

Playing violent video games, desensitization, and moral evaluation in children

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Abstract

Relationships between short- and long-term exposure to violent video games and desensitization, as measured through components of moral evaluation, were examined. Sixty-six children aged 5–12 years old completed questionnaires assessing video game experience and preferences and empathy and attitudes toward violence. The children played a violent or nonviolent video game and then responded to vignettes about everyday occurrences. Vignette responses were coded for aggression and empathy. Preexisting empathy and attitudes towards violence were positively related to the corresponding vignette scores. Long-term exposure to violent video games contributed to lower empathy vignette scores. Playing a violent versus a nonviolent game did not affect vignette responses. Results suggest that long-term exposure to violent video games may be associated with desensitization as reflected in lower empathy, although the direction of causality remains unclear.

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1. Introduction

Interactive media, such as video and computer games, have redefined children's leisure activities. These widely available games may be played on dedicated console systems, any computer and over the Internet, handheld devices, and various technology toys. The term *video game* will be used to refer to electronically controlled games played on any platform.

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Several recent reports confirm that video games have a significant presence in the lives of children and adolescents (Buchman & Funk, 1996; Gentile & Walsh, 2002; Roberts, Foehr, Rideout, & Brodie, 1999; Wright et al., 2001) and many of the most popular games contain violent content. For example, in one survey of fourth- through eighth-graders, children listed and categorized up to three favorite games using a system of definitions previously developed with input from children and adolescents (Buchman & Funk, 1996). Over half of the favorite games listed were categorized as having violent content, and across grades, both boys and girls preferred violent video games to games with other primary content. It has been suggested that playing violent video games may be harmful for some children, possibly resulting in desensitization to violence in real life and impairment in the process and outcome of moral evaluation (Funk, 2003; Funk, Bechtoldt, Pasold, & Baumgardner, in press). However, empirical data are lacking. The present study examined relationships between immediate and long-term exposure to violent video games and the key components and outcome of moral evaluation.

1.1. Research on the effects of playing violent video games

Although contemporary violent video games have not been well studied yet, some trends are emerging. The effects reported thus far appear to differ somewhat by age group and by whether short-term effects or long-term relationships are being assessed. For example, in one laboratory experiment with 4- to 6-year-olds, an increase in aggressive behavior was identified after children played a moderately violent video game (*Space Invaders*) for 6 minutes (Silvern & Williamson, 1987). In a more recent study, second-graders played either a martial arts or a motorcycle racing game (Irwin & Gross, 1995). Later, children who had played the violent game displayed more aggression than children who had played the racing game.

For somewhat older children, experimental results are less consistent. Working with third- and fourth-graders, Kirsh (1998) asked children to respond to stories describing common situations after playing a violent or nonviolent video game. Those who played the violent game were more likely to attribute negative intent to the actions of others. However, for a group of second through sixth-graders, no significant differences in the aggressive content of projective test responses or in willingness to help or hurt an unseen “child” were identified after participants played violent electronic games (Graybill, Strawniak, Hunter, & O’Leary, 1987). In another study, sixth- through eighth-grade boys played either a violent or nonviolent video game or completed a puzzle (Cohn, 1995). Game type did not produce different effects in the areas of behavioral aggression (delivering noxious feedback—noise—to an “opponent” during a game of *Battleship*) or projective aggression (as measured by the Multiple Adjective Checklist), arousal (as measured by heart rate), or desensitization (as measured by how long it took to seek help after a staged fight). However, Cohn reported that players with more *Mortal Kombat* experience were significantly more aggressive postplay than those with less *Mortal Kombat* experience.

Studies with adults highlight the importance of considering preexisting characteristics when evaluating short-term effects. Calvert and Tan (1994) compared the effects of playing

versus watching versus going through the motions of a violent virtual reality game. Prior to game playing, undergraduates completed a measure of trait hostility. Participants who played the violent game had increased physiological responses and aggressive thoughts compared to observers and simulation participants, independent of their scores on the measure of trait hostility. The researchers concluded that the experience of playing a violent virtual reality game has the potential to override even relatively stable personality characteristics, such as trait hostility. However, contradictory results were reported by [Scott \(1995\)](#), who presented a nonaggressive, a moderately aggressive, or a highly aggressive game to university students. Participants also completed questionnaires measuring hostile feelings and personality before and after game playing. Scott found no association between exposure to higher game violence and an increase in hostile feelings. His interpretation was that preexisting differences in hostility and aggressive personality tendencies were more important determinants of aggressive feelings, postplay, than the short-term exposure to violent video games.

Although findings are not completely consistent, the larger body of existing research on the short-term effects of playing violent video games suggests there is a relationship between exposure to violent video games and increased aggressive feelings, thoughts, and behaviors ([Anderson & Bushman, 2001](#)). In addition, there is a consensus that preexisting traits should be measured and considered in the evaluation and interpretation of experimental results.

Surveys, including self-report and reports from other observers, have been used to examine relationships between long-term exposure to video games and what are presumed to be enduring behavioral characteristics. Surveys of fourth- through eighth-graders examined relationships between a preference for violent games and several aspects of self-concept as measured by the age-appropriate Harter scale ([Funk & Buchman, 1996](#); [Funk, Buchman, & Germann, 2000](#)). A preference for violent games was associated with lower self-perceptions in several areas including self-esteem, behavioral conduct, social acceptance, and academic achievement. In a recent survey of fourth- and fifth-graders, relationships between exposure to violent video games and lower empathy, as well as stronger proviolence attitudes were identified ([Funk et al., in press](#)). [Roe and Muijs \(1998\)](#) reported that, in their sample of over 1000 Flemish fourth-graders, children who played more than 2 hours each day were more likely to rate themselves and to be rated by parents negatively on measures of academic achievement, self-esteem, and sociability. Across the video game literature, no studies that reported associations between exposure to violent video games and positive behaviors or personality characteristics were identified.

