

Who plays, how much, and why? Debunking the stereotypical gamer profile

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Online games have exploded in popularity, but for many researchers access to players has been difficult. The study reported here is the first to collect a combination of survey and behavioral data with the cooperation of a major virtual world operator. In the current study, 7,000 players of the massively multiplayer online game (MMO) EverQuest 2 were surveyed about their offline characteristics, their motivations and their physical and mental health. These self-report data were then combined with data on participants' actual in-game play behaviors, as collected by the game operator. Most of the results defy common stereotypes in surprising and interesting ways and have implications for communication theory and for future investigations of games.

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Who plays, how much, and why? A player census of a virtual world

Americans, both young and old, play video games at an ever-growing rate. Today's adults, unlike those who dropped game play in the 1980s due to public shame (Williams, 2006a), play more than previous generations. 40% of adults are now regular players, compared to 83% of teenagers. The average player age is now 33, propelling the industry to \$7.4 billion in U.S. sales in 2006 (Entertainment Software Association, 2007). The result is a population engaging in this medium as an acceptable mainstream activity. And as the Internet has become a larger part of everyday life (Wellman & Haythornthwaite, 2002), so too have networked games. 67% of teens now regularly play some game online (Rideout, Roberts, & Foehr, 2005). Online games bring people together as they use their cell phones, their computers and their

gaming consoles to access not only games, but other people. The most social and high-profile of these spaces are persistent virtual worlds—games that are always on, in which players maintain a regular character who grows and changes, and in which many players participate in long-term social groups (Griffiths, Davies, & Chappell, 2003; Yee, 2006). These worlds, called “massively multiplayer online games,” or MMOs, are vibrant sites of community (Steinkuehler & Williams, 2006). Yet even as participation in them rises to several million players in North America alone, research on their players and their impact has remained relatively scant. Ethnographic and experimental investigations of player “guilds” and communities have explored the social dynamics and relationships that exist (Taylor, 2003, 2006; Williams, Caplan, & Xiong, 2007), but systematic and generalizable research has remained elusive, largely due to the difficulties of securing access to players within the walled gardens of for-profit companies. The current investigation represents the first case of access to proprietary in-game player data. With the active cooperation of a major game operator, the current study surveyed players and unobtrusively collected in-game data on their behaviors. This combination of demographic, attitudinal and behavioral data generated a true player census of a virtual world. The paper presented here explicates players’ demographics, their playing patterns as related to those demographics, and their motivations for play. Many of the results defy both stereotype and theoretical predictions.

Prior research on virtual worlds

As with any new medium (Wartella & Reeves, 1983, 1985), questions about the impact of video games have fallen into three categories that occur in order (Williams, 2003): What does it replace? What are the health impacts? And, what are the social impacts? While the third question is beyond the scope of the present study, public concern over displacement and health issues continues to be a policy debate and an area of interest for communication researchers. The most basic concern is that consumers of the new medium will use it to the detriment of human relationships. As Putnam has theorized with the rise of television (Putnam, 2000), use of the new technology may come at the expense of personal relationships and community involvement. As use of the isolating technology rises, Putnam argues, users spend less time with their friends and family. Similarly, some have speculated that since games are sedentary activities, as television and prior media have been, then they might be present a risk to health as well (Rideout et al., 2005).

Early reports on video games featured several claims of direct physical health impacts, including “Pac Man elbow” (Skow, 1982), “video wrist” (“Donkey Kong Goes to Harvard,” 1983), and “Nintendinitis” (Adler, Rogers, Brailsford, Gordon, & Quade, 1989). Mental health concerns have also made appearances in both cultural outlets and in research. Movies such as *Nightmares* (Sargent, 1983) featured characters, usually young males, drawn inexorably to the devilish glow of arcade screens. Subsequent research has explored gamers’ mental health (Fisher, 1994; Salguero & Moran, 2002), especially within virtual worlds (Plusquellec, 2000). With such

portrayals and concerns, it is not surprising that there are many popular stereotypes of video game players. As portrayed in print media, game players are stereotypically male and young, pale from too much time spent indoors, and socially inept (Williams, 2003). As a new generation of isolated and lonely “couch potatoes,” young male game players are far from aspirational figures.

Although stereotypes are common, there is a scarcity of systematic research on game players. One question for scholarly researchers to answer is whether the popular stereotypes of video game players are accurate. The initial research on these populations suggests that players are not all isolated teenage males. While not able to draw on random or stratified samples, two self-reported survey projects of MMO players (Griffiths, Davies, & Chappell, 2004; Yee, 2006) found evidence that the players are older than was previously thought and likely more social than stereotype suggests. Additionally, a range of ethnographic and interview projects have discovered family-like dynamics among active game groups (Taylor, 2003, 2006), active ecologies of players (Castronova, 2005), and complex hierarchies of players in large guilds (Williams et al., 2006). Experimental investigations have explored communication differences and interpersonal variations due to virtual distance or representations (Pena & Hancock, 2006; Williams et al., 2007; Yee & Bailenson, 2007) or type of game played (Smyth, 2007). Yet in all of these cases the work has been limited by access to game populations, with the researchers relying on convenience samples or subject pools. Game companies have been largely closed to researchers due to time, legal, resource and focus constraints. An exception is Kafai et al.’s (Kafai, Feldon, Fields, Giang, & Quintero, in press) collaboration with a game developer to test science learning. Kafai’s team was able to work closely with a game maker specializing in adolescents and science education. While studying that target population, the team was able to bring adolescents into social lab settings, and also to marry those data with unobtrusive behavioral measures from within the game world. Such access has never occurred for any of the mainstream game titles.

Instead, the common approach to studying games has been to have single-player lab sessions with self-reported behavioral measures. The dominant model for this research has been the General Aggression Model (GAM) (Anderson, 2004), which extends cognitive neoassociational approaches (Bandura, 1994; Berkowitz & Rogers, 1986) into a larger framework that incorporates behaviors and several routes to aggressive behaviors. This paradigm offers minimal depth when explaining how effects occur in social spaces, or how player motivations might moderate the effects process. Thus, mapping out the social and motivational factors of play within these dynamic spaces is a key necessary condition for theoretical progress, begun by Sherry and colleagues (Sherry, Greenberg, Lucas, & Lachlan, 2006) and continued here.

In the study of virtual worlds, one well-known player taxonomy is Bartle’s four Types (Bartle, 1996)—Achievers, Socializers, Explorers, and Killers. While the model is widely referred to, it was developed without statistical data. Thus, the motivations suggested by the Types may not factor out as proposed. For example, Bartle suggested that Explorers enjoy discovering the geographical boundaries of the world as

well as analyzing the numbers and rules underlying the game mechanics, but these two motivations may not be highly correlated.

Nevertheless, Bartle's taxonomy does provide a starting point for exploring player motivations in online games. In an attempt to create a taxonomy of player motivations based on empirical data, Yee (2006) generated a set of motivation items based on qualitative responses from earlier open-ended surveys eliciting motivations for play from online gamers (N. Yee, 2005). These were then added to the motivation items suggested in Bartle's typology. Five factors emerged from the analysis—Achievement, Relationship, Manipulation, Immersion, and Escapism. The first three factors mapped on to three of Bartle's Types while the motivations of Immersion and Escapism were not previously noted in Bartle's typology. More importantly, Bartle's suggested Explorer type did not coalesce as a factor; geographical exploration was not correlated with an interest in analyzing game mechanics.

While this factor-analytic framework was based on statistical analysis, some motivations that players have articulated in the mentioned works did not emerge as factors. For example, geographical exploration didn't load on any of the five factors. To this end, Yee (2007) used additional qualitative data from open-ended responses to expand on the existing inventory of motivation items. This expanded inventory yielded 10 factors. The large number of factors hinted at a higher-order factor structure. Indeed, a second-order factor analysis yielded three factors. In other words, these three second-order factors summarized the 10 first-order factors.

