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Young Children's Video/Computer Game Use: Relations with School Performance and Behavior

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This study examined the amount and content of children's video game playing in relation with behavioral and academic outcomes. Relationships among playing context, child gender, and parental monitoring were explored. Data were obtained through parent report of child's game play, behavior, and school performance. Results revealed that time spent playing games was related positively to aggression and negatively to school competence. Violent content was correlated positively and educational content negatively with attention problems. Educational games were related to good academic achievement. Results suggest violent games, and a large amount of game play, are related to troublesome behavioral and academic outcomes, but educational games may be related to positive outcomes. Neither gender nor parental monitoring emerged as significant moderators of these effects.

The possible effects of violent television has received much attention in recent years (Coyne & Archer, 2005; Gentile & Walsh, 2002; Huesmann, Moise-Titus, Podolski, & Eron, 2003; Levine & Waite, 2000) but the relatively recent popularity of video games has led to research focused on gaming as well (Carnagey, Anderson, & Bartholow, 2007). Video gaming has grown into a very lucrative business. In 1999, the video game industry in the United States generated approximately $7.4 billion in retail revenues (PC Data, 2000). High-speed Internet has made it possible in recent years to download and/or play online games instantly, making total video game sales an estimated $29 billion dollar business in 2005 (Wong, 2006). It is not simply playing these games, however, that is concerning. Funk (2005) has reported that 53% of games played by first- to third- grade children contained violence, and this exposure to violence may lead to problematic mental health outcomes (Blake & Hamrin, 2007).

Due to the growing popularity of these games, it is important to learn what effects they may have on children, and what may moderate these effects. Using a parent report survey, this investigation explores the frequency of video game play in young children (age six to ten), the content of those games, and the social context in which games are played, and then relates these variables to children's school performance and behavior problems. Child gender differences and parental monitoring over children's gaming are explored as potential moderators. First, however, it is important to understand how and why video game play can impact child behavior.

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BACKGROUND

Anger management is an important public health issue, and it has been reported that anger-related behavior, such as violence and aggression, is one of the more common reasons children are brought in for mental health services (Blake & Hamrin, 2007). Past research using both correlational methods (Funk, Baldacci, Pasold, & Baumgardner, 2004; Gentile, Lynch, & Linder, 2004) and experimental manipulations (Bushman & Geen, 1990; Kirsh, Olczak, & Mounts, 2005; Polman, deCastro, & vonAken, 2008) has established that exposure to violent media causes children and adults to behave more aggressively. In this way, violent media may be contributing to a major public health problem. Most research on violent media has defined aggressive behavior as actions "intended to injure or irritate another person" (Huesmann & Taylor, 2006, p. 395). A meta-analysis by Anderson and Bushman (2001) showed that violent video game use was significantly related to aggressive behavior, aggressive cognition, aggressive affect, and physiological arousal, and negatively related to helping behavior. In another meta-analysis, Anderson (2004) found that playing violent video games and real-life aggression were correlated with an effect size of about 0.26. According to Anderson, "this is larger than the effect of condom use on decreased HIV risk, the effect of exposure to passive smoke at work and lung cancer, and the effect of calcium intake on bone mass" (p. 20).

Although there are likely bi-directional causal influences at play, with already-aggressive children being more likely

to choose and play violent games in the first place (Griffiths, 1999), there is some longitudinal evidence to suggest that playing violent video games is linked with more aggressive behavior months later (Anderson et al., 2008). A variety of different causal mechanisms have been proposed to account for the influence of violent media on aggression. The pathway from media violence to aggressive behavior is thought to have cognitive, affective, and social components, and may incorporate both immediate and long-term influences.

One cognitive component to this pathway may include cognitive scripts, which are internal representations of events that can be expected to occur in the environment, and how one could appropriately respond to such events (Huesmann, 1988; Rosenkoetter, Rosenkoetter, & Ozretich, 2004). Cognitive scripts are developed over a long period of time through both positive reinforcement to action and through observational learning; they develop early in childhood and once formed, are very difficult to change (Huesmann, 1988). By being active participants in a violent video game, children both observe aggression on the screen and are rewarded for acting aggressively. Over time, these children learn that violence is both a likely occurrence in the world and that aggression is an appropriate response to events. These cognitive scripts may become a guide for future behavior, leading to a greater potential for aggression (Huesmann, 1988; Rosenkoetter et al., 2004). Another possible cognitive component to the pathway from media violence to aggression is priming (Huesmann et al., 2003). After repeated pairings of certain stimuli with aggressive acts in the virtual world (i.e., using neutral objects such as candlesticks as weapons), people become primed to associate everyday objects with aggressive acts. In this way, some characteristics of the observed violence may be converted into cues for aggressive behavior in the real world (Huesmann, 1988; Huesmann et al., 2003).

An affective component to the pathway may include desensitization (Ballard, Panee, Engold, & Hamby, 2001; Carnagey, Anderson, & Bushman, 2007; Funk, 2005). Desensitization theory is based on the idea that most humans have an instinctive aversion to observing blood, gore, and violence (Koukounas & McCabe, 2001). As an individual is exposed to violence repeatedly over a long period of time, the negative response dissipates. Through the process of desensitization, an individual may be less likely to experience a strong emotional response to hurting a real person (Funk et al., 2004; Funk, 2005; Huesmann et al., 2003). For instance, Carnagey, Anderson, & Bushman (2007) found that college students who had just played a violent video game, even for only 20 minutes, experienced lower levels of physiological arousal when viewing real-life violence than those who had not.

