

Behavioral and psychological involvement of online video gamers: Building blocks or building walls to socialization?

By: [Benjamin Hickerson](#) and Andrew J. Mowen.

Hickerson, B., & Mowen, A. (2012). Behavioral and psychological involvement of online video gamers: Building blocks or building walls to socialization? *Society & Leisure*, 35(1), 79-103. doi:10.1080/07053436.2012.10707836

*****© Taylor & Francis. Reprinted with permission. No further reproduction is authorized without written permission from Taylor & Francis. This version of the document is not the version of record. Figures and/or pictures may be missing from this format of the document. *****

This is an Author's Original Manuscript of an article published by Taylor & Francis in *Society & Leisure* on 7/2/13 available online at <http://www.tandfonline.com/10.1080/07053436.2012.10707836>

Abstract:

Video gaming has often been associated with negative outcomes such as aggression and social isolation, particularly for those who spend significant amounts of time playing. However, advances in video game technology have enabled online, multi-player experiences which may facilitate social relationships. Recent literature suggests that meanings ascribed to video gaming may be more important in determining social outcomes than gaming behaviors alone. This study examined the relationship of both behavioral and psychological involvement in video gaming to perceived friend-based social support among a sample of multi-player, first-person shooter gamers. Results indicated that behavioral involvement (e.g., time spent playing, dollars spent) was unrelated to perceived social support. Enduring (i.e., psychological) involvement with video games had varied relationships with the measure of social support. Gamers who perceived video gaming to be a forum for social bonding were more likely to perceive higher levels of social support, while gamers who appeared to centralize their lifestyle around gaming were less likely to report positive social support levels.

Keywords: video games | behavior | relationships

Article:

Introduction

Video gaming has emerged as the fastest growing form of leisure behavior in the 21st Century (Ryan, Rigby, & Przybylski, 2006). As of 2010, 67% of homes in the United States own a console or personal computer used to play video games (Entertainment Software Association, 2010). Video games have become more complex and realistic each year since they became widely available in the 1970's, making them an increasingly attractive medium to experience

leisure virtually. Modern advances in technology have allowed video game manufacturers to shift their products from arcades to homes, which has expanded and diversified opportunities to play. These improvements to the quality and delivery system of gaming have created a market with sales in excess of 10.5 billion dollars per year in the United States (Siwek, 2010).

Many early adopters of video games have retained their interest in this leisure activity throughout their lifespan, and “noobs” (i.e., people new to video gaming or a certain game) are choosing to try video games each day (Griffiths, Davies, & Chappell, 2003). Children under the age of 18 years old have been identified as the most frequent video gamers. For example, a Pew Research Center project found that 97% of youth under the age of 18 play some type of video-based games (Lenhart et al., 2008). However, children comprise only 25% of the total consumers of video games. Currently, the mean age of video gamers is 34 years old, and in 2010, 26% of players were over the age of 50. Females have also demonstrated an interest, representing 40% of video gamers (Entertainment Software Association, 2010). The diversity of people interested in video gaming indicates that this leisure activity is one that is maturing and will continue for years to come.

Research on video game play is still developing, but a large amount of attention has been focused on the content of video games. One area that is emerging, yet has received less empirical attention, is the social nature of gameplay. Since the widespread availability of the internet, many games now offer online services that allow users to interact and play with each other. While the leisure activity of video gaming has traditionally been considered socially isolating, these new technologies may be changing how and why people choose to play.

The choice and motivation to play video games is another area being studied concurrently with the social dimensions of video game use. Video gamers have been described by their consumptive behaviors such as time spent playing and purchases, but little research has been conducted about psychological processes such as commitment and motivation to play. Therefore, this study aimed to address the converging areas of involvement and social relationships in gaming by examining behavioral and psychological involvement with video games. Furthermore, we sought to understand how this involvement is associated with a measure of friend-based social support. To capture highly committed video game players, we purposively selected players who were waiting for a pre-ordered copy of a popular first-person shooter game emphasizing the multi-player (i.e., online) function. We hypothesized that this group’s high level of behavioral and psychological immersion may be related to their perceptions of friend-based social support.

Literature Review

The expanding popularity of video games has been accompanied by a growth of public interest and scrutiny. With the rise of childhood obesity, physical inactivity, and attention disorders in the United States, many have anecdotally determined that television and video game “screen time” must be the cause. Beliefs such as “...video game systems like the Sony Playstation 2 or Microsoft XBOX have rarely been associated with good health” are wide-spread (Brown, 2006, p.188). However, research has yielded mixed results (i.e., both negative and positive) in determining the nature of the relationships between video gaming and health outcomes.

Video Gaming Behaviors and Outcomes

The majority of video game research since the late 1980's has explored linkages between violence-oriented games and negative outcomes such as aggression (see Anderson et al., 2010; Bensley & Van Eenwyk, 2001; Dill & Dill, 1998). Fear of children viewing aggressive behaviors and physically mimicking those actions dates back to debut of crime programs broadcast on television in the 1940's (Smith, 1952). To compound the issue, public beliefs about video games and violent behaviors have been exacerbated by the media and major events such as the 1999 shootings occurring in Columbine, CO. Many in the media suggested that the two students who staged an attack on Columbine high school did so because they played violent video games and listened to sadistic music (Cullen, 2009). Results from research suggest that viewing ultraviolent video games depicting acts such as physical infliction of pain and homicide may have a connection with aggressive behaviors, but there is no consensus about causality (Ferguson, 2007; Ferguson & Kilburn, 2010).

Other potentially negative outcomes related with video game use include sedentary behaviors (Vandewater, Shim, & Caplovitz, 2004; Weaver et al., 2009), attention problems (Swing, Gentile, Anderson, & Walsh, 2010), susceptibility to addiction (Griffiths, 2008), and uncontrollable actions such as the inability to judge time spent playing (Tobin & Grondin, 2009) and inability to consider the consumption of unhealthy foods during participation (Raudenbush, Reed, & Hunker, 2007). Similar to aggression research, however, some researchers have found conflicting results. For example, Ferguson (2011) found that television and video game use were not associated with attention problems or grade point average. Others have also found that video game play has no association with the onset of alcohol consumption or physical inactivity (Feldman, Barnett, Shrier, Rossignol, & Abenheim, 2003; Robinson, Chen, & Killen, 1998).