The three second-order factor structures were: Achievement, Social, and Immersion. Under the Achievement structure were the factors related to: 1) advancement, 2) analyzing game mechanics, and 3) competition. Under the Social structure were the factors related to: 1) chatting and casual interactions, 2) developing supportive relationships, and 3) teamwork. And finally, under the Immersion structure were the factors related to: 1) geographical exploration, 2) role-playing, 3) avatar customization, and 4) escapism.

The 10 factor model covered all of the motivations listed in Bartle's typology. In addition, the factor analysis showed that Bartle's Explorer Type was composed of two uncorrelated motivations—geographical exploration and analyzing game mechanics. The 10 factor model also covered five out of the six motivations in Sherry's (2006) typology of motivations for video gamers in general (i.e., across genres). The remaining motivation—Arousal, or the constant feeling of an adrenaline rush—is seldom seen in qualitative responses from online gamers because the genre, based on long-term goals and progression over the span of weeks and months, doesn't lend itself to constant arousal or instant gratification. This is an area in which first-person shooter players' motivations likely differ from MMO players' (Jansz & Tanis, 2007). The second-order factor structures also show how the underlying motivations can be grouped together. Indeed, it begins to become unwieldy to have 10 entirely independent factors in a model. The second-order structures provide a more parsimonious representation of the disparate factors. These second-order structures also allow us to cover the range of known motivations with fewer factors in an analysis.

Without access to game server data, no study has yet been able to draw a representative or stratified sample from any game to study motivations or basic play patterns and their offline demographic correlates. What is more, measurements of in-game activities have been limited to either self-reports of behaviors or observable ones, rather than measures of actual in-game data obtained by servers. This has been particularly vexing given that the actions and behaviors within game spaces are all capturable in a way that is atypical in social science research. A truly unobtrusive measure of behaviors exists, untapped, on the electronic servers and databases of game companies. These data are often captured at millisecond resolution and contain thousands of potential variables at a level of specificity never imagined by early proponents of unobtrusive measurement (e.g. Webb, Campbell, Schwartz, & Sechrest, 1966). Even limited studies of unobtrusive game data have shown great promise (Ducheneaut, Yee, Nickell, & Moore, 2006). The findings reported here are the first such use of data supplied by a game operator, and the first combination of them with standard survey measures. The result is a unique combination of demographic, attitudinal and behavioral measures.

Research Questions

Despite the stereotypical portrayals, the three waves of concerns identified by Wartella and Reeves (1983, 1985) have become a common way to fear—and to study—new media. Nevertheless, this does not also mean that those concerns are spurious. It is worth examining the demographic profiles and health outcomes of game players simply to add empiricism to an area of study often weighed down by preconceptions and popular stereotypes. Policy makers and parents are also concerned with game play and should not have to rely on industry trade organizations for data.

Thus, the overall goal of the current study was to conduct a proper census of MMO game players:

RQ1: What are the means and distributions of age, gender, race and class among MMO players?

Such a census cannot, of course, exist in a vacuum. It must be paired with national-level data on the same categories so that the MMO population can be compared to the general population. Therefore:

RQ2: How do the demographics of MMO players compare to the general population?

Next, it is important to gain not just a measure of who these people are, but to also discover what they do. Basic play patterns of time can be examined, and, combined with the demographic data, the following question can be asked:

RQ3: Who plays how much?

In turn, play patterns can be examined for their displacement implications. The most obvious example is in media use. If players add a significant amount of playing time, this time must come at the expense of something else. Prior work (Williams,

2006b) suggests that other entertainment or communications media will be displaced or altered. So:

RQ4: What are the media use patterns of MMO players?

In keeping with the questions about the health impacts, it is worth learning about both the physical and mental health of the playing population in comparison to the general population. Players may be the sedentary at-risk populations feared (Rideout et al., 2005), or may exhibit unhealthy levels of mental health. Although no causal inferences can be drawn, it would be important to future research to explore the health of players. Such outcomes, combined with demographics and play patterns, can lay the groundwork for causal studies of the impact of games (positive or negative) on physical health and mental state. Therefore:

RQ5: How does the physical health of MMO players compare with the general population?
And

RQ6: How does the mental health of MMO players compare with the general population?

For researchers, establishing baselines for populations offers the obvious practical value of establishing frames and starting points for future work, but a census of behaviors and motivations is equally important for theoretical reasons. Practically speaking, having a framework for discussing and measuring motivations for play among online gamers extends the tools of uses and gratifications theory for online gamers, and provide us with a means to better differentiate users beyond demographic information alone. Furthermore, such a framework provides the foundation to explore whether different subgroups are motivated differently, and whether certain motivations are more highly correlated with usage patterns or in-game preferences or behaviors. It is important to recognize that different users have always had different expectations and uses of the same media (Blumler & Katz, 1974), and that new media do not change this fact (Sherry et al., 2006). Game players make not only the choice of title and genre, but direct the action and make choices throughout the play experience. So while it is still fair to ask what the impact of such experiences are, it is no longer sufficient to stop there. We must also ask why the users do what they do so that we can understand the role their choice and actions might play as moderating variables in any effects model. Understanding the motivations behind video game-play therefore provides us with good predictors of gamers' usage and genre preferences (Sherry et al., 2006), consistent with a perspective driven by what Ruggiero (2000) calls the "uses and effects" paradigm. But while Yee's (2005) original framework was validated with a large sample of online gamers, respondents to the survey were self-selected, and thus the framework would benefit from a replication with a known and stratified sample. Incorporating this framework of motivations in the current study also allows us to understand how player motivations intersect with other variables of interest. Thus:

RQ7: What are the motivations of MMO players?

Lastly, in keeping with the user-centric investigation of motivation, one key player choice is made when a player chooses a “home” server. To explain, most MMOs do not exist as one large, common space. For reasons of virtual geography, density and computational capacity, players are spread out across multiple parallel versions of most games. These versions sometimes come in slightly different flavors, with minor differences in rules and affordances. The two common differences include the ability to attack other players (a “PvP” or player vs. player server), and a focus on role playing. The game studied here also featured a unique variation dubbed “Exchange” servers which allow using real U.S. dollars to buy virtual items and characters. Thus, players entering the game world for the first time are presented with a choice of playground: normal, PvP, role play or Exchange. This self-selection can be studied by asking:

RQ8: Do players of different types systematically select different servers?

Method

The current study focused on the MMO *EverQuest 2* (EQ2) because of its popularity, its representativeness of mainstream MMOs and because of the unique access provided by the game operator. The sequel to the highly successful *EverQuest*, EQ2 launched in November of 2004. Both it and its predecessor maintained a large share of the North American market until the launch of *World of Warcraft*, the current U.S. MMO leader. Despite losing its market lead, the *EverQuest* franchise continues to expand and still attracts several hundred thousand players (Schiesel, 2007). For generalizability purposes, EQ2 represents the mainstay of the MMO market, fantasy role playing. Its basic game rules and goals are nearly identical to *World of Warcraft*'s and the other several fantasy titles on the market, which altogether comprise 85% of the total MMOs as played.¹ Because MMO operators do not release data on their players, there is no way of knowing whether the results here are or are not indicative of other game populations. Indeed, the findings released here are the first public data to be shared by a major game company. The game operator, Sony Online Entertainment, agreed to cooperate with the research team, and to provide access to data from the game's large back-end databases. Sony further worked with the research team to help field the large survey described below. This level of access and cooperation between a game developer and an academic research team is the first of its kind. It enabled a stratified sample rather than a convenience sample, helped establish trust with the potential survey takers, and most importantly, it allowed the linkage of survey data with unobtrusively collected game-based behavioral data.

