Gaming, Gender, and Time: Who Makes Time to Play?

Jillian Winn · Carrie Heeter

Abstract This study of 276 US undergraduate students from a large Midwestern university provides the first research evidence of a relationship between leisure time availability and how much digital games are played. College students with less free time were less likely to spend time playing games. The findings suggest one reason women play fewer games than men is because they are required to fulfill more obligatory activities, leaving them less available leisure time, which in turn makes them less likely to "make" time for games. It was found that not only do women report having less free time than men, but their free time is available in smaller chunks, and they play digital games for shorter periods of time than men.

Keywords Gender · Gaming · Time use · Game behavior and trends · Leisure and free time

Introduction

Although there are many studies that examine gender differences in time use and several studies on gender differences in gaming, there are not past studies that directly link these research areas together. On average in the USA, females spend less time than males playing digital games (ESA 2006a). However, some females are avid gamers and others never play. The magnitude of the gaming gap increases as children become young adults (Roberts et al. 2005). Adult women have less leisure time (Aguiar and

Hurst 2006; Larson and Verma 1999; Mattingly and Bianchi 2003; Mauldin and Meeks 1990; Ritchie et al. 2004) and the free time they do have is available in smaller chunks than adult males (Apt and Grieco 1998; Mattingly and Bianchi 2003). This disparity begins in childhood (Ritchie et al. 2004). The amount of free time and chunk size one has limits the available time they have to play games. When free time occurs only in small chunks, potential players are less likely to be attracted to games with a lengthy learning curve and games designed for players who play for hours at a time. Leisure time availability and non-leisure time pressures may help to explain why women are less interested in devoting time to playing games than men are. This US study looks at the impact of current and past gaming behavior, non-leisure time demands, and leisure time availability on the time female and male college undergraduates spend playing digital games. The findings provide the first research evidence of a relationship between leisure time availability and how much digital games are played. The study and findings are of particular interest to academic researchers and educators interested in better understanding differences in gender roles and addressing the gender gap in technology. Additionally, examining gender roles in games and time use has implications for game designers wanting to reach a wider audience (women).

Gender Gap in Technology

Large gender gaps have been found in science, technology, engineering and mathematics (STEM) areas, and more specifically within technology (AAUW 1992; AAUW 1998; AAUW 2000). Women are still underrepresented and men continue to dominate in STEM field jobs. Women tend to be less confident and underestimate their computer

J. Winn (✉) · C. Heeter
Telecommunication, Information Studies, and Media,
Michigan State University, 409 Communication Arts & Sciences,
East Lansing, MI 48824, USA
e-mail: jillian@msu.edu

skills (Margolis et al. 2000). Fewer women in college study and get degrees in computer science (College Board 2007; NCWIT 2007). Women hold only 27% of US computer-related jobs (NCWIT 2007). These trends parallel the technology-based field of game development. It was found in 2005 that 88% of game developers were male (Gourdin 2005). It is clear that there is a significant gender gap in careers in technology, computing, and games. This divide may also be a factor in why women make significantly less than men (AAUW 2008).

Girls' lack of interest in gaming has the potential to widen the gender gap in gaming and occupations in game development, computing, and technology. Playing games can increase technical and computer skills, plus self-efficacy in these areas (Greenfield 1984; Greenfield and Cocking 1996; Kiesler et al. 1985; Loftus and Loftus 1983; Subrahmanyam et al. 2000). Depending on the type of game one plays, gaming can also have other benefits such as increase focus and attention, build cognitive skills, enhance orientation and spatial skills, and also improve other non-verbal skills that are often tested on intelligence tests (Flynn 1994; Greenfield 1998; Greenfield et al. 1994; Okagaki and Frensch 1994; Subrahmanyam and Greenfield 1994). Additionally, more and more learning games are entering the classroom as alternative teaching tools, which are thought to be more "fun" and interactive than traditional instruction. If girls are less engaged by games than boys, they may miss out on opportunities in the classroom, workplace, and even society as games grow to be a part of our culture. It's time girls got into the game.

Reviewing Gender Differences in Gaming

Games today touch all ages. According to data from the Entertainment Software Association, the average game player today is 33 years old (ESA 2006b). In 2005, 25% of Americans over the age of 50 played video games, an increase from 9% in 1999. Thirty-one percent of game players are under the age of 18, 44% are 18 to 44 years old, and 25% are 50 or older. Girls and women DO play games. The pattern varies by age. At almost every age category, males spend more time playing games than females do. Combining computer and video games, a recent Kaiser Family Foundation Report (Roberts et al. 2005) found a steady drop in game play occurs between the ages of 8 and 18. Boys play an average of an hour and 34 min per day and girls less than half as long (40 min).

Digital games today come in many genres. Massively Multiplayer Online games (MMOs) are time intensive. They require long blocks of time to complete a quest. The average MMO player spends 22 h per week playing their favorite MMO (Yee 2006). Although MMO gameplay is very social in nature, a feature many researchers say is attractive to women (Brunner et al. 1998; Cassell and Jenkins 1998), male players significantly outnumber female players in the time intensive genre (Yee 2006).

Casual games represented 10% of the computer game market in 2005 (IGDA 2005). The International Game Developer's Association (IGDA) defines casual games as games which are primarily distributed online. Online play periods are often divided into numerous short game sessions. Female casual gamers pick up and drop games multiple times per day. Casual online games are playable in small chunks of time, as little as 5 to 10 min. According to the IGDA Casual Games White Paper, market research shows the majority of the casual online game audience today is women 30–45 years old (IGDA 2006). Popcap Games (Information Solutions Group 2006) reports that over 76% of its players are female, and 89% of its players are 30 or older. Females spend more time on average playing online casual games (9.1 h per week) than do males (6.1 h per week). Although combining across game genres, men spend more time playing than women do (IGDA 2006). Looking across studies, gaming behaviors are strongly related to both age and gender, although this relationship has not been systematically examined. What is it about casual games that are especially attractive to older women, who could not have grown up playing digital games?

Speakers from industry and academia speculate the reason adult women are such avid casual gamers is because women have less available time to spend playing games and thus can best play in small chunks (Beyond Barbie Workshop 2006; Girls 'n' Games Conference 2006). However, this common sense expectation of a relationship between available time and casual game play is conjecture, not confirmed by research. Women 35 and older spend more time playing casual online games than younger women, and than men and boys (Information Solutions Group 2006).

Considering time use across the lifespan, college corresponds to the time when digital game play has ebbed to its lowest point since childhood. Gender and time use has been studied extensively among adult women and to a lesser extent among children living at home. As adults, family responsibilities predictably result in time demands. As children, parents assign daughters and sons different household chores (Katz and Boswell 1984). College for the majority of undergraduates is a stage of life, typically from the age of 18 to 22, when they experience relative freedom, a time when parents no longer assign chores and before relationship and family responsibilities are omnipresent.

