# Media violence and children: A complete guide for parents and professionals

**Chapter**



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# Media Violence and Children

A COMPLETE GUIDE FOR PARENTS AND PROFESSIONALS

Edited by Douglas A. Gentile



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CHAPTER 7

# Violent Video Games: The Newest Media Violence Hazard

*Douglas A. Gentile and Craig A. Anderson*

In 1972, a new form of entertainment became commercially available with the release of the video game *Pong.* In *Pong,* two players tried to "hit" an electronic "ball" back and forth. From these humble beginnings, a revolution in the entertainment industry was born. Interactive game revenues are now significantly greater than the domestic film industry ("Industrial Strengths," 2000). Worldwide video games sales are now at $20 billion annually (Cohen, 2000). The PlayStation video game console, which began as a side project at Sony, now represents $6 billion of the company's $20 billion in annual sales (Cohen, 2000). It is reasonable to question whether video games may have similar effects to the effects of other entertainment media. In this chapter the term video game will be used to describe games played on video game consoles (e.g., PlayStation), on computers, or on hand-held video game devices (e.g., GameBoy).

## TIME SPENT WITH VIDEO GAMES

Video games have become one of the dominant entertainment media for children in a very short time. In the mid-1980s, children averaged about four hours a week playing video games, including time spent playing at home and in arcades (Harris & 'Williams, 1985). By the early 1990s, home video game use had increased and arcade play had decreased. The average amount was still fairly low, averaging about two hours of home play per week for girls, and about four hours of home play per week for boys (Funk, 1993). By the mid 1990s, home use had increased for fourth grade girls to 4.5 hours per week, and to 7.1 hours per week for fourth grade boys (Buchman & Funk,

1996). In recent national surveys of parents, school-age children (boys and girls combined) devote an average of about seven hours per week playing video games (Gentile & Walsh, 2002; Woodard & Gridina, 2000). In a recent survey of over 600 eighth and ninth grade students, children averaged 9 hours per week of video game play overall, with boys averaging 13 hours per week and girls averaging 5 hours per week (Gentile, Lynch, Linder, & Walsh, in press). Thus, while sex-correlated differences in the amount of time committed to playing video games continue to exist, the rising tide has floated all boats.

Even very young children are playing video games. Gentile & Walsh (2002) found that children aged two to seven play an average of 43 minutes per day (by parent report), and Woodard and Gridina (2000) found that even preschoolers aged two to five average 28 minutes of video game play per day. Although few studies have documented how the amount of time devoted to playing video games changes with development, some studies have suggested that video game play may peak in early school-age children. Buchman & Funk (1996) found the amount of time was highest for fourth grade children and decreased steadily through eighth grade. Others have suggested that play is highest between ages 9 and 12, decreases between ages 12 and 14, and increases again between ages 15 and 18 (Keller, 1992). Surprisingly, the amount of time children devote to television has remained remarkably stable even as the amount of time devoted to video and computer games has increased.

Although the research evidence is still limited, amount of video game play has been linked with a number of risk factors for maladaptive development, including smoking (Kasper, Welsh, & Chambliss, 1999), obesity (Berkey et al., 2000; Subrahmanyam, Kraut, Greenfield, & Gross, 2000), and poorer academic performance (e.g., Anderson & Dill, 2000; Creasey & Myers, 1986; Harris & 'Williams, 1985; Lieberman, Chaffee, & Roberts, 1988; Gentile et al., in press; Roberts, Foehr, Rideout, & Brodie, 1999; Van Schie & Wiegman, 1997; Walsh, 2000). These results parallel those showing that greater use of television is correlated with poorer grades in school (e.g., Huston et al., 1992; Roberts, Foehr, Rideout, & Brodie, 1999; 'Williams, Haertel, Haertel, & Walberg, 1982).