Finally, according to social learning theory, the influence of violent media on aggression may involve social pathways (Bandura, 1977). This theory implies that exposure to violence may lead to behavioral imitation, because individuals learn behaviors through observing models (Kirsh, 2003; Strasburger & Donnerstein, 1999). The interactive nature of video game play may make such imitation even more likely (Anderson & Dill, 2000; Dill & Dill, 1998; Scott, 1995).

RATIONALE FOR PRESENT STUDY

Thus, the influence of violent media on aggression is likely complex and probably occurs through both immediate and long-term processes, via a combination of cognitive, affective, and social pathways. Anderson and Bushman's (2001) General Aggression Model (GAM) includes the interaction of all these pathways and suggests that it is important to explore a variety of mediators and moderators involved in the link between media exposure and aggression. Two potential moderators explored in the present study are child gender and parental monitoring.

It could be that the outcomes associated with media use differ based on, or are moderated by, child gender. Research has suggested that there are gender differences in time spent playing video games and preferred content. Boys tend to play video games more frequently than girls (Kubey & Larson, 1990; Lucas & Sherry, 2004) and report a preference for more violent games than girls (Kafai, 1996; Yelland & Lloyd, 2001). Yelland and Lloyd (2001) found that ten- to thirteen-year old girls described games they like as challenging or intellectually stimulating, whereas boys tended to describe their favorite games as exciting and having good graphics. Clearly, the boys' preferences are more often present in violent, "shoot-em-up" games than in educational, strategy-based games. Despite these gender differences, however, Anderson and Bushman (2001) did not find that gender moderated the negative effects of violent video games in their meta-analysis, suggesting both genders may be similarly affected by violent media. The present study examines further whether child gender moderates the relationship between video games and negative outcomes, as well as explores whether gender moderates any positive relationships between video game play and outcomes (i.e., school performance).

Another potential moderator for the effects of video game violence on children is parental monitoring, as suggested by Vessey and Lee (2000). Levels of parental monitoring for television and video games have been shown to vary according to age of the child, the game (violent or educational), gender of the parent, and the situation (Cheng, Brenner, Wright, Sachs, Moyer & Rao, 2004; Funk, 1993). Research in this area is lacking, and the present study is a step in filling this gap in the literature. One survey-based study questioned parents about their young (aged three to eleven) children's use of time (Bianchi & Robinson, 1997), but it did not address video/computer game playing habits. It is possible that, in highly-monitored homes, media use has fewer negative outcomes than in poorly monitored homes (Huesmann & Taylor, 2006). This could be due to a decrease in time spent using media because of set boundaries and limitations, or to involved parents being less likely to allow the media used in the home to contain violence, or to both. Gentile et al. (2004) found that parental involvement in limiting

time spent playing and content of video games is related to better behavioral and academic outcomes.

This study also contributes to the literature by exploring both the content and frequency of children's gaming in relation to two different outcomes, namely school performance and behavior problems, in an effort to tease apart which aspects of media exposure are related to which domains of development (Anderson, Huston, Schmitt, Linebarger, & Wright, 2001). Importantly, we are considering the possibility of both positive (i.e., academic achievement) and negative (i.e., aggression) outcomes. On one hand, several studies have shown a relationship between large amounts of time spent playing video games and poor performance in school (Anderson & Dill, 2000; Gentile et al., 2004; Walsh, 2000). One popular theory to explain this effect is the "displacement hypothesis" (Huston, Wright, Marquis, & Green, 1999; Strasburger & Donnerstein, 1999), which states that time spent using media reduces time spent doing homework, studying, reading, or participating in intellectually stimulating conversation. Although Huston et al. (1999) found that a decrease in educational activities was related to an increase in television viewing, the displacement hypothesis also may apply to video game playing. On the other hand, one unique feature of video game use is the potential for educational game play that could actually improve school performance. At least one study has suggested potential positive effects of video game play on attention or educational outcomes (Rezaiyan, Mohammadi, & Fallah, 2007; Rosas et al., 2003). The present study explores the use of both educational and violent games in order to assess whether these types of games are differentially associated with school performance. The present study also includes a measure of time spent using media in relation to other activities and academic performance in order to test the displacement hypothesis. In addition to the question of what negative or positive outcomes may be attributed to media use, another important question is which aspects of media use are associated with negative versus positive outcomes. Whether the influences of media on children is due to amount of time spent playing video/computer games or to the content of the games, or both, is still unknown. It is possible that the amount of time spent playing computer games is related to educational performance (due to displacement, for instance), while the content (violent or educational) is related to behavior. This study attempts to tease apart such relationships.

Finally, this study may help address some of the limitations of past research. In particular, most of the previous work on the influence of media on behavior has been conducted with older children, adolescents, and adults (e.g., Carnagey, Anderson, & Bushman, 2007; Eastin, 2007; Gentile et al., 2004; Kronenberger et al., 2005). It has been found that younger children may be more susceptible to media effects than older children (Dill & Dill, 1998; Huesmann & Taylor, 2006). Paik and Comstock (1994) completed a meta-analysis on the effects of violent television on aggression and other antisocial behaviors, and found an inverse relationship between age and effect size, suggesting that young children may be more affected by violent television than older children and adults. Thus, research on violent media use among younger children is sorely needed, and the present study attempts to help fill that gap. Additionally, the existing literature has focused almost exclusively on children's solitary computer/video game use. The present study describes the social context of young children's gaming.