Games have the potential to be highly attractive for women. Genevive Bell, a cultural anthropologist at Intel, observes that women use technology as often as men, but in different ways. "Women tend to use technology in ways

that make busy days more manageable, which is why cell phones, laptops and wireless Internet access are popular" (Sidener 2005, Time Management section, 1). The availability of laptops and faxes increases the ease of mixing work and leisure activates (Floro 1999). A study by Apt and Grieco (1998) determined women benefit from distance education, which allows them to have more flexible school schedules. Distance education worked well for women in particular because lessons could be delivered in components, accessed remotely, completed incrementally, and available at anytime. These features encouraged time management, allowed tasks to be completed over multiple chunks of time, and provided an influx of flexibility (Apt and Grieco, 1998). The features of distance information technologies that are attractive to women can be used to understand women players' needs in games. Although some women are satisfied by today's games, women who are not attracted to typical digital games may prefer games that are designed in component forms and can be played in an incremental manner rather than in a one-time block mode.

Reviewing Gender Differences in Leisure Time

Time perception, or one's sense of time, has a great effect on how individuals live their lives and what they choose to do with their time (Nir 1999). People live their lives based off of their own perception of time—how much of their time is already planned for, how much available time they have left to spend, and how valuable they believe that time is. Often it is said that we "make" time for something. Unfortunately, time cannot really be made. Time is like money that can be spent in different ways. Unlike money, time is finite and runs out every day. Even the richest among us have at most 24 h in a day.

Individuals assess the amount of available "free" time they have and then decide how to spend that time. Playing a game is an act of spending time. Some activities, such as listening to music or eating, can happen concurrently with other activities. Indeed, some games require little enough attention that they can be multitasked, played while engaging in instant messaging, emailing, and surfing the Web. But until, and despite, the recent growth in casual games, most console and computer games are intended to engage players, to "hold them on the edge of their seats for hours" (Prensky 2001). Playing an engaging game typically means choosing to spend time exclusively on that activity.

The number of men who choose to spend available free time on gaming is much higher than the number of women (game players are 62% men and 38% women) (ESA 2006a). However, male–female differences in whether they play games may be directly related to how men and women perceive and manage their time. Time management and

time use studies consistently reveal gender differences. Aguiar and Hurst (2006) report 36 h of leisure time per week for Americans in general, but found a difference between genders. Men had 38 h of leisure time per week, while women had 34 h. Women have less available leisure time than men (Aguiar and Hurst 2006; Larson and Verma 1999; Mattingly and Bianchi 2003; Mauldin and Meeks 1990; Ritchie et al. 2004). But how does having less (or more) available leisure time effect how one chooses to spend that time?

Studies in developing countries found girls had less time than boys for leisure activities and carried a larger workload at school and home (Levison et al. 2001; Ritchie et al. 2004). Mattingly and Bianchi's study (2003) found women have less free time than men in regard to both quantity and quality of time. They found that on average men have nearly half an hour more free time per day than women. The availability of "disposable" or leisure time is inversely related to other obligations in life. The opportunity cost of allocating free time to playing a game is much higher for those with very little free time. Game play would need to be a gratifying experience for women, to be worth the allocation of scarce free time.

Reports about "millennials" suggest that older kids today have more scheduled activities than previous generations. Responding to a survey of the high school class of 2000, students reported that kids a few years older than them had less homework and fewer scheduled activities during high school than high school students do today (Howe and Straus 2000). Today's high school students believe they experience more time pressure than even their slightly older peers.

Both the amount and nature of responsibilities and leisure time activities differ for men and women. In general, more responsibility falls on women for taking care of the family and household duties, regardless of other work-related obligations (Apt and Grieco 1998; Mattingly and Bianchi 2003). Males spend more time in leisure activities and less time in household work and personal care than females (Mauldin and Meeks 1990). Renk et al. (2003, 13) posited that women have more responsibility for caring for the family because "fathers may experience more choice in their interactions with their children, whereas mothers may perceive the time they spend with their children as part of their expected role rather than as a leisure activity."

Not only do men and women have different roles in society, but they also manage their time differently. Women have more time constraints built into their daily routine (Apt and Grieco 1998) and feel more time pressure (Mattingly and Bianchi 2003). "The major difference, however, is that men typically play their roles sequentially, focusing on a single productive role, while women must usually play their roles simultaneously, balancing the

demands of each within their limited time constraints" (Moser 2005, Gender Roles—Multiple Roles section, 1). Women utilize time management and multitasking skills to cope with an overload of tasks and have fragmented amounts of available time (Apt and Grieco 1998). Traditional video games demand undivided attention (Prensky 2001) and, therefore, are not conducive to multitasking. As a result games are a less appealing and less viable option for busy women.

When individuals experience an increase in the amount of time spent doing productive work, they spend less time doing leisure-oriented activities (Zick and McCullough 1991). Huston et al. (1999) and Shin (2004) used the displacement hypothesis to explain how children's television viewing may affect other activities. Ogletree and Drake (2007) suggest the displacement hypothesis may cause frequent gamers to spend less time with their non-gamer significant other. They did not find a significant difference regarding gaming and conflict in a relationship with a significant other, but they did find that a greater proportion of women complained their significant other played too much, whereas a greater proportion of men admitted their significant other complained about how much they played.

Games that permit multitasking and serve the simultaneous function of socializing with friends or family may appeal to women. Women mainly engage in leisure as an overlapping activity rather than an exclusive activity (Floro 1999). Women are more likely than men to multitask leisure time with socializing or other "good for me" activities. Women and girls put more emphasis on interpersonal relationships than men. Because of this, females are more likely to spend time with others rather than alone, and spend more time in conversation than males (Smith 1997).

Hypotheses

As the literature review has shown, gender differences exist in gaming and they also exist in time use. Past studies focused on either time or gaming, while we aim to examine these two areas together in one study. We examine (1) gender, (2) current and prior gaming behavior, (3) non-leisure time demands, and (4) leisure time availability in college undergraduate students in order to better understand why non-gamers (particularly women) don't play video games. The literature review showed women play less digital games than men. If there is a significant gender difference in time spent playing games, why does it exist? What gender role differences exist that may cause such a disparity? It is believed that if we find or better understand patterns of gaming, we will be able to know more about why people play and what keeps them playing. Specifically, are there gender-specific play patterns? It is hypothesized

the less free time one has, the less time they will spend playing games. For the purposes of this study the term *digital games* includes games played using an electronic devise, such as console games (PlayStation, Xbox, Nintendo), handheld games (GameBoy, NintendoDS, PSP), computer games (casual games, internet games, downloadable games, PC games), and arcade games.

