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Factors Correlated with Violent Video Game Use by Adolescent Boys and Girls

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Abstract

Purpose: To compare the video and computer game play patterns of young adolescent boys and girls, including factors correlated with playing violent games.

Methods: Data collected in November/December, 2004 from children in grades 7 and 8 at two demographically diverse schools in Pennsylvania and South Carolina, using a detailed written self-reported survey.

Results: Of 1254 participants (53% female, 47% male), only 80 reported playing no electronic games in the previous 6 months. Of 1126 children who listed frequently played game titles, almost half (48.8%) played at least one violent (mature-rated) game regularly (67.9% of boys and 29.2% of girls). One third of boys and 10.7% of girls play games nearly every day; only 1 in 20 plays often or always with a parent. Playing M-rated games is positively correlated ($p < .001$) with being male, frequent game play, playing with strangers over the Internet, having a game system and computer in one's bedroom, and using games to manage anger.

Conclusions: Most young adolescent boys and many girls routinely play M-rated games. Implications for identifying atypical and potentially harmful patterns of electronic game use are discussed, as well as the need for greater media literacy among parents. © 2007 Society for Adolescent Medicine. All rights reserved.

Keywords: Adolescent; Video games; Media violence; Survey

Concerns about violent media have been rising on the national agenda, particularly children's exposure to violence in video and computer games. In 2005, legislators in 20 states and the District of Columbia put forth at least one bill to protect minors from various specific violent and/or sexual content in interactive games. Illinois, Michigan, and California passed laws to ban the sale and rental of violent games to children under 18. In all three cases, U.S. District Court judges blocked enforcement of these laws [1]. Despite these rulings, more policies to regulate game access are under consideration, including the federal Family Entertainment Protection Act (S.2126), which would prohibit sales and rentals to children of those games rated M (mature) by the industry-sponsored Entertainment Software Rating Board. Use of M-rated games is of concern because they include content not intended for children under 17. Major retailers (which account for roughly 80% of video and computer game sales) have policies against the sale of M-rated games to children [2].

Dozens of studies have been published about the effects of electronic interactive games on children and adolescents, with most focusing on potential negative consequences of

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game play [3]. Some reviews of research on violent video games conclude that more study is needed [4,5], that effects are small or mixed [6], or that subgroups of children may be at higher risk [7]; others assert that the weight of the evidence supports a large and consistent effect of violent games on aggressive thoughts, feelings, and behaviors, and that repeated, widespread exposure of young people to violent games could have major societal consequences [8].

A firmer foundation is needed to help clinicians, policymakers, and parents identify combinations of game content, children's characteristics, and game play environments that may promote aggressive behavior, increase fear, or desensitize children to violence. An important first step is identifying atypical play patterns and potential markers of greater risk for aggressive behavior or other psychological or behavioral problems. Such patterns likely differ for boys and girls. Studies of young adolescents are particularly needed because (1) their activities are less subject to adult oversight than those of younger children, (2) they may be more vulnerable to the influence of violent content during this stage of cognitive, emotional, social and neurological development [9,10], and (3) limiting young adolescents' access to mature game content is the goal of many policy proposals.

Only a few recent studies have examined how interactive game use varies by violent content, amount of exposure, play environment, or child characteristics. A Swiss survey [11] of a national sample of 4222 7th and 8th graders found that more hours per week of television and video game play were correlated with several aggressive behaviors and with feeling unsafe at school, but results varied for boys and girls. The content of children's games was not assessed. A U.S. survey of 607 8th and 9th grade students [12] attempted to assess content exposure, but relied on children's own definitions of violent content and of the level of violence in their "three favorite games." The sample was limited to classrooms of students volunteered by their teachers, who also administered the survey.

Most recently, the Kaiser Family Foundation conducted a national media use survey of 2032 children in grades 3 to 12 (about 20% of subjects attended grade 7 or 8) [13]. Young adolescents reported spending an average of 17 minutes per day on computer games, 32 minutes on console games, and 20 minutes on handheld games. Game content was addressed by a single question on whether children had ever played one of four popular video games.

The purpose of this study was to survey a diverse sample of young adolescents to fill these gaps and begin to identify risk markers associated with electronic game play, particularly violent games.

