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Sex Differences and Similarities in Video Game Experience, Preferences, and Self-Efficacy: Implications for the Gaming Industry

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Abstract As computer technology continues to pervade every facet of life, the study of video game playing becomes more relevant. Studies show that sex differences continue to exist between men and women, boys and girls, in video game experience, favoring males. Few studies show any overlap in preferences between young men and women in their video gaming choices. The current study surveyed over 2,000 college undergraduates for video game experience, preferences, and self-efficacy. Although it was found that men play video games more often, have had more experience, and feel more confident in their game playing ability, a moderate female gaming population was found to exist, who also play video games regularly. Almost as many similarities as differences were found between men and women in their gaming preferences. Suggestions and implications for the video game industry are discussed.

Keywords Sex differences · Video game · Experience · Marketing

Sixty-eight percent of U.S. households play computer video games, and 42% of American homes own at least one gaming console (Entertainment Software Association 2009). This statistic is unsurprising given the rise of computer technology in American culture. Video games may play a significant role in forming children's attitudes about technology (Bennett and Bruner 2000). In fact, a recent study showed that 90% of adolescents, both male and female, thought that technology (including video games) is "cool" and regularly use it and discuss technology with friends (Twentyman 2008). National studies show that on average, 30% of children aged zero to six have played video games, while about one in six (16%) of four to six year-olds plays video games daily (9% boys and 2% girls) for an

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average of an hour per day (Rideout et al. 2003). In one study, 100% of college students reported playing a video game at least once, and 65% reported being regular or occasional video game players (Jones 2003). More recent estimates show 99% of adolescent boys and 94% of adolescent girls play video games (Pew Internet and American Life Project 2007), although these projections seem quite high. It is apparent that video gaming culture is present and persistent among today's youth.

Video gaming is also quite popular among adults. Research shows that adult gamers (including both men and women) have been playing for an average of 12 years, and 43% of online gamers are female (Entertainment Software Association 2009). However, this statistic decreases to 35% when one considers only video game playing via console (Stredder 2001). It appears that older generations prefer to play online, while younger generations prefer to use game consoles (Lenhart et al. 2008). Surprisingly, 30% of the game playing population is made up of women aged 18 years and older while only 23% of the gaming population consists of boys 17 and younger, although the average age of the game player (regardless of sex) is 35 years old (Entertainment Software Association 2009). What is perhaps most interesting is that there may be very little difference, according to some research, in the amount of time spent playing video games weekly: women play 7.4 h per week while men play 7.6 h per week (Entertainment Software Association 2009). Yet, research suggests that men and boys fit the hardcore gamer profile more than casual, online women and girl gamers (Osborne 2008). Massively Multi-user Online Role-playing Games, or MMORPG, appears to be dominated by women (Consumer Electronics Association 2007; Yee 2006). Online surveys of more than 30,000 Massively Multi-user Online players showed that the majority of players are adult females who play for extended periods of time.

Overwhelming research argues, however, that far more boys and men play video games (off-line) than girls and women (Buchman and Funk 1996; Cherney and London 2006; Dawson et al. 2007; de Castell and Jenson 2006; Klimmt and Hartmann 2006; Larsson and Neren 2005; Quaiser-Pohl et al. 2005; Ogletree and Drake 2007; Terlecki and Newcombe 2005; Terlecki et al. 2007; Willoughby 2008). Some female gaming practices and preferences (or lack thereof) may be attributed to women's and girl's lack of experience and exposure, rather than some innate or biological underpinning (Hayes 2005; Terlecki and Newcombe 2005; Terlecki et al. 2007). Some argue that male gamers may dominate during video game play, which may discourage women from playing (Yee 2008).

Studies of video gaming preferences have shown that motivations, styles of play, and underlying personality factors vary widely (Schott and Horrel 2000), although empathy and sensation-seeking may be moderating factors in the selection of violent video game choices (Bolton and Fouts 2005), especially for men. It has been suggested that violence in games appeals more to males than females, as men are found to purchase more titles with higher ESRB (Entertainment Software Rating Board) ratings and violent content, while women selected the opposite (Przybylski et al. 2009). For instance, in a series of studies, when gamers (boys and girls) were given the chance to build their own video games, a majority of girls created interfaces that took place in real-world settings, with very little (if at all) violence (Denner et al. 2005; Denner and Campe 2008). Likewise, if girls do use

violence, it may more often be used it in a fantastical context with less real-world violent imagery than boys (Buchman and Funk 1996; Kafai 1998). Perhaps reflective of this trend is society's acceptance of male violence and/or aggression, yet disapproval of females engaging in such acts (Norris 2004).

