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Looking for Gender: Gender Roles and Behaviors Among Online Gamers

Dmitri Williams[1], Mia Consalvo[2], Scott Caplan[3], & Nick Yee[4]

1 Annenberg School for Communication, University of Southern California, Los Angeles, CA 90089, USA
2 School of Media Arts and Studies, Ohio University, Athens, OH 45701, USA
3 Department of Communication, University of Delaware, Newark, DE 19716, USA
4 Department of Communication, Stanford University, Stanford, CA 94305, USA

Several hypotheses regarding the importance of gender and relationships were tested by combining a large survey dataset with unobtrusive behavioral data from 1 year of play. Consistent with expectations, males played for achievement-oriented reasons and were more aggressive, especially within romantic relationships where both partners played. Female players in such relationships had higher general happiness than their male counterparts. Contrary to stereotypes and current hypotheses, it was the female players who played the most. Female players were also healthier than male players or females in the general population. The findings have implications for gender theory and communication-oriented methods in games and online research—most notably for the use of self-reported time spent, which was systematically incorrect and different by gender.

Female video game players now comprise 40% of all players, and women over 18 make up more of the game-playing population than do males under 17 (*Top 10 Industry Facts*, 2008). Yet, studies of men and women report both genders believe that computer games are a "particularly masculine pursuit" (Selwyn, 2007, p. 533). Are more women ignoring social sanctions for engaging in a supposedly masculine activity? Are men avoiding feminine actions while playing? To determine the answers, we must investigate how video game players are positioning their activity in relation to their gender, and better understand their reasons for playing games at all. Past media research on gaming has found that men and women perform in, and perceive, games differently (Blumberg & Sokol, 2004), but this research has not been updated since the mass adoption of large-scale online games. Likewise, social scientific research in the area of gender roles has not examined online game play, and how it may be changing gendered definitions of game play. At the same time, research covering a wide variety of social Internet activities has found women's uses and considerations to be different

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Corresponding author: Dmitri Williams; e-mail: dmitri.williams@usc.edu

than men's (Fallows, 2005; Rainee, Fox, Horrigan, & Lenhart, 2000). However, the combination of these two areas—gaming and social Internet activities—remains an underexplored area for gender-based research. By bringing gender role theory (Dill & Thill, 2007; Eagly & Karau, 1991) to the study of online games, we can investigate a range of predictions about how men and women might consider and behave in these new game spaces; and likewise see how emergent leisure activities are shaping our contemporary beliefs about appropriate gendered behaviors.

Online games encompass many forms, but one form receiving much attention is the Massively Multiplayer Online game (MMO), which now totals over 47 million active subscriptions worldwide (White, 2008). MMOs are persistent worlds that players log into and out of, usually maintaining a character, or "avatar," that grows in abilities and is typically part of a long-term social group of other players (Williams et al., 2006). Players can maintain multiple avatars within these spaces as they tackle genre-based fantasy and science fiction worlds. These games have become persistent sites of both play and community (Steinkuehler & Williams, 2006), but systematic research on gender within them is rare (but see Yee, 2006). Understanding the different uses and perceptions between the genders will have theoretical and practical applications. First, by exploring gendered behaviors and norms in these new and increasingly popular spaces, we can test, refine, and extend our existing theories of gender differences. Then, for producers of these spaces, such knowledge will help them craft spaces and systems that appeal to both genders (Laurel, 2003) in what is a largely male-dominated industry (Williams, 2006a) and product (Ivory, 2006). For users, self-awareness and knowledge are crucial elements of modern media literacy (Hall, 2000).

Prior work on games and gender

The bulk of research on video games has largely focused on adolescents, teenagers, and aggression. Across most study domains, research has employed grade-school populations and laboratory studies of college students (Anderson & Dill, 2000; Ferguson, 2007), relying on either short (typically 20–30 minutes) exposures to game content or on self-reported measures of game play (Anderson, 2004; Gentile, Lynch, Linder, & Walsh, 2004). This research tradition has yielded a sizable body of literature, but in doing so it has generally avoided methodologies that would capture the play styles and behaviors of modern gamers—especially for online play. This is important because the most obvious and powerful change in games has been in their growing social nature. Game players had already been known to seek out game play in general for social reasons (Sherry, Greenberg, Lucas, & Lachlan, 2006; Yee, 2006), but for explicitly networked games, the attractions are the other players (Herz, 1997), the relationships between them (Williams, Caplan, & Xiong, 2007) and their impact on out-of-game community and relationships (Williams, 2006b). Indeed, a common broadcast message within MMOs is "LFG," which stands for "looking for group." For gender-based research, it is imperative to begin considering game spaces in which players from both genders *interact*, rather than studying solo players in a lab and using gender as a post hoc control variable.

From a communication theory perspective, this is an important tradition. Social interactions in new media have been proven time and again to be crucial after initially being ignored in many eras of communication research (Lowery & DeFluer, 1995). In games, gender has again been employed as a basic demographic control, rather than as a dynamic element that shapes how players approach games, interact within them, and negotiate expectations. Among adolescents and college students, studies have focused on aggression effects by gender and to a lesser extent on motivational (Morlock, Yando, & Nigolean, 1985) or performance-based (Blumberg & Sokol, 2004) differences. Researchers have used gender as a control variable and found that it moderates a variety of outcomes including skill (Brown, Hall, & Holtzer, 1997), aggression (Sherry, 2001), game content (Kafai, 1999; Ray, 2004), and game preference (Sheldon, 2004). Gender research has almost entirely avoided the study of sexual relationships among gamers (Ogletree & Drake, 2007), but has occasionally examined family interactions (Mitchell, 1985), focusing instead on hot social topics such as the displacement of homework (Gentile et al., 2004; Lin & Lepper, 1987), and health (Rideout, Roberts, & Foehr, 2005) by gender.

A handful of recent studies have examined the social contexts of female game play. Female gamers—both young and old—who play frequently believe that games can be valuable spaces for socializing, including playing with friends and family as well as meeting new people via games (Royse, Lee, Undrahbuyan, Hopson, & Consalvo, 2007; Yee, 2006). And females are also more often drawn to gaming through offline social networks than through standard advertising (Fullerton, Fron, Pearce, & Morie, 2008; Kerr, 2003; Royse et al., 2007), which tends to focus on a male point of view (Ivory, 2006). Yet such work stresses the factors that bring female players to games, and does not scientifically explore how they play or think about playing once in games. Further, none of the research yet performed utilizes gender role theory to explore female game play, leaving the theory underdeveloped in terms of contemporary digitally based leisure activities. This study aims to address that omission, helping us see whether the predictions of gender role theory apply to the allegedly masculine spaces of online games, and if not, how we can refine the theory to better account for shifting gendered player actions and beliefs.