SPECIFIC AIMS

The research questions investigated in this study include: (1) What is the nature, in terms of content, amount, and social context, of young children's computer/video game playing, and how does it vary by child gender and parental monitoring? (2) What are the relations among children's video/computer game playing (content and frequency), parental monitoring, and child outcomes (school performance and behavior problems)? and (3) Are relations between children's video/computer game playing (content and frequency) and child outcomes (school performance and behavior problems) moderated by child gender or parental monitoring of time and/or content? Based on previous literature, we hypothesized that young boys would play more games overall and more violent games than young girls, and that the relationships between gaming and both positive and negative child outcomes would be similar for both genders (Anderson & Bushman, 2001). We also hypothesized that both amount of play and playing games with violent content would be positively related to behavior problems and negatively related to school performance in this young age group. Finally, we hypothesized that parental monitoring would be associated with more positive outcomes, such as better school performance, and that such monitoring would diminish the negative relations found between gaming and child behavior.

METHOD

Research Design

Parents reported on their oldest child's (aged 6–10) video game playing, school grades, and behavior, using a paper-and-pencil survey that included the measures described below. SPSS 17.0 was used to analyze relationships among characteristics of game play and both academic and behavioral characteristics of the child.

Participants

Participants included 70 children (50% male) between six and ten years of age ($M = 7.8$ yrs, $SD = 1.2$) and their parents. The sample consisted of mostly middle-class (annual family income $M =$ between \$80,000–100,000), Caucasian families (91% Caucasian, 3% Latino, 2% black, 4% other) from an urban/suburban mid-Atlantic community. The vast majority of families (97%) were married with two parents in the home, and in these cases it was the mother who completed the survey. Single fathers completed the remaining few surveys. Parental age was almost 40, on average ($M = 39.6$,

SD = 4.7) and parental education was fairly high (5.7% doctoral degree, 38.6% masters degree, 7.1% some graduate school, 30% bachelors degree, 18.6% some college). The average number of children in the home was 2.5 (*SD* = .9).

Procedure

A letter of introduction and return postcard was mailed to prospective participants who were recruited from family organization mailing lists. A total of 149 letters/postcards were mailed out to prospective participants, who were not pre-screened on the basis of having an appropriately aged child and had to indicate this on the postcard. Eighty-one families (54%) indicated interest and qualification for the study and were each sent, via regular mail, an informed consent form to sign and a parent survey to complete. Participants were asked to return the survey in the provided self-addressed, stamped envelope. Ultimately, 70 families (86%) gave informed consent to participate and returned a completed and usable questionnaire. No compensation was given for participation, parents were informed of the purpose of the study (in the informed consent form), and results were available for the parents to review upon request. The study was approved by the Human Subjects Review Board and APA ethical standards were followed throughout the study.

Measures

The survey consisted of three sections: Section A contained demographic questions, Section B contained questions regarding the video/computer game use in the home and parental monitoring, and Section C consisted of questions about the target child's behavior and school performance. Survey sections A and B were based on previous work (Creasey & Myers, 1986), and the complete survey is available from the corresponding author, upon request.

Demographic Questionnaire

In section A, parents reported on demographic information relevant to themselves and the target child (defined as the oldest child in the family between the ages of 6 and 10), such as parent and child age, gender, ethnicity, parent level of education, marital status, total number of children in the family, and household income.

Type and Content of Media

Section B questions included those regarding the type and content of video/computer games played in the home. Parents were provided with a checklist and asked to identify which and how long each gaming system was present in the home (including Nintendo, Sony, Sega/Genesis, Gameboy, Computer Games, and Other), how many games were owned by the target child (from a selection of ranges: 0, 1–5, 6–10, 11–20, 21–30, 31–50, 50–70, and 70+), and to name the top three games most often currently played by the child (open-ended).

Finally, parents were asked to report what percentage of the games played by the child were of several categories (totals were required to sum to 100%): Human Violence (direct physical or graphic violence involving individual humans in a regular human setting such as Mortal Kombat or WWF Smackdown), Non-Human Violence (direct physical violence involving nonhumans, such as aliens or animals, such as Quake or Zelda), Arcade-Like Games with Violent Themes (does not involve people being hurt, but involves shooting of spaceships, asteroids, etc., such as Donkey Kong or Tank Wars), Arcade-Like Games without Violence (includes games such as Tetris, Solitaire, and regular sports games), and Explicitly Educational (those marketed toward academic skill development, such as Math Blaster or Reader Rabbit). Each category indicated 4–6 popular examples of each game category to help ensure accurate categorization of games recognized by the parent in the home. A variable was created to capture overall violent content by summing the percentages reported for Human Violence, Non-Human Violence, and Arcade-Like Games with Violent Themes.

Social Context

In Section B, parents also were asked to report what percentage of the child's video/computer game playing/watching is done alone, with siblings, with friends, and with parents. Totals were required to sum to 100%.

Time Spent on Games and Other Activities

Section B also included questions regarding the child's time spent playing video games. Examples of such questions included, "How many hours per day, on average, does your child spend playing/watching video/computer games in your home on the weekdays (Monday-Friday)?" and "How many total hours does your child spend playing/watching video/computer games on the weekends (Sat. and Sun. combined)?" These two responses were summed to create a variable for amount of playing time per week. Parents responded by circling the appropriate number or range of hours on a Likert-type scale. In the same manner, parents were also asked to indicate the number of hours the target child spends watching television, reading, studying/doing homework, or in organized activities.