In addition to asking undergraduate participants how they spend their time and how much they play games currently, in college, we asked them to recall how much free time they had, and how much they played digital games in middle school and high school. According to the literature review, women have less leisure time than men (Aguiar & Hurst, 2006; Larson & Verma, 1999; Mattingly & Bianchi, 2003; Mauldin & Meeks, 1990; Ritchie et al., 2004). Is this pattern true with our undergraduate participants and, if so, how large is the gap of available leisure time between our undergraduate men and women? We hypothesized that our female participants spent less time playing games than males did in middle school, high school, and college (H1). We predicted reported time spent gaming would be highest in middle school, and decline to it lowest point in college, for both males and females (H2). Does one's game playing evolve over time? Are those who were the avid gamers amongst their peers in middle school still avid gamers today when compared to their college classmates? We hypothesized the choice of allocating leisure time to games is consistent over time: those who spent more time playing games in middle school, will also spend more time playing games in high school and college. Therefore, young gamers are more likely to grow up to be adult gamers (H3).

Women have smaller chunks of free time than males (Apt and Grieco 1998; Mattingly and Bianchi 2003). We predicted that male college students have more free time overall and their free time is available in larger chunks than female college students (H4). Is there a significant relationship between available leisure time and time spent gaming? We predicted male and female students with more available free time would spend more time playing games (H5). We looked at how specific time demands affected the amount of time spent gaming. We predicted competing demands on students' time, such as (a) homework, (b) a paying job, and (c) maintaining a good GPA will result in less time devoted to game play (H6a, 6b, 6c). It was also predicted being involved in a romantic relationship would result in less time devoted to game play (H7). We hypothesized one reason non-gamers choose not to play games is because they have trouble finding interesting games. Having a lack of interest in currently available games was predicted to be associated with less time devoted to game play (H8a), and the prospect of more interesting games would motivate non-gamers to play more (H8b).

The time use studies we reviewed showed women have less free time and their free time is in smaller chunks. Therefore, we predicted that when female undergraduates do play, they will play games for shorter blocks of time than male undergraduates (H9).

Method

Participants

A survey was conducted with 276 undergraduates between the ages of 18 and 24. All of the participants were undergraduate students at a large Midwestern university. Thirty-six percent took the survey for extra credit in an introductory "Information Society" course and 64% completed the survey as an optional, for-credit assignment in a junior level "Health Psychology" course. The instructors of both courses notified their students of the survey opportunity either via email, course website, or during in-class instruction. Students were also given alternate options in case they did not want to participate in the survey, but wanted additional class credit. The mean age of the student respondents was 20.4. Slightly more than two thirds (69%) were female. Most were Caucasian (including Hispanic); 8% were African American and 5% were Asian. The breakdown by year was 14% freshman, 16% sophomore, 26% junior, and 44% senior. About one fourth (26%) of students were pursuing majors in the College of Social Science (most likely Psychology majors) and another fourth (27%) were pursuing degrees in the College of Communication Arts and Sciences (most likely majoring in Telecommunication, Information Studies, and Media). Majors for the other students varied widely with no other college accounting for more than 14% of the respondents.

Data Collection

Participants were given a URL where they could take the online survey at their convenience on their personal computer or in a public lab, the choice was theirs. All surveys were identical. Twenty-two (22) questions related to the hypotheses were analyzed in this study. T-tests, correlations, analysis of variance and MANOVA were conducted to explore the research questions and test the 9 research hypotheses.

Measure

Demographics

Participants were asked their gender (male/female), age (open-ended, numeric), ethnicity (African American/His-panic/Asian/Caucasian [not Hispanic]/Other), relationship status (single/dating/engaged/married/separated/divorced), year in school (Freshman/Sophomore/Junior/Senior/Graduate student/other), the college of their major (16 radio button choices), and their grade point average (GPA) using a 4.0 scale.

Time Use

Participants were asked about their "free" time in two ways. They were asked the number of days per week they had at least some free time, and also how long their typical chunks of free time were. Respondents could choose 1 through 7 days per week with at least some free time or they could select "less than 1 day per week." Five response categories were provided for indicating how long their typical chunks of free time were (10 to 15 min, 30 min, 1 h, 2 h, and more than 2 h).

Leisure and Non-leisure Activities

Participants were asked to estimate the number of hours per week they spent on various leisure and non-leisure activities. Non-leisure activities included time spent at a paying job and time doing homework. They were asked to estimate hours spent playing digital games per week in middle school, high school, and college (now). Middle school and high school were defined for participants as sixth–eighth grade and ninth–12th grade, respectively. Responses were numeric, open-ended hours per week.

Gaming Behavior

In addition to being asked the hours spent playing games in middle school, high school, and college (now), participants were asked how long they usually play digital games in one sitting. Response choices were 0 (never play), 10 to 15 min, 30 min, 1 h, 2 h, and more than 2 h. The "more than 2 h" category was coded as 3 h, which is certain to be an underestimate for extreme gamers, though it is impossible to know by how much.

Game Appeal

Data was collected on whether respondents were able to find appealing games and the likelihood they would play more if better games were available. They were asked what they find when looking for an appealing game (5-point Likert scale: 1-Almost No Appealing Games to 5-Almost All Appealing Games). They were also asked if they would spend more time playing games if there were more interesting games to play (5-point Likert Scale: 1-Not True at All to 5-Extremely True).

Table 1 When was the last time you played a digital game?*.

	Avid gamer				Non-gamer	
	Today (%)	This week (%)	This month (%)	2 to 6 months ago (%)	Longer than 6 months (%)	Total (N)
Female	7.4	17.4	20.5	22.10	32.60	190
Male	41.2	20.0	21.2	14.1	3.50	85

Female M=3.55 (between this month and within 2 to 6 months), SD=.09; Male M=2.19 (closer to this week than this month), SD=0.14

*p<.001

Gaming Orientation Construct

In order to characterize individuals with different affinities for gaming, we first defined the construct. Respondents were asked when was the last time they played a digital game, with 8 response categories (within the hour, within the day, within the week, within the month, within 1–6 months, within 7–12 months, over a year, and never). Playing within the hour and within the day were combined to report those who last played "today." Because of small cell sizes within infrequent-play male respondents, the last three categories (7 to 12 months, more than 1 year ago, and never) were collapsed into one category, "over 6 months," combining all respondents who had not played a game within the last 6 months. Collapsing these categories left 5 responses (today, within the week, within the month, within 1–6 months, over 6 months). Responses on recency of game playing helped to define a gaming orientation construct with a spectrum ranging from avid gamer to non-gamer. Those who responded that they played games the most recently (played "today") were considered "avid gamers", while those who had not played a game in more than 6 months were located on the other extreme, "non-gamer" side of the spectrum. The avid gaming variable was compared with estimated number of hours playing games per week to confirm the use of the avid gaming measure and to characterize game play among those with different gaming orientations.