The degree of overlap between boys' and girls', men's and women's video game playing preferences is unclear. Studies show boys to have a greater preference for real-world sports (Buchman and Funk 1996), action/adventure-type games (Kafai 1998; Quaiser-Pohl et al. 2005) and fighting/combat games (Heeter et al. 2009). Likewise, a British study of players between the ages of 7 and 40 years showed that women tended to play more strategic, life-simulation, and puzzle-type games more often (and were less interested in competitive games) than first-person shooter, violent, and sports-type games (Dawson et al. 2007). Similar results have been found with adolescent girls (Carr 2005). Dawson's study also reported that girls and women tended to play fewer games for shorter sessions (average half an hour) than men and boys, also reported by Ogletree and Drake (2007).

It has been suggested that the choice of games may be more gendered for boys than for girls, with a larger proportion of males selecting gender-stereotyped games than females (in comparison to gender-neutral games) (Joiner 1998). This conforms to gender-role theories that men and boys tend to adhere to stricter gender-stereotyping norms than women and girls. For instance, girls, when asked to design their own game, designed for both males and females in mind, while boys designed for a male audience only (Heeter et al. 2009; Kafai 1998). Similar studies show boys to prefer all-male characters with more variation in the characters females select (Williams et al. 2009).

The reasons for engaging in video game play may also differ between men and women, boys and girls. Specifically, studies of gamers have shown females to play for social interaction and to form relationships, whereas men play for achievement and personal gain; to "win" (Heeter et al. 2009; Klimmt and Hartmann 2006; Lucas and Sherry 2004; Morlock et al. 1985; Osborne 2008; Taylor 2003; Williams et al. 2009; Yee 2006). Women and girls may view computer technology and video games as a tool to "accomplish things" (such as obtain relationships) more than a just a "toy" (American Association of University Women 2000). Perhaps related is the fact that it is more likely for men to play alone than women. Women were found to more often play with someone else present, such as a romantic partner (Yee 2008) and yet complained more often about the amount of time their significant other played video games (Ogletree and Drake 2007).

Thus, the experience of gaming may be different for men and women, boys and girls. Dawson et al. (2007) found that men and boys shared their video game experiences and talked about video games more than women and girls, and men and boys expected to be players for "life", whereas women and girls were less sure. Girls and women tended to fit video games in when there was nothing else to do (entertainment) and fit gaming around other interests (unlike their male counterpart who reported that video gaming was more of a priority). Similar results have been found by Klimmt and Hartmann (2006). It appears that women and girls may be less "immersed" in the culture and perhaps less motivated to "win" or succeed at video games than men and boys (Dawson et al. 2007; Hartmann 2003; Hoeft et al. 2008; Williams et al. 2009).

Although studies show that both men and women, boys and girls, think that females are less interested in playing video games (Dawson et al. 2007), there is no question that many girls are in fact interested in gaming (Inkpen et al. 1994; Ivory and Wilkerson 2002). In fact, some argue that this male bias in video games is steadily weakening (Bryce and Rutter 2003; Dawson et al. 2007; Entertainment Software Association, 2009), and the "digital divide" may be smallest among the youngest populations of girls and boys, as more children (in general) are being exposed to more technology (Quaiser-Pohl et al. 2005). Some argue that the difference between male and female gamers is as small as 7–15% (Stredder 2001). In fact, some studies show that boys and girls, men and women, want the same types of outcomes in games; the fun of mastery, curiosity, improved cognition, and socialization (Lazzaro 2008), although the way they achieve these goals may be different.

Despite the moderate female gaming population (Ivory and Wilkerson 2002), research shows that women are still falling further behind in information technology and computer science fields (National Center for Women and Information Technology 2007; Twentyman 2008), with female employment in computer-related occupations at roughly 20% with women making 85% the salaries of men (Culp and Honey 2002). Between 1983 and 2006, the percentage of women awarded bachelor's degrees in computer science dropped from 36 to 21% (National Center for Women and Information Technology 2007). In fact, the number of these degrees was nearly the same in 2004 as it was in 1985. For instance, female undergraduate enrollment in computer science at UCLA is at its lowest point since the 1970's (Lanzalotto 2007). Given the increase of computer technology in our culture, this finding is alarming.