1.2. Desensitization, moral evaluation, and violent video games

Desensitization to violence is an often-cited negative outcome of exposure to violent media ([Bushman & Huesmann, 2001](#)). Desensitization has been defined as the attenuation or elimination of cognitive, emotional, and behavioral responses to a stimulus, which would normally elicit a significant response ([Rule & Ferguson, 1986](#)). One approach to establishing the condition of desensitization to violence is to examine the individual's capacity for moral evaluation. Moral evaluation is an automatic process that is triggered when the situation requires that certain normative beliefs guide behavioral choice ([Guerra, Huesmann, &](#)

Hanish, 1995). Moral evaluation of the appropriateness of aggressive behavior includes the social information processing stages as described by Dodge and Schwartz (1997). The individual must first selectively attend to and interpret the appropriate cues, then determine their goal for the situation and how to best attain that goal (Bijttebier, Vasey, & Braet, 2003; Dodge & Schwartz, 1997). Moral evaluation is also influenced by the individual's affective repertoire, including guilt and empathy. Soon after age 2, a child who deliberately hurts another child will then feel empathy and guilt in response to the injured child's pain (Feshbach, 1997; Hoffman, 2000). This occurs as a result of the feedback received from the injured child, in combination with developing normative beliefs and attitudes about the morality of aggression. In most cases, by the end of the elementary school years, moral evaluation is a fully internalized, essentially unconscious process, which is triggered when needed (Hoffman, 2000; Turiel, 1998). However, desensitization to the cognitive or affective cues that are necessary to initiate moral evaluation processes will allow actions to be taken without consideration of potential moral implications.

The possibility that exposure to violent video games will result in desensitization and subsequent impairment of the processes involved in the moral evaluation of aggression and violence has not yet been studied. However, violent video games condone, promote, and justify the use of violence while concealing realistic consequences. When playing a violent video game, the player first observes repeated demonstrations of violent actions. To succeed, the player must then identify and select the violent strategies built in by the game designers. Choosing not to apply the authorized violent tactics results in defeat or obliteration. Players who prudently choose violent strategies experience cycles of practice coupled with positive reinforcement for their astute decisions. In violent video games, violence is acceptable because it is not real; therefore, "victims" do not really suffer. In violent subcultures in the real world, dehumanizing victims is a commonly used technique for minimizing the activation of moral reasoning (Guerra, Nucci, & Huesmann, 1994). It has also been reported that the U.S. Army frequently uses violent video games to desensitize soldiers during training (Grossman, 1995). Recently, the army released a free online game to demonstrate all aspects of army life to potential recruits. *America's Army: Operations* is described on the website as "one of the largest and best first person shooter games" (see <http://www.americasarmy.com>). Both single and multiplayer options are available, and sufficiently skilled players can attend Sniper School. A companion game, *Soldiers*, will soon be available, also free of charge. The army recommends the game for individuals age 13 and older. Such developments make research on how playing violent video games may influence moral reasoning and cause desensitization even more critical.

1.3. Empathy and attitudes towards violence

Desensitization to violence involves changes in both emotional and cognitive responsivity. Changes in emotional responsivity are seen in the blunting or absence of emotional reactions to violent events, which would commonly elicit a strong response. Cognitive changes are demonstrated when the customary view that violence is uncommon and unlikely is transformed to the belief that violence is mundane and inevitable. Empathy and attitudes towards

violence are components of the process of moral evaluation that may reflect both emotional and cognitive desensitization, with empathy decreasing and proviolence attitudes being strengthened.

Empathy is one of the “self-conscious emotions” critical for moral evaluation (Eisenberg, 2000; Hoffman, 2000; Tangney & Fischer, 1995). Although there is some remaining theoretical controversy about the precise nature and development of empathy, there is agreement that empathic responding requires both cognitive (perspective-taking) and affective responsiveness to the perceived emotional state of another (Eisenberg & Fabes, 1998; Feshbach, 1997). Empathy develops in response to positive socialization experiences such as the opportunity to view empathic models and to experience feedback about behavioral choices (Eisenberg & Fabes, 1998; Feshbach, 1997). The experience and expression of empathy is influenced by both dispositional factors (the individual’s innate tendency to experience emotion) and by situational factors outside the individual, for example, the degree of affect being expressed by the other (Eisenberg, Wentzel, & Harris, 1998).

Once moral evaluation becomes internalized, empathy is needed to transform moral standards into “hot” or emotionally charged cognitions, which then influence behavior, the product of moral evaluation. In most cases, a positive relationship between empathy and prosocial behavior has been identified (Hastings, Zahn-Waxler, Robinson, Usher, & Bridges, 2000; Krevans & Gibbs, 1996; Miller & Eisenberg, 1988; Roberts & Strayer, 1996). Lower empathy has been associated with social maladjustment and aggression in youth (Cohen & Strayer, 1996). In another study, aggressive elementary school children showed less empathy than their nonaggressive peers (Boldizar, Perry, & Perry, 1989).

Relationships between video game playing and empathy were examined in two surveys. Sakamoto (1994) identified a negative relationship between simple frequency of video game use and empathy, as measured by an adaptation of Bryant’s (1982) scale for use with Japanese children, in fourth- through sixth-graders. Barnett et al. (1997) investigated game preference, self-esteem, and empathy in a survey of 15- to 19-year-olds. Although no significant relationships were found with self-esteem, adolescents whose favorite game was violent had lower empathy scores on the 7-item “fantasy empathy” subscale of the Interpersonal Reactivity Index.

Attitudes towards violence are another important component of the process of moral evaluation. Attitudes are a type of knowledge structure: coherent, experience-based mental structures that influence information processing and behavior (Dodge, 1993; Fabrigar, Smith, & Brannon, 1999). Attitude formation may occur as a result of purposeful information processing, as in jury deliberations, or automatically without conscious effort, for example, as a result of advertising (Wegner & Bargh, 1998). The formation of attitudes towards aggression and violence is influenced by many variables including parental attitudes, amount of exposure to violence, and social class (Rule & Ferguson, 1986; Vernberg, Jacobs, & Hershberger, 1999). Exposure to violence strengthens the attitude that, in certain situations, violence is an appropriate way to resolve conflict (Barkin, Kreiter, & DuRant, 2001). For example, Barkin et al. (2001) reported that adolescents with significant prior violence exposure felt completely justified in using violence (termed *moralistic violence*) to respond to a perceived assault on their honor.

Attitudes may directly influence social information processing because new data may be misperceived to better conform to preexisting attitudes. For example, hypervigilance to cues for threat increases the probability that an individual will attribute hostile intent to another when the situation is ambiguous (Dodge & Schwartz, 1997). Positive attitudes towards violence may encourage the evolution of hostile attributions into aggressive behavior, which may be considered a malfunction of the process of moral evaluation (Velicer, Huckel, & Hansen, 1989; Vernberg et al., 1999). Several researchers have reported that stronger proviolence attitudes in children and adolescents are associated with increased aggressive behavior (Cotten et al., 1994; Guerra & Slaby, 1990; Slaby & Guerra, 1988; Tolan, Guerra, & Kendall, 1995).