Gender role theory

Gender roles are shared cultural expectations that are placed on individuals on the basis of their socially defined gender (Donaghue & Fallon, 2003; Eagly & Karau, 1991; Kidder, 2002). One explanation for the origins of these socialized categories stems from a Freudian analysis of early childhood (Chodorow, 1994). In brief, Chodorow's hypothesis is that young girls look to their mothers as role models, and are socialized to behave like them when the mothers encourage this imitation. They thus become nurturing and social. In contrast, young males are discouraged from cleaving to their mothers and pushed away. Left in a relative vacuum, young boys are in search of their own roles and identities and often gravitate toward athletics or tinkering as a way of establishing them. Although young girls are encouraged to be empathetic, social,

and caring, young boys are encouraged to be brave, independent, and accomplished. These two sets of roles become the cultural expectations that drive gender role processes throughout the lifespan and generate such tropes as the ''boy inventor'' popularized during the early 20th Century (Douglas, 1987). Gender role theory suggests that ''individuals internalize [these] cultural expectations about their gender because social pressures external to the individual favor behavior consistent with their prescribed gender role'' (Kidder, 2002, p. 630). People use such expectations to categorize themselves and others, and thus such factors guide individuals toward their own individual and more general social identities. These categorizations have important impacts on individuals' lives, relationships (Donaghue & Fallon, 2003), careers and income (Eagly & Karau, 1991; Kidder, 2002; Stickney & Konrad, 2007), leisure activities (Malcom, 2003), and expressions of emotions such as fear and anxiety (Gallacher & Klieger, 2001; Palapattu, Kinsgery, & Ginsburg, 2006). Individuals are expected to behave in ways that are consistent with their socially defined gender, and can experience negative outcomes (Kidder & Parks, 2001) ''if they deviate from these gender prescriptions'' (p. 941). For example, Heikes (1991) found that when men enter traditionally female occupations such as nursing they are subject to stigma and backlash. Likewise, adolescent girls who play softball seek to emphasize their femininity as a way to counterbalance the potential conflict of engaging in a male activity (Malcom, 2003). These patterns matter for outcomes as well; theorists have found that women who do not categorize themselves in gender-stereotypic ways earn more than women who self-categorize themselves in more traditionally gender-stereotypic ways (Stickney & Konrad, 2007).

Importantly, gender roles have been found to be moderated by factors such as age (Malcom, 2003) and self-stereotyping (Gallacher & Klieger, 2001), suggesting that gender is dynamic and can depend on things such as age, life situation, or race. Such findings paint a picture of a society where some gender roles remain entrenched, although others appear to be shifting, at least at certain times or in particular contexts.

Gender role theory has been usefully applied in many areas, yet there has been no application of it relative to either video game play generally, or MMO game play in particular—activities which now draw millions of users globally and command attention regarding their regulation and health effects. Video games have consistently been portrayed as a male activity (McQuivey, 2001), yet the number of women now playing games would seem to indicate a shift. As it is currently conceived, gender role theory suggests that girls and women would not find games an attractive pastime, and if they did decide to play, they would be deviating from traditional gender roles and activities. So are women using MMOs and deviating from gender roles simply to engage in a new leisure activity traditionally reserved for boys and men, or might they be using them for traditionally female goals? As stated earlier, MMO games are social in nature, which is a draw for many players, male and female. Participating in MMO games offers players opportunities to interact with like-minded others, including family and friends who play, as well as individuals met online. Gender role theory suggests that women are encouraged to be social and caring, and to

maintain relationships, but also to avoid activities portrayed as masculine. And from what we know of MMOs and video games, these spaces remain heavily focused on achievement and competition, and often have sexist imagery within them (Taylor, 2006). Is the draw of the social environment enough to overcome the image of a leisure activity traditionally portrayed as masculine?

If we were looking at the predicted differences between men and women, we would not expect the increasing numbers of female video game players over the past several years. And in MMOs in particular, ethnographic work done on a small scale has found that some women clearly enjoy the more typically masculine elements of competition and mastery (Taylor, 2003, 2006). An updating to gender role theory is clearly needed to help us explain this puzzle. Gender role theory should be used to drive more generalizable methodologies, and likewise, MMO studies can enrich and refine gender role theory. Finally, gender role theory takes a contextual approach, accounting for variables such as age, race, income level, and other factors. In doing so, it gives us the strongest theoretical approach possible for examining how women as well as men interact in MMOs.

To begin the investigation into gender-based game play in MMOs, our most basic question is the purely descriptive, but useful, one that sets the baseline:

RQ1: What are the basic demographic differences between male and female players?

Next, we can draw from gender role theory to generate a series of hypotheses that will investigate key ways that gender roles might be expressed in MMO games; we also incorporate past work done on MMO players' preferences and motivations in this study (Yee, 2007). Gender role theory has found that gender roles can have real effects on individuals' relationships, on their self-perceptions, on their leisure activities and on their health (Donaghue & Fallon, 2003; Malcom, 2003; Stickney & Konrad, 2007). Thus, we must test whether gender role theory can help us predict relationship patterns, the health status of players, and possible gender role differences in players' feelings about the leisure activity of MMO play.

Motivations for play

Past research on MMO players has found that female gamers enjoy playing for various reasons, including feelings of achievement and power, and to be social (Taylor, 2006). Yee (2007) found that although men play for more achievement-oriented reasons, both genders play to be social. However, within that sociability, the female players were much more likely to play as part of maintaining a relationship. In keeping with gender role theory, women are expected to be nurturing and caring across most life contexts, and exhibit traits such as empathy and altruism, although men are expected to be "heroic" and exhibit traits such as competitiveness, aggressiveness, and being ambitious (Kidder, 2002, p. 630). Thus, women are more likely to want to foster and maintain relationships, although men are more interested in competition and achievement. In addition, gender role theory has predicted that women are not only

expected to be caring and altruistic, but are fearful of sanctioning for engaging in competitive leisure activities such as softball (Malcom, 2003). MMO games offer a variety of ways to play, including being social, for competition and for achievement. For those reasons gender role theory predicts that women and men will play MMO games for different reasons:

> **H1:** Women will be more likely than men to express a social motivation for being in MMO games.

> **H2:** Men will be more likely than women to express an achievement-oriented motivation for being in MMO games.

Hours played

Content analyses of digital games have found that they emphasize activities such as killing, assault, and competitive situations (Thompson, Tepichin, & Haninger, 2006). In addition, games continue to feature male characters as aggressive, competitive, and macho, although female characters, if appearing at all, appear as hypersexualized, often secondary characters (Dill & Thill, 2007). If these content elements impact behaviors and norms within the increasingly social spaces of MMOs, gender role theory would predict that women would be less likely than men to play the games, as such games contain less content of interest to them. And if they did choose to play such games, they would likely play less frequently than men played, because of the lack of content of interest to them.

> **H3:** Men will play MMO games for more hours per week than women.