Video game play has also been linked with positive outcomes. A primary benefit of playing video games is that this experience may improve perceptive and motor skills. For example, Green and Bavalier (2004) found that playing video games led to a marked increase in visual selective attention. Playing video games may also offer a host of additional benefits including recuperation from stress and strain (Reinecke, 2009), physical activity opportunities (Orsega-Smith, Smith, & Kukich, 2010), dexterity (Schott & Hodgetts, 2006), prosocial behaviors (Greitemeyer & Osswald, 2010), development of leadership skills (Yee, 2006a), and an increase in knowledge of sport (Crawford, 2005).

Our review of the video gaming research literature suggests there is a general consensus that both positive and negative outcomes of gaming are possible. Some have suggested these outcomes may be linked with context, or the varying experiences that occur while interacting with the game interface (Bartlett, Anderson, & Swing, 2009). One way the contextual experience of video games may be impacted is through social interactions occurring through online modules embedded within the majority of currently popular games.

Online Video Gaming and Social Interaction

In the 1980's and 1990's some research evidence indicated that video games could be socially isolating (Colwell & Payne, 2000; Provenzo, 1991; Putnam, 2000; Selnow, 1984; Zimbardo,

1982). Gamers would sit alone in their homes competing against themselves, which in turn would reduce the amount of time they had to interact with others. This may have been a concern prior to the 21st century, but the social context of gaming has since changed. With the widespread availability of fast, reliable, and cheap internet services many games are now offering content that is available when the player connects to an online service. Gamers no longer need to be in the same room to play together and now an estimated 67% of teens regularly play games online with other players across the globe (Rideout, Roberts, & Foehr, 2005).

Online gaming environments, generally known as multi-player gaming, provide parallel or competitive play for users who own the same consoles (e.g., XBOX 360, PC) and games. These players connect to a network where they can create a unique user name and speak with one another through voice-activated headsets. Possibly the most well-known multi-player games are Massively Multiplayer Online Games (MMOs) where players maintain a character who grows and develops, much like a human being, based upon performance indicators. These virtual worlds allow gamers to interact with one another, but researchers have questioned whether this online interaction has any relationship with social connectedness in the real world. While online gaming may allow opportunities for social interaction within the context of participation, these types of multi-player games may still not promote the development of social capital in other aspects of the participants' lives.

Indeed, some researchers have found that online gaming can be “severely disruptive to school, work, and real life social contacts” (Smyth, 2007; Van Rooij, Meerkerk, Schoenmakers, Griffiths, & Van de Mheen, 2010, p. 489). Williams (2006) found that committed online gamers allowed a deterioration of their existing social relationships. They replaced face-to-face interactions with the social interactions taking place in the game; a process known as “cocooning” (p. 651). For these same reasons, de Kort, Ijsselstein, and Poels (2007) determined that the social interactions in gaming have a different “social presence” than in face-to-face interactions.

Psychological Experiences Associated with Video Gaming

Considering the video game research done to date, many scholars suggest that multi-player environments and psychological reasoning are two of the areas with the greatest need (Griffiths et al., 2003; Kaye & Bryce, n.d.; Schott & Hodgetts, 2006). Yee (2006b) determined that multi-player gamers could be segmented into three groups based upon their psychological motivations for play: those who play for achievement (i.e., the desire to gain power and wealth within the game), for social reasons (i.e., socializing and working as a team), and for immersion (i.e., extensive detail to customization and knowing every small detail of the game). These types of psychological motivations and experiences may yield more precise insights regarding the differential effects of gaming on outcomes such as loneliness, social network size, perceived social support, and depression (Ryan et al., 2006; Seay, 2006). Seay observed that the effects of online gaming hinged primarily upon how one plays, why one plays, and with whom one plays. Further, the time spent playing video games online did not make a difference in explaining the social integration of the participant. He found that when video gaming was approached as a social medium in which to spend time with friends and relatives, it had clear positive effects on perceived social wellbeing.

Despite this early evidence supporting the salience of psychological gaming experiences to participant outcomes, additional inquiry is needed to further examine the meanings ascribed to video gaming and how such meanings correspond with positive and negative outcomes.

Assessing these meanings is important because they may offer a more powerful indicator of video gaming's importance to the individual as opposed to behavioral measures alone. In other words, while the sheer number of hours, sessions, or money spent may not reveal addictions or decreased social interaction, participants' attitudes concerning the role of video games in their daily lives may.

Within the context of leisure, the concept of involvement is often used to assess personal meaning and psychological involvement with leisure activities. One conceptualization of involvement embraced by a number of leisure scholars is enduring involvement (Gahwiler & Havitz, 1998; Iwasaki & Havitz, 2004; Kyle, Graefe, Manning, & Bacon, 2003a; McIntyre, 1989; McIntyre & Pigram, 1992). Enduring involvement is manifested when there is congruence between personal needs, goals, and the values and attributes of the leisure activity (Kyle, Absher, Norman, Hammitt, & Jodice, 2007). It has generally been defined as an enduring, unobservable state of motivation or arousal between an individual and a leisure activity characterized by four domains: (1) Attraction, which represents importance and pleasure from the activity; (2) Centrality, which represents lifestyle choices and personal investments made to sustain association with the activity; (3) Social Bonding, which represents development and maintenance of interpersonal relationships associated with the activity; and (4) Self Identity, which represents the degree to which the activity serves as a mechanism to affirm or express identity to others (McIntyre, 1989).

Purpose of the Study

While some studies have examined video gaming motivations and their implications for health outcomes, few have examined the role of enduring involvement in shaping strengthened or weakened social support among specific groups of gamers. Moreover, the various domains of enduring involvement could correspond with video game participation outcomes in different ways. For example, one might expect that involvement characterized through social bonding would correlate positively to perceived levels of social support.

Existing research focused on the leisure activity of video gaming suggests that it is a diverse form of leisure behavior encompassing a wide variety of play styles and player types. Furthermore, studies increasingly support using both behavioral and psychological involvement indicators when assessing the impacts of video games upon health outcomes. To extend earlier work on video game participation and outcomes, our study focused upon a specific population of video gamers, multi-player (i.e., online) users of a first-person shooter game (MP-FPS), and assessed the behavioral and enduring involvement profile of these types of gamers. This study also examined whether and how behavioral and enduring involvement contributes to these video gamers' generalized perceptions of friend-based social support. Five core research questions evolved from these objectives:

Behavioral Involvement of MP-FPS Gamers

- R1: How many hours per week do MP-FPS gamers spend playing video games?
R2: How many discrete sessions do MP-FPS gamers dedicate to video gaming each week?
R3: How much money do MP-FPS gamers spend on video gaming annually?