Methods

In the fall of 2004, we surveyed 7th and 8th grade students during English/Language Arts class periods at two middle schools in Pennsylvania and South Carolina. Class sizes ranged from 6 to 31 students, with a median size of 23. All students in attendance on the day of the survey were asked to participate, with the exception of classrooms of students who had significantly limited English skills or physical, emotional, or intellectual limitations that prevented them from completing surveys (as determined in advance by school administrators). We sought study sites that would provide socioeconomic, racial/ethnic, and geographic diversity, with principals and teachers willing to give up class time in the interests of research. At the suburban Pennsylvania school, the student population was 90% white, 4% black, 4% Asian, and 1% Hispanic; median household income in that county for 2003 was $60,700. At the urban South Carolina school, the student body was 50% white, 43% black, 5% Hispanic, and 2% Asian; 2003 median household income in that city was $40,600.

The self-administered questionnaire created for this study included questions on access to electronic games, game preferences and exposure, and context of and motivations for game use. We defined electronic games as "computer games, video games (Xbox, PlayStation, GameCube, etc.) and handheld games (Game Boy, etc.)." Thirty-one children at a Boston-area youth club pilot-tested the survey.

Parents received notice of the student survey via school newsletters and information packets sent home in student backpacks. Packets included a description of the survey and contact information for study staff, so that parents could ask questions or request that their child not participate. The Partners HealthCare System human research committee approved all study procedures and materials.

On the survey date, in each participating classroom, a researcher read an assent form explaining the goals, procedures, and voluntary nature of the study. To preserve student privacy, surveys were distributed and collected in each classroom by a member of the study team, with no teacher involvement. No list of names or identifying information was created. Schools received aggregate results of their students' responses to the questions regarding media use.

Statistical analyses

Frequencies and percentages (both absolute and relative) accompanied by Pearson correlation coefficients were used to assess relations between pairs of continuous measures. We first tested for any interactions between school and the various predictor variables. In all cases, the interactions were not significant at $p > .05$. School was not a significant moderating variable in any of the logistic regressions. Differences in categorical variables were assessed by odds ratios (ORs) generated by logistic regression (99% confidence intervals [CIs]) or by contingency table analysis tests using chi-square. We used logistic regression and ORs when examining the prediction of a dichotomous dependent variable from one or more dichotomous independent variables

(i.e., when some directionality of effect was suggested). We used the phi correlation coefficient when we were examining the relationship between pairs of dichotomous variables in which no directionality of effect was assumed.

All statistical analyses were computed using the SPSS statistical package. To minimize Type I errors due to the large sample size, analyses were tested at the $p < .001$ level (exceptions noted). All reported significance levels are two-tailed.

Results

A total of 1254 students completed the survey; participation was considered evidence of assent. More than 98% of respondents were aged 12 to 14; the sample was 53% female and 47% male. Virtually all 7th and 8th grade students in attendance on the day of the survey, including students in some special-needs classrooms, took part in the study; 88% of enrolled students in Pennsylvania and 79% of enrolled students in South Carolina completed surveys. One parent directly requested that his child be excluded; several other children who reported parent concerns about the study or had just enrolled in the school were not surveyed.

Children's game exposure and preferences

Only 17 children (1.4%) reported that they had never played video or computer games. Another 63 children indicated that they had not played any games during the 6 months prior to the survey. These students were excluded from the analyses below.

To assess violent content exposure, children were asked to "list five games that you have played a lot in the past 6 months." A total of 1126 children listed at least one game title. We treated any game listings that could not be classified into a game series (e.g., "driving game" "cell phone games," or "game cube") as missing data. Titles of commercially available electronic games were entered into a database and matched with the age-based ratings assigned to them by the Entertainment Software Rating Board. Children wrote down a total of 2534 game names that matched a single available ESRB-rated title; 20.5% were rated M; 21.3% were rated T-Teen (ages 13 and older), and 58.2% were rated E — Everyone (ages 6 and older).