Parental Monitoring

In addition to content of games and time spent playing, in Section B, parents were asked to reflect on their monitoring level. Questions had a 5-point Likert scale (ranging from 1 = "strongly disagree" to 5 = "strongly agree"). A single parental monitoring score was obtained by summing the responses for the following questions: (a) "I carefully monitor the amount of time my child watches/plays video games," (b) "My child is allowed to watch/play video/computer games only for a set amount of time each day/week," (c) "I carefully monitor the content of the video games/computer games my child watches/plays," and (d) "My child is allowed to buy/receive (gift) whatever type of

video/computer game s/he wants" (reverse scored). Additionally, questions (a) and (b) were summed as an indication of time monitoring, and questions (c) and (d) were summed as an indication of content monitoring.

Child Behavior Checklist (CBCL/4–18; Achenbach, 1991)

Section C of the survey consisted of the following subscales from the Child Behavior Checklist (CBCL/4–18; Achenbach, 1991): Attention Problems (11 items; e.g., "daydreams or gets lost in thought," "stares blankly;" Cronbach's alpha = .83), Delinquent Behavior (13 items; e.g., "doesn't seem to feel guilty after misbehaving," "steals outside the home;" Cronbach's alpha = .43), Aggressive Behavior (20 items; e.g., "gets in many fights," "cruelty, bullying, or meanness to others;" Cronbach's alpha = .85), and School Competence (6 items; e.g., "repeated a grade," "poor school work;" Cronbach's alpha = .55). The Attention Problems subscale was used because it was thought that such problems may be associated with both behavior and school difficulties, and so was deemed relevant for the present study. The Delinquent Behavior and Aggressive Behavior subscales were summed to create an overall externalizing behavior problems scale (total of 33 items), and this scale had a Cronbach's alpha of .86. The CBCL/4-18 is based on a 3-point Likert scale (ranging from 0 = Not True, 1 = Somewhat or Sometimes True, 2 = Very True or Often True).

School Performance

School performance included both the CBCL subscale of School Competence (described above) and academic achievement (grade point average, or GPA, in core school subjects: reading, writing, math, spelling, social studies, and science). Not surprisingly, these two measures (CBCL school competence and GPA) were strongly correlated, $r\ (68) = .49$, $p < .001$. To obtain GPA, parents were asked to either (a) report the child's academic and effort grades from his or her most recent report card onto the survey (with a template that looked exactly the same as the way progress reports are distributed to parents in the county), or (b) photocopy their child's latest official progress report and include with the survey. About 30% of the families chose the latter option. There were no differences in child GPA as a function of the format with which this was provided. Both academic achievement and effort were based on a five-point scale where a 5 indicated a grade of "A" or "outstanding" and a 1 indicated a grade of "U" or "unsatisfactory."

RESULTS

All correlation coefficients (r) reported are Pearson product-moment correlation coefficients. For all results, only overall correlations are reported when the difference in correlations between males and females was not significant. In addition to the reported variables, a variable was computed to measure total exposure to violent video games, by multiplying time spent playing games by the amount of games with violent content. This variable was then used to examine its relationships with monitoring and outcomes.

Research Question #1: Nature of Video Gaming

The first research question was to learn the nature, in terms of content, amount of time, and social context, of young children's computer/video game playing, and how it may vary by child gender and parental monitoring. The vast majority (97%) of the children in the study owned and played some kind of video/computer games. Over half (56%) owned and played some type of hand-held game system (i.e., Gameboy). Almost half (43%) of the families in the study owned some type of video game/TV system (i.e., Nintendo, PlayStation, Xbox). More than half (62.3%) of the families owned more than one of these electronic gaming systems. Families in the study owned on average 21–30 different computer/video games. Over half (51%) of the sample reported owning more than 20 games.

Game Content

According to our classification of the games reported by parents, children's gaming consists mostly (61%) of educational games. The percentage of games in the home that had violent content of any kind was 23%, which included the following components: Arcade-Like Games with Violent Themes (13%), Non-Human Violence (8%), and Human Violence (2%). A minority (19%) of children from the sample played exclusively educational computer games. There was more variance in violent content for boys than for girls, as found by a significant Levene's test, $p < .05$. Therefore, the following t-statistic represents an adjusted value for the violation of the homogeneity assumption. The content of boys' video/computer games was more violent (37% containing violence of any kind) than that of girls (9%), $t\ (54.43) = -4.61$, $p < .001$. The content of girls' video/computer games was proportionally more educational (76%) than that of boys (45%), $t\ (67) = 4.48$, $p < .05$.

Time Spent Playing

As shown in Figure 1, parents reported that children spend 3.4 hours per week on average ($SD = 2.8$) playing video/computer games, which is second only to watching television (M = 4.9 hours, $SD = 2.8$). As suggested by a significant t-test, boys spent more hours playing video games ($M = 4.3$ hours, $SD = 3.4$) than did girls ($M = 2.4$ hours, $SD = 1.5$),$t(68) = 3.2$, $p < .05$. To assess the displacement hypothesis, the number of hours children spent playing video/computer games was correlated with the hours spent doing the other activities. In no case were these correlations significant; $r\ (68) = -.02$ to .08, ns. Findings were thus not supportive of the displacement hypothesis.