Enduring Involvement of MP-FPS Gamers

- R4: What is the level of enduring involvement that MP-FPS gamers ascribe to the leisure activity of video gaming as reflected through the domains of Attraction, Centrality, Identity, and Social Bonding?

Relationship of Video Game Behavioral and Enduring Involvement to Perceived Social Support

- R5: Does behavioral and enduring involvement with video gaming significantly relate to a perceived level of generalized friend-based social support reported by MP-FPS gamers?

Methods

Data for this study came from on-site surveys of pre-ordered customers of the popular video game, Call of Duty: Black Ops (COD-BO) outside of two retail stores in a Mid-Atlantic United States university town. COD-BO is a first-person shooter (FPS) game where the gamer assumes the role of a soldier conducting Special Forces activities during the Cold War of the 1960's. The story line centers on CIA-supported missions (e.g., black operations), that are carried out behind enemy lines in Russia, Cuba, Laos, and Vietnam. COD-BO provides an online multi-player mode that focuses on socialization and customization, allowing participants to play one another in real time from remote locations. In the multi-player mode of COD-BO, players receive incentive-based bonuses by completing milestones such as time spent playing, high scores, and team-oriented behaviors. These bonuses may include improved weapons and techniques that are not available to players with lesser performance. This is a common feature in multi-player games used to reward players for their comparative success and motivate others to compete for these incentives.

Recruitment of Participants

The public was provided the opportunity to pre-order and pay for COD-BO in order to be the first to pick up the game and play. Pre-ordered video game customers often stand in line leading up to the release time and stores stay open late hours to accommodate these types of sales (Ortutay, 2008; USA Today, 2005). Therefore, it was anticipated that pre-ordered COD-BO customers would be committed, both behaviorally and psychologically, to the leisure activity of video gaming. Moreover, given that COD-BO was a FPS game and that it emphasized the multi-player format, it was expected to provide a context from which to examine positive and negative social outcomes associated with video gaming. In the two hours leading up to the 12:01AM release of the game, 175 video game customers were approached by trained data collectors as they stood in line outside of two video game retail stores. These individuals were asked to

participate in a brief on-site questionnaire concerning video gaming behaviors and attitudes, as well as perceived friend-based social support. A drawing for a prize was offered as an incentive to participate in this study.

One-hundred and sixty-six participants completed the questionnaire for an on-site response rate of 95%. Given that the purpose of this study was to examine the behavioral and enduring involvement of MP-FPS video gamers, the sample was further delimited to focus on this particular segment. Participants were asked if they were predominately a multi-player video gamer and if they played first-person shooter games (e.g., Call of Duty, Halo). Those who said yes to both of these questions (85%) were retained in the dataset for a final usable sample size of 141.

Measures

This study sought to document video gaming involvement expressed by a sample of multi-player first-person shooter (MP-FPS) players and the degree to which that involvement corresponded with a measure of friend-based social support. Involvement was measured in two ways, behavioral involvement and enduring involvement.

Behavioral Involvement in Video Gaming

Behavioral involvement in the leisure activity of video gaming was measured with three core variables: weekly hours spent video gaming, the number of discrete weekly sessions spent video gaming, and the amount of money spent annually on video gaming. These variables are common ways of defining participation of gamers (Siwek, 2010). In the study, MP-FPS gamers were asked about the time spent video gaming with the following question, “During a typical week, how many total hours do you spend playing video games?” Respondents then entered their best estimate for the number of hours spent. While this measure provides continuous data, self-reports of screen time are often plagued by under-reporting and this limitation may influence the degree to which self-reported weekly hours reflect actual behaviors. Nevertheless, self-reporting weekly hours is a common way of assessing video game behaviors and allows comparisons between this study’s findings and national averages.

In addition to weekly hours spent gaming, study participants were asked about the frequency of their gaming participation with the question, “Over how many blocks/sessions are your weekly gaming hours spread?” In other words, how many different gaming sessions did they participate in on a weekly basis? Participants were told that one session was the equivalent of starting play, then turning off the console. Respondents then entered a number representing their best estimate for video gaming sessions.

The final behavioral involvement variable in this study assessed annual video gaming expenditures. Here, participants were asked, “Over the past year, how much would you estimate that you’ve spent on video gaming? Remember to include all expenses including consoles, peripherals, games, online services, strategy guides, etc.” Participants were given five spending categories to choose from: \$0–\$100, \$101–\$200, \$201–\$300, \$301–\$400, and \$401 or more. These categories were chosen based on the authors’ price estimates of consoles, games, and on-

line gaming. Games or peripherals that were received as gifts were not considered because they did not require action or purchase by the participant. To incorporate the spending variable as a dummy variable for subsequent multivariate regression, spending was re-coded into a dichotomous variable by splitting the sample in half (\$0–\$300 and \$301 or more).

Enduring Psychological Involvement in Video Gaming

The present study sought to assess the personal relevance and meaning of video gaming by using an adaptation of the Modified Involvement Scale (MIS; Kyle et al., 2007). This particular scale, or modified versions of the scale, has been used extensively to understand the personal meanings ascribed to a range of non-virtual leisure activities such as camping (Kyle & Chick, 2002; McIntyre & Pigram, 1992), golf, skiing, windsurfing (Havitz & Howard, 1995), hiking (Kyle et al., 2003a), birding (Kim, Scott, & Crompton, 1997), and casino gambling (Jang, Lee, Park, & Stokowski, 2000). Seventeen items representing each of five involvement domains: (a) Attraction, (b) Centrality, (c) Social Bonding, (d) Identity Expression, and (e) Identity Affirmation were chosen based upon their prior validation in empirical research as well as their face validity with the leisure activity of video gaming.

Respondents were asked to rate the degree to which they agreed with each statement on a Likert-style scale where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. Factor analysis using the principal axis factor method with Promax rotation was used to reduce these items into their respective domains. Results from this analysis indicated that all but one of the items loaded on their expected domains. The first domain, Attraction, represents the importance and pleasure derived from the leisure activity and was assessed through three statements: “video gaming is one of the most satisfying things I do,” “video gaming is very important to me,” and “video gaming is engrossing.” The latter item cross-loaded on the other four factors and was subsequently eliminated from the Attraction domain. The final two item Attraction index had an acceptable reliability ($r = 0.78$).