Ratings and descriptors occasionally vary within game series or even game titles, most often due to differences in the game play platform, i.e., the handheld version may have milder content than the console versions. While 84.3% of boys and 72.7% of girls reported having played games on at least two of three device types (computer, console, handheld), they were not asked to name the play platform for each game they listed. Children listed an additional 2496 identifiable game titles (or series titles) that had cross-platform rating variability and/or ratings that varied among different games in that series. In these cases, a rating was assigned to the game based on the least violent version of the game available across platforms, or within the game series, during the previous 2 years. (Games in the following series were rated either T or M by the ESRB: *Dead or Alive, Def Jam, Doom, Driver, Mortal Kombat, No One Lives Forever, Quake, Resident Evil,* and *Tom Clancy*. *Prince of Persia* games were rated E, T, or M.)

We collapsed titles from series with similar content and mode of play (e.g., *The Sims*, *NCAA* sports games) into single categories for analysis. The resulting list comprised roughly 500 unique titles of games or game series. Over half of these were listed by no more than one child; 119 were listed by 5 or more children. Tables 1 and 2 list the most popular games or game series for boys and girls, along with the age-based ratings and content descriptors. (In the case of game series, the table lists descriptors for the most recent game in that series as of October 2004.)

Exposure to M-rated games

In our sample, 48.8% of children had at least one M-rated title on their "five most played" list (67.9% for boys, 29.2% for girls), with no pattern by age level. Boys were more likely than girls to play at least one M-rated game (OR = 5.1, CI = 4.0–6.7). Ten percent of children played predom-

Table 1
Game popularity: Frequency (%) of five games played most often by boys

Game rank	Game/Series (ESRB rating)	No. boys listing 1 or more in that series (%)	ESRB content descriptors
1	Grand Theft Auto (M)	242 (44%)	Blood and gore, Intense violence, Strong language, Strong sexual content, Use of drugs
2	Madden (football) (E)	189 (34%)	No descriptors
3	Halo (M)	154 (28%)	Blood and gore, Violence
4	NBA (E)	111 (20%)	No descriptors
5	Tony Hawk (skateboard) (T)	90 (16%)	Blood, Crude humor, Language, Suggestive themes, Use of alcohol, Violence
6	NCAA (E)	85 (16%)	No descriptors
7	Need for Speed (racing) (E or T)	76 (14%)	Mild language, Suggestive
8	ESPN (E)	56 (10%)	No descriptors
9	Medal of Honor (T)	40 (7%)	Violence
10	Lord of the Rings (T)	28 (5%)	Violence

Table 2
Game popularity: Frequency (%) of five games played most often by girls

Game rank	Game/Series	No. girls listing 1 or more in that series (%)	ESRB content descriptors
1	The Sims (T)	177 (32%)	Crude humor, Sexual themes, Violence
2	Grand Theft Auto (M)	112 (20%)	Blood and gore, Intense violence, Strong language, Strong sexual content, Use of drugs
3	Super Mario (E)	73 (13%)	No descriptors
4	Solitaire (E)	63 (11%)	No descriptors
5	Tycoon games (E)	69 (12%)	Comic mischief, mild violence
6	Mario games (unspecified) (E)	64 (11%)	No descriptors or mild cartoon violence
7	Tony Hawk (skateboard) (T)	57 (10%)	Blood, Crude humor, Language, Suggestive themes, Use of alcohol, Violence
8	Dance Dance Revolution (E)	55 (10%)	Lyrics, suggestive themes
9	Mario Kart (racing) (E)	53 (10%)	Mild cartoon violence
10	Frogger (E)	45 (8%)	No descriptors

inantly M-rated games (i.e., at least half of the games they listed were rated M). The top five M-rated game series (based on the number of children who had at least one game in that series on their five-most-played list) were: *Grand Theft Auto* (listed by 359 children), *Halo* (185), *Def Jam* (52), *True Crime* (37), and *Driver* (34). The mean number of M-rated games played did not differ significantly by school.

Table 3 presents the phi correlations between a variety of dichotomous demographic and video game playing characteristics. The relationships between these and other variables are discussed in more detail below.