Likewise, women represent fewer than 20% of workers in the video game industry, of which only 3% represent game programmers (Pham 2008). In a study of 2,000 women working in technology-related fields, almost half (48%) reported feeling that their views were considered inferior to their male coworkers, yet three quarters of respondents stated that they felt confident they could influence their boss and (75%) would encourage other women to pursue similar career paths. Likewise, it has been reported that girls believe they can work with computers (although other studies cite confidence as an issue; Lanzalotto 2007) but don't want to; suggesting a disinterest in computer culture (American Association of University Women 2000). Playing computer video games may not be explicitly related to women choosing fields in computer science, but it may provide valuable exposure to spark interest.

Again, some speculate that one reason women and girls are currently not more interested in the computer science and video gaming industry is that most digital resources (websites, CD-ROMs, etc.) do not reflect females' design and content preferences (Agosto 2004), perhaps because many programmers and designers in the industry are men. Much of the gaming available involves war, conquest, or competition, which largely appeals to men and boys (Ito and Matteo 2008; Norris 2004). While recently more video games have been explicitly marketed towards girls and women (Nintendo and several other marketing companies have explicitly used females, including female celebrities, in their video game advertisements), they have conformed to stereotypical female interests (for instance, pink game consoles, fashion and dating scenarios) which may not reflect what the population truly wants

(Bennett and Bruner 2000; Jenson and de Castell 2007; Ogletree and Drake 2007). In fact, it may be that the women gamers out there "just want to fit in" and be viewed the same as their male counterpart (Graner Ray 2003); creating girl games may "strengthen the female stereotype" (Jenkins 1998). Many cite the "princess factor" as being a dangerous one; girls don't want dumbed-down "girls games". But yet, how do current games need to differ to be attractive to women and girls?

Understanding the female perspective on video game participation (motivations, preferences, etc.) needs to be further studied in order to increase their participation in the gaming culture (which may allow for a smoother interface with our highly technological society). Understanding the female (and male) gaming populations is also important to help educate the gaming industry on how to solicit this population, who has a vested profit in attracting women and girls to video games. Previous research suggests strong storylines, community, and female characters appeal most to females (Phillips 2005), but continued research needs to survey what components of video games are attractive to *both* men and women, boys and girls, though the message to each population may need to differ. With computer technology becoming increasingly ingrained into every facet of our lives, understanding and increasing female participation in the industry, perhaps beginning with video games, is an important goal to have and to study.

Method

Participants

Over 2,000 undergraduates (n=2,056; 563 men, 1,481 women, 12 not indicated) enrolled in *Introductory Psychology* courses across four academic semesters at an urban, northeastern university were screened for spatial experience and preferences through the Spatial Survey of Spatial Representation and Activities (SSRA) questionnaire (see Terlecki and Newcombe 2005). Participants were primarily Caucasian (64%), with smaller percentages of African American (15%), Asian American (9.5%), Hispanic or Latino American (4%), and Native American (.4%) students. Roughly 7% of participants did not report ethnicity. Participants ranged in age from 17 to 49 years, with a mean of 19.19 years (SD=2.30). No significant differences were found among participants in demographics or answers on the SSRA across the four semesters (all p values ranged from .19 to .97 with F values ranging from .11 to .95) and thus data were collapsed.

Materials

The Survey of Spatial Representation and Activities (SSRA), is a 21-item, open-ended and multiple choice questionnaire (modified from the original SSRA; see Terlecki and Newcombe 2005). The questionnaire consists of six questions related to participants' demographics (age, sex, major, etc.) and 15 questions that assess frequency of video game playing and experience, as well as preferences for doing so, including genre and console choice. Also, self-efficacy related to video game usage

was assessed through the survey. Previous analyses have shown the SSRA to be an effective measure of video game playing (Terlecki and Newcombe 2005; Terlecki et al. 2007), and it is available on the web through the National Science Foundation Spatial Intelligence and Learning Center (www.silccenter.org).

Design and Procedure

At the beginning of each semester, potential participants were given the SSRA as part of a packet of psychological research questionnaires administered during their first week of classes across *Introductory Psychology* classes. The packet of questionnaires was completed to fulfill requirements for research credit for graduation.

Surveys were completed online via a secure university website. Surveys were not timed, and participants could return to surveys to complete portions within a two-week window (after which, log-in was denied). Only fully completed surveys were analyzed. Following the two-week completion deadline for each semester for four consecutive semesters, data was electronically transferred into an SPSS database for analysis.

Results

Data were collected and collapsed across the four semesters of survey completion. The statistical package, SPSS, was used to analyze video game playing experience, preferences, and self-efficacy across young men and women. Descriptive data was analyzed using several techniques to investigate similarities and differences between the sexes across such measures.