Relationship dynamics

Gender role theory has demonstrated that the self-perceptions of individuals in romantic relationships have important effects on their relationships, including perceptions of fairness and income levels (Donaghue & Fallon, 2003). Couples who define themselves in a more traditional manner report more stereotypical relationships, with female partners earning less, and feeling that relationship work is equal, even when male partners do less to maintain the relationship (Gallacher & Klieger, 2001). Yet gender role theory has not investigated how couples actually engage in leisure activities, or what sorts of couples might be more likely to engage in play together. In their research on college-aged players, Ogletree and Drake (2007) noted that many of the female players had been drawn into gaming by male partners. They noted that gaming was an important activity within those relationships that deserved investigation, but that there was little research on the topic. Initial work by Yee (2006) has shown that women are more likely to play with a partner than men, and were much more likely to have been introduced to the game by their partner (27 vs. 1%). Given the literature on females and males adopting stereotypical roles in other joint media consumption, for example, watching horror movies as a couple (Weaver & Tamborini, 1996), it is possible that the partners in social

game situations would be likely to similarly gravitate toward highly gendered roles, and fall into stereotypical patterns of behavior. One indicator of this would be the partner's relative levels of aggression. If playing couples conform to traditional gender stereotypical categories, the men should be more aggressive than the women:

> **H4:** Romantic partners who play together will conform to gendered expectations of aggressive traits with men being more aggressive than the women.

A more conservative test of this theory would be whether the men in the player relationships were also the more aggressive men, and the women in them were the less aggressive women:

> **H5:** Male players who play with a romantic partner will be more aggressive than men who do not play with romantic partners; female players in a romantic playing couple will be less aggressive than females who do not play with romantic partners.

Health

Very little work with gender role theory has examined the impact of gender on health, beyond perceiving particular sports as having a masculine or feminine gendered orientation (Malcom, 2003). One study did report that gender role orientation accounted for variance in scores of African American adolescents tested for anxiety, with femininity being positively associated with anxiety symptoms (Palapattu et al., 2006). Such a finding suggests there might be a correlation between gender role and other health issues, but we need more data before being able to make accurate predictions. It is nearly taken as a given among researchers that screen time is sedentary and is correlated with less exercise and lower health (Lanningham-Foster et al., 2006). It is less clear whether such a sedentary lifestyle can be predicted by gender roles. Thus we ask the exploratory question:

> **RQ2:** Will male and female game players experience different health outcomes related to play?

Self-reports of hours played

Given the slow acceptance of games as an acceptable past time (Williams, 2006a), all players will likely underreport their playing time for reasons of social desirability and to avoid a self-image of deviance. Yet gender may play an additional role. As stated above, individuals can be sanctioned if they do not fit their socially defined gender roles. Video games have long been associated with men and masculine culture (McQuivey, 2001; Royse et al., 2007), and thus not as socially appropriate for women. Women playing a large number of hours may experience enough dissonance with the knowledge that they will underreport their total playing time in comparison to the men.

> **H6:** Women will underreport time played in MMO games (as compared to actual time played) to a greater extent than men will.

Method

Until now, systematic research on gender in virtual worlds has been difficult because of the lack of access to the data collected by commercial servers. These data allows for unobtrusive behavioral measures rather than self-reports, and includes a degree of accuracy that is rare in social science: very precise and detailed records of nearly all actions, interactions, and transactions. The proprietary nature of this game data, combined with its immense size, has made analysis impossible. Moreover, access to the populations for systematic sampling and survey work has not been allowed. This paper reports the first case of access to both kinds of data, and generates a series of findings involving gender-based differences among players in both their online worlds and in their "real lives." The data include game-based behavioral measures unobtrusively collected during play and a large-scale original and systematic survey of a large sample of players. These data sources were linked, providing a combined demographic, attitudinal, and behavioral data set that allows for an analysis of issues grounded in gender role theory.

The current study focused on the MMO *EverQuest II* (EQII) because of its popularity, its representativeness of mainstream MMOs and because of the unique access provided by the game operator. Despite losing its early market lead, the *EverQuest* franchise continues to expand and still attracts several hundred thousand players (Schiesel, 2007). EQII represents the mainstay of the MMO market—fantasy role-playing games—which altogether accounts for 85% of all MMO subscriptions (White, 2008). 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 collaboration made possible a stratified sample rather than a convenience sample and established trust with the potential survey takers. Most importantly, it allowed the linkage of survey data with unobtrusively collected game-based behavioral data.

Sampling and procedures

Survey sampling in MMOs requires focusing on the player as the unit of analysis because players can maintain multiple characters. The average player in the study had more than six different characters. In the analysis here, all of those characters on a given account were collapsed into one metalevel value, making the account (i.e., one player) the sampling unit of analysis. It is important to note that we did not investigate whether players played as male or female avatars, in part because of the difficulties arising from aggregating this data. In order to conduct such a study, we would have had to determine some metric for the proportion of time spent on avatars of each gender, plus validated that measure with a psychological indicator of importance and self-identification. That was not possible with the resources at hand. Rather than focusing on the mix of characters, players were sampled across the game's servers by inviting all players to participate in a survey if they logged in

during the study time window. If they agreed, players were directed to a separate website linked to their account information. This linkage, and subsequent database work, allowed the survey results to be matched to actual playing data, including their time spent, their playing window and the number of characters they kept.

After providing consent, players completed an online web-based survey that took about 25 minutes. There was no cover story for the instrument, and players were not offered money as an incentive. Instead, they were promised a special in-game item as compensation. This item, the ''Greatstaff of the Sun Serpent'' was created by Sony for this unique use. According to the Sony team, the item was made to be desirable for players of all levels because of its rarity and its usefulness in combat for any player, and proved to be a valuable recruiting tool for the survey. A total of 7,129 players (5,719 males and 1,406 females) participated in the survey in just over 2 days.

Server-side measures

Sony Online's game databases collected data on player actions across four different game types. Each is a slight variation on the basic game that allows for different player preferences within a parallel version of the game world. These four types were player versus player servers (where players are allowed to attack each other), player versus environment servers (where players cannot attack each other), role play servers (where players are encouraged to act and communicate in character), and Exchange servers (which allow the purchase of online goods for U.S. dollars). Although there were dozens of servers, the survey was only made available to one server of each type. Across these four servers, the large databases collected second-by-second measures of playing time, as well as the total number of characters played. The main value used in the current study is the total time played per week per account. This value was reached by totaling the number of seconds played by any one account across all of their characters, and then dividing by the player's total time window from their first login to the day of the survey. These were then converted into an hours per week value. Along with the number of characters they played, these mean time values were added to the survey data and matched by an account ID.

Survey measures

To answer the research questions, the survey instrument used a variety of standard demographic and psychological measures. Players were asked for their age, gender, race, personal income, education, and whether they had children. Comparative data were derived from the 2000 U.S. census. Relationship measures included questions about relationship quality (''If you are in a relationship, how would you describe the quality of that relationship''?) and coplay of EQII (''Do you regularly play EQII with a romantic partner, for example, spouse, fiancé, boyfriend/girlfriend''?), as well as measures of happiness as used by Kraut et al. (2002), the UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) and the AQ Physical and Verbal Aggression subscales (Buss & Perry, 1992). Two questions explored linkages with the time-played behavioral logs, one covering enjoyment of the game (4-point scale: ''How much

would you say you've enjoyed playing this game"?) and likelihood to keep playing (4-point scale: "Are you thinking about quitting the game"?). Game experience was measured by asking how many MMOs they had played previously, and how many hours per week they played other video games.