Results

Hypothesis 1: Females spend less time playing games than males do in middle school, high school, and college.

Gender differences were significant and extreme. Half of male undergraduates had played a game the day they completed the survey whereas only 7% of female under-graduates had done so. Combining respondents who had last played today with those who had last played sometime in the last week, 70% of males in the survey had played within the last week, compared to one fourth of female respondents. Gaming was an extremely common activity for male undergraduates and much less common for female undergrads. The non-gamer category, which was made up of respondents who had not played a game within the last 6 months, included almost no males (3%) but one third of female respondents (33%). ANOVA confirms these differences are significant (F(1, 273)=66.93, p<.001, η=.20). Table 1 presents the data comparing how recently female and male undergraduate respondents played.

In our study, males spent significantly more time playing games than females did at all three life stages studied (middle school, high school, and college). A repeated-measures MANOVA confirmed a significance between subjects main effect for gender (F(1, 269)=146.00, p<.001, η^2=.352). Analyzed separately (using ANOVA), hours played at all three time periods showed significant gender differences (all at p<.001). Paired t-tests comparing middle school and high school, high school and college, and middle school and college confirmed life stage differences (all significant at p<.001). In middle school, female undergraduates recalled playing games an average of 2.85 h per week, compared to 8 h per week for males (Table 2). Female undergraduates recalled playing 1.68 h per week in high school, compared 7.67 h for males. In college females played about 1 h per week on average, compared to 5.3 h

Table 2 How many hours do or did you play digital games in a typical week?*.

		Middle school	High school	Now (college)	No.
Female	M	2.85	1.68	.98	189
	SD	3.49	2.96	1.93	
Male	M	8.02	7.67	5.30	84
	SD	5.50	5.53	5.08	

The range for self-reported hours played per week was 0 to 15, with reports of playing more than 15 h recoded to a maximum of 15. Of college hours responses, 3.4%; 4.5% of high school, and 5.7% of middle school responses were greater than 15 h per week

*p<.001

for males. Extrapolating from these differences (multiplying average weekly hours by 52 weeks), males played 269 more hours per year than females each year of middle school, 311 more hours per year each year of high school, and 225 more hours per year each year of college. Chi Square analysis confirmed significant gender differences, $\chi^2(4, N=275)=60.86$, $p<.001$. Hypothesis 1 is supported.

Hypothesis 2: The amount of time individuals spend playing games changes from childhood through young adulthood. When comparing how much undergraduates played games when they were in middle school, high school, and currently in college, gaming is highest in middle school, and declines overtime to the least amount of time in college, for both males and females.

Do college students recall middle school as the time when they played the most games, and college the least? Examining trends over time (Table 2), both female and male undergraduate respondents recalled playing the most hours per week in middle school, less in high school, and the least in college. Undergraduates' average reported playing time declined from the most hours in middle school to the fewest hours in college. That same repeated measures MANOVA reported earlier in relation to Hypothesis 1 also showed a significance within subjects main effect for life stage ($F(2, 268)=36.83$, $p<.001$, $\eta^2=.216$). There was a small, but significant interaction effect between gender and life stage ($F(1, 0, 133)=9.19$, $p<.001$, $\eta^2=.064$). The two loci of the gender X life stage interaction were the absence of a significant reduction in gaming for males between middle and high school, and a consistently large standard deviation for males (always between 5.3 and 5.5 h) compared to a smaller and steadily declining standard deviation among females (the SD for females dropped from a high of 3.49 for girls in middle school to a low of 1.98 in

college). Most college females gamed very little. Females in particular followed the hypothesized pattern of progressively less time spent gaming. On average females played 2.85 h per week in middle school ($SD=3.49$), 1.68 h in high school ($SD=2.96$), and almost 1 h in college ($SD=1.93$). Among males, middle school and high school playing time was not significantly different, varying between 8.02 ($SD=5.50$) and 7.67 ($SD=5.53$) hours per week. Between high school and college, male time spent with games dropped to 5.3 h per week ($SD=5.08$). Hypothesis 2 is partially supported.

Hypothesis 3: The choice of allocating leisure time to games is consistent over time: those who spend more time playing games in middle school will also spend more time playing in high school and college. Young gamers are more likely to grow up to be adult gamers.

Self reported game play hours per week in middle school, high school, and college are significantly correlated. College and high school game play have a correlation of .721, high school and middle school are correlated .814, and middle school and college have a weaker though still significant correlation, .558. All correlations are significant at $p<.001$. Table 3 reports average self reported weekly gaming hours for females and males in middle school, high school, and college, this time further divided by when respondents most recently played an electronic game. Repeated measures MANOVA was applied using life stage as the within subjects variable and gender and most recent game play as the independent, between subjects factors. The main effect for most recent game play was significant and had a substantial effect size ($F(4, 266)=51.98$, $p<.001$, $\eta^2=.44$). A small but significant interaction effect was observed for life stage and most recent gaming ($F(8, 532)=2.59$, $p=.009$, $\eta^2=.037$). Out of 12 comparisons (four for each of the three life stages), 11 of 12 female averages followed the expected order of those who have more

Table 3 How many hours do or did you play digital games in a typical week?*.

		Middle school	High school	Now (college)	No.
Female	Today (avid gamer)	5.23 (4.92)	4.00 (5.64)	3.92 (4.43)	12
	This week	4.13 (4.13)	2.76 (3.30)	2.07 (1.82)	33
	This month	3.14 (3.35)	2.28 (3.61)	1.15 (1.79)	29
	2–6 months	3.41 (3.73)	1.55 (2.04)	.48 (0.70)	42
	>6 months (non-gamer)	1.16 (1.54)	.37 (0.73)	.05 (0.20)	62
Male	Today (avid gamer)	10.51 (4.74)	11.21 (4.20)	8.94 (4.87)	34
	This week	7.35 (5.56)	6.00 (4.46)	4.53 (3.74)	17
	This month	6.17 (4.85)	6.00 (5.35)	2.64 (3.43)	18
	2–6 months	5.83 (5.65)	4.17 (5.64)	1.01 (2.48)	12
	>6 months (non-gamer)	1.00 (0.00)	1.00 (0.00)	1.67 (2.89)	3

The range for self-reported hours played per week was 0 to 15, with reports of playing more than 15 h recoded to a maximum of 15. Of college hours responses, 3.4%; 4.5% of high school; and 5.7% of middle school responses were greater than 15 h per week

*$p<.001$

recently played a game having spent more hours playing at other life stages, as did 10 of 12 male averages. The predominant pattern is consistent with Hypothesis 3.

Frequent gamers in college were also heavier gamers in high school and middle school. Infrequent game players in college likewise devoted less time to playing games when they were in middle school and high school. Time spent playing games in middle school is a good predictor of future game behavior. Time spent playing games in high school is an even better predictor of college gameplay time. Gaming as a leisure time choice appears to be a consistent leisure time preference, despite developmental changes in the individual and changes in the nature and content of available games. Hypothesis 3 is supported.