Sampling and Procedure

Survey sampling in the world of MMOs requires focusing on the player as the unit of analysis, but being aware of the fact that players can maintain more than one character. These characters may reside on multiple servers. However, Williams

et al. (2006) found that most players play one character most actively and consider it their “main.” Thus, the first step in establishing the sampling frame was to examine the game databases to determine which of the player’s characters was played the most frequently over the prior year. This “main” character became the sampling unit in the study, and established the equivalent of residency for the player—their main character determined which server they belonged to. These characters then populated the sampling frame, and were listed evenly across the four servers used in the study.

Players with a character within the frame were then invited to participate in the survey if they logged in during the survey window. There were no special efforts made to hide the nature of the survey as it was what it was labeled to be: a general study of who plays *EverQuest 2*. If they agreed to participate, players were directed to a secure web page. After giving informed consent, the players completed the survey, which took about 25 minutes. Players were not offered a cash or prize incentive for their participation. Instead, they were promised a special virtual item that would be added to their in-game inventory as compensation. This item, the “Greatstaff of the Sun Serpent” was created by Sony for this unique use. It was considered desirable for players of all levels because of its rarity and its potency in combat and proved to be a valuable recruiting tool for the survey. Based on prior survey work by the research team in this area using cash incentives or no incentive (Williams, 2006b; Yee, 2006), the prediction was that the survey would take one to two weeks to fill to a cap of 7,000 respondents, but the total was reached in just over two days.

Participants were identified by an unseen account number in Sony’s databases. These account numbers were used to unobtrusively link the survey data with the game’s databases. The main measure derived from Sony’s databases was total playing time, calculated by averaging the number of cumulative seconds of play over the playing window on each account. These data were then used to compute the players’ average time in the game per week, and were matched back to their entries from the survey. Because players could maintain multiple characters on their account, each character’s playing time was collapsed into one metalevel play value for the player. These calculations occurred within the database and separate from the survey, so subjects were unaware that their time online, their server residence, or their character use were part of the research.

Measures

To answer the research questions, the survey instrument used a variety of standard demographic measures. Players were asked for their age, gender, race, household income, education, and religion. For general demographics, comparative data were derived from the 2000 U.S. census. General population religion was drawn from Kosmin, Mayer, and Keysar (2001). With the large dataset in use here, nearly all tests are significantly significant. Thus, t-tests are reported with Cohen’s *d* to allow for substantive interpretation. As a rough rule of thumb for Cohen’s *d*, .20 is considered a small effect, .50 moderate and .80 large.

The survey also asked players several questions about their media use, including their hours of television viewed per week, how often they read a newspaper, and their Internet connection speed. For the general population, hours of television per week were drawn from Hu, Leitzmann, Stampfer, Colditz, Willett & Rimm (2001). Broadband use was taken from the 2007 version of the Center for the Digital Future Report (Cole, 2007). Newspaper use was obtained from a national study of election behaviors (*The 2004 election panel study*, 2004). When comparing the EQ2 data with these other large samples, the mean percentage of the other sample was used as a fixed point of contrast for a one-sample t-test.

Players' physical health was measured with three indicators. The primary measure was their body mass index (BMI), which was calculated from self reports of weight and height ($(\text{pounds/inches tall}^2) * 703$). BMI is a general indicator of fitness and general body fat and is correlated with several indicators of disease and death (*Physical status: The use and interpretation of anthropometry*, 1995). The World Health Organization lists the weight ranges for BMI as lower than 18.5 for "underweight," 18.5 to 24.9 as "normal," 25.0 to 29.9 as "overweight", and 30 or higher as obese. The second measure was a question about exercise habits ("How many days a week do you engage in vigorous exercise?"). The third measure was for physical impairment ("Do you have a physical condition that impairs your ability to carry out ordinary daily activities?"). Comparative national data were derived from the U.S. Census 2006 American Community Survey's question on physical disabilities. The age range for the census data was constrained from 16 to 64, meaning that those EQ2 players 12–15 (3.45% of the sample) would not directly compare. However, a T-test of physical disabilities between 12–15 year old and 16–65 year old EQ2 players found no significant difference ($t = 1.168$, $df = 6,759$, $p = .243$).

Mental health was measured by asking whether the subject had ever been diagnosed with depression, substance addiction, or anxiety. The survey data were then compared to national-level data for depression (Ipsos-Insight, 2007), substance addiction (SAMHSA Office of Applied Studies, 2006), and anxiety (Kessler, Chiu, Demler, & Walters, 2005).²

Given that earlier work in player motivations have suggested a factor structure of three main factors (Yee, 2006), we condensed the inventory items to focus on these three factor structures. The 10-item inventory (see Appendix) consisted of items related to the three factor structures established by Yee as those that underlie MMO play: Achievement, Social, and Immersion. Respondents answered the questions using a 5-point rating scale, ranging from "Not Important At All" (1) to "Extremely Important" (5).

Lastly, to address the research question about server differences, every measure was tested with ANOVAs to see if any server featured players with systematically different characteristics than another.

Results

Who plays and how much?

To answer the research questions about the player base, its comparison to the general population and its playing time (RQ1–4), player data were derived and compared to national-level data for age, gender, race, income, education, religion and media use. Subgroups were then tested for differences in time spent in EQ2. Among all players, the mean hours played per week was 25.86 ($SD = 19.06$). This compares to the seven-and-a-half hours per week of video game play for adults reported by the industry (Ipsos-Insight, 2005). The research question about server-based differences (RQ8) was examined throughout the analyses, but none of the findings differed significantly by server type.

Age

Consistent with both Yee (2006) and Griffiths (2003), EQ2 players are 31.16 years old on average ($SD = 9.65$, Median = 31.00, capped minimum of 12 and maximum of 65), compared to a median age of 35.3 for the general population (Hetzl & Smith, 2001). Counter to stereotype, the largest concentration of players are in their 30s, not teens or even college-aged (See Table 1). There are more players in their 30s than in their 20s (36.69% vs. 34.59%).

Older players also play more than younger players. Excepting a slight deviation in the early and mid 30s, mean hours played per week increases steadily with age (see Figure A).

Gender

The gender distribution is 80.80% male and 19.20% female, compared to national estimates of 49.1% male/50.9% female (Smith & Spraggins, 2001). Female players play slightly more hours per week than male players (Females $M = 29.31$ hours per week; Males $M = 25.03$; $t = 7.33$, $df = 6,722$, $p < .001$, $d = .18$).

Table 1 Basic age range of EQ2 players

Age range	Percentage	Cumulative Percentage
Teens, 12–17	6.58	6.58
College-age, 18–22	12.40	19.09
Young adult, 23–29	26.27	45.61
Thirties, 30–39	36.69	82.64
Forties, 40–49	12.40	95.16
Fifty or older, 50–65	4.80	100.00

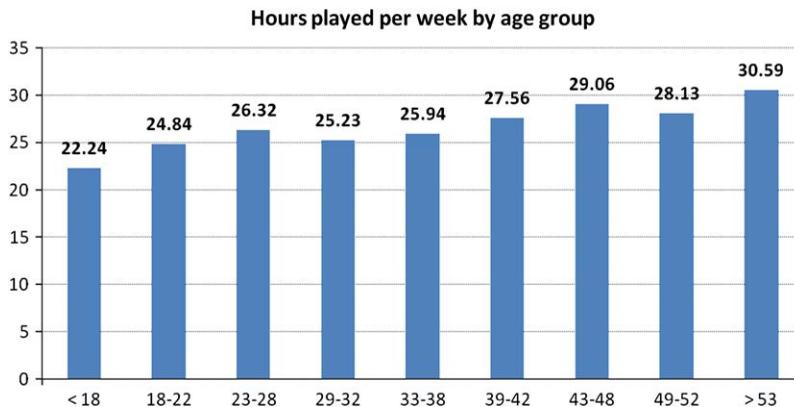


Figure 1

Race

Table 2 compares the racial distribution of *EQ2* players with national averages (Grieco & Cassidy, 2001). Whites and Native Americans play at higher rates, while Asians, Blacks, and Hispanics/Latinos play at lower rates. Within the players, there was no race-based difference for hours played.