Exposure to violence in video games may influence the development of proviolence attitudes because, in such games, violence is not only justified and rewarded, it is presented as fun. In contemporary violent video games violence is at the same time both realistic and unreal, negating the suffering of victims. Playing violent video games encourages fantasizing about aggression and cognitive rehearsal of aggressive acts; this may not only strengthen proviolence attitudes but also, through cognitive priming, increase the accessibility of aggressive behaviors in real life (Eron, 2001). As yet, however, research examining relationships between exposure to violent video games and proviolence attitudes in children is very limited. In one survey of fourth- and fifth-graders, long-term exposure to video game violence predicted stronger proviolence attitudes on the Attitudes Towards Violence Scale, Child Version (ATVC; Funk et al., *in press*).

In another study, relationships between a preference for violent video games, attitudes towards violence, and empathy were examined by surveying 52 sixth-graders (Funk, Buchman, Schimming, & Hagan, 1998). Participants completed questionnaires including Bryant's Index of Empathy for Children and Adolescents (Bryant, 1982) and the adolescent version of the Attitudes Towards Violence Scale (Funk, Elliott, Urman, Flores, & Mock, 1999). Children also listed and categorized up to three favorite video games using the Funk and Buchman (1995) content categories. It was hypothesized that a stronger preference for violent games would be associated with lower empathy and stronger proviolence attitudes. Marginally significant relationships in the expected direction with small effect sizes were found. Children with both a high preference for violent games and high time commitment to playing demonstrated the lowest empathy. The results of these preliminary studies are intriguing, but the possibility remains that children with stronger proviolence attitudes and lower empathy may simply be drawn to violent video games. However, establishing direction may not be critical to evaluating the importance of the relationship because there is no theoretical or logical reason to believe that long-term exposure to violent video games will decrease proviolence attitudes or increase empathy.

1.4. Goals of the present study

Information is needed about whether or not exposure to violent video games causes desensitization to violence in children. Desensitization is a condition that can be understood by examining components of the process of moral evaluation, and its outcome. In the present research, we evaluated both short- and long-term exposure to violent video games. Short-term

effects were evaluated by examining differences in children's responses to vignettes portraying everyday experiences after playing a relatively violent or a nonviolent video game. We anticipated that children who played the violent game would give more aggressive and less empathic responses to the vignettes. Associations between long-term exposure to violent video games and moral evaluation were examined by determining the relationship between exposure to violent games, preexisting empathy and attitudes towards violence, and vignette responses. We anticipated that more exposure to violent games would be associated with less empathy and more aggression in vignette responses. We also anticipated that stronger preexisting proviolence attitudes would be associated with more aggression in vignette responses and that higher preexisting empathy would be associated with more empathy in vignette responses. Long-term relationships were expected to be stronger in older children who presumably would have greater video game violence exposure than younger children.

2. Method

2.1. Participants

Participants were thirty-five 8- to 12-year-olds ($M = 10.14$ years, $SD = 0.97$, 10 girls) and thirty-one 5- to 7-year-olds ($M = 5.61$, $SD = 0.62$, 17 girls). One younger boy's data were not included because his scores on the questionnaires were extreme outliers and he did not respond to some of vignette questions. Occupational codes from Nakao and Treas (1992), described by Entwisle and Astone (1994), were used to examine socioeconomic status. Ratings are provided for individual or combined parental occupation, with higher ratings indicating higher socioeconomic status. For example, physicians receive a score of 97.16, garbage collectors 24.62. In the present study, the mean combined parental occupational level was 54.74 (range = 24.78–97.16, $SD = 20.57$) for the older group and 43.67 (range = 24.62–85.05, $SD = 13.51$) for the younger group, suggesting that this was a socioeconomically diverse sample. Of the younger group, six children could not describe their parents' occupations, while all the older children were able to provide an occupation for each parent in the home or with whom they had regular contact. The older group was 20% African American, 65% European American, and 15% in other ethnic groups. Ethnicity for the younger group was 16% African American, 70% European American, 5% other ethnic groups, and not recorded for 9% of the younger children.

2.2. Measures

All children completed a background questionnaire reporting typical game-playing habits and listing and categorizing up to three favorite video or computer games using six content categories with definitions (educational, general entertainment, sports without violence, sports with violence, human violence, fantasy or cartoon violence) that were previously developed with the help of children and adolescents (Funk, 1993; Funk & Buchman, 1995). Habits reported included typical weekly playing time and length of time playing in months.

For typical weekly playing time, children chose one of six categories ranging from 0 (*no time*) to 5 (15 or more hours per week). Most children were assisted by an experimenter (all experimenters were female psychologists or clinical psychology graduate students); however, some of the older children chose to complete the questionnaire independently with the experimenter available to answer questions.

Next, the children completed questionnaires measuring attitudes towards violence and empathy, with the order of administration counterbalanced. The ATVC was in development at the time the older children were tested. This version consisted of 9 one-sentence items, 4 being reverse-scored. Examples include “Parents should tell their kids to fight if they have to” and “I think it’s too dangerous for people my age to carry guns.” This version demonstrated acceptable psychometric characteristics (Cronbach’s $\alpha = .78$), with one strong proviolence factor. The younger children completed a revised, 16-item version of ATVC (Funk, Elliott, Myers, et al., 2003). Based on the norm group of 728 fourth- through sixth-graders, the revised, published version has good psychometric characteristics (Cronbach’s $\alpha = .84$) and two factors that mirror the previously developed adolescent version (reactive violence: $\alpha = .79$ and culture of violence: $\alpha = .79$). For the present study group of 31 children, Cronbach’s α was .55. Examples of items added to the revised version include “Teenagers who are in gangs know what they are talking about” and “It’s ok to do whatever it takes to protect myself.” Both versions of the ATVC have four response choices, with values of one through four: “no,” “maybe,” “probably,” and “yes.” A total score is calculated across items (with some being reverse-scored), with higher scores indicating stronger proviolence attitudes.