Time Spent with Electronic Games

Respondents estimated how much time they usually spend playing electronic games, in categories of hours and days per week. One third of girls (32.1%) played for less than 1 hour per week. Nearly two thirds of girls (64.0%) played for 2 hours or less, and 14.4% played for 6+ hours per week. Boys spent much more time on electronic games. Only 8.4% of boys played for less than 1 hour per week, and 28.1% for 2 hours or less; 44.6% of boys played 6+ hours per week. Boys were ten times as likely as girls to play 15+ hours per week (12.6% vs. 1.5%) (OR = 10.12, CI = 3.8–26.9). The two middle schools did not differ significantly in the percentage of students playing 15+ hours per week (p = .13) or 6 to 7 days per week (p = .41).

Figure 1 shows the number of days per week children played electronic games. One third of boys (33.4%), compared to 10.7% of girls, reported that they typically played games almost every day (6 or 7 days a week) (OR = 3.7, CI = 2.7–5.0); 8.8% of boys and 23.0% of girls reported playing only 1 day per week.

Many children who played electronic games typically did so only on weekends (37.8% of boys and 43.5% of girls). Children who listed any M-rated games were more likely to play 15 hours or more per week (11.2% vs. 2.9%) (OR = 4.1, CI = 1.9–8.6) and to play almost every day (33.4% vs. 13.5%) (OR = 3.2, CI = 2.2–4.8) than children who listed no M-rated games.

Access to games

Many children report having electronic games and other media in their bedrooms, where play is presumably less

Table 3
Correlations among demographic and video game playing characteristics

	M-rated	Bedroom	Alone	Parent	Plays 1 friend	Many friends	Strangers on net	Plays 6–7 days	Plays 15+ hrs
Male gender	.39[a]	.16[a]	.19[a]	.01	.26[a]	.31[a]	.13[a]	.26[a]	.22[a]
M-rated game player (at least 1)	1	.17[a]	.03	.01	.20[a]	.25[a]	.14[a]	.23[a]	.16[a]
TV, console, and computer in bedroom		1	.10	.07	.15[a]	.15[a]	.08	.14[a]	.12[a]
Plays games alone			1	.12[a]	.25[a]	.14[a]	.15[a]	.30[a]	.20[a]
Plays games with parent				1	.19[a]	.19[a]	.09	.10	.05
Plays with 1 friend in same room					1	.65[a]	.18[a]	.23[a]	.15[a]
Plays w/many friends in room						1	.20[a]	.24[a]	.15[a]
Plays with strangers on the Internet							1	.25[a]	.24[a]
Plays almost every day								1	.42[a]
Plays 15+ hours per week									1

"M-rated game players": at least one M-rated game on child's list of 5 games "played a lot in the past 6 months."
Responses related to game play companions were dichotomized as "never or rarely" vs. "sometimes, often or always."
[a] $p < .001$ (n = 1094–1137).

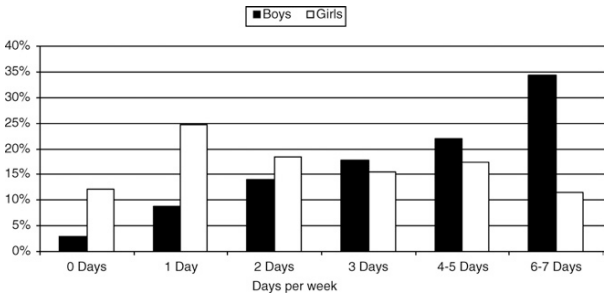

Figure 1. Frequency of electronic game play in days per week, by gender, among 7th and 8th grade students who had played games within the previous 6 months (n = 1137).

subject to supervision by parents: 67.2% of children reported a television, 31.0% a computer, and 46.2% a video game console. We found that 18.2% of children had a computer, game console and television in their bedroom. These children were more than twice as likely to play 15+ hours per week (OR = 2.5, CI = 1.6–4.2) and to play M-rated games (OR = 2.4, CI = 1.7–3.2).

Game play companions

We asked children how often they played games alone, and with various types of companions. Few boys (5.1%) or girls (6.0%) reported playing electronic games "often" or "always" with a parent, step-parent, or foster parent; 79.5% of boys and 77.8% of girls played with parents "rarely" or "never."