Income and Education

EQ2 players come from wealthier backgrounds than average. The mean household income for players is \$84,715/year ($SD = \$104,171$), compared to \$58,526 for the general population (U.S. Census Bureau, 2006). Income was unrelated to hours played. *EQ2* players are also more educated than the general population (see Table 3).

Religion

EQ2 players have substantially different levels of spirituality than the general population (see Kosmin et al., 2001). They are less spiritual in general, and less likely to belong to mainstream faiths when they do practice. Although they are as likely to be Jewish (1.46% for players compared to 1.3% for the general population, *n.s.*), they

Table 2 Comparing Race in *EQ2* Players and the U.S. Population

Race	% <i>EQ2</i> players	% General Population
Asian/Pacific Islander	2.68	3.64
Black/African American	1.55	12.31
Hispanic/Latino	3.34	12.55
Native American	1.74	0.88
White	87.62	75.14

Note. U.S. Census data do not tabulate Latinos and Whites as mutually exclusive.

Table 3 Comparing Education for EQ2 Players and the U.S. Population

Educational level	Percentage of EQ2 players	Percentage of General Population
Less than high school	7.67	20.14
High school diploma	15.62	29.82
Some college	32.63	18.21
Associates degree	16.93	7.78
Bachelor's degree	14.43	16.01
Grad training or prof degree	12.67	8.03

are far less likely to be Christian (49.21% compared to 76.5%, $t = -51.65$, $df = 7128$, $p < .001$, $d = 1.22$), more likely to self-describe as belonging to Muslim, Buddhist or alternate faiths (11.64% compared to 2.4%, $t = 22.93$, $df = 7128$, $p < .001$, $d = .54$) and much more likely to state “No Religion” (37.69% compared to 14.1%, $t = 36.82$, $df = 7128$, $p < .001$, $d = .87$). Among the players, religious affiliation had no bearing on time spent playing.

Media Use

EQ2 players' media use data were compared with national-level data to explore what their game play took the place of. The most apparent difference lies in the number of hours spent watching television vs. playing online. EQ2 players spent 21.56 hours per week watching television, compared to 31.5 per week for the general population ($t = -29.60$, $df = 6485$, $p < .001$, $d = .74$) (Hu et al., 2001). The game players' own difference between mean television use ($M = 21.56$ hours per week, $SD = 27.02$) and hours of EQ2 play was 4.30 hours ($t = 10.41$, $df = 6136$, $p < .001$, $d = .27$). EQ2 players had a very high rate of broadband use, nearly double that of the general population (97.97%, $SD = 14.12\%$ vs. 51.77% for the general population, $t = 276.30$, $df = 7128$, $p < .001$, $d = 6.55$). They spent fewer days per week reading a newspaper ($M = 1.62$ vs. 3.93 for the general population; $t = -90.77$, $df = 7124$, $p < .001$, $d = 2.15$), although they did report using the Internet to learn about local (5-point

Table 4 Means and standard deviation of motivation factors by gender

	Male		Female	
	M	SD	M	SD
Achievement	3.50	.88	3.17	.91
Social	3.14	.94	3.22	.98
Immersion	3.29	.87	3.38	.86

scale, ranging from 1 = never to 5 = frequently: $M = 3.19$, $SD = 1.32$) and international events ($M = 3.09$, $SD = 1.53$) at a level between “sometimes” and “often.”

Health

To address *RQ5* and *RQ6*, players were asked about their physical and mental health. Physically, *EQ2* players are healthier than the regular population. *EQ2* players have an average BMI of 25.19 ($SD = 8.19$), making them slightly overweight, but much less so than the average American adult, who has a BMI of 28 ($t = -28.74$, $df = 6993$, $p < .001$, $d = .69$) (Ogden, Fryar, Carroll, & Flegal, 2004). 22.2% of *EQ2* players are technically obese, compared to 30.5% of American adults. Among children and adolescents (ages 11–19), *EQ2* players have lower BMIs, with an average of 21.96 ($SD = 10.2$), compared to 23.3 ($SD = 1.33$) for US adolescents ($t = -3.52$, $df = 723$, $p < .001$, $d = .26$) (Ogden et al., 2004). This difference is smaller than for the total population comparison at all ages, indicating that while adolescent *EQ2* players are still healthier than their nonplaying counterparts, they do not have as large an advantage as the older population. Put another way, older *EQ2* players are especially fit in comparison to their nongamer counterparts. On average, *EQ2* players describe their health as slightly better than “good” ($M = 1.92$, $SD = 0.74$, where 1 = excellent and 4 = poor) and report engaging in vigorous exercise between one and two times a week. This compares favorably to national data showing that 62% of Americans over 18 do not engage in any exercise that lasts more than 10 minutes (Center for the Digital Future, 2007). However, *EQ2* players do have a higher rate of physical impairments than the general population, 9.51% vs. 7.30% ($t = 6.20$, $df = 6760$, $p < .001$, $d = .15$).

In contrast, *EQ2* players have lower levels of mental health on two out of the three indicators. 22.76% of *EQ2* players reported having been diagnosed with depression. This level is larger for the female players (36.52%, $SD = 48.17\%$) than the males (19.38%, $SD = 39.63\%$) ($t = 13.567$, $df = 6776$, $p < .001$, $d = .33$). These figures are both higher than the respective gender rates for the U.S. population, which has a 23% rate for women and an 11% rate for men. Players had a slightly higher rate of substance addiction (5.56%, $SD = 22.91\%$ vs. 4.8% for the general population, $t = 2.73$, $df = 6798$, $p < .01$, $d = .07$). The exception to this pattern was anxiety, for which *EQ2* players reported slightly lower levels ($M = 16.60\%$, $SD = 37.21\%$) than the general population (18.1%) ($t = -3.32$, $df = 6776$, $p < .005$, $d = .08$).

Motivations

To address *RQ7* and to replicate Yee’s (Yee, 2007) framework, motivations were checked via factor analysis and then examined in relationship to playing time. The replication was successful; the 10 items clustered into the three factors as in Yee’s (2007) study, thus also indicating that the shortened inventory successfully captured the original inventory of items. A factor analysis of the inventory using principal components extraction (Tabachnick & Fidell, 2007) yielded three factors with eigenvalues greater than 1: Sociability ($a = .76$), Achievement ($a = .66$) and Immersion

($a = .62$; See Appendix for the items and loadings). Together, these three factors accounted for 60% of the overall variance. As suggested by Fabrigar et al (1999), an oblique rotation was used to account for the inherent low-level correlations between the components. All factor loadings were in excess of .60 and no secondary loadings exceeded 50% of the primary loadings. Items were grouped to create three- and four-item subscales for the achievement, social, and immersion factors by averaging the scale items. The loadings paralleled the original 40-item instrument. However, the subscales employed in the current study produced lower alpha estimates, which is to be expected given the small number of items per subscale.

The correlation between the Achievement and Sociability factors was .25 ($p < .001$). The correlation between the Achievement and Immersion factors was .21 ($p < .001$). And the correlation between the Sociability and Immersion factors was .41 ($p < .001$).

The motivation subscales were compared to examine whether players favored certain motivations over others. A repeated-measures ANOVA revealed a significant difference between the three motivations ($F[2,6837] = 224.75, p < .001$). Achievement ($M = 3.44, SD = .89$) was rated as more important than immersion ($M = 3.31, SD = .87$), which in turn was rated as more important than sociability ($M = 3.16, SD = .95$). A comparison of the confidence intervals showed that all three means were significantly different from each other ($p < .05$).