The motivation measures were a condensed 10-item version of Yee's (2006) inventory of MMO motivations. The items used a 5-point scale ranging from *not important at all* (1) to *extremely important* (5). This allowed for gender comparisons based on the scale's three central factors of immersion, achievement, and sociability—the latter two of which reflect the gender role hypotheses. To verify that the condensed inventory of motivation items replicated earlier findings, a factor analysis was conducted. A factor analysis used principal components extraction and yielded three factors with eigenvalues greater than one. Together, these three factors accounted for 60% of the overall variance. An oblique rotation was used to account for the inherent low-level correlations in psychometric measures. All factor loadings were in excess of .60 and no secondary loadings exceeded 50% of the primary loadings. The inventory items loaded onto the factors in the same way as in Yee's (2007) study. The weighted factor scores for each motivation were generated via the regression method. These standardized scores can be thought of as the sum of the weighted values of the inventory items as determined by the factor loadings. Thus, they have a mean value of 0 and a standard deviation of 1, and a score of 1.00 is one standard deviation away from a score of .00. These factor scores were used in the analysis of player motivations.

Physical health was measured with body mass index (BMI), and a question about exercise ("How often do you engage in vigorous exercise"?). BMI was calculated from self-reports of height and weight (BMI = (pounds/inches tall^2) * 703). It is a general indicator of fitness and general body fat, and although it can overestimate body fat in very fit individuals, and underestimate body fat in older people, it is correlated with several indicators of disease and death (World Health Organization, 1995). The World Health Organization (WHO) lists the weight ranges for BMI as lower than 18.5 for "underweight," 18.5–24.9 as "normal," 25.0–29.9 as "overweight," and 30 or higher as obese. Participants also reported how often they engaged in vigorous exercise. Finally, participants responded to a single self-report item asking them to assess their health. Specifically, participants answered the question "How would you describe your health"? on a scale ranging from 1 = *poor* to 4 = *excellent*.

Results

Male players comprised 80.22% and females 19.72% (.06% declined to provide gender) of the survey sample. In order to test for gender differences on noncategorical dependent variables, a two-way Multivariate analysis of variance (MANOVA) was performed with gender as one fixed effect predictor and whether the participant played with a romantic partner as the second fixed effect predictor. The remainder of this section presents those results. The MANOVA examined main effects for gender,

playing with a partner, and the interaction between these two predictors. To remain conservative with the analysis, cases with any missing variables were dropped from the analysis. The final sample size for the MANOVA analysis was $N = 2,440$ (2,006 males and 434 females).

The analysis revealed a significant multivariate omnibus effect for gender for the linear combination of dependent variables, $\Lambda = .90$, $F(22, 2415) = 13.28$, $p < .001$, partial $\eta^2 = .108$. There was also a significant multivariate omnibus effect for whether participants played with romantic partners ($N = 1, 425$) or did not play with partners ($N = 1, 015$) for the linear combination of dependent variables, $\Lambda = .96$, $F(22, 2415) = 5.17$, $p < .001$, partial $\eta^2 = .045$. Finally, the MANOVA revealed a significant multivariate omnibus effect for the interaction between gender and playing with a partner on the linear combination of dependent variables, $\Lambda = .99$, $F(22, 2415) = 1.59$, $p < .05$, partial $\eta^2 = .014$. The following paragraphs present the univariate results for both main effects and interactions.

Demographic and motivational differences are presented in comparison in Table 1. Female EQII players are older than the males, and both genders are just under the national median age of 35.3, and so slightly younger than the general population. Female EQII players are less likely to be students (Females 22.68%, Males 27.45%), and also less likely to be employed (Females 66.29%, Males 79.84%). The employment rates for both genders closely mirror the national averages (79.1% for men, 66.2% for women). As Table 1 indicates, there was no statistically significant difference between male and female players on level of education or number of children. However, females were earned lower incomes than male players.

Motivational differences
Motivations were assessed by the three component scores derived from Yee's 10 inventory items. As expected, the MANOVA results presented in Table 1 show that males were much more motivated by achievement than female players (supporting H1). In addition, the analysis revealed that females were slightly more socially motivated

Table 1 Basic Demographics and Motivations by Gender

	Males *M* (*SD*)	Females *M* (*SD*)	*F*	*df*	Partial η^2
Age	32.82 (8.28)	33.49 (9.19)	9.45**	1,2436	.004
Education	3.86 (1.50)	3.91 (1.50)	1.13	1,2436	<.001
How many children?	1.07 (1.46)	1.12 (1.35)	1.07	1,2436	<.001
Income ($/year)	53,380.31 (70,264.15)	32,890.73 (58,849.40)	12.07***	1,2436	.005
Motivation components					
Achievement	.12 (.90)	−.31 (1.02)	57.83***	1,2436	.023
Social	−.08 (1.00)	.09 (1.04)	6.23*	1,2436	.003
Immersion	.03 (.97)	.06 (1.01)	.12	1,2436	<.001

*p < .05. **p < .01. ***p < .001.

than male players (supporting H2). There was no prediction for the scale's third component of immersion, and no significant gender difference on it.

Playing patterns

Women had less experience with the genre; female players reported significantly less previous MMO playing time ($M = 5.64$ years, $SD = 3.08$) than male players ($M = 6.22$ years, $SD = 2.95$, $F(1, 2436) = 13.78$, $p < .001$, partial $\eta^2 = .006$). There was a significant gender difference for the total number of MMOs played. Males had played significantly more MMOs ($M = 4.64$, $SD = 4.45$) than females (3.56, $SD = 3.43$, $F(1, 2436) = 22.61$, $p < .001$, partial $\eta^2 = .009$). Yet contrary to the hypothesis about playing time (H3), women played more hours of EQII than males ($M_{\text{female}} = 29.32$ hours/week, $SD = 20.14$, $M_{\text{male}} = 25.03$ $SD = 18.70$, $F(1, 2436) = 10.24$, $p < .001$, partial $\eta^2 = .004$). Moreover, the overall distribution showed differences with the female population (Skewness $= 1.63$) having more high-intensity players than the men (Skewness $= 1.30$). A closer analysis of time by gender bears this pattern out: The top 10% of male players played an average of 48.86 hours/week, while the top 10% of female players played an average of 56.64 hours/week. Males played other titles at a higher rate (Hours per week $M_{\text{male}} = 5.20$, $SD = 7.31$; $M_{\text{female}} = 3.70$, $SD = 5.73$; $F(1, 2436) = 15.61$, $p < .001$, partial $\eta^2 = .006$) but still less than females overall when combined with EQII play.

There was no statistically significant gender difference for how much players enjoyed the game, $F(1, 2436) = 2.44$, $p = .118$, partial$\eta^2 = .001$). Yet, when asked if they had plans to quit, the females chose ''have no plans to quit at all'' 48.86% of the time, compared to the males who chose that option only 35.08% of the time. Females played significantly more characters ($M = 7.02$, $SD = 2.420$) than males ($M = 6.41$, $SD = 2.358$), $F(1, 2436) = 7.42$, $p < .01$, partial $\eta^2 = .003$).