The second domain, Centrality, measures the central importance of the activity to individual lifestyle choices and personal investments as a means to support continued association with the activity. In this study, Centrality was assessed with four items, “I find that a lot of my life is organized around video gaming,” “Video gaming occupies a central role in my life,” “I try to structure my daily (weekly) routine around video gaming,” and “I invest most of my energy and resources in video gaming.” The internal reliability of Centrality was acceptable ($r = 0.86$).

The third domain, Social Bonding, reflects the importance of the leisure activity in continuing and fostering social ties and interpersonal relationships. This domain was assessed with five items, “Participating in video gaming provides me with opportunity to be with friends”, “Most of my friends are in some way associated with video gaming,” “Special people in my life are associated with video gaming,” “I prefer to be around others who share my interest in video gaming,” and “I enjoy discussing video gaming with my friends.” Internal reliability for this domain was acceptable ($r = 0.88$).

The fourth and fifth enduring involvement domains were selected to represent the degree to which the leisure activity serves as a mechanism to both affirm the identity of the participant

(i.e., Identity Affirmation) and express this identity to others (i.e., Identity Expression). Identity Affirmation was assessed with three items, “When I participate in video gaming, I can really be myself,” “Video gaming has enhanced my self-image,” and “My true self emerges when I participate in video gaming.” Identity Expression was assessed with two items, “Participating in video gaming allows me to express myself,” and “Participating in video gaming says a lot about who I am.” The Identity Expression and Identity Affirmation items loaded onto a single factor and were highly correlated with one another. As a result, the items were combined into a single domain that represented aspects of both identity expression and identity affirmation. This domain was labeled simply as Identity and its internal reliability was acceptable ($r = 0.78$). Scale reliabilities, means, and factor loadings for the enduring involvement scale are illustrated in Table 1.

TABLE 1
Enduring Involvement Factor Analysis

Items	ID ^a	CEN	SB	ATT	Mean (S.D. ^b)
Participating in video gaming allows me to express myself	0.96				2.83 (1.25)
Participating in video gaming says a lot about who I am	0.73				2.63 (1.15)
My true self emerges when I participate in video gaming	0.74				2.46 (1.15)
Video gaming has enhanced my self-image	0.69				2.24 (1.03)
When I participate in video gaming, I can really be myself	0.42				3.31 (1.12)
I find that a lot of my life is organized around video gaming		0.82			2.34 (1.08)
I try to structure my daily (weekly) routine around video gaming		0.82			1.98 (1.02)
I invest most of my energy and resources in video gaming		0.79			1.99 (1.08)
Video gaming occupies a central role in my life		0.68			2.38 (1.09)
Participating in video gaming provides me with opportunity to be with friends			0.78		3.51 (1.12)
I enjoy discussing video gaming with my friends			0.70		3.83 (0.90)
Most of my friends are in some way connected to video gaming			0.58		3.40 (1.24)
I prefer to be around other who share my interest in video gaming			0.56		3.20 (1.01)
Special people in my life are associated with video gaming			0.38		2.73 (1.32)
Video gaming is very important to me				0.77	3.38 (0.96)
Video gaming is one of the most satisfying things I do				0.58	3.60 (1.01)
Cronbach's Alpha	0.78	0.86	0.88	0.78	
Eigenvalue	6.54	1.74	1.52	1.07	
% of Variance Explained ^c	38.38	8.74	6.81	4.02	
Factor Mean	2.69	2.17	3.34	3.48	

Note: ^a. ID=Identity, CEN=Centrality, SB=Social Bonding, ATT=Attraction

^b. Standard Deviation

^c. Total % of variance explained=57.95%

^d. KMO=0.84

Perceived Friend-Based Social Support

Video gaming behaviors and attitudes have been associated with a number of health outcomes such as addiction, aggression, and perceived social relationships. Social relationships are beginning to receive significant attention in the literature because of the positive cooperative effects that could result from shared multi-player gaming as well as the face-to-face social isolation that could result from extended screen-time. That is, video game play could be related to dimensions of a person's social integration (see Berkman, Glass, Brissette, & Seeman, 2000;

Durkheim, 1951). Social integration is the degree to which an individual feels socially connected to others such as family members, friends, or co-workers.

The central question addressed in this research is whether behavioral and psychological involvement with video gaming was associated with positive or negative social support among a sample of MP-FPS gamers. A specific type of social support, perceived support provided by friends, was chosen as the outcome variable. Perceived social support provided by friends was measured using a series of questions taken from the Social Support Appraisals Scale (SS-A; Vaux et al., 1986). The SS-A was based on Cobb's 1976 conceptualization of social support and was designed to assess the extent that the individual "believes that she or he is loved by, esteemed by, and involved with family, friends, and others" (Vaux et al., 1986, p. 203). This 23 item scale was validated against other popular measures of social support. It is both reliable and concurrently valid, relating to positive perceptions of psychological wellbeing.

Given that the sample for the present study was expected to be dominated by university students and that space/time limitations of the on-site surveys were at a premium, we focused on a reduced set of four items that focused on perceived friend-based support from the SS-A, rather than support from other domains (e.g., family support). These questions pertained to perceptions of support provided by friends in general, rather than just friends associated with the activity of video gaming. The final index used in the study was comprised of the following four items, "My friends and I have done a lot for each other," "I can rely on my friends for support," "I feel a strong bond with my friends," and "My friends look out for me." Study participants noted the extent that they disagreed or agreed with these statements on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). This modified subjective appraisal of friend-based social support was found to have acceptable internal reliability ($r = 0.90$). Nevertheless, the reader is cautioned that this particular index represents one type of support from friends rather than more generalized support perceptions of family members and other individuals. Thus, the relationships between behavioral and enduring involvement with social support should be considered primarily through the lens of friend-based social networks.

Analysis

Descriptive statistics including frequencies as well as measures of central tendency and dispersion were used to illustrate the behavioral and enduring involvement profile of MP-FPS gamers reflected in the sample. Analyses of the relationships between behavioral involvement, enduring involvement, and perceived friend-based social support were completed with multiple linear regression using a simultaneous entry procedure with list-wise deletion of missing data. Significance levels were set at $p < 0.05$ and standardized Beta weights were used to determine the relative influence of individual predictor variables.