The three motivation factors were then tested for their relationship to total playing time. A regression model on playing time, $R^2 = .03, F(3, 6460) = 58.97, p < .001$, found that all three factors were significant predictors. Due to the moderate correlations among the motivation factors, the possibility of multicollinearity was checked. The tolerance values were all above .82, suggesting that multicollinearity was not a problem. Immersion was negatively related ($B = -2.34$ hours, $\beta = -.11, p < .001$), while sociability ($B = 1.99$ hours, $\beta = .10, p < .001$) and achievement ($B = 2.45$ hours, $\beta = .12, p < .001$) were both positively related. To ensure that the unexpected negative association between Immersion and playing time was not a statistical artifact stemming from the correlations among the motivation factors, the Pearson correlation between Immersion and playing time was examined. The resulting correlation coefficient of $-.04$ ($p < .001$) suggests that the negative association seen in the multiple regression results wasn't a statistical artifact. Thus the desire to get ahead and the desire to spend time with others both predicted increased playing, whereas the desire for immersion was a predictor of playing less.

To further explore the unexpected negative association between Immersion and time played, the correlation coefficients between each of the Immersion factor's underlying scale items and time played were computed. The coefficients were all negative: exploration ($r = -.01, p = .44$), role-play ($r = -.07, p < .001$), customization ($r = -.02, p = .10$), and escapism ($r = .02, p = .20$).

Discussion

Survey data were combined with unobtrusive measures of playing time to answer the research questions. Players were found to be primarily adult, male, white, and middle class. They were less religious than the general population and have substantially different media habits. Players were found to be physically more healthy than the general population, but mentally less healthy. Lastly, players were motivated to play for achievement, immersion and social reasons, with achievement as the strongest predictor of playing time. Each finding has implications for stereotype formation, but more importantly, each has implications for theories and models of game effects, and for future research designs. The data were cross-sectional, meaning that the outcomes could be caused by game play, or that people with certain characteristics are more likely to play. The theoretical implications of each possibility are discussed.

Demographic findings and their research implications

The mean age of 31.16 confirms the trend found in game play more generally (Williams, 2006a), i.e., that players within Generation X continue to play at rates higher than Baby Boomers. Joined by new generations playing at equally high rates, the overall trend is thus for the mean age of a gamer to match that of the general population (a median of 35.3 years old). These findings join others (Griffiths et al., 2004; Yee, 2006) in suggesting that the stereotype of the young gamer is no longer accurate—at least among MMO players. However, the data do show a large gender divide, with men outnumbering women four to one. Given that other, more general, research on games finds that 38% of players are female (Griffiths et al., 2004), and that women are the driving force behind the majority of online game play (Jones, 2003), the MMO findings stand in defiance of other trends. Despite being on the platform that appeals more to women (the PC), this particular genre has not attracted female players at a rate consistent with other games. Further research is necessary to tease out whether this is due to genre, an unappealing social environment, or some other factor.

What was somewhat surprising was the trend for older players to play more than younger ones, and for women to play more than men. Game developers have assumed that adolescents and college-aged populations have more free time and have tooled their MMOs accordingly as their player base has aged (Beliaeff, 2007). They have also assumed that males are their most devoted audience. However, both assumptions are incorrect. Young males are often tagged as the “hard core,” but it is the adults and the females who log the most hours.

The implication for researchers is that studying young males—especially the ubiquitous college sophomores who populate research pools—is no longer sufficient for generalizability, at least not with online games. For researchers to argue that their results have external validity, they must increasingly consider the actual playing populations of the games lest the studies become meaningless outside of laboratories. Children rightly remain a particular population of interest because of their at-risk

status with media (Paik & Comstock, 1994), but the results here suggest that they may not be the primary, or even secondary, player base of some genres. Traditional effects research, including the widely studied area of aggression (Anderson, 2004; Anderson & Dill, 2000; Bushman & Huesmann, 2006), should incorporate these factors to maintain external validity.

Building towards a theory of active players

The dominant research approach toward media use continues to be effects-based thinking, i.e. “What are media doing to us?” Yet the results here show that this one-way relationship is not adequate in this highly interactive and social age. Without updating, our traditional approaches are becoming theoretically impoverished. The evidence presented here clearly shows a different kind of user than the typical student being acted upon in a short effects experiment. As shown here, they are motivated to play and interact with others in a way that traditional models such as the GAM do not account for. We think there is a broader point to be emphasized: With the rise of blogs, wikis, chat rooms and the like (Howard & Jones, 2004), such a shift from media consumers to producer-consumers is likely not constrained to online gaming. The clear pattern of user actions is demonstrating that game research needs to undergo the same transition that early communication research did, i.e. that a once simple direct effects model was slowly but inevitably made more nuanced by the addition of mediating variables such as personal difference, culture, social context and choice (Lowery & DeFluer, 1995).

This is not to say that effects thinking needs to disappear. Far from it; it needs to evolve and incorporate new elements. GAM-based research does not incorporate how a player seeking to achieve and compete might process stimuli or model behaviors differently than someone interested in role play and immersion, or someone playing to have a casual chat with a friend. It does not consider other players to be mediating forces, whose impact might vary from one game context to the next (and not always positively). It largely considers games to be a black box of effects sources rather than the complex and public social medium it increasingly is. Thus, the game research field is strikingly similar to early communication research on persuasion and public opinion: A one-way effects model was the dominant approach until later studies established the complex mediating relationships that social networks brought to the process (Berelson, Lazarsfeld, & McPhee, 1954). The field’s theoretical growth leaped forward once models began to incorporate how and why indirect social influences changed the effects process (Lowery & DeFluer, 1995). Social scientific game research has yet to make this leap. With evidence of motivations and player differences more in hand, we call for theory construction—for a more nuanced model of uses and effects that incorporates the social network, the context and mechanics of the space, and the motivations of the user.

Motivations are a central element in understanding uses and effects processes because they may moderate them (Katz, 1996). Having a framework for discussing and measuring motivations for play among online gamers extends the tools of uses

and gratifications theory for online gamers, and provides us with a means to better differentiate users beyond demographic information alone. Such a framework provides a theoretical foundation to explore whether certain motivations are more highly correlated with usage patterns or in-game preferences or behaviors, or serve as moderators of processes. On a basic level, the current findings also demonstrate that different types of players may have very different motivations for play, with achievement as the strongest predictor of time played overall. This is in contrast with Sherry and colleague's (2006) findings on general motivation patterns across gamers of all types, and Jansz and Tanis' study of first-person shooter players (Jansz & Tanis, 2007), and so is a further indicator that different genres will have different kinds of players. Given the dynamic within MMOs for more time to usually equal more progress and more acquisition of virtual goods, this may be unsurprising. Still, awareness of this kind of nuance makes for a more robust approach to games research.

For effects research, specifically the GAM model (Anderson & Dill, 2000), motivations could mediate the effects process by focusing attention on different modeled behaviors. Likewise, they could lead to different levels of cognitive processing that lead to different patterns of schema formation, use and recall (Eagley & Chaiken, 1993; Petty & Cacioppo, 1996). For example, it is unknown whether a desire for more immersion in game play might lead to a different kind of cognitive processing that might in turn mediate an effects process. Or perhaps the desire for achievement would cause some players to selectively model others with similar motivations. Given that the different motivation types have now been shown to lead to different playing rates, this is an element that effects models need to incorporate. The strong social motivation finding points out why the social nature of the spaces has to be accounted for in any process. Social motivations and achievement motivations, for example, were nearly equal drivers of playing time. Recent game research shows that in MMOs these two functions go hand-in-hand as groups seek organization to accomplish goals, especially large-group raids (Taylor, 2006). Thus social processes must be incorporated into a fully nuanced effects theory in any game space with more than one player.