Health

Female players' self-reported data indicated they were healthier than males on two measures. First, as measured by BMI, female players reported an average value of 24.88 ($SD = 7.15$), considered as ''normal'' by the National Institutes of Health as well as the WHO, compared to 27.90 ($SD = 8.05$), considered ''overweight'' by the same agencies for the men ($F(1, 2436) = 42.85$, $p < .001$ partial $\eta^2 = .017$). For the women, the mean was lower than the national female mean (Ogden, Fryar, Carroll, & Flegal, 2004) of 28.1, whereas for the men, the mean was nearly the same as the national value of 27.8. Thus the typical American female has a slightly higher mean BMI than the typical American male, but among EQII players the women break ranks and reported better height and weight ratios as well as better exercise habits. The pattern is most apparent when considering age (see Figure 1). As female EQII players age, they stay relatively lower in BMI although the rest of the population becomes heavier. On the second measure of health, females players reported engaging in significantly more exercise ($M = 3.96$, $SD = 1.515$) than male players ($M = 3.65$,
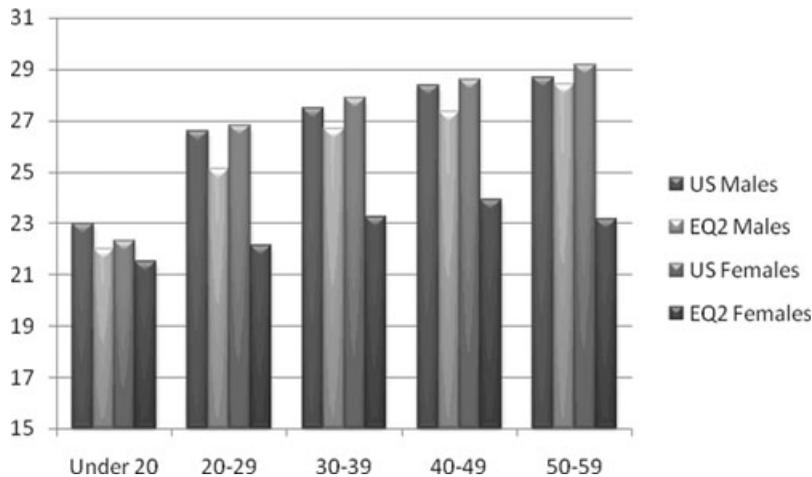
Figure 1 Body mass indeces of EQII players versus general population by age group and gender.

$SD = 1.52$, $F(1, 2436) = 5.91$, $p < .05$, partial $\eta^2 = .002$). However, on the single-item self-report health measure, males still viewed themselves as significantly healthier ($M = 3.15$, $SD = .66$) than did females ($M = 3.03$, $SD = .67$, $F(1, 2436) = 4.18$, $p < .05$, partial $\eta^2 = .002$). Finally, there were no significant gender differences on self-reported loneliness, $F(1, 2436) = .96$, $p = .33$, partial $\eta^2 < .001$, or for self-reported happiness, $F(1, 2436) = .432$, $p = .326$, partial $\eta^2 < .001$. However, there were interaction effects for happiness when considering romantic relationships, as reported below.

Aggressiveness
The results indicated significant gender differences for both physical and verbal aggressiveness. First (supporting H4), males were significantly more physically aggressive ($M = 30.01$, $SD = 9.36$) than females ($M = 23.92$, $SD = 8.23$; $F(1, 2436) = 108.22$, $p < .001$, partial $\eta^2 = .043$). Although the main effect for gender on physical aggression was significant, it was moderated by whether men and women played with a romantic partner. This interaction effect will be presented later in this section (see Figure 3). Male players were also more verbally aggressive ($M = 17.76$, $SD = 5.91$) than female players ($M = 15.67$, $SD = 5.79$; $F(1, 2436) = 40.98$, $p < .001$, partial $\eta^2 = .017$). However, there was no gender by playing with a partner interaction on verbal aggression.

Self-reported hours of play
The test of self-reported hours versus actual hours of play revealed a systematic underestimation of playing time among all players as suspected (H6), with female players underestimating more than males, $F(1,2436) = 10.24$, $p < .001$, partial $\eta^2 = .004$.

Table 2 Differences Between Players Who Played With Romantic Partners Versus Those Who Did Not

	Played With a Partner M (SD)	Did Not Play With Partner M (SD)	F	df	Partial η^2
Relationship quality	1.55 (.85)	1.79 (.85)	33.20***	1,2436	.013
Age	33.48 (8.72)	32.18 (8.00)	16.00***	1,2436	.007
Personal income ($/year)	41,053.26 (46,567.12)	55,920.28 (80, 458.19)	11.19***	1,2436	.005
Happiness	11.17 (3.42)	11.34 (3.36)	.30	1,2436	<.001
Loneliness	37.82 (8.45)	39.22 (10.79)	1.44	1,2436	.001
Achievement motivation	−.04 (1.03)	.10 (.92)	2.35	1,2436	<.001
Immersion motivation	.09 (.99)	−.01 (.97)	.48	1,2436	<.001
Social motivation	.07 (1.01)	−.14 (1.00)	2.35	1,2436	<.001
Game enjoyment	3.84 (.39)	3.79 (.44)	9.11**	1,2436	.004
Hours per week	26.62 (18.07)	23.29 (18.31)	4.43*	1,2436	.002
Number of characters	6.78 (2.31)	6.32 (2.41)	11.66**	1,2436	.005
Exercise	3.83 (1.54)	3.61 (1.51)	4.42*	1,2436	.002
Body mass index	26.99 (7.05)	27.63 (8.57)	.24	1,2436	<.001
Self-reported health	3.08 (.69)	3.16 (.66)	4.14*	1,2436	.002

*$p < .05$. **$p < .01$. ***$p < .001$.

Males reported playing 24.10 ($SD = 17.47$) hours/week, but according to the game servers actually played 25.03 ($SD = 18.70$) hours, a difference of about 1 hour/week ($t = 3.09$, $df = 5,418$, $p < .005$). Females reported playing 26.03 ($SD = 17.77$) hours/week, but actually played 29.32 ($SD = 20.14$), a difference of about 3 hours/week ($t = 5.32$, $df = 1,304$, $p < .001$).

Differences associated with playing with a romantic partner

Playing with a romantic partner was the largest single gender-based difference in the study. 61.52% ($SD = 48.67\%$) of women play with a romantic partner compared to 24.77% ($SD = 43.18\%$) of men. A comparison of those players who played with partners to those who did not revealed several interesting differences. As Table 2 reveals, those playing with a romantic partner were older, made less money, played more hours per week, exercised more, had lower BMI, had more characters, reported higher relationship quality and enjoyed the game more. Despite the fact that those who played with partners had higher BMI and exercised more frequently, they reported lower self-assessments of health. There were no motivation differences between the groups.