Analysis of Variance (ANOVA)

Differences in video game playing and preferences were assessed between men and women using a One-way Analysis of Variance (ANOVA). Both men (95%) and women (85%) have played video games in the past [F (1,491)=2.11, p=.15], although men (M=1.15, SD=.35) said that they were more interested in playing video games in the future [F (1,491)=8.53, p<.01] than women (M=1.26, SD=.44). Seventy-two percent of men and 43% of women surveyed would like to continue playing, while 48% of women and only 17% of men were not interested in playing video games in the future.

Similarly, significantly fewer women (M=1.12, SD=.49) were currently playing video games than men (M=1.38, SD=.33), F (1,491)=42.99, p<.001, eta^2=.08, and those women who did currently play, they played less often (M=3.57, SD=1.41) than men (M=2.31, SD=1.34), F (1,491)=98.35, p<.001, eta^2=.17. This amounted to 74% of men and only 27% of women currently playing video games, while 24% of men and a whopping 71% of women did not currently play. Thirty-five percent of men played weekly (with 22% playing daily and 16% playing only once a month) while the greatest percentage of women (14%) only played video games one time a month (with less than 10% playing daily, weekly, or fewer than once a month).

Men (M=4.17, SD=1.14) had also been playing video games longer in their lifetimes than women (M=3.49, SD=1.43), F (1,491)=30.96, p<.001, eta^2=.06, with men playing an average of 10 years and women playing an average of 2–5 years prior to this survey. Nearly half (49%) of men had been playing for 10 or more years (with 19% playing between 5 and 10 years, and less than 13% playing for a shorter period of time) while only 14% of women had been playing for greater than 10 years (with 10% playing between 5 and 10 years, and roughly 16% playing for a shorter period of time).

Unsurprisingly, men and women differed in how good they felt about their video game playing ability [F (1,491)=72.88, p<.001, eta^2=.13]. Men felt moderately to very skilled at playing video games (M=1.89, SD=.83), while women (M=2.54, SD=.83) felt not very skilled to moderately skilled at playing video games. Twenty-eight percent of men and only 4% of women felt very skilled at playing video games, with 43% of men and 19% of women feeling they are of moderate skill. Less than 10% of men felt they had very little to no skill at video games while 26% of women felt the same.

Correlational Analysis

As expected, whether individuals currently played video games was significantly correlated with whether how long they have been playing (r=.31, p<.00), how often they played (r=.66, p<.00), and how good they felt about playing (r=.42, p<.00). Being male was positively correlated with whether an individual had ever played video games (r=.15, p<.00), whether they currently play (r=.44, p<.00), playing video games longer in history (r=.29, p<.00), playing video games more frequently (r=.47, p<.00), feeling good about one's own video game playing ability (r=.43, p<.00), and whether they'd be interested in playing (more) video games in the future (r=.30, p<.00). When sex was factored out using a partial correlation, no video game behaviors were correlated. Thus, sex, specifically being male, was a significant predictor of video game playing habits and preferences.

Chi-square Analysis

Although men and women reported variability in the consoles they played video games on [χ^2(424, N=2,044)=8.73E2, p<.00], men (59%) and women (49%) both reported using the Playstation 2© system most often. The second most popular system with men was the Xbox © (21%) and Nintendo 64 © for women (23%). Both men (19%) and women (16%) also reported that if they did not play video games using a console, they played with other friends that do own a console, or played online (computer or PC) or using the internet (8% men and 5% women).

Men and women both were attracted to games that were "fun", χ^2(31, N=2,044)= 2.61, p=.11 (11% men, 5% women), and both felt that advertising is what attracts them to different games, χ^2(29, N=2,043)=3.67, p=.09 (13% men, 6% women), however men and women differed in the genre of their "favorite" video game [χ^2(31, N=2,043)=4.88E2, p<.00], with men preferring sports games and women preferring racing games, although both men and women enjoyed adventure games (13% men, 5% women). Congruently, when asked what they'd like to see in a game "just for

them" [$\chi^2(27, N=2{,}044)=1.61E2, p<.00$], men reported wanting more games relating to sports and women wanted more racing, sports, and adventure-type games.

In summary, although several differences existed between the men and women of our sample in what they prefer in video games and how they feel about their ability, there were some similarities as well, many of which confirm previous literature. Although differences in video game playing frequency were observed between men and women, it is interesting to note that both men and women *are* playing video games, and have been for quite some time.