The motivations findings have a further theoretical utility that extends beyond effects models. Consistent with mood management research on older media (Zillmann, 1988), players are likely choosing games that match their individual motivations. Or, if they are choosing poorly, they may be experiencing negative outcomes. There is rich theoretical territory here for future work, so we offer a handful of speculations and suggestions. One possibility is game use as personality maintenance. If a player is highly achievement oriented, she may seek games that fulfill this when she has a lack of achievement in her nongame ("real") life. There are several potential hypotheses. Players may choose motivation-congruent games to achieve higher self-esteem, e.g. when needing a confidence boost, does the person seek game play they have mastery over? Players may choose games when threatened, e.g. the social player plays a socially supportive game when dealing with an upsetting

offline social situation. Players may make these choices and find a range of results, i.e. some of these motivation-orientation choices may lead to negative reinforcement cycles and others to positive ones. Each of these possibilities marries the uses and effects approaches with the nuance of interactive media. Lastly, it would be both theoretically rich and practically valuable to determine which game mechanics satisfy which motivations. Such knowledge would help game makers make more appealing games, of course, but it would also help us leverage game mechanics into other contexts such as educational games or collaborative virtual work spaces.

Whatever future research may find, it is clear from the current findings that MMO players are using media differently than the general population, and have direct reasons for doing so. Although they are much larger consumers of media overall, there is a deeper story in the proportions and types of media they choose. With 10 fewer hours per week of television and the replacement of print newspapers for online sources, these players have dramatically moved from passive media to interactive ones for their social, entertainment and civic needs. It was telling that they rated achievement as their primary motivation for play, indicating that they are taking a proactive role in their media use; rather than consume prepackaged entertainment, MMO players spend their time consuming entertainment that they have a direct hand in creating. And, crucially, they are doing so with other people active in the same process. The cross-sectional nature of the survey cannot determine whether the impacts of this shift are helpful or harmful for community. Prior work suggests that the changes occurring are complex and multidirectional (Smyth, 2007; Williams, 2006b).

The negative association between the Immersion factor and time-played was unexpected and counterintuitive. One might have expected that the desire to be immersed in a fantasy world leads to spending progressively more time in an online game. One possible explanation is that players who enjoy game-play elements such as exploration and role-playing may not find these aspects of the game satisfying or compelling. For example, given that one has to level up before exploring many areas of the world, a player who cares more about exploration than advancement may become frustrated. Similarly, while EQ2 is technically a role-playing game, only three out of 25 servers are explicitly labeled as "role-playing servers." Thus, role-playing is ironically a somewhat fringe activity in these role-playing games and one might conclude that role-playing is not as well supported by the game as advancement might be.

Considering health and culture

Given the literature on health and sedentary activities, the physical health finding was something of a surprise. EQ2 players had lower BMI scores than the general population, meaning that they have higher health-related quality of life (Hassan, Joshi, Madhavan, & Amonkar, 2003). They also indicated a strong affinity for exercise. Studies indicate that time spent watching television is positively related to poor health outcomes such as increased rates of diabetes (Hu et al., 2001), making this

finding counterintuitive. After all, *EQ2* players still reported watching 21 hours of television per week. This is 10 fewer hours per week than the typical American, but the combined game plus TV total makes the numbers closer. Adding the 7.5 hours of game play for adults as reported by the industry to the Hu et al TV estimates, the typical American has 38 hours of screen time per week as a starting point, compared to a total of 47 hours per week for *EQ2* players—although the measures cannot account for time when both the game and TV are on, or other screen-based tasks. Data on total screen time across all media were not available for the general population, making a true comparison impossible. If the BMI findings are a direct result of sedentary screen time, this would indicate that the general population may spend even more time sitting in front of a screen than *EQ2* players do.

There are more nuanced possible explanations to consider than simple screen time. Most obvious is the relationship between education, income and health. Research suggests that while education is usually positively related to good health, the process by which this happens may well be in getting people to think differently rather than in access to healthier foods or medical care (Cutler & Lleras-Muney, 2006). However, in this sample, education was not substantively correlated with BMI ($r = .055$, $n = 6994$, $p < .001$), and income was unrelated. Some other social or cultural factor may be at work, and it might be an error to collapse all screen-based media use into one variable. Although the health literature has made connections between screen time and health, all media may not be equivalent and television time appears to be more impactful than other media, including games (Finkelstein, Ruhm, & Kosa, 2005). Television has well-studied connection with eating attitudes due to the presence of commercials for unhealthy foods, especially during children's programming (Harrison, 2006). Video game use may involve higher or lower amounts of screen time, but the messages may be different, and the research is so far inconclusive: Some work has found that relationships between television time and health do not extend to video game time (Wake, Hesketh, & Waters, 2003), while other research has found that it does (Vandewater, Shim, & Caplovitz, 2004). One study found that exercise was a far larger factor than either TV or game use (McMurray et al., 2000). Unfortunately, the research on health and media use (especially video games) is heavily focused on adolescents and not other ages, meaning that the picture for adults is even less clear. This research is further limiting given that the average age of video game players has been steadily rising to meet that of the general population (Williams, 2006a). Thus, age, period and cohort effects become unknowns in the equation. Moreover, the research rarely makes a distinction between types of games, i.e. console, portable or PC-based. It could be that these players, for whatever reason, value exercise more than the general population.

EQ2 players may also have other healthier habits and attitudes in general. One general population study found that after controlling for demographics and exercise that more time spent watching television lead directly to fewer servings of healthy fruits and vegetables (Hu et al., 2001). Perhaps the culture of television is different than the culture of MMOs, which suggests that raw screen time is not a nuanced

enough predictor. Health habits and attitudes may be driven by the values and culture associated with particular media. This possibility was unexpected, and not instrumented in the survey. The only other explicitly values-based measure was for religion, and here as well the *EQ2* population yielded a large and unexpected difference: *EQ2* players chose “No religion” at a rate more than double the general population. Combined, the health attitudes and religious values differences suggest that the playing population is in some ways culturally different than mainstream U.S. society. Personal values, cultural norms, or even generational differences may be factors, leaving this an intriguing area in which future researchers can untangle the sociocultural, media, and demographic factors.

In contrast to the physical health findings, the mental health indicators paint a potentially bleaker picture, although it is important to recognize that there are no causal conclusions drawn here. *EQ2* players have worse mental health than the general population on depression and substance addiction, but not anxiety. Causally, it is possible that game play created these outcomes, but it is equally possible that people with mental health issues are more likely to seek out MMOs. Each possibility has a plausible model. Time spent in MMOs could be isolating players from real-world human connections, or providing an escape hatch from dealing with difficult offline personal issues and situations. However, given the large social motivations found here and repeated in nearly every ethnographic study of MMOs (Steinkuehler & Williams, 2006; Taylor, 2006), it is clear that time spent in MMOs is far from asocial. One obvious mechanism would be the displacement of previously existing relationships by new in-game ones. However, this is tempered to some degree by the fact that a large number of players play with those they knew beforehand. In the sample here, that percentage was over 57%. If the game is causing mental health problems, it is clearly not because of a lack of social contact, but because of a qualitative difference in it. Thus it is equally plausible that people come to MMOs with lower mental health a priori. They could come seeking refuge—perhaps in lieu of traditional spiritual outlets—and it is not possible to use these results to speculate on whether their results are ultimately harmful, or perhaps therapeutic. Their relatively healthy levels of anxiety suggest a complex picture. A more in-depth investigation of the correlates of mental health is certainly warranted by these findings, as is an investigation of the causal direction of any effects. Likewise, a more in-depth investigation of the social and community patterns could help explain these relationships.