Interaction effects between gender and playing with a partner

As noted earlier, the MANOVA revealed a significant omnibus gender by playing with a partner interaction effect. An analysis of the between-subjects effects identified three
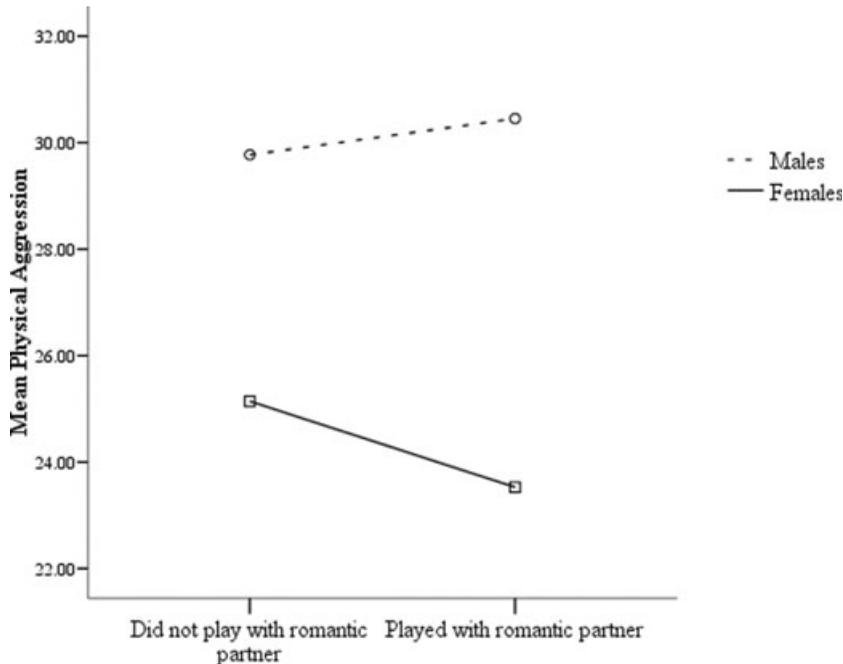
Figure 2 Gender *x* playing with partner interaction on physical aggression scores.

significant interactions. First, there was a significant gender by playing with partner interaction effect on physical aggression, $F(1,2436) = 4.27$, $p < .05$, partial $\eta^2 = .002$. Figure 2 illustrates the interaction effect on physical aggression scores. Overall, males were more physically aggressive than females, but this difference was especially pronounced among those who played with a partner (supporting H5). The men in playing relationships were slightly more aggressive than the men who played alone and the women in playing relationships were the slightly less aggressive women.

Next, there was a significant playing with partner by gender interaction effect on the social motivation factor, $F(1,2346) = 4.35$, $p < .05$, partial $\eta^2 = .002$ (see Figure 3). Although female players are more socially motivated than men overall, there were significant differences for each gender when comparing those in romantic playing relationships to those not. For female players, playing with a partner was related to being slightly less socially motivated. For males, playing with a partner was related to being much more socially motivated.

Finally, there was an unpredicted gender by playing with a partner interaction effect on participants' self-reported happiness, $F(1, 2436) = 3.83$, $p < .05$, partial $\eta^2 = .002$). Notably, this happiness variable was not a game-related variable or a relationship satisfaction variable, but rather and indicator of overall life happiness. Figure 4 illustrates that among the men, it was the ones playing without a partner who were happier and among the women, it was the ones playing with a partner who were happier.
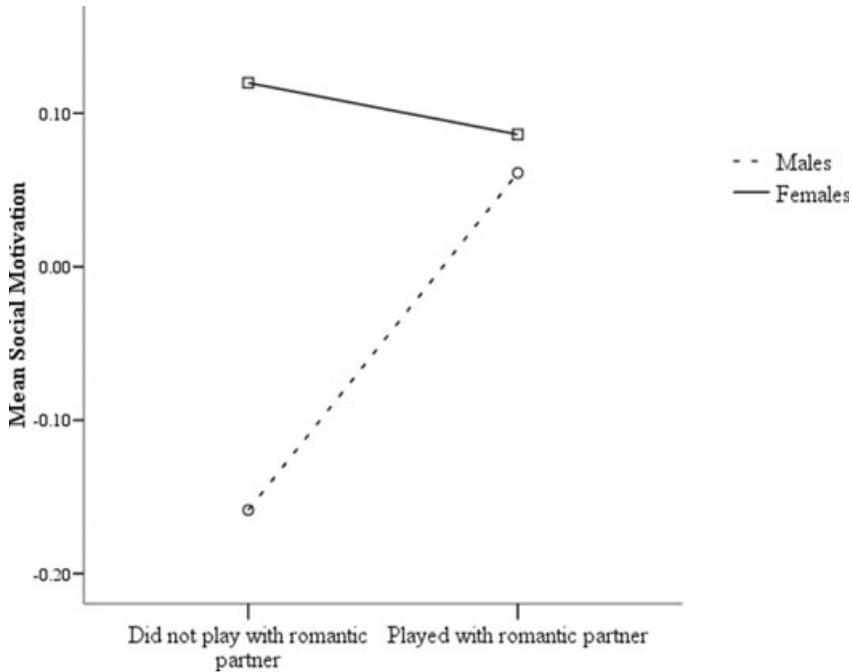
Figure 3 Gender *x* playing with partner interaction on social motivation.

Gender differences on categorical demographic variables
Finally, one demographic variable of interest was categorical and, as such, not included in the MANOVA. In an unpredicted finding, among the original sample of 7,129 players, the female players were more likely to report being bisexual (Females 14.15%, 95% confident interval lower bound 12.33%, upper bound 15.98%; Males 3.64%, 95% confidence interval lower bound 3.15%, upper bound 4.12%), and slightly less likely to report being homosexual (Females 2.28%, Males 3.37%). These rates were not comparable to general population estimates, especially among the female players. In a national study, Mosher, Chandra, & Jones (2002) found that males reported being homosexual at a rate of 2.3%, 1.8% bisexual, and 3.9% ''something else.'' Females reported rates of 1.3% homosexual, 2.8% bisexual, and 3.8% ''something else.'' Although the numbers for males are slightly different, this might be explained by the lack of a comparable ''something else'' category in the player survey. This category difference cannot account for the large difference in the level of bisexuality among female players, which is more than five times as high as the national baseline (14.15 vs. 2.8%). Furthermore, 3.6% of males and 6.4% of females declined to answer the sexual identification question. If this comes as a result of answering a sensitive question, it is likely that those withholding responses fall within the less normative camp of homosexual or bisexual orientation. Thus the large difference here could be underestimating an even larger actual difference.
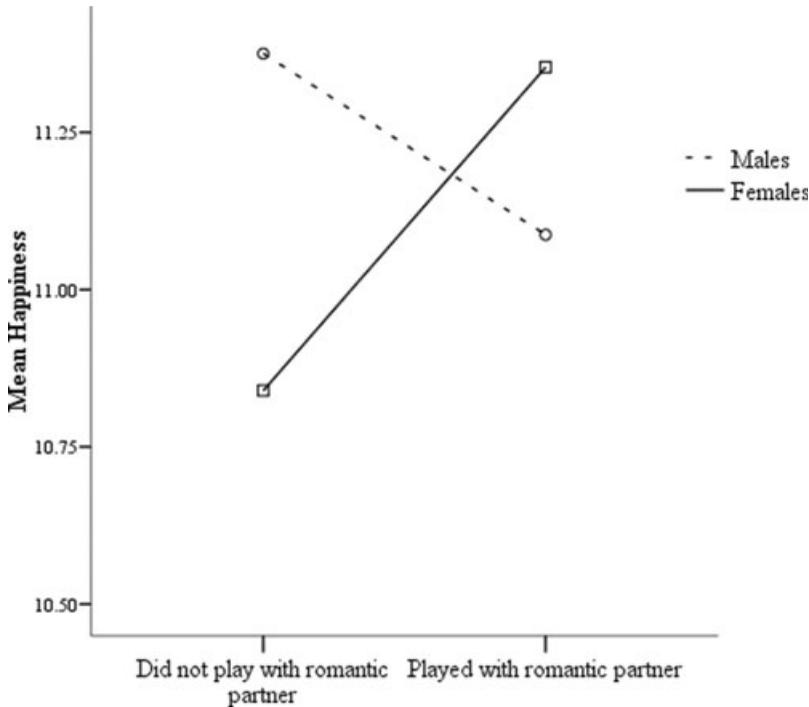
Figure 4 Gender *x* playing with partner interaction on happiness.