Hypothesis 4:   Male college students have more free time overall and their free time is available in larger chunks than female college students.

Female undergraduates reported smaller available chunks of free time, an average block size of 1 h and 21 min, compared to male undergraduates who on average had 1 h and 52 min blocks of free time (Table 4). Male undergraduates also had more days per week with at least some free time (4.8) than females (3.3). MANOVA showed a significant gender difference between days per week with any free time and available chunks of free time. ANOVAs comparing male and female means were significantly different at $p<.001$ for both leisure time availability measures. Hypothesis 4 is supported.

Hypothesis 5:   Time spent playing games is related to available free time. Male and female students with more available leisure time will spend more time playing games.

Avid gamers (college students who played a game on the day they completed the survey) had more free time than other students. This relationship was true for both male and female students, although female avid gamers had less free time than male avid gamers (7 h and 41 min per week compared to 12 h and 18 min). Non-gamer

Table 4 Estimated free time in a typical week*.

	Typical chunk size (hours:minutes)	Number of days per week with any free time	No.
Female	1:21	3.27	189
Male	1:52	4.76	84
Total	1:31	3.73	273

Days per week with any free time ranged from less than 1 day per week (coded as zero) through 7 days; chunk size ranged from 12.6 min to 3 h

*$p<.001$

Table 5 Multiple regression of gender and free time with current gaming hours.

Predictors	Standardized coefficient
Gender	.434*
Free time	.332*

*$p<.001$

females had the least free time (4 h and 15 min per week) and they experienced free time in the shortest chunks (on average, 1 h and 12 min). Among males, those who played a game the same day as the survey had the most free time and those who played sometime that week had the next most free time (12:18 and 9:58). Multiple regression was used to examine the relationship between gaming and gender, available free time, and four other activities associated with obligatory, non-leisure time (Table 5). Free time was constructed by multiplying respondents' typical duration of free time by the number of days per week when they have at least some free time. Both gender and free time were significant predictors of time spent gaming in college ($F(6, 266)=27.88$, $p<.001$, adjusted $R^2=.374$). Hypothesis 5 is supported.

Hypothesis 6a, 6b, 6c: Competing demands on students' time, such as (a) homework, (b) a paying job, and (c) maintaining a good GPA will result in less time devoted to game play.

H6a.   Both male and female avid gamers spent the least amount of time per week doing homework (9.3 and 8 h, respectively). However, time per week spent playing games was not significantly related to time spent on homework.

H6b.   Female undergraduates in our study spent 2.8 times more time per week working at a paying job than male undergraduates (23.76 h as compared to 8.61 h; $F(1, 264)=61.530$, $p<.001$). However, there was not a significant relationship between the number of hours spent working and game orientation. Those who most recently played "today" worked an average of 8.2 h per week, whereas those who had not played at all within the last 6 months worked an average of 25.6 h per week ($F(4, 264)=3.682$, $p=.006$).

H6c.   Neither time spent on homework nor time spent gaming were correlated with GPA overall, among males or among females ($R^2=.390$).

Hypothesis 6 is not supported.

Hypothesis 7:   Being involved in a romantic relationship will result in less time devoted to game play.

It was predicted that students would play games less often if they were in a romantic relationship because they would need to spend free time with their romantic partner, leaving less time for other leisure time activities like gaming. Female student respondents were much more likely to be in a relationship than male student respondents (54%, as compared to 36%). However, there was not a significant relationship between game orientation and relationship status. The small group of avid female gamers (those who had played the day of the survey) were least likely to be in a relationship (21% in a relationship). Avid male gamers, who had played the day of the survey, were twice as likely to be in a relationship as male students who had played the week of the survey (43% and 23% in a relationship, respectfully). But overall relationship status, based on the Regression Analysis reported in Table 5, relationship status is unrelated to game orientation. Hypothesis 7 is not supported.

Hypothesis 8a, 8b: (a) Lack of interest in currently available games will be associated with less time devoted to game play and (b) the prospect of more interesting games would motivate non-gamers in playing more.

Here we investigate the possibility that the reason games fail to attract non-gamer students is the nature of games, not the time orientation and demographics of potential student players. Non-gamers are expected to report less satisfaction with existing game titles, and to say they would play more if more interesting games were available. The scale for *ease of finding appealing games* ranged from 1= almost no appealing games to 5=almost all appealing games; the scale for *expectation of playing more if better games were available* ranged from 1=not true at all to 5=extremely true.

H8a. Students who had very recently played a game felt it was moderately easy to find appealing games ($M=3.0$, $SD=.8$). Those who had not played in the last 6 months reported more difficulty finding an appealing game ($M=1.7$, $SD=.8$). Two way ANOVA was conducted using ease of finding appealing games and the respondent's belief that if more appealing games existed, they would play more as dependent variables and gender and recency of gaming as independent variables. Ease of finding appealing games was associated with a significant main effect for gender ($F(1, 261)=36.65$, $p<.001$) and a significant main effect for recency of game play ($F(4, 261)=15.08$, $p<.001$). The interaction between gender and recent play was not significant. Respondents who had played a game more recently were more likely to say it was easy to find appealing games to play.

Gender was associated with ease (or lack of ease) of finding appealing games. Overall female students found games less attractive ($M=2.3$, $SD=.9$) than male students ($M=2.9$, $SD=.7$). Female and male undergraduates who had not played a game in the last 6 months reported the hardest time finding interesting games, for females ($M=1.7$, $SD=.8$) and for males ($M=2.3$, $SD=.6$). The male non-gamer statistic should be interpreted with caution because the sample size for non-gamer males was extremely small. Hypothesis 8a is supported.

H8b. Contrary to our predictions, those who already play the most games were the most likely to agree that they would play more if better games were available. ANOVA main effects for gender ($F(1, 261)=6.30$, $p<.013$) and recency of game play ($F(4, 261)=4.30$, $p<.020$) were significantly related to individuals' expectations that they would play more if better games were available. For female students, the average response was 2.41 ($SD=1.2$), while for male students the average was 2.84 ($SD=1.2$). The interaction between gender and game play recency was not significant. The gender difference was significant but not large. The level of enthusiasm for playing more games was lukewarm across respondents but in the opposite direction predicted.

Students with an avid gaming orientation (those who had recently played) were more likely to say they would play more if better games were available ($M=3.0$, $SD=1.3$), while non-gamers were less likely to anticipate an increase in their gaming if better games were available ($M=2.0$, $SD=1.1$). College-age individuals appear to have already established a general attitude towards gaming. Those who already play and enjoy games would be interested in playing even more with the availability of more interesting titles, while those who play very little would not be persuaded to play more because they do not consider gaming as an appealing leisure time activity in general. Hypothesis 8b is contradicted.