Children also completed questionnaire measures of empathy. The older children completed the Index of Empathy for Children and Adolescents (Bryant, 1982). This is a widely used, 22-item, “yes/no” scale based on Mehrabian and Epstein’s (1972) adult measure. The possible range of scores is 0–22 with higher scores indicating higher empathy (some items are reverse-scored). Questions assess an individual’s response to typical situations that may prompt an empathic response: “I get upset when I see a boy being hurt”; “People who have no friends probably don’t want any.” Cronbach’s α coefficients were .79 for a sample of seventh-graders, and other psychometric properties were satisfactory (Bryant, 1982). This is a well-known instrument with good psychometric properties, although some wording is outdated and the measure has been criticized for item heterogeneity (Eisenberg & Strayer, 1987). The younger children completed the Children’s Empathy Questionnaire (CEQ), a 12-item measure of empathy in development for use with children ages 6–12 (Funk, Elliott, Pasold, & Tsavoussis, 2003). Questions address both cognitive and emotional aspects of empathy: “When I’m mean to someone, I usually feel bad about it later,” “It’s hard for me to understand what makes other kids upset.” This measure has the same four response choices as the ATVC, and a total score is calculated, with higher scores indicating higher empathy. The CEQ demonstrates acceptable psychometric characteristics with one strong empathy factor (Cronbach’s $\alpha = .77$) in the norm group of 722 children. In the present group, Cronbach’s α was .58.¹

¹ The CEQ is available from the corresponding author.

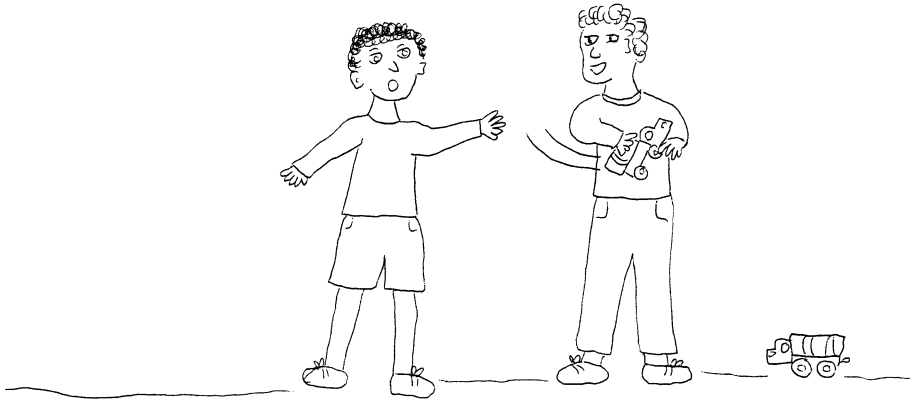


Fig. 1. Example of line drawing accompanying vignette (male Vignette 8).

To assess game effects, children were presented with 10 vignettes describing everyday situations after playing one of two video games. Four vignettes were designed with aggressive actions as a probable next occurrence, while six had empathic responses as likely happenings. Line drawings depicting each situation accompanied the verbal vignette description. To increase the probability that the child would identify with the situation, two sets of drawings were used so that situations could be gender-specific (see Fig. 1 for an example); names of main characters in the vignettes were also made gender-specific. The female versions of the vignette descriptions are presented in Table 1.

Table 1
Empathy and aggression vignettes (version for girls)

Empathy vignettes

1. Tammy is walking out on the playground for recess. She sees a new kid in her class crying at the side of the playground.
3. Nancy's friend trips and skins her knee on the playground.
5. The new kid Christine will lose recess for leaving a mess in the art center of the classroom. Joni sees what is happening.
6. Sally and Tracy are eating cookies from the cookie jar at Tracy's house. Tracy drops the lid and breaks it.
9. Peggy sees her next-door neighbor Mrs. Jones drop something out of her wheelchair.
10. Natalie sees a kid leave her necklace on the table at McDonald's.

Aggression vignettes

2. Julie always likes to start fights with other kids. One day she tries to start a fight with Susie.
4. Sharon is waiting in line for the slide at the Discovery Zone. A child pushes in front of her.
7. Trudy accidentally hits Kathy with a ball while playing on the playground.
8. During recess, Chris is playing with a new toy by herself. A kid comes over and takes the toy away from her.

Numbers indicate order in which items were read. Vignettes presented to boys used names to indicate male characters.

2.3. Procedure

Informed consent was obtained from parents or legal guardians for all participants. Each child also gave written consent. The older children were brought to the first author's university laboratory by their parents. Parents waited in a nearby room while the child completed the experiment. For the younger group, all procedures took place at the child's kindergarten or childcare center in a quiet room that was separated from the childcare group.

After completing the questionnaires, pulse rate was measured by a trained examiner using typical office techniques including a stopwatch. Pulse rate was used to provide a general measure of arousal for the younger group. Examiners were trained in this technique by a registered nurse. Next, both groups of children were instructed in, and then played, either a relatively nonviolent or relatively violent computer game for 15 minutes. The older children played either *Marble Drop* or *Terra Nova* on a Dell OptiPlex GXM 5133 desktop computer. *Marble Drop* is a nonviolent game in which the object is to place colored marbles into the correct chute so that they will line up in a predetermined order. Levers and other mechanisms controlling the path of the marble change as placements are made. The relatively violent game played by the older children was *Terra Nova*, in which the object is to defend a colony from invaders by maneuvering a plane and using various weapons while avoiding being blown up by the invaders. Children were instructed in the basic goals and game moves and given instruction sheets to help them remember key commands. They were asked about previous experience with their assigned game, but none was reported for either game. Then the experimenter went to an adjoining room while the children played the game for 15 minutes. Seventeen children played *Marble Drop* and 18 played *Terra Nova*.

The younger children played either *Croc: Legend of the Gobbos* or *Earthworm Jim: New Junk City* on a portable Dell Latitude computer. *Croc*, a cartoon-style crocodile, negotiates a series of fairly simple levels trying to save his friends, the Gobbos. *Croc* must avoid bumblebees and gather crystals. He primarily tries to avoid trouble, but can use his tail to ward off attack. *Croc* has no actual weapons. The goal of *Earthworm Jim* is to try and rescue a princess by moving through a dangerous junkyard. The character is a humanoid earthworm that has weapons, such as whips and guns, that are used to fight off attacks by various evil characters. Prior to game playing, the younger children were instructed in basic goals and game moves and questioned about previous experience with their assigned game (none was reported). Then their play was observed for 5 minutes and additional training was given if needed. The examiner moved to an adjoining room while the child played independently for 10 additional minutes. Fifteen children played *Croc* and 16 played *Earthworm Jim*. Immediately after game playing, the children's pulse rates were taken again and recorded.