Results

Of the 141 survey respondents who were defined as multi-player first-person shooter (MP-FPS) gamers, a majority was male (99%), full-time college students (63%), and employed either part-time or full-time (62%). Respondent ages ranged from 12 to 38, with an average age of 21.1

years ($SD = 3.96$). The average number of different video game consoles owned by respondents was 2.1, with 46% owning only one console (typically XBOX 360) and 19% owning 4 or more separate consoles. While these respondents were predominately interested in FPS games, they also played other types of video games. For example, 65% played sports video games (e.g., Madden NFL), 50% played non-FPS action games (e.g., Grand Theft Auto), 43% played role-playing games (e.g., World of Warcraft), and 30% played fighting games (e.g., Street Fighter IV).

Behavioral Involvement Results

The first three research questions of this study focused on document respondents' video-gaming behaviors. Respondents noted that they spent an average of 20.5 hours per week playing video games. There was considerable variation in the average weekly hours spent gaming with a standard deviation of 17.9 hours and a range of 2 – 112 hours reported per week. In terms of video gaming frequency, respondents were asked about the number of different video gaming sessions/blocks consumed per week. Respondents reported an average frequency of 7.7 weekly sessions with a standard deviation of 4.6 sessions and a range between 1 and 30 sessions. Respondents were also asked to indicate their annual video game expenditures. A majority (65%) indicated that they spent more than \$200 dollars or more annually with only 6% indicating that they spent \$100 or less. Annual video game spending was dichotomized (\$0 to \$300 vs. \$301 or more) into an independent dummy variable for use in subsequent regression; 54% spent \$300 or less annually and 46% spent more than \$300.

Enduring Involvement Results

In addition to video gaming behaviors, this study assessed the perceived importance and personal meaning that participants derived from video gaming using a modified enduring involvement scale (MIS; see Table 2). Among scale domains, Attraction, a measure of generalized importance, was perceived to be modestly high with an average score of 3.5 on a 5-point scale and 63% agreeing or strongly agreeing that they were attracted to the leisure activity of video gaming. Study participants also perceived video gaming to be an important medium for socialization with a Social Bonding mean score of 3.32. Approximately 61% agreed or strongly agreed that video gaming presented opportunities for social affiliation and interaction as assessed through this particular domain. The domains of Identity and Centrality, however, were less likely to be perceived as an important psychological element of video gaming. For example, only 32% agreed or strongly agreed that video gaming offered an opportunity to affirm or express their individual identities with an Identity average of 2.69 on a 5-point scale. Finally, only 13% agreed or strongly agreed that video gaming was central to their lifestyle with a Centrality mean of 2.17 on the 5-point scale.

TABLE 2
Enduring Involvement Domain Mean Scores

Factor	N	Mean	Standard Deviation
Attraction	137	3.50	0.88
Centrality	132	2.17	0.91
Social Bonding	134	3.32	0.82
Identity	138	2.69	0.91

The Relationship between Involvement and Social Support

The final research question of this study was to assess the extent to which behavioral involvement and enduring involvement corresponded with perceived friend-based social support (see Table 3). Descriptive analyses of the dependent social support variable indicated that a large majority (91%) of the video gamers from this study perceived positive levels of friend-based social support with an average score of 4.26 on a 5-point scale.

TABLE 3
Social Support Appraisal Item and Index Mean Scores

Item	Mean	Standard Deviation
My friends and I have done a lot for each other	4.22	0.81
I can rely on my friends for support	4.23	0.82
I feel a strong bond with my friends	4.32	0.86
My friends look out for me	4.29	0.84
Subjective Appraisal of Social Support (N=140)	4.26	0.73

Multiple regression whereby social support was regressed against behavioral and enduring involvement indicated a significant model effect ($F = 4.23$, $p = .000$; Table 4). Approximately, 20.6% of the variance in general friend-based social support was explained by video gamer behavioral and enduring psychological involvement. However, only two enduring involvement constructs, Centrality and Social Bonding, were significantly related to friend-based social support with standardized Beta coefficients of -0.296 and 0.343, respectively. MP-FPS players who were more likely to report that video games were central to their lives were less likely to report positive perceptions of friend-based social support. Conversely, the more that study participants' perceived video gaming to provide opportunities for Social Bonding, the more likely they were to report positive perceptions of friend-based social support.

The two other domains of enduring psychological involvement in video gaming, Attraction and Identity, were not significantly related to perceived friend-based social support. Furthermore, none of the behavioral involvement measures were significantly related to social support. The number of hours spent playing video games, the frequency of gaming sessions, and the annual expenditures were not even closely related to perceived social support with p-values ranging from 0.247 to 0.383 (see Table 4).

Discussion

The purpose of this study was to examine the association of video gamers' behavioral and psychological involvement with perceptions of friend-based social support. Results indicated that behavioral involvement was not associated with friend-based social support, but enduring involvement had both positive and negative relationships with friend-based social support. So while video games may not always be socially isolating, perceptions of friend-based social support may vary based upon the type of involvement with the activity.

TABLE 4
Multiple Regression Predicting Social Support Appraisal

Independent Variables	Beta	t-value	p value
Money spent gaming	0.079	0.875	0.383
Number of hours spent gaming	-0.117	-1.148	0.254
Sessions	-0.104	-1.163	0.247
Attraction	-0.124	-1.222	0.224
Centrality	-0.296	-2.601	0.011
Social Bonding	0.343	3.183	0.002
Identity	-0.092	-0.862	0.391
R²	0.206		

Note. *df* = 7; *F* = 4.231; *p* < .001

Behavioral Involvement

We found that a sample of multi-player, first-person shooter gamers (MPFPS) who waited for a pre-ordered copy of Call of Duty: Black Ops (CODBO) were behaviorally committed to video gaming. Some study participants reported spending more than 100 hours per week playing video games and the average time spent for the sample was 20.5 hours of weekly video game playing. These numbers far exceed the national averages for gaming, indicating this sample had high behavioral involvement for time spent playing video games. Gentile et al. (2004) found that the “average” person plays video games 9 hours per week, while a Harris Interactive Poll (2007) indicated a higher average at 14 hours. In our study, even the “average” participant played longer than that.

In addition to the long hours of time spent gaming, most of the participants in this sample played in large blocks, or sessions. Some gamers spread their gaming hours over as many as 30 discrete gaming sessions, but the average participant split the hours into 7.7 unique blocks. This suggests that most gamers spent fewer, but longer periods of their time gaming, instead of many short sessions. Dividing the number of hours by the number of sessions indicated that the average session was 2.66 hours long. As with the number of hours, the small number of sessions demonstrates that study participants were behaviorally involved with video gaming. The number of sessions (i.e., ~7) corresponds with the number of days in the week, suggesting that participants could have played video games on a daily basis instead of in long blocks on weekends or other extended periods of free time.