Hypothesis 9: When they do play, female undergraduates will play games for shorter blocks of time than male undergraduates.

Respondents were asked, when they play a digital game, about how long did they spend in a typical session. Possible response categories included no time, 15 min, 30 min, 1 h, 2 h, and 3 or more hours. Seventy-eight percent of female respondents' typical game play session was less than an hour, whereas only 24% of male respondents' typical gaming session was that short (Table 6). Most female undergraduates played for at most 30 min per session. Casual games are perhaps the only possible type of game

Table 6 Typical amount of time spent playing a game in a single sitting (in hours) by most recent game play and gender*.

	Game session duration (hours)						
	0:00	0:15	0:30	1:00	2:00	3:00	No.
Female	22.9%	28.2%	27.1%	16.0%	4.3%	1.6%	188
Male	2.4%	5.9%	15.3%	54.1%	15.3%	7.1%	85

*$p<.001$

that can be played in such a short period. Conversely, only 8% of male undergraduates played in bursts of less than half an hour. Only a handful of female gamers played for 2 or more hours per session (6%) compared to 22% of male gamers. Chi Square analysis confirmed significant gender differences, $c^2(5, N=275)=77.35$, $p<.001$. Hypothesis 9 is supported.

Discussion

This study provides the first research evidence of a relationship between leisure time availability and time spent playing digital games. Time allocated per session of game play is strikingly shorter among female than male undergraduates, with females typically devoting one half hour or less per play session and males typically devoting 1 h or more.

Previous research, in concurrence with our findings, found gender differences in the amount of video game playing among younger participants (Bickham et al. 2003; Rideout et al. 2005; Woodard and Gridina 2000; Wright et al. 2001) and college students (Ogletree and Drake 2007). However, previous studies have not compared gender differences of game play across different ages in life. The Kaiser Family Foundation Report described game play time between different age groups, but did not break down playing time at different ages by gender (Roberts et al. 2005). Examining time spent playing games by age shows individuals play varying amounts during different parts of their lives (Hypothesis 1; Hypothesis 2; Roberts et al. 2005). However, when investigating how much one plays in comparison to their peers, do individual play patterns or styles immerge? For example, although the actual amount of time one plays may fluctuate; do those who play the most games in middle school also play the most games in high school and college in comparison to their peers? Do play patterns or styles exist that explain game play over one's lifespan?

This study is a first attempt to look at gaming across middle school, high school, and college, revealing that a propensity to spend time playing games is consistent, though proportionately lower over time, between middle school, high school, and college. Female undergraduates have less leisure time, available in smaller chunks, than male undergraduates. Being in a relationship was unrelated to game play, as was GPA. Gaming was associated with

less time spent doing homework, but not with lower reported GPA.

Synthesis of Key Findings

Our study confirmed the well-known gender gap in gaming, verifying that this overall trend also occurs among college students. Seventy percent of male undergraduates had played a digital game the week of the survey, compared to only one quarter of the females. The majority of women fell in the category of non-gamers, those who had not played a game in over 6 months, or never. The goal of the study was not to add evidence in support of a gender gap in gaming. We wanted to explore some of the underlying causes and predictors of differences in gamer orientation.

Female undergraduates in our study spent significantly more time per week working at a paying job than male undergraduates, 2.8 times more. Women also reported spending more time on homework. Those who had played games "today," worked fewer hours per week than those who had not played at all within the last 6 months (8.2 h per week, compared to 25.6 h per week).

Since women reported spending 16 more h per week on obligatory activities (work + homework) than men, it follows that women would have less available time to dedicate to leisure activities. Male participants reported having more free time than female undergraduates. Men reported larger chunks of free time and more days per week with at least some free time. Comparing what can best be considered estimates of the minimum available free time, males reported having twice as much free time as women did, per week (8 h and 53 min versus 4 h and 25 min per week).

Gender and gaming behavior were significantly related to the amount of free time one had available and the size of their blocks of time. Students with less free time were less likely to spend time playing games.

Our findings suggest that one reason women play fewer games than men is because they are required to fulfill more obligatory activities, leaving them less available leisure time, which in turn makes them less likely to "make" time for games. Therefore, how one's time is divided between responsibilities and "free" time is a predictor of their game behavior.

Regardless of the amount of time, or leisure time, that one might have available, if they "make" time to game at an

early age, players will likely continue to do so. When looking at gamer orientation across time, individuals were fairly consistent in their game playing in comparison with their peers' gaming. Across as much of the lifespan as we measured, avid gamers consistently played more than their peers. Those who play the most games now in college, were also the most frequent gamers in high school and middle school. Those classified as non-gamers in college were also likely to be non-gamers in high school and middle school. In our study time spent playing games at younger ages is a good predictor of future play.

Looking at gender and game play behavior over time, males played significantly more than females at all three stages in life. Males played 266 more hours per year each year of middle school, 305 more hours per year each year of high school, and 225 more hours per year in college.

Females played more games when they were younger than they do in college (yet less than their male counterparts). When comparing playing time in middle school, high school, and college, undergraduate women played more in high school than in college and more in middle school than in high school.

Looking across the study results, time stress and the perception of limited leisure time is linked to gender, even during college before adult gender roles are fully enacted. Shorter chunks of leisure time, more time spent on homework, less game play and shorter game play sessions, even beyond actual time limitations, characterize female undergraduates. Almost all of these gender differences were highly significant and large.

Directions for Future Research

Our study looked at (1) free time and time pressure as well as (2) current and past time spent playing digital games in relation to both gender and gaming orientation. We studied college students, so data was collected about the present and recent childhood, which included middle school and high school.

For males, days per week with some free time dropped from 6.4 days in middle school to 5.2 days in high school to 4.8 days in college. For females, days with free time followed the same overall pattern, but females had less free time than males did in each phase of childhood. College females recalled having an average of 5.6 days per week with some free time in middle school, 3.9 days in high school, and 3.3 days in college. Time spent playing digital games closely paralleled free time, with males having more free time and playing more games in each of the three life stages than females, but with both genders finding less free time and spending less time gaming as they got older.

Looking past college, we might anticipate even lower gaming time for females as they start families and enter the workforce. Today's avid, female casual gamers do not have a childhood history of digital game play. In fact, the appeal of casual games appears to increase in midlife. Data from the Popcap survey (Information Solutions Group 2006) showed women 50 and older devoting more time to casual games than women in their 40s, who devoted more time than women under 40. Free time is greatest for young children, drops steadily through early adulthood, and perhaps gradually increases later in life. Gaming seems to follow that same pattern. Even when they eventually have more time, it appears that women are still drawn to casual games, playable in short chunks of time, rather than games which require tens of hours to learn and many hours to play. Casual gaming by adults should be studied in relation to available time and the duration of free time chunks.