Discussion

Confirming previous research (Jones 2003; Pew Internet and American Life Project 2007), almost all college students in our sample have played video games, although more men currently play and would like to continue playing. Women that do play, play less frequently than their male counterpart (men tended to play weekly while women played once a month, if that). This finding is contrary to national estimates of both men and women playing 7 h a week, on average (Entertainment Software Association 2009). However, the 27% of women currently playing video games is quite close to the national 30% estimate (Entertainment Software Association 2009). Men had also been playing longer in their lifetimes than women (our average of 10 years is close to the 12 year national estimate; Entertainment Software Association 2009), although as previous research suggests, this gap may draw closer in time (as computer technology becomes more pervasive, especially in young children's lives). These data confirm what we already know: more young men are playing video games.

Unsurprisingly, men also felt more skilled at video game playing than women, although some men and women both felt "moderately" skilled. Very few women and very few men felt highly skilled or felt they had no skill at all, respectively. Previous research confirms the finding that men's self-efficacy in relation to video games, as well as other spatial skills, is often superior to women's (Klimmt and Hartmann 2006; Lanzalotto 2007; Terlecki and Newcombe 2005), which may be due to many reasons (experience, media messages, stereotype threat, etc.). Again, this may be related to the finding that men in our sample play more often and have been playing for longer in their lives, or may be due to women's under-involvement in computer sciences (and video games). This relationship may be bidirectional and likely builds upon previous experiences and exposure to video games and computer technology.

Although men and women reported great variability in the consoles they played video games on, both men and women reported using the Playstation 2 © system most often. This might be expected given that the Playstation 2 © is the best-selling console to date, with over 138 million units sold and a game library projected to exceed 1,900 games in 2009 (Plunkett 2009). Also, similar percentages of men and women reported that if they did not play video games using a console, they played with other friends that did own a console, or played online (computer or PC) using the internet. This finding is interesting given that research shows that more men tend to play video games alone (Yee 2008) and more women tend to play online

(Consumer Electronics Association 2007; Yee 2006). Given the smaller percentages of these choices, and the fact that if one does not play using a console, one of the only other alternatives is to play online (these appear to be the two most popular choices, according to the literature), these results make sense.

Men and women both want "fun" games, which confirm earlier beliefs that both sexes are attracted by the same core affordances of video games (the fun of mastery, curiosity, improved cognition, and socialization; Lazzaro 2008). Men also preferred sports games and women surveyed preferred racing games (both sports and racing have an "action" component). Interestingly, both men and women enjoyed adventure games. Some previous literature also purports that men and women, boys and girls prefer adventure games (Grimes 2003), although males may prefer more violence in that genre. There were also similarities in what men and women reported they would like to see in a game "just for them"; both men and women wanted sports in their games (while women also wanted racing and adventure). This may be somewhat surprising given that women did not report sports games as being their favorite. However, it may be that globally, women wanted more qualities (sports, racing, and adventure) than what is currently available. Perhaps this reflects the narrow genre of games currently marketed towards women; women want more diversity in their game selection.

In summary, there are similarities, perhaps unexpected, in what men and women want in their video gaming experiences, which previous research has not often reported. Both do use similar consoles, enjoy adventure games, and want their games to be fun. Overlap in preferences, such as those found in this study, is important for video game designers and developers to consider in their marketing. The fact that both men and women in this study thought that advertising was/is the most crucial aspect that influences their gaming preferences also argues for great attention to be paid to women's choices. More research needs to be conducted and communicated to the gaming industry to better serve the female gaming population.

Although men have been playing video games longer and more often, a moderate proportion of women play as well, as others have found (Consumer Electronics Association 2007; Entertainment Software Association 2009; Ivory and Wilkerson 2002; Pew Internet and American Life Project 2007; Stredder 2001; Yee 2006). Moreover, this gap may be slowing closing, as more children and adults are being exposed to computer technology as part of their daily lives. Involvement and experience with current computerized technologies in not just the home, but educational settings as well, is important to provide both men and women, boys and girls, a chance to learn valuable life-long skills (Culp and Honey 2002). Because computer video games are a seamless lead-in to the technological age, those who are not playing may be at a disadvantage.

Hence, it is crucial to get more women involved in computer technology to lead to less male-focused game worlds (Culp and Honey 2002). According to Sheri Graner Ray, game designer, developer, and author on the subject, we must recruit, outreach, and mentor women in the gaming field/industry (2003). Given that video-simulated interfaces are being used to train doctors and nurses, pilots and firefighters as well, computer literacy spans further than just the video game market.

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