Social Context

Overall, young children spent the largest percentage of time playing video games alone. Children played such games alone 44% of the time, with their friends 11%, with siblings 33% of

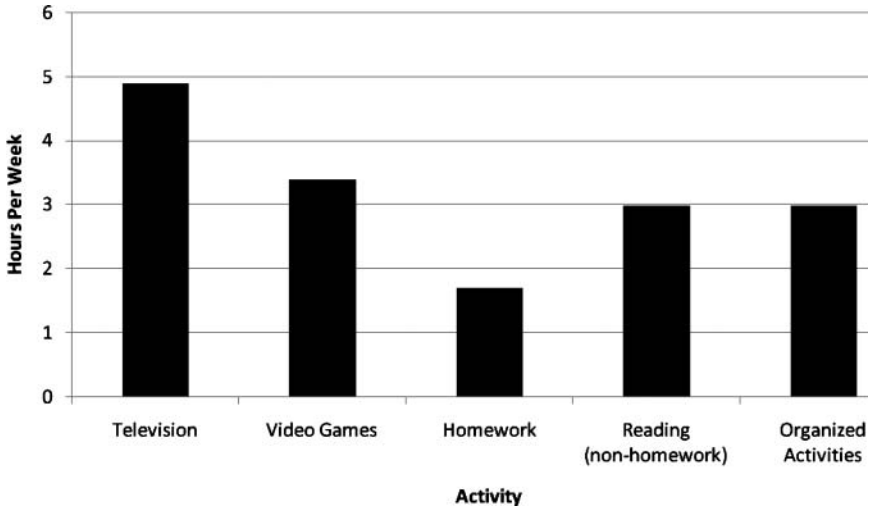

FIG. 1. Time spent playing video games relative to other activities.

the time, and with parents only 10% of the time. Nearly half of the respondents (49%) claimed that children do not play any video/computer games with parents. A t-test was conducted to compare means of boys and girls and results suggested that boys played video games with friends more often than girls, $t\ (67) = 4.38$, $p < .05$.

Parental Monitoring in General

Over a fifth (21.4%) of parents responded that they did not know the rating level of their children's video and computer games, suggesting a lack of parental monitoring. The average parental monitoring score, which consisted of an aggregate of four Likert-type questions and could range from 1–24, was 19.1 ($SD = 3.7$). This implies that parents believe that they are monitoring the content and amount of game play. Monitoring of time and monitoring of content were significantly related, $r\ (69) = .51$, $p < .05$, suggesting that parents probably monitor both as opposed to one or the other. Table 1 presents overall correlations (boys and girls combined) between parental content and time monitoring and characteristics of games played. Additionally in Table 1, gender differences are noted, where applicable, by superscripts indicating for which gender(s) the correlations remained significant when the sample was split and analyzed by gender. As will be described below, it is clear that content and time monitoring of video game play is associated with more violent game play and exposure. However, many of these effects seem to be particular to boys.

TABLE 1
Overall Correlations between Parental Monitoring and Characteristics of Play

	Time Monitoring	Content Monitoring
Total Violent Games	$.24^{\dagger}$	$\mathbf{-.34}^{*,a}$
Games with Human Violence	$\mathbf{-.26}^{*,a}$	$-.48^{*,a,b}$
Games with Non-Human Violence	$-.23^{\dagger,b}$	$-.23^{\dagger}$
Arcade-like Games	.07	$-.15$
Educational Games	.12	$\mathbf{.38}^{*,a}$
Exposure to Violent Games	$\mathbf{-.32}^{*,a}$	$\mathbf{-.31}^{*,a}$

Note: $^{*}\mathbf{p < .05}$, $^{\dagger}p < .10$; Gender differences: ^{a}significant for boys, ^{b}significant for girls

Content Monitoring

Greater monitoring of content was found to be associated with less violent game playing, $r\ (67) = -.34$, $p < .05$, less playing of games with human violence, $r\ (67) = -.48$, $p < .05$, more educational game playing, $r\ (67) = .38$, $p < .05$, and less exposure (time spent playing multiplied by amount of games with violent content) to violent games, $r\ (67) = -.31$, $p < .05$. When examining boys and girls separately, a few differences in correlations based on gender emerged. For instance, the correlations between content monitoring and total violent game playing [$r(33) = -.44$, $p < .05$] and content monitoring and educational game playing [$r(33) = .47$, $p < .05$], were only significant for boys. Further, the correlation between content monitoring and exposure to violent games approached significance only for boys, $r\ (33) = .47$, $p < .10$, and did not approach or tend toward significance for girls. The fact that the overall correlation including both genders (and therefore including more participants) was significant suggests that, with a larger sample, this correlation also may have been significant when just boys were analyzed.

Time Monitoring

Like content monitoring, time monitoring was significantly associated with particular game characteristics, as presented in Table 1. In particular, greater time monitoring was related to fewer games containing human violence, $r\ (67) = -.26$,

TABLE 2
Overall Correlations between Game Playing Time, Content, and Child Outcomes

	CBCL School Competence	Academic Achievement (GPA)	CBCL Aggressive Behavior	CBCL Delinquent Behavior	CBCL Attention Problems	CBCL Externalizing Behavior
Playing Time (weekly)	**−.25**^{*,a}	−.09	**.24***	.22†	.15	**.26**^{*,a}
Total Violent Games	−.13	−.23†	.04	.13	**.25***	.06
Arcade-Like Games	.00	−.11	.20†	.07	.14	.19
Educational Games	.07	.27†	−.11	−.15	**−.25***	−.12
Exposure to Violent Games	**−.28***	**−.29**^{*,a}	.22†	.17	**.24***	.23

Note: ***p < .05**, †p < .10; Gender differences: ^{a}significant for boys, ^{b}significant for girls.