Next, children in both age groups were asked to report how frustrating the game was on a scale of 1–10 with 10 being most frustrating. A visual aid consisting of a numbered horizontal line with a smiling line drawing face at one end and a frowning face at the other was used and children were asked to point to the place on the line that represented their

frustration level. Younger children were also asked to indicate how much they liked the game using a similar procedure.

Following these reports, a description of the vignette task was read to each child. This task involved responding to the 10 vignettes about common situations described above. After each vignette was read aloud, children were asked a series of questions: what happens next; a forced-choice response to two vignette-specific alternatives; and what would you do in the situation. Their responses were audiotaped and recorded in writing.

2.4. Coding

Psychology students (one senior undergraduate and one graduate student for each of two coding teams) were trained in a coding system developed by the first author. Coders were instructed to evaluate responses in terms of the concept of interest in the specific vignette (either aggression or empathy). Unrelated responses were given a score of 0. For example, one 5-year-old gave a response of “He’ll fall on a rock” to the first question in Vignette 1 (see new kid crying on the playground, what will happen next?), which the coders determined to be unrelated to empathy. Each vignette-relevant response was scored on a scale of 1–3, with 3 being either the *most aggressive* or *most empathic response*. The social acceptability of the response was also taken into consideration. Empathic responses were those that perceived and recognized the need to respond to distress portrayed in the vignette. More active helping responses received higher scores for empathy, as did responses that acknowledged the emotional state of the other child. For example, in Vignette 1 (see Table 1), for the younger group, a response of “He says, ‘Are you all right?’” received a score of 2, while a response “Nancy will help her friend” received a score of 3. For a child in the older group a score of 2 was given for “She will play with the kid,” while another child received a score of 3 for “He will cheer him up.”

Aggression was scored when the child’s response to aggression vignettes included either verbal or physical aggression (actions that had the intent to harm). For example, in Vignette 2 (see Table 1), one younger child responded, “They will fight each other and get mad.” This response received a score of 3 for aggression. A score of 1 was given for the response “He could ignore him or tell on him.” Longer, more complex responses were scored according to the following guidelines: If a response was one idea that the child developed over the course of the response, the last idea in the response was scored. If the response contained separate ideas, each idea was scored separately.

Reasonable developmental expectations for aggression and for empathy were taken into consideration by having one team of coders evaluate all the responses of the younger children and the other team evaluated all the older children’s responses. This allowed each team to develop a sense of the normative responses for their age group. All vignettes were scored by both coders in the coding team, with disagreements resolved by discussion and consensus. Intercoder reliability of 88% was attained for the coders assessing the older group. For the younger group, intercoder reliability for aggression and empathy vignette scores was 92%.

3. Results

3.1. Preliminary analyses

An alpha level of .05 was used for all statistical tests. Preliminary analyses were done to examine possible gender differences in game-playing habits, including both time spent playing in the average week and length of time the child had been playing video games. Since the children had indicated weekly time and length of time playing using ranges, the midpoint of each range was used in these analyses, with the exception of the highest category that was a single number (for time: 15 or more hours a week, for months: 24 or more). For the older girls, mean weekly playing time was 6.05 hours ($SD = 5.54$) and the mean length of time playing video games was 19.60 months ($SD = 9.29$). For the older boys, mean weekly playing time was 6.68 hours ($SD = 3.63$) and the mean length of time playing video games was 23.28 months ($SD = 1.99$). Within the older group, gender differences for both weekly play and length of time having played were nonsignificant. For the younger group, boys reported significantly more weekly playing time than girls, $t(29) = 2.78$, $p < .01$; girls: $M = 2.93$ hours, $SD = 2.79$; boys: $M = 6.56$ hours, $SD = 4.17$. Gender differences in the length of time younger children had been playing video games approached significance, $t(29) = 1.85$, $p = .08$; girls: $M = 12.43$ months, $SD = 7.34$; boys: $M = 17.47$ months, $SD = 7.74$.

Frustration scores were evaluated in relation to game played, gender, and type of vignette. No significant relationships were identified. For the younger group, no statistically significant difference was found in how much children liked the two games. Regarding their physiological response to the games, paired sample t test results indicated there was not a significant increase in pulse rate after game playing. There was also no difference in postplay pulse rate by game played.

Different questionnaires were used for each age group to measure preexisting empathy and attitudes towards violence, so for purposes of comparison, these scores were transformed into a single distribution with a mean of 50 and standard deviation of 15 and no negative scores. Means, standard deviations, and the range for questionnaire scores are presented by gender in Table 2.

A variable was created to estimate each child's total exposure to video game violence by multiplying the proportion of video game choices that the child categorized as violent by weekly time by length of exposure in months. Descriptive statistics for the exposure score are presented in Table 3 by gender and age group. A 2 (age) \times 2 (gender) analysis of variance applied to this violence-exposure score revealed that the age group difference approached significance, $F(1, 62) = 2.92$, $p = .09$, and differences for gender, $F(1, 62) = 0.3.95$, $p = .05$, and for the interaction between gender and age, $F(1, 62) = 3.95$, $p = .05$, attained the level of significance. Younger girls reported less exposure to video game violence than boys and older girls.

Correlations among major study variables are presented in Table 4. As expected, significant relationships were identified between age group and both aggression and empathy scores in response to the two types of vignettes. A negative association was identified between the attitude towards violence questionnaire and empathy questionnaire scores

Table 2

Means (and standard deviations) and ranges for empathy and attitudes towards violence (ATVC) questionnaire scores by gender and age group

Questionnaire	Child gender and age group					
	Older			Younger		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
<i>Boys</i>						
Empathy	50.09	(10.17)	28.3–71.2	54.28	(7.79)	38.9–65.0
ATVC	51.18	(9.91)	38.5–72.3	48.57	(8.02)	36.3–59.7
<i>Girls</i>						
Empathy	49.76	(10.11)	31.6–61.3	47.71	(9.77)	29.1–63.4
ATVC	47.06	(10.13)	38.5–77.6	50.07	(10.82)	34.8–75.2

Note. Older children completed Bryant's empathy measure and the 9-item Attitudes Towards Violence Scale. Younger children completed the CEQ and the 16-item ATVC.

assessed before video game play. Attitude towards violence questionnaire scores were positively correlated with scores for the aggression vignettes. There was also a significant correlation between gender and the violent video game exposure variable, with boys having greater exposure to violent video games.