Discussion

An investigation of gender differences among an online game population revealed that gender differences were noteworthy and systematic. Demographically (RQ1), female players were older and better educated, but slightly poorer than the males. Females were also much more likely to be bisexual, at a rate several times that of the national average. As predicted, male players were more motivated by achievement-related reasons (H1), and female players more motivated by social reasons (H2). Contrary to expectations (H3), male players did not play the most hours, despite being more experienced with the genre. It was the female players who were the most intense and dedicated "hardcore" players, playing more often (if in smaller overall numbers) and with more dedication than the males (as indicated by lower likelihood of quitting). As expected, players in romantic relationships with other players conformed to stereotypical gendered roles (H4 and H5), and enjoyed slightly higher perceived relationship quality. Surprisingly, females playing with a partner were happier than males doing so. With regard to health (RQ2), the female players reported having more normal BMIs and being in much better shape than their male counterparts and their nonplaying counterparts. Lastly, as predicted by gender role theory, the female players had more underreporting of their play time (H6). Taken together, these findings affirm the predictive power of gender role theory, and

highlight the importance of including gender as an independent variable in future work among social gamers. The several findings will be covered individually, followed by a discussion of theory and methodology.

At the broadest level, the findings support past research (Fullerton et al., 2008; Kerr, 2003; Royse et al., 2007) that has found that adult women do indeed play online games, including casual and persistent games, and for large numbers of hours weekly. And although women are the minority of players, they are more committed to the game and play for more hours than their male counterparts. In this sense, female MMO players may be the "hardcore" players than young males are often assumed to be. However, their reasons for playing are different than the males', as women are more likely to play for social interaction and the men to achieve, indirectly supporting the Chodorow (1994) hypothesis of gender role origins, and directly supporting the predictions of gender role theory. One reason women may play more hours than men may be a greater desire to interact with others (both with friends and family who play as well as with other individuals in the game), supporting what we know of gender role expectations, as well as being a pleasurable leisure activity (Royse et al., 2007). Other findings offer support for the theories as well. One key example can be found in the finding on self-reported hours. As expected, all players underestimated the amount of time they spent online, most likely because of the social desirability issues associated with both compulsive Internet use and video games in general. However, it was telling that the females underreported their time at a rate nearly three times that of the males. With games expected to be male spaces, these females had difficulty expressing the extent of their involvement, even on an anonymous survey. In line with what we know from gender theory, it is likely that the difficulty for the women may have been because of their desire to remain cognitively consistent about being a woman who is not "too" into games and any perceived male orientation. The Chodorow roles and their resulting gendered expectations may explain the large numbers of bisexual women playing. If bisexual women identify less strongly with standard gender expectations and are more willing to break with them, they may be more comfortable in spaces perceived by them and others as male-oriented. And indeed, an examination of the bisexual female's self-reported time ($M = 29.28$, $SD = 19.56$) was not statistically different ($t = .348$, $df = 183$) from their actual play time ($M = 29.83$, $SD = 20.20$), supporting this notion and further strengthening the theoretical power of gender role theory. And although it was not included in the present work, future research might include Bem's (1993) approach to psychological gender, which allows for more nuanced measurements of masculinity and femininity within both physical genders—including the potential androgyny that may be driving the bisexual players.

If the men are more achievement oriented, it would be reasonable to expect them to play more hours than the women because MMO performance is strongly linked to playing time (Williams et al., 2006). The desire for communication could in part have been met *through* game play with romantic partners and/or relatives, suggesting that MMOs may allow (especially younger female) players greater opportunities to

communicate with friends/family outside of normal routines. Such motivations may not have been picked up by the Yee scales, which do not specifically address family communication. If true, this pattern would be consistent with the general trend in Internet research to find online activities to be more of an extension of offline life, for example, a maintenance tool, than a substitute for it (Gershuny, 2002; Wellman & Haythornthwaite, 2002).

Playing with a romantic partner
Our hypotheses (H4 and H5) regarding playing with romantic partners predicted that, within player relationships, men would be more aggressive and that both genders would skew to stereotypical levels of aggression. These were supported by the data, suggesting that gender role stereotyping plays a role in player relationships, and possibly in how many females enter the MMO world. In general, the current research supports prior findings on playing with a romantic partner (Yee, 2006), with a majority (61%) of female players regularly playing with one (as compared to only 24% of male players) and 35% playing with a relative (as opposed to 26% of male players). Female players are thus using MMO games such as EQII as relationship-oriented spaces to a greater degree than male players. This runs counter to Ogletree and Drake's (2007) more general examination across all game types, in which they speculated that game play may lead to more feelings of togetherness for males than females. If Ogletree and Drake are correct, MMOs, with their deep time involvement and strong social component, may be different in their uses and effects on relationships than other types of games. And, in addition to being "third spaces" generally (Steinkuehler & Williams, 2006), it seems that for women in particular, MMOs are places for relationship expression and maintenance—which may result in feelings of better quality of life for them, if not for males. In contrast, males playing with a partner experienced worse outcomes. The causal direction is unclear, and presents an intriguing topic for future research: Is it that less happy men play with romantic partners or that playing with romantic partners makes them less happy? And is it that happier women play with romantic partners or that playing with romantic partners makes them happier? Similarly unclear is the causal direction for social motivations within romantic player relationships. Although the men in relationships were the more socially oriented men and the women in them the slightly less socially oriented ones, we cannot know if this was a cause or effect of game play, or driven by some unknown third factor.

It is important to note that MMOs are not valueless spaces themselves. EQII, like most virtual worlds, has been criticized for sexist portrayals of women (Taylor, 2006). Such settings may be comfortable to individuals who value or simply expect more traditional relationships between romantic partners, or they may actively induce stereotyping. Prior work has found cultivation outcomes arising from MMO play (Williams, 2006c). Although researchers such as Taylor are careful to point out that the women who play such games enjoy the power they gain from advancing and exploring, we do not know how such settings reinforce or challenge traditional

views about gender relationships, other than reports of harassment of women online (Barak, 2005). These several findings about relationships suggest that there is ample room for further research on games and romantic partnering.