$p < .05$, and exposure to violent games, r (67) = −.32, $p <$ .05. Again, when separating boys and girls, a few differences in correlations emerged. For instance, greater time monitoring was significantly associated with less game play with human violence [$r(33) = -.44$, $p < .05$] and less exposure to violent games [$r(33) = -.57$, $p < .05$] for boys, but these correlations only approached significance for girls [$r(34) = -.29$, $p < .10$]. In fact, parents who monitored boys' playing times had boys who were significantly more likely to play educational games, r (33) = .40, $p < .05$. For girls, the more parents monitored play time, the less likely girls were to play games with non-human violence [$r(34) = .60$, $p < .05$]. These differences could reflect the choices of boys versus girls in terms of the type of violence they prefer; when not monitored for content, boys may prefer to play games with human violence, whereas girls may prefer non-human violence.

Research Question #2: Relationships with Behavior and School Performance

The second research question involved an exploration of the relationships between children's video/computer game playing (content and frequency), parental monitoring, and child outcomes (school performance and behavior problems). Table 2 shows overall correlations between children's amount and content of gaming and school performance and behavior. In the table, gender differences are noted where applicable by superscripts indicating for which gender(s) the correlations remained significant when the sample was split and analyzed by gender. Overall, this sample had relatively high academic achievement, as measured by report card GPA of math, reading, writing, science, spelling, and social studies ($M = 4.3$, $SD = .5$).

Time Spent Playing and Outcomes

The amount of time that the children spent per week playing video/computer games was significantly positively correlated with CBCL aggression, r (68) = .24, $p < .05$, and externalizing behavior, r (68) = .26, $p < .05$, and negatively correlated with school competence, r (66) = −.25, $p < .05$. None of these correlations were significant for girls. However, for boys, time that the children spent per week playing video/computer games was significantly negatively correlated with CBCL school competence, r (33) = −.35, $p < .05$, and exhibited a significant trend toward a relationship with externalizing behavior, r (33) = .29, $p < .05$. As previously noted, with a larger sample, this correlation may have become significant.

Game Content and Outcomes

As shown in Table 2, violent content of the games was positively associated with CBCL attention problems, r (68) = .25, $p < .05$, whereas explicitly educational content of games showed a negative correlation with CBCL attention problems, r (67) = −.25, $p < .05$. Exposure to violent games (time spent playing games multiplied by amount of violent games) was significantly negatively associated with CBCL school competence, r (68) = −.28, $p < .05$, academic achievement (GPA), r (68) = −.29, $p < .05$, and positively associated with CBCL attention problems, r (68) = .24, $p < .05$. When separating genders, with the exception of exposure to violent content, no gender differences in correlations were revealed. The effect of exposure to violent content on GPA was significant only for boys, r (33) = −.41, $p < .05$.

Parental Monitoring and Outcomes

Table 3 shows the overall correlations between parental monitoring and school performance and behavior. Additionally

TABLE 3
Overall Correlations between Parental Monitoring and Child Outcomes

	Time Monitoring	Content Monitoring
CBCL School Competence	**.26**^{*,b}	.20
Academic Achievement (GPA)	.12	.13
CBCLAggressive Behavior	.01	−.23^{†,b}
CBCL Delinquent Behavior	−.12	**−.24***
CBCL Attention Problems	−.05	−.22†
CBCL Externalizing Behavior	−.01	**−.24**^{*,b}

Note: ***p < .05**, †p < .10; Gender differences: ^{a}significant for boys, ^{b}significant for girls

in Table 3, gender differences are noted where applicable by superscripts indicating for which gender(s) the correlations remained significant when the sample was split and analyzed by gender. There were significant negative correlations between content monitoring and delinquent behavior, $r\ (67) = -.24$, $p < .05$, as well as externalizing behavior, $r\ (68) = -.29$, $p < .05$. Correlations among content monitoring and aggressive behavior and attention problems approached significance, as presented in Table 3. When separating boys and girls, it became clear that these relationships were particular to girls. For boys, none of these correlations were significant. However, for girls, there were significant negative correlations between content monitoring and externalizing behavior, $r\ (34) = -.46$, $p < .05$, as well as content monitoring and aggressive behavior, $r\ (34) = -.45$, $p < .05$. Although non-significant when split by gender, the correlation between content monitoring and delinquent behavior was stronger for girls $r\ (34) = -.28$, than boys, $r\ (33) = -.19$.

Time monitoring seemed to have only a significant relationship with school competence, $r\ (65) = .26$, $p < .05$. However, this correlation was only significant for girls, $r\ (34) = .35$, $p < .05$. Therefore, parental monitoring of content and time spent playing appears to be related to better behavioral and school outcomes, particularly for girls.

Research Question #3: Moderation Effects

The final research question was whether relationships between children's video/computer game playing (content and frequency) and child outcomes (school performance and behavior problems) were moderated by child gender or parental monitoring of time and/or content.

Gender

Moderated multiple regressions were conducted for the main outcome variables (achievement and behavior problems) in order to investigate the individual contributions of each independent variable, gender, and their interactions. First, the main effects of gender and the individual independent variable were entered. Then, the interaction between gender and the variable was entered. All interaction terms were standardized to correct for the possibility of multi-collinearity between gender and independent variables. As reported, some relationships were only statistically significant for one gender. However, in no case in the moderated multiple regressions did the interaction term between gender and any of the game playing variables yield statistical significance in predicting outcomes. It is important to note that in the pattern reported above, however, playing video games was more related to outcomes for boys than girls. Also, the relationship between parental monitoring and all outcomes were stronger for girls than for boys.