3.2. Immediate effects of game playing

Mean (standard deviation) vignette scores are presented by game played and gender in Table 5. A 2 (age group) \times 2 (type of game: violent or nonviolent) multivariate analysis of variance was conducted on children scores in response to the empathy and aggression vignettes. There was no significant effect of type of game played on aggression or empathy scores, $F(2, 61) = 0.35, p > .05, \eta^2 = .01$, observed power = 0.10. Age group was significantly related to vignette scores, $F(2, 61) = 96.33, p < .00, \eta^2 = .76$, observed power = 1.0, with the older group having higher scores in response to both empathy, $F(1, 62) = 114.02, p < .00, \eta^2 = .65$, observed power = 1.00. and aggression vignettes, $F(1, 62) = 8.12, p < .01, \eta^2 = .17$, observed power = 0.80.

Table 3

Mean (and standard deviation) and range for estimated exposure to violent video games by gender and age groups

Age group	Child gender					
	Girls			Boys		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
Younger	3.84	(8.41)	0–27	96.87	113.25	0–300
Older	90.36	(117.48)	0–360	90.37	(84.83)	0–300

Note. Estimated exposure to violent video games was calculated by multiplying the proportion of video game choices that the child categorized as violent by weekly time by length of exposure in months.

Table 4

Correlations among child gender, age group, scores for the aggression and empathy vignettes, ATVC scores, CEQ scores, estimated prior exposure to violent video games, and type of game played

	1	2	3	4	5	6	7
1. Gender							
2. Age group	.17						
3. Aggression vignette	.03	-.34**					
4. Empathy vignette	-.15	-.80**	.01				
5. ATVC	-.14	-.03	.34**	-.14			
6. CEQ	.16	.04	-.23	.18	-.40**		
7. Exposure	-.27**	-.19	.11	-.00	.02	-.04	
8. Type of game	-.02	.00	-.04	-.04	.11	-.06	-.08

Note. Gender: 0=boys, 1=girls; age group: 0=older, 1=younger; type of game played: 0=nonviolent, 1=violent. ** $p < .01$.

3.3. Long-term effects of exposure to violent video games

Separate hierarchical multiple regression analyses were conducted to examine the relationship of empathy and attitudes towards violence scores obtained from prior questionnaires and exposure to violent video games to the vignette scores assessed following video play. We first constructed orthogonalized two- and three-way interaction variables using a partial Gram–Schmidt procedure (Burrill, 2003). We then tested a model predicting empathy vignette scores that included all the primary and interaction variables. Age group, transformed empathy questionnaire scores, and the exposure variable were entered in Step 1; the interactions between age group and empathy questionnaire scores, age group and exposure, and empathy questionnaire scores and exposure were entered in Step 2; and the interaction among age group, empathy questionnaire scores, and exposure was entered in Step 3. The three primary variables accounted for 72% of the variance in empathy vignette scores, $F(3, 62) = 51.65$, $p < .00$. The three variables representing the two-way interactions explained an additional 2% of

Table 5

Mean (and standard deviation) for empathy and aggression vignette scores by child gender, age group, and type of game played

Child gender	Type of game played and age group			
	Nonviolent		Violent	
	Older	Younger	Older	Younger
<i>Boys</i>				
Empathy	36.75 (3.42)	24.00 (7.26)	35.85 (2.88)	22.57 (7.89)
Aggression	12.92 (2.11)	11.29 (3.50)	12.46 (1.85)	11.14 (3.13)
<i>Girls</i>				
Empathy	34.80 (6.57)	23.63 (5.71)	36.80 (3.49)	22.56 (3.81)
Aggression	13.40 (2.97)	11.00 (3.38)	13.60 (2.51)	10.89 (2.76)

Note. Higher scores indicate more aggressive and more empathic responses.

the variance in the empathy vignette score over the three primary variables and the change in R was not significant, $F(3, 59) = 1.303, p > .05$. The three-way interaction explained an additional 0.5% of the variance in the empathy vignette score over the three primary variables and the three variables representing the two-way interactions. The change in R was not significant, $F(1, 58) = 1.169, p > .05$. Examining the t values, none of the interaction variables were significant predictors and therefore were not retained in the final model.

A priori, our theoretical model related to the three primary predictor variables suggested entering age group, empathy questionnaire scores, and the exposure variable sequentially in a hierarchical multiple regression. Regression analyses are presented in Table 6. In addition to the expected relations with age group, empathy questionnaire scores and exposure to video game violence were significant predictors of empathy vignette scores: Higher empathy questionnaire scores were related to higher empathy vignette scores and more exposure to video game violence was related to lower empathy vignette scores. In Step 1, age group accounted for 65% of the variance in empathy vignette scores, $F(1, 64) = 117.23, p < .00$. An analysis of observed power for Step 1 indicated 100% power to detect an R^2 of .65 attributed to one independent variable with an alpha of .05 with a sample size of 66. In Step 2, empathy questionnaire scores accounted for an additional 5% of the variance in empathy vignette scores over age group alone, $F(1, 63) = 9.23, p < .00$. An analysis of observed power for Step 2 indicates that a sample size of 66 achieved 86% power to detect a change in R^2 of .045 attributed to one variable, controlling for one additional variable with an R^2 of .65 with an alpha of .05. In Step 3, exposure to video game violence accounted for an additional 2% of the variance in empathy vignette scores over age group and empathy questionnaire scores, $F(1, 62) = 4.83, p < .05$. An analysis of observed power for Step 3 indicates that a sample size of 66 achieves power of 0.60 to detect a change in R^2 of .022 attributed to one variable, controlling for two additional variables with an R^2 of .69 with an alpha = .05.

In the second regression, we again constructed orthogonalized two- and three-way interaction variables using a partial Gram–Schmidt procedure (Burrill, 2003). We then tested

Table 6
Summary of hierarchical regression analysis for variables predicting children's empathy vignette scores

Variable	ΔR^2	B	$SE B$	β
<i>Step 1</i>				
Age group	.65	– 12.98	0.82	– .80***
<i>Step 2</i>				
Age group		– 13.10	1.13	– .81***
Empathy questions	.05	0.18	0.06	.21**
<i>Step 3</i>				
Age group		– 13.56	1.11	– .84***
Empathy questions		0.17	0.06	.21**
Estimated violence exposure	.02	– 0.01	0.01	– .15*

Note. Dummy coding was used to indicate age group membership with older = 0, younger = 1.