Conclusion

The general demographic and motivations findings here have implications for the study of games in general, but they also offer challenges to existing theory and suggest areas where theory building is needed. Theory building occurs when we explain, predict and organize information about phenomena. Therefore, with a set of largely counterintuitive findings in hand, the next step is to develop and extend theories that fit these data. Given that many stereotypes about gaming suggested

opposite outcomes, the research can go one of two ways. The first is to ask, as many have done (Herz, 1997; Jenkins, 2006; Williams, 2006a), why inaccurate stereotypes about gamers formed and what other social and cultural work was taking place. The second, and ultimately more important task, is to develop theories which would predict these outcomes in the first place, unfettered by (but aware of) cultural baggage. Why, for example, are older female players playing at the highest rates? Why are older players playing more when younger people are thought to have more free time? Why are these gamers physically healthier than nongamers? Why do minorities play at lower rates? Why do so many players not practice religion? Did game play cause the mental health outcomes or vice versa? Theories must be developed or adapted to answer these questions.

There are methodological considerations as well, which are equally important as the booming world of players interacting online becomes increasingly distant from traditional lab settings. Looking ahead, the use of game-server data offers the possibility of longitudinal in-world behavioral measures. Therefore, the logical next step is to gather these data and to develop metrics of player behavior that can be used in theoretical models. These models will likely include the traditional communication topics of effects, community, gender, race and user psychology. Lastly, the use of unobtrusive behavioral data is a boon to researchers seeking to test models without having the act of testing impact the results. This approach is far from the traditional laboratory model and could be a great improvement in the external validity of games research, a shortcoming that has long left the work open to criticism (Goldstein, 2005). With the baselines established here, the study of MMOs can proceed to more nuanced investigations of specific theories and processes. And as Kafai's work has shown (Kafai et al., in press), when done in cooperation with game developers or with increasingly accessible tools, games can be used as controlled experimental platforms in their own right.

Notes

- 1 Data were taken from Bruce Woodcock's ongoing chart of MMO subscriptions, which, as the only public source, is the standard used by the industry. The 85% was derived from Woodcock's subscription figures for *World of Warcraft*, *Lineage I and II*, *Final Fantasy XI*, *EverQuest I and II*, *Ultima Online*, *Dark Age of Camelot* and *Dungeons and Dragons Online*. The data were accessed and calculated on Oct. 10, 2007 from the Excel file posted on www.mmogchart.com.
- 2 The Kessler et al data were for those 18 and older.

References

The 2004 election panel study. (2004). Madison, Wisconsin: BYU Center for the Study of Elections and Democracy and UW-Madison Wisconsin Advertising Project. (Document Number).

- Adler, J., Rogers, M., Brailsford, K., Gordon, J., & Quade, V. (1989, March 6). The Nintendo Kid. *Newsweek*, 64–68.
- Anderson, C. (2004). An update on the effects of playing violent video games. *Journal of Adolescence*, 27, 113–122.
- Anderson, C., & Dill, K. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology*, 78(4), 772–790.
- Bandura, A. (1994). The social cognitive theory of mass communication. In J. Bryant & D. Zillmann (Eds.), *Media effects: Advances in theory and research* (pp. 61–90). Hillsdale, New Jersey: Erlbaum.
- Bartle, R. (1996). Hearts, clubs, diamonds, spades: Players who suit MUDs. *The Journal of Virtual Environments*, 1.
- Beliaeff, N. (2007, August 1). More of what they want: How to keep your online players coming back. *Game Developer*, 64.
- Berelson, B. R., Lazarsfeld, P. F., & McPhee, W. N. (1954). *Voting: A study of opinion formation in a presidential election*. Chicago: University of Chicago Press.
- Berkowitz, L., & Rogers, K. (1986). A priming effect analysis of media influences. In J. Bryant & D. Zillmann (Eds.), *Perspectives on media effects* (pp. 57–81). Hillsdale, New Jersey: Erlbaum.
- Blumler, J. G., & Katz, E. (1974). *The uses of mass communications: Current perspectives on gratifications research*. Beverly Hills, CA: Sage.
- Bushman, B. J., & Huesmann, L. R. (2006). Short-term and long-term effects of violent media on aggression in children and adults. *Archives of Pediatrics & Adolescent Medicine*, 160(4), 348–352.
- Castronova, E. (2005). *Synthetic worlds: The business and culture of online games*. Chicago: University of Chicago Press.
- Center for the Digital Future. (2007). *2007 Digital future report*. Los Angeles: University of Southern California Annenberg School for Communication. Document Number
- Cole, J. (2007). *2007 Digital Future Report*. Los Angeles: University of Southern California Annenberg School for Communication. Document Number
- Cutler, D., & Lleras-Muney, A. (2006). *Education and health: Evaluating the theories and evidence*. Cambridge, MA: National Bureau of Economic Research. Document Number
- Donkey Kong Goes to Harvard. (1983, June 6). *Time*, 77.
- Ducheneaut, N., Yee, N., Nickell, E., & Moore, R. (2006, April 22–28). “Alone together?” *Exploring the social dynamics of massively multiplayer online games*. Paper presented at the CHI 2006, Montreal, Quebec.
- Eagley, A., & Chaiken, S. (1993). *The psychology of attitudes*. Fort Worth, TX: Harcourt Brace Jovanovich.
- Entertainment Software Association. (2007, October 10, 2007). Top 10 industry facts. from http://theesa.com/facts/top_10_facts.php
- Fabrigar, L., Wegener, D., MacCallum, R., & Strahan, E. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 3, 272–299.
- Finkelstein, E., Ruhm, C., & Kosa, K. (2005). Economic causes and consequences of obesity. *Annual Review of Public Health*, 26, 239–257.
- Fisher, S. (1994). Identifying video game addiction in children and adolescents. *Addictive Behaviors*, 19(5), 545–553.

- Goldstein, J. (2005). Violent video games. In J. Raessens & J. Goldstein (Eds.), *The handbook of computer game studies* (pp. 341–358). Cambridge, MA: The MIT Press.
- Grieco, E., & Cassidy, R. (2001). *Overview of race and hispanic origin: Census 2000 brief*. Washington, D.C.: U.S. Department of Commerce. Document Number)
- Griffiths, M., Davies, M., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *CyberPsychology & Behavior*, 7(4).
- Griffiths, M., Davies, M. N., & Chappell, D. (2003). Breaking the stereotype: The case of online gaming. *CyberPsychology & Behavior*, 6(1), 81–91.
- Harrison, K. (2006). Media exposure, current and future body ideals, and disordered eating among preadolescent girls: A longitudinal panel study. *Journal of Youth and Adolescence*, 35(2), 146–156.
- Hassan, M., Joshi, A., Madhavan, S., & Amonkar, M. (2003). Obesity and health-related quality of life: A cross-sectional analysis of the US population. *International Journal of Obesity*, 27(10), 1227–1232.
- Herz, J. C. (1997). *Joystick nation*. Boston: Little, Brown and Company.
- Hetzel, L., & Smith, A. (2001). *The 65 years and over population: 2000: Census 2000 brief*. Washington, D.C.: Department of Commerce. Document Number).
- Howard, P., & Jones, S. (2004). *Society online: The Internet in context*. Thousand Oaks, CA: Sage.
- Hu, F., Leitzmann, M., Stampfer, M., Colditz, G., Willett, W., & Rimm, E. (2001). Physical activity and television watching in relation to risk for type 2 diabetes mellitus in men. *Archives of Internal Medicine*, 161(12), 1542–1548.
- Ipsos-Insight. (2005). *Essential facts about the computer and video game industry*. Washington, D.C.: Entertainment Software Association. (Document Number).
- Ipsos-Insight. (2007). *84% of North Americans say CEO's should make helping employees in the workplace with depression a key human resource priority*. Washington, D.C. Document Number).
- Jansz, J., & Tanis, M. (2007). Appeal of playing online first person shooter games. *CyberPsychology & Behavior*, 10(1), 133–136.
- Jenkins, H. (2006). *Fans, bloggers, gamers: Exploring participatory culture*. New York: New York University Press.
- Jones, S. (2003). *Let the games begin: Gaming technology and entertainment among college students*. Washington, D.C.: Pew Internet & American Life Project. Document Number).
- Kafai, Y., Feldon, D., Fields, D., Giang, M., & Quintero, M. (in press). *Life in the times of Whytox: A virtual epidemic as a community event*. Paper presented at the Third International Conference on Communities and Technology, New York, NY.
- Katz, E. (1996). Viewers work. In J. Hay, L. Grossberg & E. Wartella (Eds.), *The Audience and Its Landscape* (pp. 9–22). Boulder, Colorado: Westview Press.
- Kessler, R., Chiu, W., Demler, O., & Walters, E. (2005). Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey. *Archives of General Psychiatry*, 62(6), 617–627.
- Kosmin, B., Mayer, E., & Keysar, A. (2001). *American religious identification survey*. New York: The Graduate Center of the City University of New York. Document Number)
- Lowery, S., & DeFluer, M. (1995). *Milestones in mass communication research: Media effects*. White Plains, New York: Longman Publishers USA.