Parental Monitoring

Moderated multiple regressions were conducted to investigate whether parental monitoring of time or content had differential effects on outcome according to game type. A separate regression was conducted for each CBCL outcome, as well as academic achievement (GPA). First, the main effects of total violent exposure (a term created by multiplying time spent playing games and amount of violent content in games played) and overall monitoring (obtained by summing time and content monitoring scores on the survey) were entered into the regression equation. Then, the interaction between total violence exposure and the monitoring variable was entered. As in the previous regressions, all interaction terms were standardized to correct for the possibility of multi-collinearity between independent variables. The moderated regressions did not yield any significant interaction results, suggesting that outcomes associated with violent video game exposure do not significantly differ by overall level of parental monitoring. To investigate any independent interactions between violence exposure and type of monitoring, the above regressions were re-run using content monitoring and then time monitoring separately. Again, no significant interaction effects were found between either type of monitoring and violent exposure.

DISCUSSION

Our findings replicate, in many ways, the results of previous work in the identification of several negative outcomes associated with violent video game play (Anderson & Bushman, 2001). Specifically, results suggest that amount of time playing video games and exposure to violence in video games are associated with lower school performance, increased aggression, attention problems, and externalizing behavior. However, this study provides an important source of replication in that the age group studied is younger than most of the extant research.

The results of the present study partially supported our hypotheses. With regard to the nature and context of game play, as expected, boys played more games overall, more violent games, and tended to play more with friends than girls. Girls tended to favor educational games. As predicted, similar to Anderson and Bushman's (2001) findings, gender did not emerge as a strong moderator, although there was a hint of stronger associations found among boys between both parental monitoring and nature of games played, as well as between nature of game play and behavioral/school outcomes. Parental monitoring seemed to impact behavioral and school outcomes more for girls. The lack of a moderation effect found in this study may be due to the small sample size involved, or to the possibility that child gender does not moderate the relationships, and that boys and girls are therefore similarly affected by video game use.

In regards to the relationships between game playing and outcomes, we expected that both amount of play and playing games with violent content would be positively related to all four measured behavior problems (aggression, attention problems, delinquency, and externalizing behavior) and negatively related to school performance in this young age group. Of the two school performance measures, the school competence scale

was related to more game-playing variables than GPA. This could be due to the fact that grades given by teachers may be a measure of factors other than pure academic performance, such as perceived effort, behavior, and improvement. Overall, the expected pattern emerged. Time spent playing video games was negatively related to one school performance variable and positively related to aggression and externalizing behavior. Total exposure to violent content was negatively related to both school performance variables, and mildly related to aggressive behavior. Interestingly, however, educational games were associated with fewer attention problems and mildly associated with a higher school GPA, suggesting that video game playing can be associated with some positive outcomes. The displacement hypothesis was not supported, suggesting that excessive media use by children may be related to poorer school performance not due to displacement, but instead due to some other influence of time played and content of games on children's empathy and prosocial behavior (Funk et al., 2004; Sheese & Graziano, 2005) or on aggressive behavior. These behaviors may, in turn, be associated with worse school performance.

As expected, parental monitoring was associated with positive outcomes, such as better school competence, fewer externalizing behavior problems, and a lower level of delinquent behavior. Parental monitoring of content was associated with more educational game play, less violent game play, less game play with human violence, less exposure to violent games, and fewer externalizing behavior problems. Parental monitoring of the amount of time spent playing games was linked to better school performance, less playing of games with human violence, and less exposure to violent games. Contrary to our hypothesis, however, parental monitoring did not appear to moderate the relationships between time spent gaming or violent game exposure and outcomes.

Limitations

There are several limitations to this study that must be considered. First is the fact that only parents reported on their child's video/computer game playing habits. Parent reports may be flawed in the amount of time the child spends playing games and in the assessment of game content. If the parent is not often playing with the child, as this study suggests may be the case, it is unlikely that the parent can be completely accurate in reporting game content or the amount of time involved. In addition, parents may misreport the amount of monitoring that they actually do. This may be less of a problem for our population, due to the young age of the sample (parents probably are more aware of their young child's video game use, as opposed to adolescents) and due to the fact that video games are likely bought by parents and titles are readily visible around the home (Kronenberger et al., 2005). Finally, to obtain child grades, parents were permitted to either (a) submit a grade report from school, or (b) report their child's grades. It is conceivable that the self-report option may have introduced some error, presumably due to parents inflating grades to enhance their child's academic standing. However, there were no significant differences in grades found between the two reporting methods, so it seems unlikely that this error was large enough to impact the results. Future studies should include measures to corroborate parent report to enhance validity. Also, our sample was limited to generally high-achieving children from relatively well-educated, mostly middle- to upper-class families. This may limit the extent to which our findings are generalizable to other populations. However, Huesmann and Taylor (2006) report that the effect of media violence on aggression is not moderated by socioeconomic status (SES), and therefore both high- and low-SES children may be similarly affected by violent media.