The health surprise

The findings on health and fitness gender differences (RQ2) were unexpected. Female players reported lower BMIs than either the male players or nonplaying females. The males' health findings met expectations, yet the men still perceived themselves to be more fit than the women, although this is clearly not the reality. Regardless, there is still a puzzle remaining for the female fitness levels. Given the relationship between time spent in front of a screen—which the women did more of—and overall fitness, it would have been more logical for the women to be less fit than the men. And, the fitness gender gap was further surprising in that it seems to get larger as female player age goes up. Given that the number of free hours left after play is smaller for females than males, one possible explanation is that females use this remaining time more intensely for exercise than would be expected. On the other hand, given that we found that women were more likely to underreport their playing time than men, and given that body image is more central to women's gender role than it is for men, it is also possible that women systematically underreported their weight. Nevertheless, the current data do suggest that females who play EQII report lower BMI and better health outcomes than nonplaying females who answered the same exact question. Is this difference an outcome of playing this game, or are people—particularly women—with particularly healthy exercise habits drawn to EQII? Another factor to consider might be an overreporting of lower weight figures by women in the survey, especially as women are under greater pressures in society to be thin, if not healthy. Thus even although some women might report lower weights, they may still express the feeling that they are unhealthy, especially if such players feel they are already overengaging in an inappropriate activity either generally or for their gender. This becomes another intriguing causal arrow for future research to tackle. In the mean time, the stereotype of the sedentary and overweight game player has been shown to be inaccurate (at least among MMO players), in that the male players seem to be no better or worse than the general population. And, for the women, the stereotype is especially inaccurate. We note that although high BMIs are typically indicative of poor health, so too are very low BMIs. The lower scores for the females keep their mean in the "normal" range, but the standard deviation implies that outliers of course fell into both high and low ranges. Further exploration of this topic might also consider whether subgroups of players venture into unhealthy underweight or overweight ranges.

Limitations

Although the method is novel and powerful, it is not perfect. The player sample was drawn over a 3-day period (Thursday–Saturday), and a longer time frame might avoid potential day-based differences. However, there is no theoretical reason to link

day-based differences with the particular areas of inquiry here. Also, it is possible that the incentive item supplied by Sony might attract some players and not others. However, the item was constructed to be desirable as a functional item within the game. If some players did not seek to improve their character, they might have been less likely to participate. A future improvement to the incentive might cut across the different motivations for playing the game, such as a choice between in-game items, free playing time, or other incentives. Lastly, although the omnibus test yielded a moderate η^2 level, many of the study's specific tests had small η^2s. In these instances, readers should take care to note that the explanatory power of the predictor variables was statistically significant but relatively small.

Reporting time

As predicted (H6), female players underreported their playing time compared to males, with a discrepancy of nearly three times the males' rate. This finding is in line with gender role theory, which predicts that individuals will seek to avoid sanction for gender-inappropriate behaviors. Female players, even as they enjoy the experience of MMO games, likely feel it is not an appropriate activity, due either to the generally masculine culture associated with digital games, or because such play takes time away from household activities, for which women are still expected to contribute the greater share. Yet women are playing games for longer time periods than men, even if they are not expressing that fact. Perhaps when women play such games in greater numbers, or when their interests are acknowledged and validated in contemporary culture, such activities will lose their masculine association and such greater underreporting among women will diminish.

Implications for future (and past) work

One broad theoretical implication of the findings is that gender role theory is useful when examining online populations and gamers. With the exception of playing time, the genders conformed to predictions. Collectively, the many predictions made by gender role theory show that gender must be included in game research, especially online research, and the study of digital games is important to understanding the evolving gender roles of gender role theory. The theory has given us a useful framework for understanding how male and female players experience one MMO game differently, with the important moderator of playing with a partner. We can also see how individual players have "pushed back" against certain gender role expectations, as women, for example, play for longer hours than men, even as they underreport that time. This "hardcore" female playing pattern, as well as the bisexual subgroup, represents intriguing areas for future study.

This paper also indicates that new media such as video games and MMOs must be taken into account in complex ways as researchers continue to refine gender role theory. Although video games have typically been characterized as for boys and men, we have seen a number of women use MMOs, and with greater dedication and time commitment than men. Part of our explanation for such behavior is that women have

recognized MMO spaces as places to fulfill social needs, as well as engage in leisure activities. Perhaps as more women see the potential of such new media forms, the "gendering" of games, or at least MMOs in particular, will shift overtime, or become less distinct. Likewise, if women begin using MMOs for social reasons, they may also grow to enjoy playing and engaging in competitive or cooperative activities, which may not have initially attracted them. Such developments and speculations indicate that it is critical for gender role theory to continue to investigate multiple contexts relevant to activities and beliefs, and go beyond surface depictions of technologies or activities as simply "for men" or "for women."

Stepping outside gender role theory, there are also other ways to explore gender in relation to MMO game play which can be equally valuable to games researchers. Our data suggest that female players—not males—are the real "hardcore" MMO players. From a political economy perspective, we might ask why game developers are not more actively catering to this group. Along with Meehan and Riordan (2002), we might ask why such a gendered commodity audience fails to "count" in ways that more traditional hardcore player audiences have. It may be as Williams et al. (Williams, Martins, Consalvo, & Ivory, 2009) have suggested that games are simply made by men for men, who grow up to be game developers in a reinforcing cycle. Finally, our findings hint at, but do not deeply engage, issues of power in contemporary culture. In families with only one computer, for example, how might access to MMO playtime be negotiated, and how are women faring in such transactions? Prior work suggests strong social and cultural forces impact the access, uses and expectations around gender and media technology in the home (Spigel & Mann, 1992; Spigel & Olsson, 2004). Our study shows many women already in relationships have that access, but other women, with perhaps less household income, may find less access to MMO games, even if they have the desire to play. Overall then, gender role theory provides some solid insights into gender differences in online play, but it is only one avenue, and we hope many other gendered analyses of MMO games will further expand our knowledge.

Lastly, there is one methodological note that applies beyond the current study and even into prior research. This was the first use of large-scale unobtrusive behavioral data collection in game research. The findings of inaccuracy of self-reported time played are inarguable and have serious implications for prior work. It has been a typical measure to ask players how many hours they play games per week, per month, and so forth, and researchers have always taken the answers on faith (the authors here are no exception). Inaccuracy was thought to be simple noise in the data. This can no longer be the case because not only do players systematically underestimate the time they play but also do so differently by gender. This finding, although not large, nevertheless brings into question marginal findings in past work. If time spent has been used as either a dependent or independent variable and findings have been only barely significant (or have just missed significance), those findings may have been under- or overstated. Given the field's use of the .05 significance level, there may now be a series of past findings that should not have been published, and a series of

rejected findings that actually should have been. Future work must be careful when using this standard, and past work should be re-evaluated. This also points out the usefulness of having unobtrusive measures of behavior whenever possible.

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