Boys were more likely than girls to play often or always by themselves (62.8% vs. 45.6%) but also to often/always play with multiple friends in the same room (33.4% vs. 12.5%). Children who reported playing M-rated games were more than twice as likely as children who listed no M-rated games to play often or always with multiple friends in the same room (31.8% vs. 16.0%) (OR = 2.4, CI = 1.8–3.4) and to play with older siblings (21.5% vs. 11.6%) (OR = 2.10, CI = 1.34–3.27).

Regarding online game play, 11.4% of boys and 12.2% of girls played often or always with friends over the Internet; however, boys were twice as likely as girls to play with strangers over the Internet (9.8% vs. 4.9%) (OR = 2.23, CI = 1.2–4.1). M-rated gamers were more likely to play with friends (13.9% vs. 10.7%) (OR = 1.28, CI = 1.02–1.59, $p = .004$) and with strangers (10.7% vs. 4.1%) (OR = 1.67, CI = 1.29–2.16) over the Internet.

Children's reasons for playing video games

Figure 2 displays the percentage of students responding "somewhat agree" or "strongly agree" (on a four-point scale) to the question, "I play electronic games because . . .." Children were offered 17 possible reasons for play. (A write-in option attracted few responses.) The top five reasons cited by boys were "it's just fun" (97.3%), "it's exciting" (88.3%), "it's something to do when I'm bored" (87.9%), "I like the challenge of figuring the game out" (86.9%), and "I like to compete with other people and win" (84.4%). For girls, the most common motivations for play were "it's just fun" (92.4%), "it's something to do when I'm bored" (90.2%), "I like the challenge of figuring the game out" (71.8%), "it's exciting" (71.3%), and "there is nothing else to do" (68.3%).

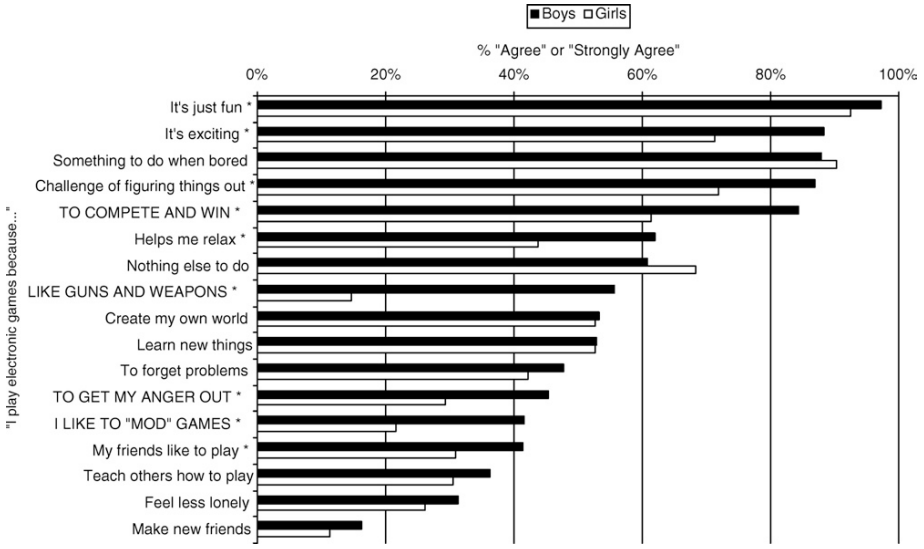

Figure 2. Reasons for playing video games for boys and girls. Agreement percentages for questions followed by asterisk (*) significantly larger for males at $p < .001$ by Fisher's Exact Test. Agreement percentages for questions in all capitals significantly larger for M-rated game players at $p < .001$ by Fisher's Exact Test. (n = 1137).

Over half of children endorsed creative reasons for play, such as "I like to create my own world" and "I like to learn new things." Many children seem to use games to manage their emotions, particularly boys; 61.9% of boys played to "help me relax," 47.8% because "it helps me forget my problems," and 45.4% because "it helps me get my anger out."

As noted in Figure 2, four reasons for play were endorsed significantly more often by M-rated gamers: to compete and win (81.4%), to get anger out (43.2%), liking "to 'mod' games (change the game using computer code)" (38.5%), and liking "the guns and other weapons" (52.1%). These differences existed in both genders, and across both schools.