- McMurray, R., Harrell, J., Deng, S., Bradley, C., Cox, L., & Bangdiwala, S. (2000). The influence of physical activity, socioeconomic status, and ethnicity on the weight status of adolescents. *Obesity Research*, 8(2), 130–139.
- Ogden, C., Fryar, C., Carroll, M., & Flegal, K. (2004). *Mean body weight, height, and body mass index, United States, 1960–2002*: Centers for Disease Control and Prevention. Document Number)
- Paik, H., & Comstock, G. (1994). The effects of television violence on antisocial behavior. *Communication Research*, 21, 516–546.
- Pena, J., & Hancock, J. (2006). An analysis of socioemotional and task communication in online multiplayer video games. *Communication Research*, 33(1), 92–109.
- Petty, R., & Cacioppo, J. (1996). *Attitudes and persuasion: Classic and contemporary approaches*. Boulder, CO: Westview Press.
- Physical status: The use and interpretation of anthropometry*. (1995). Geneva, Switzerland: World Health Organization. Document Number)
- Plusquellec, M. (2000). Do virtual worlds threaten children's and teenagers' mental health? *Archives De Pediatrie*, 7(2), 209–210.
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.
- Rideout, V., Roberts, D., & Foehr, U. (2005). *Generation M: Media in the lives of 8–18 Year-olds*. Washington, D.C.: Kaiser Family Foundation. Document Number).
- Ruggiero, T. (2000). Uses and gratifications theory in the 21st century. *Mass Communication & Society*, 3(1), 3–37.
- Salguero, R. A. T., & Moran, R. M. B. (2002). Measuring problem video game playing in adolescents. *Addiction*, 97(12), 1601–1606.
- SAMHSA Office of Applied Studies. (2006). *National survey on drug use and health*. Washington, D.C.: U.S. Department of Health and Human Services. Document Number)
- Sargent, J. (Writer) (1983). Nightmares. In C. Crowe (Producer). United States: Universal Pictures.
- Schiesel, S. (2007, February 11). Game on: Hero returns to slay his dragons. *New York Times*, p. 1,
- Sherry, J., Greenberg, B., Lucas, S., & Lachlan, K. (2006). Video game uses and gratifications as predictors of use and game preference. In P. Vorderer & J. Bryant (Eds.), *Playing computer games: Motives, responses and consequences*. Mahwah, New Jersey: Erlbaum.
- Skow, J. (1982, January 18). Games that play people: Those beeping video invaders are dazzling, fun-and even addictive. *Time*, 50–58.
- Smith, D., & Spraggins, R. (2001). *Gender: 2000: Census 2000 brief*. Washington, D.C.: U.S. Department of Commerce. Document Number)
- Smyth, J. (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.
- Steinkuehler, C., & Williams, D. (2006). Where everybody knows your (screen) name: Online games as “third places”. *Journal of Computer-Mediated Communication*, 11(4).
- Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics*. Boston: Pearson.

- Taylor, T. L. (2003, May). *The Sopranos meets Everquest: Socialization processes in massively multiplayer games*. Paper presented at the Digital Arts and Culture (DAC) Streaming Wor(l)ds Conference Proceedings, Melbourne, Australia.
- Taylor, T. L. (2006). *Play between worlds: Exploring online game culture*. Cambridge, Massachusetts: The MIT Press.
- U.S. Census Bureau. (2006). Educational Attainment. Washington, D.C.
- Vandewater, E., Shim, M., & Caplovitz, A. (2004). Linking obesity and activity level with children's television and video game use. *Journal of Adolescence*, 27(1), 71–85.
- Wake, M., Hesketh, K., & Waters, E. (2003). Television, computer use and body mass index in Australian primary school children. *Journal of Paediatrics and Child Health*, 39(2), 130–134.
- Wartella, E., & Reeves, D. (1983). Recurring issues in research on children and media. *Educational Technology*, 23, 5–9.
- Wartella, E., & Reeves, D. (1985). Historical trends in research on children and the media: 1900–1960. *Journal of Communication*, 35, 118–133.
- Webb, E., Campbell, D., Schwartz, R., & Sechrest, L. (1966). *Unobtrusive measures: Non-reactive research in the social sciences*. Chicago: Rand McNally and Company.
- Wellman, B., & Haythornthwaite, C. (2002). *The Internet in everyday life*. Malden, Massachusetts: Blackwell Publishing.
- Williams, D. (2003). The video game lightning rod. *Information, Communication & Society*, 6(4), 523–550.
- Williams, D. (2006a). A (brief) social history of gaming. In P. Vorderer & J. Bryant (Eds.), *Video Games: Motivations and Consequences of Use*. Mahwah, New Jersey: Erlbaum.
- Williams, D. (2006b). Groups and goblins: The social and civic impact an online game. *Journal of Broadcasting and Electronic Media*.
- Williams, D., Caplan, S., & Xiong, L. (2007). Can you hear me now? The social impact of voice on internet communities. *Human Communication Research*.
- Williams, D., Ducheneaut, N., Xiong, L., Zhang, Y., Yee, N., & Nickell, E. (2006). From tree house to barracks: The social life of guilds in World of Warcraft. *Games & Culture*, 1(4), 338–361.
- Yee, N. (2005, June). *Motivations of Play in MMORPGs*. Paper presented at the Digital Games Research Association Conference, Vancouver, Canada.
- Yee, N. (2005). The Psychology of MMORPGs: Emotional Investment, Motivations, Relationship Formation, and Problematic Usage. In R. Schroeder & A. Axelsson (Eds.), *Avatars at Work and Play: Collaboration and Interaction in Shared Virtual Environments* (pp. 187–207). London: Springer-Verlag.
- Yee, N. (2006). The demographics, motivations and derived experiences of users of massively-multiuser online graphical environments. *PRESENCE: Teleoperators and Virtual Environments*, 15, 309–329.
- Yee, N. (2007). Motivations of play in online games. *CyberPsychology & Behavior*, 9, 772–775.
- Yee, N., & Bailenson, J. (2007). The proteus effect: The effect of transformed self-representatioin on behavior. *Human Communication Research*, 33, 271–290.
- Zillmann, D. (1988). Mood managment through communication choices. *American Behavioral Scientist*, 31, 327–340.

Appendix A

Factor Loadings of Yee's Motivation Inventory

Factor	Inventory Item	Loading
Achievement	Leveling, acquiring great items and gear, and becoming powerful.	.82
	Figuring out the game mechanics, planning my character's development, and optimizing my character.	.82
	Competing with other players in terms of combat, crafting ability, or the economy.	.64
Social	Chatting with and getting to know other players.	.88
	Developing deep and meaningful relationships with other players.	.85
Immersion	Being part of a team.	.72
	Exploring the world and knowing things (stories, locations of NPCs, etc.) that most other players don't know about.	.75
	Roleplaying and having interesting background stories for your character.	.74
	Customizing your characters to make them look distinctive, stylish, and unique.	.66
	Escaping from the real world and leaving behind some real-life problems and worries.	.60