Also, since college game play is strongly related to high school game play which is strongly related to middle school game play, it would be interesting to discover the precursors to casual gaming among mature adults, who did not grow up with digital games. Were avid casual gamers also avid board game or card game players when they were younger?

Research should be conducted with this player segment to understand how gaming fits into their lives and interests. When today's female college students are 40 or 50, will those who grew up with digital games, spend even more time playing? Games and gaming behaviors are still rapidly changing and need to be studied and reported with attention to when in the evolution of games and society each study is conducted.

Although 20 members of the game industry converged on a definition of the broad concept of casual games as "web and downloadable" when they co-wrote the 2005 IGDA Casual games whitepaper, this distinction was based on distribution mechanism, and not the game genre or content. Players do not necessarily use or even understand the term "casual games." The biggest defining factor of a casual game is to be playable within a short time period. The current study asked about typical duration of a digital game session. Future research should attempt to further define and measure the construct of casual gaming.

Directions for Future Game Design: Less is More

Common sense explanations of casual game play among women 35 and older claim women have less free time, available in smaller chunks. Therefore casual games are well suited to the leisure time constraints of older women. The current study clearly shows that it is not just older women, but indeed even undergraduate college females, who play in blocks of half an hour or less. Games that want to attract larger numbers of female players need to dramatically change game designer expectations of how

long a player will or should spend in a typical play session. A female player who knows she can spend as little as 10, 15, 20, or 30 min can more easily justify spending her time with a game. Quite likely it is useful to be able to know and control exactly when the play session will end, to facilitate time management and to permit temporary concentration on the gaming experience without the worry of being sure to stop on time. More time in a play session is not better, for the typical adult female player.

References

AAUW. American Association of University Women Educational Foundation Commission on Technology, Gender, and Teacher Education (1992). *How schools shortchange girls*. Washington, DC: American Association of University Women Educational Foundation.

AAUW. American Association of University Women Educational Foundation Commission on Technology, Gender, and Teacher Education (1998). *Gender gaps: where schools still fail our children*. Washington, DC: American Association of University Women Educational Foundation.

AAUW. American Association of University Women Educational Foundation Commission on Technology, Gender, and Teacher Education (2000). *Tech-savvy: educating girls in the new computer age*. Washington, DC: American Association of University Women Educational Foundation.

AAUW. American Association of University Women Educational Foundation Commission on Technology, Gender, and Teacher Education (2008). *Women's educational gains and the gender earnings gap*. Washington, DC: American Association of University Women Educational Foundation.

Aguiar, M. & Hurst, E. (2006, January). Measuring trends in leisure: The allocation of time over five decades. Working Papers, 06-2. Boston: Federal Reserve Bank of Boston. Retrieved August 2, 2006, from http://www.bos.frb.org/economic/wp/wp2006/wp0602.pdf.

Apt, N. A., & Grieco, M. (1998). Managing the time: Gender participation in education and the benefits of distance education information technologies. The Change Page: Participative Approaches to Development Management. *Ghaclad Conference on Computer Literacy and Distance Education*. Accra, Ghana. Retrieved March 28, 2006, from http://www.geocities.com/margaret_grieco/elecedu/asynchro.html.

Beyond Barbie and Mortal Kombat: New perspectives on gender, games, and computing workshop. (2006, May 8). Sponsored by the National Science Foundation. Los Angeles.

Bickham, D. S., Vandewater, E. A., Huston, A. C., Lee, J. H., Caplovitz, A. G., & Wright, J. C. (2003). Predictors of children's electronic media use: an examination of three ethnic groups. *Media Psychology, 5*, 107–137.

Brunner, C., Bennett, D., & Honey, M. (1998). Girl games and technological desire. In J. Cassell, & H. Jenkins (Eds.), *From Barbie to Mortal Kombat: Gender and computer games* (pp. 72–79). Cambridge: MIT.

Cassell, J., & Jenkins, H. (1998). Chess for girls? Feminism and computer games. In J. Cassell, & H. Jenkins (Eds.), *From Barbie to Mortal Kombat: Gender and computer games* (pp. 2–45). Cambridge: MIT.

ESA. Entertainment Software Association. (2006a). *Top 10 industry facts*. Facts and Research. Retrieved July 24, 2006, from http://www.theesa.com/facts/top_10_facts.php.

ESA. Entertainment Software Association. (2006b). *2006 Sales, demographic and usage data: Essential facts about the computer and video game industry*. Retrieved July 26, 2006, from http://www.theesa.com/archives/files/Essential%20Facts%202006.pdf.

Floro, M. S. (1999, October). Whose work and whose leisure? Time use and overlapping activities of men and women. *The Gender CG Newsletter, 5*(2). Retrieved March 28, 2006, from http://www.ifpri.org/themes/mp17/gender/news5-2/news52e.htm.

Flynn, J. R. (1994). IQ gains over time. In R.J. Sternberg (Ed.), *Encyclopedia of human intelligence* (pp. 617–623). New York: Macmillan.

Girls 'n' Games Conference. (2006, May 9). Sponsored by the National Science Foundation. Los Angeles.

Gourdin, A. (2005, October). Game Developer Demographics: An Exploration of Workforce Diversity. Washington, DC: *International Game Developers Association (IGDA)*. Retrieved June 8, 2006, from http://www.igda.org/diversity/report.php.

Greenfield, P. M. (1984). *Mind and media: the effects of television, video games, and computers*. Cambridge: Harvard University Press.

Greenfield, P. M. (1998). The cultural evolution of IQ. In U. Neisser (Ed.), *The rising curve: long-term gains in IQ and related measures*. Washington, DC: American Psychological Association.

Greenfield, P. M., & Cocking, R. (Eds.). (1996). *Interacting with Video*. Greenwich, CT: Ablex Publishing Corporation.

Greenfield, P. M., Camaioni, L. E., Ercolani, P., Weiss, L., Lauber, B. A., & Perrucchini, P. (1994). Cognitive socialization by computer games in two cultures: inductive discovery or mastery of an iconic code? Special issue: effects of interactive entertainment technologies on development. *Journal of Applied Developmental Psychology, 15*, 59–85.

Howe, N., & Strauss, W. (2000). *Millennials rising: The next great generation*. New York: Vintage Books.

Huston, A. C., Wright, J. C., Marquis, J., & Green, S. B. (1999). How young children spend their time: television & other activities. *Developmental Psychology, 35*, 912–925.

IGDA. International Game Developers Association. (2005). *2005 Casual games white paper*. IGDA Casual Games SIG. Retrieved July 24, 2006, from http://www.igda.org/casual/IGDA_CasualGames_Whitepaper_2005.pdf.

IGDA. International Game Developers Association. (2006). *2006 Casual games white paper*. IGDA Casual Games SIG. Retrieved July 24, 2006, from http://www.igda.org/casual/IGDA_CasualGames_Whitepaper_2006.pdf.