Another limitation is the correlational and exploratory nature of the study. Although links among game playing and children's aggression and academic achievement were found, the direction of causality is unclear. It is likely that, as previously mentioned, the relationship between aggression and violent media exposure is mutually reinforcing (Slater, Henry, & Swaim, 2003). Also, the Internet/computer game world changes quickly. It will be important for this study to be replicated in the future, as computer/video games may become more accessible and more violent over time. Finally, the relatively small sample may have limited the number of significant effects that were found. With a larger sample, it is likely that some of the effects that approached significance would have, in fact, become statistically significant. When splitting the sample to analyze by gender, this limitation became clearer, as correlations that were significant overall with the entire sample only approached significance when the sample size was halved to look at boys and girls separately. For a better analysis of gender differences, future research should recruit a larger sample. However, the fact that statistical significance was found for some outcome variables, despite the small sample, makes the large effects reported in this study even more notable. Also, the overall correlations reported in this study still provide useful information about children's exposure to video games, the outcomes associated with such exposure, and relationships with parental monitoring.

Implications for Research

The inability of some studies to obtain a significant relationship between violent video game playing and aggression does not negate the majority of findings that show that exposure to violent television and video games is associated with increased levels of aggression. According to Anderson, Berkowitz, and colleagues (2003), "influences that promote aggressive behavior in young children can contribute to increasingly aggressive and ultimately violent behavior many years later" (p. 83). The authors note that even studies that report relationships between media violence and aggression with weak or moderate statistical correlations are important and should not be discounted because much of the population is exposed to some media violence and

the aggregated effect across the population could be significant (Anderson et al., 2003).

Our study found that playing certain types of games, specifically educational games, may have positive outcomes, such as good school performance and fewer attention problems. Colwell (2007) suggests that computer game play in adolescence may serve to meet needs such as the need for a fun challenge, stress relief, and companionship. Further, Feng, Spence, and Pratt (2007) suggest that action video game play in college students may attenuate gender differences in spatial cognition. Future research should focus on what aspects of video game play may have positive outcomes. Although general negative effects on aggression have been found for violent media, future research will need to focus on how individual differences play a role. It is likely that certain individuals are more prone to aggression than others and therefore may be differentially affected by violent media (Bushman & Geen, 1990). Another increasingly interesting area of future research is how graphic capabilities influence aggression. As technology advances, the graphics of video games are becoming more and more realistic. Huesmann and Taylor (2006) suggest that the degree to which a viewer perceives media violence as realistic may influence its effects. Do recent increases in graphic realism heighten the negative effects of violence, due to a higher level of perceived similarity to the player? This research question will likely be studied in the future.

Although educational games may have positive outcomes, violence in video games is more commonplace in modern-day America. The detrimental effects on aggression have been suggested by numerous studies, including the present one, but the government is limited in the actions it can take. Therefore, parents must be responsible for their children's viewing habits through monitoring and modeling. It is important for parents to be aware of what their children are watching or playing, and what outcomes it may have (Vessey & Lee, 2000). Alternatively, one study found that a school-based intervention to reduce media use among children decreased aggressive behavior in those children receiving the intervention (Robinson, Wilde, Navracruz, Haydel, & Varady, 2001).Thus, future research may focus on how to teach parents to more effectively shape their children's media use, or on interventions aimed at the children themselves to reduce the use of violent media.

Implications for Mental Health Practice

Mental health professionals may have an especially important role to play in such parental education and awareness. Education on the influence that media can have on children should be made available in pediatric clinics, because the outcomes such as those examined in the present study (aggression, attention problems, externalizing behavior) can be detrimental to children's health and development. Further, as previously mentioned, anger-related behavior, such as violence and aggression, is one of the more common reasons children are referred for mental health services (Blake & Hamrin, 2007). Such education may not only include informing parents of normative child development and the effects of violent media; rather parents also can be advised not to use video games as a reward, punishment, or babysitter for their children. Further, parents should be encouraged to provide alternative forms of entertainment for their children, including playing outside, reading, or playing board games as a family (Johnson, 1996). If video games must be played, parents can be informed about which games provide the most beneficial outcomes. Although family situations are diverse and sometimes complicated, nurses and other health care professionals can work with parents to devise a family plan of entertainment options that work best for individual families and contribute positively to their children's development.

Mental health professionals not only play a crucial role in the education of parents and families, they also can play a role in the education of policymakers. Advocating for the availability of educational games and working toward a more effective system of warning labels on violent games are two ways that health care professionals may be able to work with policymakers to thwart the negative impact of violent video games. Finally, recognizing the effects that viewing violence may have on children can help health care practitioners gain a fuller understanding of the child's environment and a better overall health assessment. Generally, understanding the mechanisms by which exposure to violence may impact children's development can provide further understanding for health care professionals of abused children or those who have viewed domestic violence. More specifically related to video game violence, when conducting a health assessment with children, some have advocated for adding a "media history" component in order to address the potential influence of media (Monsen, 2002; Muscari, 2002; Villani, 2001). Adding such a component could lead to a better understanding and broader picture of the child's actual experiences and potential risk factors. Therefore, research such as the present study provides important knowledge to mental health professionals about the effects of media exposure and the mechanisms by which these effects occur. Professionals can then use this knowledge to promote health by educating families and policymakers, as well as by forming a more accurate assessment of children's health.

Hopefully, the age of technology will bring more than just increased exposure to potentially dangerous media. Technology may allow parents more ways to monitor their children's exposure to violent media, through parental control units, locks, or more sophisticated warning labels and prevention of underage purchases. Technology also may make media education more available to families by allowing health care practitioners a platform to conduct workshops, lead Internet chat rooms, or develop brochures to educate parents on the possible impacts of media exposure and alternative forms of entertainment for children. Through education and collaboration, families and health care practitioners can work together to maximize the positive impacts, and minimize the potential dangers, of technology in children's mental health and development.

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