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

a model predicting aggression vignette scores that included all the primary and interaction variables. Age group, transformed attitudes towards violence questionnaire scores, and the exposure variable were entered as predictors in Step 1; the interactions between age group and attitudes towards violence questionnaire scores, age group and exposure, and attitudes towards violence questionnaire scores and exposure were entered in Step 2; and the interaction among age group, attitudes towards violence questionnaire score, and exposure was entered in Step 3. The three primary variables accounted for 22% of the variance in aggression vignette scores, $F(3, 62) = 5.93, p < .00$. The three variables representing the two-way interactions explained an additional 7% of the variance in the aggression vignette scores over the three primary variables and the change in R was not significant, $F(3, 59) = 1.303, p > .05$. The three-way interaction explained an additional 0.2% of the variance in the aggression vignette scores over the three primary variables and the three variables representing the two way interactions and the change in R was not significant, $F(1, 58) = 0.13, p > .05$. Examining the t values, none of the interaction variables were significant predictors of aggression scores from the vignettes and therefore were not retained in the final model.

A priori, our theoretical model related to the three primary predictor variables suggested entering age group, attitudes towards violence questionnaire scores, and the exposure variable sequentially in a hierarchical multiple regression. Regression analyses are presented in Table 7. Age group was again a significant predictor. Associations were also identified with attitudes towards violence scores, with higher scores being associated with higher aggression vignette scores. Exposure to video game violence was not significantly related to aggression vignette scores. In Step 1, age group accounted for 12% of the variance in aggression vignette scores, $F(1, 64) = 8.36, p < .00$. An analysis of observed power for Step 1 indicated that a sample size of 66 achieved 84% power to detect an R^2 of .11 attributed to one independent variable with an alpha of .05. In Step 2, attitudes towards violence questionnaire scores accounted for an additional 11% of the variance in aggression vignette scores over age group alone, $F(1, 63) = 8.57, p < .00$. An analysis of observed power for Step 2 indicates that a sample size of 66 achieves 86% power to detect a change in R^2 of .11 attributed to one

Table 7
Summary of hierarchical regression analysis for variables predicting children's aggression vignette scores

Variable	ΔR^2	B	$SE B$	β
<i>Step 1</i>				
Age group	.12	− 0.19	0.64	− .34*
<i>Step 2</i>				
Age group		− 1.79	0.61	− .33*
ATVC	.11	0.01	0.03	.33*
<i>Step 3</i>				
Age group		− 1.75	0.62	− .32*
ATVC		0.01	0.03	.33*
Estimated violence exposure	.00	0.00	0.00	.04

* $p < .01$.

variable, controlling for one additional variable with an R^2 of .12 with an alpha of .05. In Step 3, exposure to video game violence accounted for an additional 0.10% of the variance in aggression vignette scores over age group and attitudes towards violence scores, $F(1, 62) = 0.12, p > .05$. An analysis of observed power for Step 3 indicates that a sample size of 66 achieved 6% power to detect a change in R^2 of .001 attributed to one variable, controlling for two additional variables with an R^2 of .22 with an alpha of .05.

4. Discussion

The purpose of the present study was to examine whether playing violent video games would result in desensitization as reflected in key components of moral evaluation. Our hypotheses were partially confirmed: More long-term exposure to violent video games was associated with lower preexisting empathy and with lower scores on empathy vignettes. Age group was also important, with older children receiving significantly higher empathy and aggression vignette scores. There were, however, no short-term effects of playing a violent versus nonviolent game on vignette scores for aggression or empathy.

4.1. Long-term exposure to violent video games

The results of the present study indicate that, consistent with the results of some previous research with adults (Anderson & Dill, 2000; Scott, 1995), it is important to examine preexisting characteristics when studying the possible impact of playing video games. In the present study, preexisting empathy and attitudes towards violence, as measured by the children's questionnaire responses, were important contributors to children's responses to vignettes that presented opportunities for both empathic and aggressive responses. However, more reported previous exposure to video game violence was also associated with lower empathy in vignette responses, a possible indicator that playing violent video games may be associated with desensitization. The importance of the contribution of exposure to violent video games on children's empathic responding appears small relative to other predictors, but it is statistically significant and important. This finding is consistent with other recent survey research with fourth- and fifth-graders that identified long-term exposure to violent video games as a strong predictor of lower empathy (Funk et al., *in press*). These relationships do not establish causality, as desensitized children with lower empathy may simply be more drawn to violent games, or a third factor, such as suboptimal parenting practices, may be responsible for this relationship. Potential mediating relationships should also be considered. For example, children who seek highly arousing experiences may be especially drawn to playing violent video games. If, as hypothesized, such video play is desensitizing, then lower empathy would result over the long term in children without prior empathy deficits. In future research, children's arousal-seeking tendencies could be included in the model, and directly measured.

Vignettes were used to assess children's aggressive and empathic responses to make the findings as generalizable as possible. In other research on empathy, children are typically

asked how they are feeling after hearing about or viewing tapes of situations that sometimes quite dramatic. This approach seems likely to draw primarily from the emotional side of empathic responding. In future research, it may be useful to utilize outcome measures that are closer to children's real-life experiences so that the emotional aspects of empathic and aggressive responding could be better captured. In the present research, the vignette task was basically to predict the subsequent events and outcomes of situations all children experience, possibly tapping more into the cognitive dimension of empathic responding. Consistent with social information processing theory, children with greater exposure to video game violence may not attend to cues that trigger empathic responding, or may misinterpret such cues, suggesting desensitization.

Children's estimated exposure to video game violence was not associated with aggression vignette responses. Low power may have contributed to the failure to find a significant relationship here. Another possible explanation is that the aggression vignettes did not sufficiently prime cognitions associated with past exposure to video game violence. In a previously cited study, which also failed to find a short-term game effect, a relationship between longer-term exposure to a violent video game (*Mortal Kombat*) and behavioral aggression was reported (Cohn, 1995). It is clear that, for children, continued examination of potential relationships between longer-term exposure to violent video games and aggression is needed.

Age of the child was also a key variable in the long-term relationships observed between exposure to violent video games and vignette responses. In the younger age group, there were more "unrelated" responses to the vignettes. We acknowledge that the developmental level of verbal skills in the younger group may be a limiting factor. Younger children typically report less information in response to open-ended questions (Buck, Warren, Betman, & Brigham, 2002). Although coders were instructed to consider developmental level in evaluating responses, many responses simply did not relate to theme of the vignette. This remains a limitation of the present study. In addition to possible restrictions in their ability to articulate a response, as noted earlier, it is not until the end of the elementary school years that moral evaluation is a fully internalized process (Hoffman, 2000; Turiel, 1998). Therefore, the younger children may have simply had a lower capacity for verbally expressed empathic responding.