No national data was found on the average monetary expenditures of MP-FPS gamers, but the participants in this study spent a noteworthy amount of money on video games, gaming consoles,

peripherals, and other gaming-related accessories. Forty-six percent of the sample spent \$300 or more on video games in the last year. However, it must be noted that video game expenditures do not necessarily need to be high to indicate behavioral involvement. Some gamers may be specifically committed to a single game (e.g., COD-BO, Halo) and have limited expenditures beyond that product. Video games are also frequently received as gifts, which would negate spending.

Enduring Involvement

The four domains of enduring involvement were used to define personal or psychological meaning of video gaming as a form of leisure (Kyle et al., 2007). Using principal axis factoring, each of the items loaded on their intended domains. Consistent with previous studies, we found that Attraction (i.e., importance of the leisure activity) was the highest-rated domain of enduring involvement (see Jun, Kyle, Absher, & Hammitt, 2008; Kyle, Graefe, Manning, & Bacon, 2003b; Kyle, Norman, Jodice, Graefe, & Marsinko, 2007; Vlachopoulous, Theodorakis, & Kyle, 2008). Social Bonding was the second highest-rated domain of video gamers, which was similar to recreational anglers (Kyle, Norman et al., 2007) but differed from campers (Jun et al., 2008) and exercise enthusiasts (Vlachopoulous et al., 2008). Social Bonding was followed by Attraction, and lastly Centrality. This is not surprising as Centrality is generally the lowest-rated domain in most enduring involvement studies (Jun et al., 2008; Kyle, Norman et al.; Kyle et al., 2003b).

The most surprising results were not related to the order of the enduring involvement domains, but the low overall average scores reported for each of these domains. Mean scores for Attraction ($M = 3.50$), Social Bonding ($M = 3.32$), Identity ($M = 2.69$), and Centrality ($M = 2.17$), were all lower than scores reported by enthusiasts of other leisure activities (e.g., Jun et al., 2008; Kyle et al., 2003b; Kyle, Norman et al., 2007; Vlachopoulous et al., 2008). These psychological involvement scores contrast the behavioral indicators of these MP-FPS players. The video gamers in our sample played more hours than the national average, played in long blocks, spent a considerable amount of money, and waited outside past midnight in cold weather to be the first to pick up a copy of COD-BO. These differences between behavioral and psychological indicators may be explained by two circumstances. First, a majority of the enduring involvement research has been conducted with older populations. These individuals were slightly younger, with approximately 12% of the sample under the age of 18 years old. Therefore, the differences could be indicative of generational interest in leisure activities. Also, the negative social stigma associated with identifying oneself as a gamer may have led participants to consciously or unconsciously underestimate their commitment to video gaming as a leisure activity.

Video Game Involvement and Social Support

The majority of participants in this study indicated a high level of friend-based social support. This indicates that, in general, high use of video games was not an indicator of social isolation. This finding is not similar to research conducted in previous generations (e.g., Colwell & Payne, 2000; Provenzo, 1991; Selnow, 1984; Zimbardo, 1982). Further research is suggested to confirm this finding, but the evidence suggests that online video games may have created a social venue or at least offered an opportunity for individuals who pursue social interaction while playing.

To determine the relationship between both behavioral and enduring involvement and friend-based social support, regression modeling was used. The model indicated that involvement, both behavioral and psychological, explained 20.6% of the variance in friend-based social support. Consistent with a study conducted by Seay (2006), behavioral involvement had no association with the outcome measure of social support. Enduring involvement, however, had both positive and negative associations with perceived friend-based social support of MP-FPS gamers.

These findings further support the notion that video game researchers must move beyond behavioral markers of video game use and begin to focus on the psychological experiences guiding participation (Griffiths et al., 2003, Bartlett et al., 2009; Ryan et al., 2006). Video game behaviors may help describe the profile of a video game user, but the motives and meaning behind the participation may have greater predictive power for determining outcomes. We found that Centrality and Social Bonding were the only two enduring involvement domains associated with friend-based social support of MP-FPS gamers. Centrality, the investment of significant personal energy and resources and the structuring of daily life routines around gaming, had a negative association with friend-based social support. This means excessive psychological involvement with video gaming through perceived Centrality had a negative social support outcome, regardless of the potential for social networks that could be created and delivered through online services.

However, gamers who perceived high levels of Social Bonding, such as the opportunity to be with other gamers and discuss video gaming, reported positive social outcomes. These gamers reported a greater amount of perceived friend-based social support. This finding illustrates the potential of gaming as a social medium to build both online and physical (i.e., face-to-face) social networks. At the very least, the evidence suggests that gamers who psychologically value the social bonding afforded through this activity may experience positive effects with a broader range of friend-based relationships.

Limitations and Directions for Future Research

A number of limitations of this study should be acknowledged. First, the sample was a convenience sample of MP-FPS video gamers waiting for their copy of a game at two locations in a university town. While it is important to be as specific as possible when describing video gamer types (e.g., casual, hardcore, genre-specific), each type may have different behaviors, motivations, experiences, and involvement levels. Gamers are indeed a diverse population and this sample only represents a small portion of video gamers who were classified as MP-FPS gamers. It is likely that our comparisons of involvement levels did not include infrequent and less involved gamers, rather we examined relationships between gamers who were involved at the high and highest levels. Therefore, study findings may not be generalized to all MP-FPS players, and are certainly not generalizable to all types of video gamers. Research efforts could focus on more infrequent users and diversity including gender, ethnicity, and people with disabilities.

Secondly, this study only focused on one dimension of social integration, the perceived social support provided by friends. Online, or multiplayer, video games have the opportunity to influence many different forms and types of social outcomes. For example, studies could

examine how video game involvement relates to the quality and quantity of family, school, friend, and work relationships. Another question is whether the social relationships developed within the game environment differ from those maintained outside of the game environment or generalize to it. Video game players may be able to develop a strong social network within an online community, but this could still put them at risk for decreased social integration and overall wellness because of their lack of time spent developing social relationships in the physical world. Future research could be conducted to distinguish the characteristics of online relationships and how they facilitate or constrain relationships outside of the virtual environment.

An additional limitation is that the cross-sectional, correlational design of this study does not allow for a precise interpretation that the independent variable was the cause of the dependent variable. That is, the social support system of an individual could be their reason for commitment to video games. They may have lesser attachment to the nature of gaming, but the fact that their social network is involved with video games could lead them to seek the Social Bonding afforded by playing. In general, further research is needed on the relationships between social outcomes and video game play.