Information Solutions Group. (2006). *Press release: Women choose "casual" videogames over TV; 100 million+ women now play regularly, for different reasons than men*. Seattle, Washington. Retrieved April 14, 2008, from http://www.infosolutionsgroup.com/press_release_A.htm.

Katz, P. A., & Boswell, S. (1984). Sex-role development and the one-child family. In T. Falboa (Ed.), *The single-child family* (pp. 63–116). New York: Guilford.

Kiesler, S., Sproull, L., & Eccles, J. (1985). Poolhalls, chips, and war games: women in the culture of computing. *Psychology of Women Quarterly, 4*, 451–462.

Larson, R. W., & Verma, S. (1999). How children and adolescents spend time across the world: work, play, and developmental opportunities. *Psychological Bulletin, 125*, 701–736.

Levison, D., Moe, K. S., & Knaul, F. M. (2001). Youth education and work in Mexico. *World Development, 29*, 167–188.

Loftus, G. R., & Loftus, E. F. (1983). *Mind at Play*. New York: Basic Books.

Margolis, J., Fisher, A., & Miller, F. (2000, Spring/Summer). The Anatomy of Interest: Women in Undergraduate Computer Science. *Women's Studies Quarterly*.

Mattingly, M. J., & Bianchi, S. M. (2003). Gender differences in the quantity and quality of free time: The U.S. experience. *Social*

Forces, 81, 999–1030. Retrieved March 28, 2006 from http://www.cfs.purdue.edu/pages/news_events/documents/Kanter_04-winner.pdf.

Mauldin, T., & Meeks, C. (1990). Sex differences in children's time use [Electronic version]. *Sex Roles: A Journal of Research, 22*, 537–554.

Moser, C. (2005). *What is gender analysis?* (Gender Roles). Sub-Regional Office for South-East Asia and the Pacific, International Labour Organization. Retrieved March 28, 2006, from http://www.ilo.org/public/english/region/asro/manila/gender/modwga.htm.

NCWIT. National Center for Women & Information Technology. (2007). *NCWIT Scorecard 2007: A report on the status of women in information technology.* Boulder, CO: National Center for Women & Information Technology. Retrieved September 15, 2008, from http://www.ncwit.org/pdf/2007_Scorecard_Web.pdf.

Nir, A. E. (1999). Time perspectives of strategic planning processes and plans as a function of gender and echelon socialization [Electronic version]. *Sex Roles: A Journal of Research, 41*, 737–752.

Ogletree, S. M., & Drake, R. (2007). College students' video game participation and perceptions: Gender differences and implications [Electronic version]. *Sex Roles: A Journal of Research, 56*, 537–542.

Okagaki, L., & Frensch, P. A. (1994). Effects of video game playing on measures of spatial performance: Gender effects in late adolescence. Special issue: Effects of interactive entertainment technologies on development. *Journal of Applied Developmental Psychology, 15*, 33–58.

Prensky, M. (2001). *Digital game-based learning.* New York: McGraw-Hill.

Renk, K., Rex, R., Roddenberry, A., Luick, M., Hillhouse, S., Meehan, C., et al. (2003). Mothers, fathers, gender role, and time parents spend with their children [Electronic version]. *Sex Roles: A Journal of Research, 48*, 305–315.

Rideout, V., Roberts, D. F., & Foehr, U. G. (2005). *Generation M: Media in the lives of 8–18 year-olds [executive summary].* Retrieved September 15, 2008, from http://www.kff.org/entmedia/upload/Executive-Summary-Generation-M-Media-in-the-Lives-of-8-18-Year-olds.pdf.

Ritchie, A., Lloyd, C. B., & Grant, M. (2004). Gender differences in time use among adolescents in developing countries: Implications of rising school enrollment rates. *Policy Research Division Working Paper, 193.* New York: Population Council. Retrieved April 4, 2006, from http://www.popcouncil.org/pdfs/wp/193.pdf.

Roberts, D. F., Foehr, U. G., & Rideout, V. (2005, March). *Generation M: Media in the lives of 8–18 year-olds. Kaiser Family Foundation Study.* Retrieved April 23, 2006, from http://www.kff.org/entmedia/upload/Generation-M-Media-in-the-Lives-of-8-18-Year-olds-Report.pdf.

Shin, N. (2004). Exploring pathways from television viewing to academic achievement in school age children. *Journal of Genetic Psychology, 165*, 367–381.

Sidener, J. (2005). New gender roles in digital world. Technology: Gadget Gap. *The San Diego Union-Tribune.* Retrieved March 28, 2006, from http://www.signonsandiego.com/uniontrib/20050110/news_mz1b10gap.html, January 10.

Smith, T. E. (1997). Adolescent gender differences in time alone and time devoted to conversation. *Adolescence, 32*, 483–496. Retrieved April 4, 2006, from http://www.findarticles.com/p/articles/mi_m2248/is_n126_v32/ai_19619429.

Subrahmanyam, K., & Greenfield, P. M. (1994). Effects of video game practice on spatial skills in girls and boys. Special issue: effects of interactive entertainment technologies on development. *Journal of Applied Developmental Psychology, 15*, 13–32.

Subrahmanyam, K., Kraut, R., Greenfield, P., & Gross, E. (2000). The impact of home computer use on children's activities and development. *The Future of Children and Computer Technology, 10*, 123–144.

The College Board. (2007). *Advanced Placement Report to the Nation 2007.* Retrieved September 15, 2008, from http://www.collegeboard.com/prod_downloads/about/news_info/ap/2007/2007_ap-report-nation.pdf.

Woodard, E. H., & Gridina, N. (2000). *Media in the home 2000: The fifth annual survey of parents and children.* Philadelphia: University of Pennsylvania, The Annenberg Public Policy Center. Retrieved September 15, 2008, from http://www.annenbergpublicpolicycenter.org/Downloads/Media_and_Developing_Child/mediasurvey/survey7.pdf.

Wright, J. C., Huston, A. C., Vandewater, E. A., Bickham, D. S., Scantlin, R. M., Kotler, J. A., et al. (2001). American children's use of electronic media in 1997: a national survey. *Journal of Applied Developmental Psychology, 22*, 31–47.

Yee, N. (2006). The demographics, motivations and derived experiences of users of massively-multiuser online graphical environments. *PRESENCE: Teleoperators and Virtual Environments, 15*, 309–329. Retrieved July 26, 2006, from http://www.nickyee.com/pubs/Yee%20-%20MMORPG%20Demographics%202006.pdf.

Zick, C., & McCullough, J. (1991). Trends in married couples' time use: evidence from 1977–78 and 1987–88 [Electronic version]. *Sex Roles: A Journal of Research, 24*, 459–487.