4.2. *Short-term exposure to violent versus nonviolent video games*

In the present study, a relatively brief period of playing either a violent or nonviolent game did not affect children's tendencies to respond in an empathic or aggressive manner to the vignettes. Although contrary to our prediction, present findings are consistent with some past results with child participants (Cohn, 1995; Graybill et al., 1987; Winkel, Novak, & Hopson, 1987), although inconsistent with others (Irwin & Gross, 1995; Kirsh, 1998; Silvern & Williamson, 1987). In retrospect, it may be unrealistic to expect to induce measurable effects on components of moral reasoning as a result of a relatively brief exposure to violent video games (although consistent with time spent in similar research). For ethical reasons, the violent content of the game chosen was relatively benign. Indeed, the violent games included in the present study included a prosocial element of rescuing, which may complicate the interpretation of the children's responses. However, many popular games include such justified

violence. In related media research, such content has been found to be associated with increased aggression (Paik & Comstock, 1994; Strasburger & Wilson, 2002). Future research should examine the potential moderating effects of such elements as justification for violence, degree of realism, and identification with the game characters. Although the violent and nonviolent games were clearly different in content, the level of violence in the violent games may not have been sufficient to elicit measurably different responses. These were not “first-person shooters” with unlimited blood and gore and may not have provided enough priming of aggressive cognitions to affect responses. It is also possible that some children may have entered the game-playing situation saturated by their exposure to violent video games, neutralizing immediate effects. In future research, assessing children’s perception of the content of various games would help to establish the presence or absence of prior desensitization.

The issue of power to find an effect must be considered. Although our sample size was comparable to other similar studies (see, for example, Irwin & Gross, 1995; Kirsh, 1998; Silvern & Williamson, 1987), power to find a difference by game played was very low. However, the small effect size calls into question the theoretical significance and practical implications of any difference that may be found with a larger sample size using the degree of violence in the present games. At present, the most viable explanation is that playing these particular games for a brief period had no differential effect on empathy and aggression as measured by vignette responses. In future research, increasing the potency of the violent stimulus may increase the likelihood of finding a significant game effect. It is important to bear in mind, however, that our other analyses did identify a long-term relationship between exposure to violent video games and lower empathy.

There is apparently more consistency in the results of studies of the effects of video game violence with adults than with children. Research with adults has not had the same ethical constraints in game choice and behavioral outcome measure as research with children, allowing for stronger manipulations. With careful selection procedures and debriefing, it may be acceptable to expose older children with prior exposure to violent video games to a stronger and more realistic level of game violence. As suggested above, children should first be evaluated for prior desensitization to violent content.

The possibility that social desirability may have influenced results should be considered. Social desirability pressures may have influenced some children’s responses; however, other children did give clearly socially undesirable responses, for example, some indicated they would take the toy that had been left behind for themselves (Vignette 10). In other studies of empathy, social desirability has not been found to have a major influence (Bryant, 1982; Strayer, 1993).

In the present study, different measures of attitudes towards violence and empathy were used for the two age groups. For attitudes towards violence, the measure for younger children was a logical developmental extension of the measure used with older children. For empathy, the Bryant measure and the in-development version of the CEQ are theoretically compatible and each was significantly negatively correlated with the respective measures of attitudes towards violence. In future research on violent video games, the use of up-to-date and psychometrically sound measures will continue to be crucial to determining potential relationships and effects.

Simply by virtue of their volunteering for the study, children in this sample may have differed from the general population in their involvement in video games. It is clear that the older girls were different from most their age in that their reported exposure to violent games was similar to the boys' previous exposure, an atypical finding. Again, the possible influence of prior desensitization to violent content must be raised.

4.3. Summary and conclusions

In summary, the present findings suggest that, over the long term, exposure to violent video games may be associated with lower empathy in some children, a possible indication of desensitization. In addition to these data, there is considerable theoretical reason to believe that playing violent video games is, at the very least, unlikely to enhance moral decision-making in children.

However, not all children who play violent video games demonstrate obvious negative impact. We have proposed that some children may be at higher risk for negative impact than others (Funk, 2003; Funk & Buchman, 1996). Research with adults has identified a stronger video game violence effect for individuals with more trait aggressiveness (Anderson & Dill, 2000). On a theoretical basis, vulnerable children may include those whose moral development is a work in progress or is already impaired: Younger children, bullies, and victims of bullies might be included in this group. In addition, children with problems in emotion regulation, those who are easily frustrated or who constantly seek stimulation, may also be more susceptible to negative effects from playing violent video games (Funk, 2003). Studies focusing on these theoretically vulnerable groups may help explain the inconsistencies in the present body of research on the effects of violent video games on children. In particular, longitudinal studies such as those that have been completed on the effects of televised violence (see for example, Huesmann, Moise-Titus, Podolski, & Eron, 2003) are needed to understand the cumulative effects of exposure to violent content in video games.

At this time, policy recommendations can be made at several levels. Parents are on the frontline and must carefully monitor children's leisure activities at least into early adolescence. They should be aware of the child's overt behavioral response to playing video games and take appropriate action when the impact is negative. To counter possible negative influence from playing violent video games, parents should have discussions with their children about the real-life consequences of aggressive actions, about the genuine suffering of victims of violence, and about their view of appropriate ways to resolve real-life conflict. The video game industry, specifically the Entertainment Software Review Board, should reevaluate the game rating system. In the present ratings system, many games rated E for "everyone" contain a surprising degree of violent actions. Given the increasingly sexual nature of some of the most popular violent video games, legally regulating children's access to such games, as has occurred in the state of Washington and is being considered in St. Louis (Associated Press, 2003) is now needed. The Federal Trade Commission should continue to carefully evaluate the need for federal regulation, both to regulate children's ability to purchase mature video games and to ensure that the industry's targeted advertising of violent video games is not aimed at children. Educational programs have been successful in changing

children's leisure activities, including playing video games (Robinson, Wilde, Navracruz, Haydel, & Varady, 2001). This has resulted in behavioral change including decreases in peer-rated aggression and decreases in observed verbal aggression. Such media literacy programs should be further developed and more widely disseminated.

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