Discussion

This study describes patterns and correlates of M-rated electronic game use in a sample of middle-school boys and girls, and highlights aspects that could serve as markers of risk for behavioral or psychological problems.

We found that playing M-rated games is common among children aged 12 to 14. Although 44% of boys and 20% of girls had played one or more games in the intensely violent, satirical *Grand Theft Auto* series, boys were five times more likely than girls to have played at least one M-rated game "a lot in the past 6 months." This suggests that frequent M-rated game play could be a risk marker for girls.

Many children reported spending only a brief amount of time on electronic games. However, one third of boys played games nearly every day; about 1 in 8 boys played 15 hours or more per week. Given that more hours of play was correlated with greater use of M-rated games, the combination of heavy, violent play warrants watching (again, especially among girls). Boys who rarely or never play video games are unusual; because game play is often a social activity for boys, this could also be cause for concern. Notably, M-rated game use was linked to playing with friends, and was not significantly associated with solitary play.

Parents should be alert to the risks of having game consoles and computers in children's bedrooms, as this is linked to greater amounts of play in general and more M-rated game play in particular. Parents should be particularly careful that older siblings do not introduce inappropriate content to younger ones; we found that children who played M-rated games were twice as likely to play often or always with an older sibling. Also, two in five boys and one in five girls like to "mod" games, e.g., by downloading new characters, weapons, clothing, or story lines from the Internet. While this creative activity is not bad in itself, parents should be alert for exposure to inappropriate, unrated content.

The finding that many children use games for emotional regulation—to help them relax, to forget problems, or to feel less lonely—deserves further study. The use of violent games to cope with anger may be healthy or unhealthy for particular children; a discussion of reasons for play might provide useful clinical insights.

Although many boys (55.7%) agreed with the response "I like the guns and other weapons," this result is difficult to interpret; it could measure enjoyment of action, explosions and colorful graphics, or enjoyment of using weapons against other characters. Comments from teachers and students indicated that many had real-world experience with guns through hunting.

The prevalence of M-rated game play among young adolescents may indicate a need for greater awareness and monitoring by parents. However, parents should not overrely on ratings to assess game content. M-rated games can vary considerably in terms of social context and goals; a player may be rewarded for avoiding bloodshed, or may be required to act violently to advance in the game. Clinicians can play an important role in promoting media literacy among parents [14,15] and encouraging them to monitor children's game time and game choices.

Limitations

A survey conducted at a single point in time can only demonstrate correlation, not causation; for example, we cannot state that having a game console in the bedroom causes a child to spend more time playing games. It is also not possible to assess trends by comparing our results to older studies, because of differences in methodology and sample composition.

To maximize validity of responses, we asked children to simply list five games that they had "played a lot" in the past 6 months—not all games they had played in the past 6 months, nor how much time they spent with each game. We also did not ask if they had ever played a particular game. This means that children's exposure to best-selling games (such as the *Grand Theft Auto* series) is probably greater than indicated here—as suggested by results of the 2005 Kaiser Family Foundation survey, which found that 77% of 7th to 12th grade boys had ever played a *Grand Theft Auto* game. Overall exposure to games is also underestimated because we focused on commercially available ESRB-rated games; we excluded arcade games, unrated Web-based games, and games played on mobile telephones. Further, there is no consistent definition of "violence" in the research literature on children and media [5]; one could argue that by focusing on M-rated games, we have substantially underreported children's exposure to game violence [16].

The large sample size, the socioeconomic and racial diversity of the sample, the unusually high response rate, and the consistency of results across schools suggest that these findings may be pertinent to other U.S. adolescents. However, black students were over-represented and Latino students under-represented relative to the U.S. population

[17]. Research with a nationally representative sample is needed to confirm these findings.

Future research (ideally with a nationally representative sample) might examine the game use of specific subgroups, such as Latino youth, juvenile offenders, or girls who play M-rated games. Observational studies could show how children behave differently in group vs. solo game play; for boys in particular, video game play is often a social activity. Longitudinal studies could provide insights into the role of developmental stage, and how children's game choices and play patterns evolve as they mature. More study is also needed regarding the nature and effects of Internet game play, including young adolescents' participation in massively multiplayer online role-playing games (MMORPGs), and "advergames" that promote products [18,19].

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