More specific research could focus on the relationship between the various domains of enduring involvement and outcomes associated with video gaming. This study found that enduring involvement is associated with friend-based social support, but video game-based Attraction, Social Bonding, Centrality, and Identity could be associated with a host of additional health outcomes. This research could be directed toward understanding the potential negative effects of centralizing one's life around video gaming. Indeed, an individual who invests most of his or her energy in gaming and structures his or her life around the activity may be prone to addiction, social negligence, and an assortment of other negative consequences (Griffiths, 2008).

Conclusion

In conclusion, this study demonstrates that psychological involvement in video gaming was a greater predictor than behavioral involvement in relation to perceived friend-based social support. Behavioral markers of video game participation may be useful for describing how gamers participate, but may do less to explain benefits or consequences. Especially in the social context, gamers may psychologically shape their gaming experiences around relationships resulting in greater friend-based social support as well as other potentially healthy social outcomes. This indicates that not all video game play is socially isolating. Conversely, an individual who centers most of his or her resources and daily schedule on video gaming could face a wide range of negative outcomes including decreased levels of friend-based social support. Multi-player video gaming has quickly become an established form of leisure behavior now enjoyed by millions across the world. Thus, it behooves leisure researchers to understand how this form of digital leisure is experienced and how these experiences can yield both positive and negative health outcomes.

References

Anderson, C.A., Shibuya, A., Ihoria, N., Swing, E.L., Bushman, B.J., Sakamoto, A., et al. (2010). Violent video game effects on aggression, empathy, and prosocial behavior in

- eastern and western countries: A meta-analytic review. *Psychological Bulletin*, 36(2), 151-173.
- Bartlett, C.P., Anderson, C.A., & Swing, E.L. (2009). Video game effects: Confirmed, suspected, and speculative. *Simulation & Gaming*, 40(3), 377-403.
- Bensley, L., & Van Eenwyk, J. (2001). Video games and real-life aggression: Review of the literature. *Journal of Adolescent Health*, 29, 244-257.
- Berkman, L.F., Glass, T., Brissette, I., & Seeman, T.E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine*, 51, 843-857.
- Brown, D. (2006, February). Playing to win: Video games and the fight against obesity. *Journal of the American Dietetic Association*.
- Colwell, J., & Payne, J. (2000). Negative correlates of computer game play in adolescents. *British Journal of Psychology*, 91, 295-310.
- Crawford, G. (2005). Digital gaming, sport and gender. *Leisure Studies*, 24(3), 259-270.
- Cullen, D. (2009). *Columbine*. New York: Twelve Publishers.
- de Kort, Y.A.W, Ijsselstein, W.A., & Poels, K. (2007). Digital games as social presence technology: Development of the social presence in gaming questionnaire (SPGQ). *Proceedings of 10th Annual International Workshop on Presence Research*, Barcelona, Spain.
- Dill, K.E., & Dill, J.C. (1998). Video game violence: A review of the empirical literature. *Aggression and Violent Behavior*, 3(4), 407-428.
- Durkheim, E. (1951). *Suicide: A study in sociology*. New York: The Free Press.
- Entertainment Software Association. (2010). Essential facts about the computer and video game industry. Retrieved December 8, 2010, from http://www.theesa.com/facts/pdgs/ESA_Essential_Facts_2010.PDF
- Feldman, D.E., Barnett, T., Shrier, I., Rossignol, M., & Abenhaim, L. (2003). Is physical activity differentially associated with different types of sedentary pursuits? *Archives of Pediatrics & Adolescent Medicine*, 157(8), 797-802.
- Ferguson, C.J. (2007). Evidence for publication bias in video game violence effects literature: A meta-analytic review. *Aggression and Violent Behavior*, 12, 470-482.
- Ferguson, C.J. (2011). The influence of television and video game use on attention and school problems: A multivariate analysis with other risk factors controlled. *Journal of Psychiatric Research*, 45(6), 808-813.

- Ferguson, C.J., & Kilburn, J. (2010). Much ado about nothing: The mis-estimation and over interpretation of violent video game effects in eastern and western nations: Comment on Anderson et al. *Psychological Bulletin*, 136(2), 174-178.
- Gahwiler, P., & Havitz, M.E. (1998). Toward a relational understanding of leisure social worlds, involvement, psychological commitment, and behavioral loyalty, *Leisure Sciences*, 20, 1-23.
- Gentile, D.A., Lynch, P.J., Linder, J.R., & Walsh, D.A. (2004). The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance. *Journal of Adolescence*, 27, 5-22.
- Green, C.S., & Bavalier, D. (2003). Action video game modifies visual selective attention. *Nature*, 423, 534-537.
- Greitemeyer, T., & Osswald, S. (2010). Effects of prosocial video games on prosocial behavior. *Journal of Personality and Social Psychology*, 98(2), 211-221.
- Griffiths, M.D. (2008). Internet and video-game addiction. In C. Essau (Ed.), *Adolescent addiction: Epidemiology, assessment and treatment* (pp. 231-267). San Diego: Elsevier.
- Griffiths, M.D., Davies, M.N.O., & Chappell, D. (2003). Breaking the stereotype. *Cyberpsychology & Behavior*, 6(1), 81-91.
- Harris Interactive (2007). Video game addiction: Is it real? Retrieved December 2, 2010, from <http://www.harrisinteractive.com/NEWS/allnewsbydate.asp?NewsID=1196>
- Havitz, M.E., & Howard, D.R. (1995). How enduring is enduring involvement? A seasonal examination of three recreational activities. *Journal of Consumer Psychology*, 4, 255-276.
- Iwasaki, Y., & Havitz, M.E. (2004). Examining relationships between leisure involvement, psychological commitment, and loyalty to a recreation agency. *Journal of Leisure Research*, 36, 45-72.
- Jang, H., Lee, B., Park, M., & Stokowski, P.A. (2000). Measuring underlying meanings of gambling from the perspective of enduring involvement. *Journal of Travel Research*, 38, 230-238.
- Jun, J., Kyle, G.T., Absher, J.D., & Hammitt, W.E. (2008). Reassessing the causal structure of enduring involvement. *Proceedings of the 2008 Northeast Recreation Research Symposium*, 194-199.

