anxiety Stress Scales

For each of the statements below, select the number which best indicates how much the statement applied to you OVER THE PAST WEEK. There are no right or wrong answers. Do not spend too much time on any one statement.

	Did not apply to me at all			Applied to me very much, most of the time
3)I felt downhearted and blue	0	1	2	3
21) I felt sad and depressed	0	1	2	3
28) I could see nothing in the future to be hopeful about	0	1	2	3
13) I felt that I had nothing to look forward to	0	1	2	3
35) I felt that life was meaningless	0	1	2	3
41) I felt that life wasn't worthwhile	0	1	2	3
1) I felt I was pretty worthless	0	1	2	3
20) I felt I wasn't worth much as a person	0	1	2	3
34) I felt that I had lost interest in just about everything	0	1	2	3
14) I was unable to become enthusiastic about anything	0	1	2	3
36)I couldn't seem to experience any positive feeling at all	0	1	2	3
2) I couldn't seem to get any enjoyment out of the things I did	0	1	2	3
33) I just couldn't seem to get going	0	1	2	3
37) I found it difficult to work up the initiative to do things	0	1	2	3
9) I was aware of the action of my heart in the absence of physical exertion (e.g, sense of heart rate increase, heart missing a beat)	0	1	2	3
15) I perspired noticeably (e.g. hands sweaty) in the absence of high temperatures or physical exertion	0	1	2	3
22) I was aware of dryness of my mouth	0	1	2	3
4) I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
27) I had difficulty in swallowing	0	1	2	3
16) I had a feeling of shakiness (e.g. legs going to give way)	0	1	2	3

10) I experienced trembling (e.g. in the hands)	0	1	2	3
29) I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
19) I found myself in situations which made me so anxious I was most relieved when they ended	0	1	2	3
5) I feared that I would be "thrown" by some trivial but unfamiliar task	0	1	2	3
38) I felt I was close to panic	0	1	2	3
12) I felt terrified	0	1	2	3
23) I felt scared without any good reason	0	1	2	3
17) I had a feeling of faintness	0	1	2	3
26) I found it hard to wind down	0	1	2	3
6) I found it hard to calm down after something upset me	0	1	2	3
39) I found it difficult to relax	0	1	2	3
11) I felt that I was using a lot of nervous energy	0	1	2	3
42) I was in a state of nervous tension	0	1	2	3
8) I found myself getting upset rather easily	0	1	2	3
30) I found myself getting upset by quite trivial things	0	1	2	3
24) I found myself getting agitated	0	1	2	3
32) I tended to over-react to situations	0	1	2	3
40) I found that I was very irritable	0	1	2	3
31) I felt that I was rather touchy	0	1	2	3
7) I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
18) I found myself getting impatient when I was delayed in any way (e.g. lifts, traffic lights, being kept waiting)	0	1	2	3
25) I found it difficult to tolerate interruptions to what I was doing	0	1	2	3

Appendix E

Manchester Short Assessment of Quality of Life

	Couldn't be worse	Displeased	Mostly Dissatisfied	Mixed	Mostly Satisfied	Pleased	Couldn't be better
1)How satisfied are you with your life as a whole?	1	2	3	4	5	6	7
2) How satisfied are you with your job/education?	1	2	3	4	5	6	7
3) How satisfied are you with your financial situation?	1	2	3	4	5	6	7
4) How satisfied are you with the number and quality of your friendships?	1	2	3	4	5	6	7
5) How satisfied are you with your leisure activities?	1	2	3	4	5	6	7
6) How satisfied are you with your accommodation?	1	2	3	4	5	6	7
7) How satisfied are you with your personal safety?	1	2	3	4	5	6	7
8) How satisfied are you with the people you live with? Or if you live alone, how satisfied are you living alone?	1	2	3	4	5	6	7
9) How satisfied are you with your sex life?	1	2	3	4	5	6	7
11) How satisfied are you with relationship with your family?	1	2	3	4	5	6	7

12) How satisfied are you with your health?	1	2	3	4	5	6	7
13) How satisfied are you with your mental health?	1	2	3	4	5	6	7

Appendix F

Problematic Video Game Play – Revised

	Never		Sometimes		Often
1)When I am not playing video games, I keep thinking about games I have played	1	2	3	4	5
2) Because of my video game playing, I have spent less time with my friends and family	1	2	3	4	5
3) When I can't play video games, I get irritable	1	2	3	4	5
4) When I have not obtained the desired results while playing, I need to play again to achieve my target	1	2	3	4	5
5) When I play video games, it makes my nervousness go away	1	2	3	4	5
6) I spend an increasing amount of time playing video games	1	2	3	4	5
7) Because of my video game playing, my neck hurts	1	2	3	4	5
8) I have tried to stop playing video games	1	2	3	4	5
9) When I play video games, it makes my anger go away	1	2	3	4	5
10) Because of my video game playing, I have missed meals	1	2	3	4	5
11) When I am not playing video games, I am often planning how I will play my next game	1	2	3	4	5
12) When I play video games, it makes my sadness go away	1	2	3	4	5
13) I conceal my video game playing from my significant others	1	2	3	4	5
14) Because of my video game playing, my wrist(s) hurt	1	2	3	4	5
15) When I play video games, it makes my worries go away	1	2	3	4	5
16) I have tried to cut back playing video games	1	2	3	4	5
17) In order to play video games I have stolen	1	2	3	4	5
18) Because of video game playing, I have gone to bed late	1	2	3	4	5
19) I conceal my video game playing from my parents	1	2	3	4	5
20) In order to play video games I get into arguments with people	1	2	3	4	5
21) I conceal my video game playing from my friends	1	2	3	4	5

22) Because of my video game playing, I experience headaches	1	2	3	4	5
23) I play video games over a longer time period than I intended	1	2	3	4	5
24) Because of my video game playing, my hand(s) hurt	1	2	3	4	5
25) In order to play video games I have skipped class or work	1	2	3	4	5
26) I have tried to control how much I play video games	1	2	3	4	5
27) Because of my video game playing, my eyes hurt or feel strained	1	2	3	4	5
28) In order to play video games I have lied	1	2	3	4	5
29) I conceal my video game playing from my significant other (romantic partner)	1	2	3	4	5
30) Because of my video game playing, I experience migraines					
31) When I can't play video games, I get restless	1	2	3	4	5
32) Because of my video game playing, I have trouble falling asleep	1	2	3	4	5
33) Because of video game playing, I have neglected my homework/schoolwork	1	2	3	4	5
34) Because of my video game playing, my back hurts	1	2	3	4	5
35) When I play video games, I play until I have reached my goal (for example, defeated a boss, finished a chapter, gained a level, acquired a special item) instead of setting a time limit	1	2	3	4	5