- Kaye, L.K., & Bryce, J. (n.d.). Putting the 'fun factor' into gaming: Influences of social motivations and contexts on experiences and outcomes of playing videogames. Submitted to International Journal of Internet Science.
- Kim, S.S., Scott, D., & Crompton, J.L. (1997). An exploration of the relationships among social psychological involvement, behavioural involvement, commitment, and future intentions in the context of bird watching. *Journal of Leisure Research*, 29(3), 320-339
- Kyle, G., Absher, J., Norman, W., Hammitt, W., & Jodice, L. (2007). A modified involvement scale. *Leisure Studies*, 26(4), 399-427.
- Kyle, G.T., & Chick, G.E. (2002). The social nature of leisure involvement. *Journal of Leisure Research*, 34, 426-448.
- Kyle, G.T., Graefe, A.R., Manning, R.E., & Bacon, J. (2003a). An examination of the relationship between leisure activity involvement and place attachment among hikers along the Appalachian Trail. *Journal of Leisure Research*, 35, 249-273.
- Kyle, G.T., Graefe, A.R., Manning, R.E., & Bacon, J. (2003b). Predictors of behavioral loyalty among hikers along the Appalachian Trail. *Leisure Sciences*, 26, 99-118.
- Kyle, G., Norman, W., Jodice, L., Graefe, A., & Marsinko, A. (2007). Segmenting anglers using their consumptive orientation profiles. *Human Dimensions of Wildlife*, 12, 115-132.
- Lenhart, A., Kahne, J., Middaugh, E., Macgill, A., Evans, C., & Vitak, J. (2008). Teens, video games, and civics. Retrieved December 8, 2010, from http://pewinternet.org/~media/Files/Reports/2008/PIP_Teens_Games_and_Civics_Report_FINAL.pdf.pdf
- McIntyre, N. (1989). The personal meaning of participation: Enduring involvement. *Journal of Leisure Research*, 21, 167-179.
- McIntyre, N., & Pigram, J.J. (1992). Recreation specialization reexamined: The case of vehicle-based campers. *Leisure Sciences*, 14, 3-15.
- Orsega-Smith, E., Smith, K., & Kukich, C. (2010). Analysis of caloric expenditure in older adults playing the Wii. *Medicine & Science in Sports & Exercise*, 42(5), 594.
- Ortutay, B. (2008). Video game industry looks to thrive in downturn. Retrieved December 13, 2010, from http://articles.sfgate.com/2008-12-29/business/17131063_1_video-games-game-makers-game-industry
- Provenzo, E.F. (1991). *Video kids: Making sense of Nintendo*. Cambridge, MA: Harvard Press.
- Putnam, R.D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.

- Raudenbush, B., Reed, A., & Hunker, R. (2007). Effects of video game play on snacking behavior. *Appetite*, 49, 282.
- Reinecke, L. (2009). The use of video and computer games to recuperate from stress and strain. *Journal of Media Psychology*, 21(3), 126-142.
- Rideout, V., Roberts, D., & Foehr, U. (2005). *Generation M: Media in the lives of 8-18 year-olds*. Washington, DC: Kaiser Family Foundation.
- Robinson, T.N., Chen, H.L., & Killen, J.D. (1998). Television and music video exposure and the risk of adolescent alcohol use. *Pediatrics*, 102(5), e54.
- Ryan, R.M., Rigby, C.S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation & Emotion*, 30, 347-363
- Schott, G., & Hodgetts, D. (2006). Health and digital gaming: The benefits of a community practice. *Journal of Health Psychology*, 11(2), 309-316.
- Seay, A.F. (2006). *Project massive: The social and psychological impact of online gaming*. Unpublished doctoral dissertation, Carnegie Mellon University.
- Selnow, G.W. (1984). Playing video games: The electronic friend. *Journal of Communication*, 34, 148-156.
- Siwek, S.E. (2010). Video games in the 21st century: The 2010 report. Retrieved December 8, 2010, from http://www.theesa.com/facts/pdfs/VideoGames21st-Century_2010.pdf
- Smith, A. (1952). Influence of TV crime programs on children's health. *Journal of the American Medical Association*, 150, 37.
- Smyth, J.M. (2007). Beyond self-selection in video game play: An experimental examination of the consequences of massively multiplayer online role-playing game play. *Cyberpsychology & Behavior*, 10(5), 717-721.
- Swing, E., Gentile, D.A., Anderson, C.A., & Walsh, D.A. (2010). Television and video game exposure and the development of attention problems. *Pediatrics*, 126, 214-221.
- Tobin, S., & Grondin, S. (2009). Video games and the perception of very long durations by adolescents. *Computers in Human Behavior*, 25, 554-559.
- USA Today (2005, November). XBOX 360 buyers stand in line for hours. Retrieved December 2, 2010, from http://www.usatoday.com/tech/gaming/2005-11-22-xbox360-lines_x.htm

- Vandewater, E.A., Shim, M., & Caplovitz, A G. (2004). Linking obesity and activity level with children's television and video game use. *Journal of Adolescence*, 27, 71-85.
- Van Rooij, A.J., Meerkerk, G., Schoenmakers, T.M., Griffiths, M., & Van de Mheen, D. (2010). Video game addiction and social responsibility. *Addiction Research and Theory*, 18(5), 489-493.
- Vaux, A., Phillips, J., Holly, L., Thomson, B., Williams, D., & Stewart, D. (1986). The Social Support Appraisals (SS-A) Scale: Studies of reliability and validity. *American Journal of Community Psychology*, 14(2), 195-219.
- Vlachopoulos, S.P., Theodorakis, N.D., & Kyle, G.T. (2008). Assessing exercise involvement among participants in health and fitness centres. *European Sport Management Quarterly*, 8(3), 289-304.
- Yee, N. (2006a). The demographics, motivations and derived experiences of users of massively multi-user online graphical environments. *Presence: Teleoperators and Virtual Environments*, 15, 309-329.
- Yee, N. (2006b). Motivations for play in online games. *Cyberpsychology & Behavior*, 9, 772-775.
- Weaver, J.B., Mays, D., Weaver, S., Kannenberg, W., Hopkins, G., Eroglu, D., et al. (2009). Health-risk correlates of video-game playing among adults. *American Journal of Preventive Medicine*, 37(4), 299-305.
- Williams, D. (2006). Groups and goblins: The social and civic impact of an online game. *Journal of Broadcasting & Electronic Media*, 50(4), 651-670.
- Zimbardo, P. (1982). Understanding psychological man: A state of the science report. *Psychology Today*, 16, 15.