In one study of eighth and ninth grade students (Gentile et al., in press), lower grades were associated both with more years of video game play and more hours played each week (by self-report). Path analyses showed a significant effect of amount of video game play on school performance, but no specific effect of violent game content on school performance. However, violent content showed an independent significant effect on aggressive behavior. This analysis lends support for considering amount of game play and content of game play as two independent potential risk factors for children.

### Preferences for Violent Video Games

Although video games are designed to be entertaining, challenging, and sometimes educational, most include violent content. Recent content analyses



of video games show that as many as 89 percent of games contain some violent content (Children Now, 2001), and that about half of the games include violent content toward other game characters that would result in serious injuries or death (Children Now, 2001; Dietz, 1998; Dill, Gentile, Richter, & Dill, 2001).

Many children prefer to play violent games. Of course, what constitutes a "violent" game varies depending upon who is classifying them. The video game industry and its ratings board (Entertainment Software Rating Board) claim to see much less violence in their games than do parents (Walsh & Gentile, 2001) and other researchers (Thompson & Haninger, 2001). Even within the research community there is some inconsistency in definition of what constitutes a violent video game. Generally, however, researchers consider as "violent" those games in which the player can harm other characters in the game. In many popular video games, harming other characters is the main activity. It is these games, in which killing occurs at a high rate, that are of most concern to media violence researchers, child advocacy groups, and parents. (See Appendix A for recent recommendations regarding features of violent video games.) In studies of fourth through eighth grade children, more than half of the children state preferences for games in which the main action is predominantly human violence or fantasy violence (Buchman & Funk, 1996; Funk, 1993). In surveys of children and their parents, about two-thirds of children named violent games as their favorites. Only about one-third of parents were able to correctly name their child's favorite game, and in 70 percent of the incorrect matches, children described their favorite game as violent (Funk, Hagan, & Schimming, 1999). A preference for violent games has been linked with hostile attribution biases, increased arguments with teachers, lower self-perceptions of behavioral conduct, and increased physical fights (Bushman & Anderson, 2002; Funk, Buchman, & Germann, 2000; Lynch, Gentile, Olson, & van Brederode, 2001).

## POTENTIAL FOR EFFECTS OF PLAYING VIOLENT VIDEO GAMES

There have been over 280 independent tests involving over 51,000 participants of the effects of violent media on aggression (Anderson & Bushman, 2002b). The vast majority of these studies have focused on television and movies. Meta-analyses (studies that measure the effects across many studies) have shown four main effects of watching a lot of violent entertainment. These effects have been called the *aggressor effect,* the *victim effect,* the *bystander effect,* and the *appetite effect* (Donnerstein, Slaby, & Eron, 1994). To summarize each:

The *aggressor effect* states that people (both children and adults) exposed to a lot of violent entertainment tend to become meaner, more aggressive, and more violent.

The *victim effect* states that people (both children and adults) exposed to a lot of violent entertainment tend to see the world as a scarier place, become more scared, and initiate more self-protective behaviors (such as carrying guns to school, which, ironically, *increases* one's odds of getting shot).

The *bystander effect* states that people (both children and adults) exposed to a lot of violent entertainment tend to become more desensitized to violence (both in the media and in real life), more callous, and less sympathetic to victims of violence.

The *appetite effect* states that people (both children and adults) exposed to a lot of violent entertainment tend to get an increased appetite for seeing more violent entertainment. Simply put, the more one watches, the more one wants to watch.

The scientific debate over *whether* media violence has an effect is basically over, and should have been over by 1975 (Bushman & Anderson, 2001). The four effects described above have been demonstrated repeatedly (see Stras-. burger & Wilson, this volume). Heavy diets of violent television and movies clearly have a detrimental effect on children. Given the increasing amount of time children play video games and the preferences many children have for playing violent video games, researchers have begun to study whether violent video games have similar effects.

## WHY VIOLENT VIDEO GAMES MAY HAVE LESS EFFECT THAN VIOLENT TV

Some have suggested that the effects of playing violent video games may be weaker than the effects of viewing violent television. Three arguments have been postulated. First, the graphic quality of video games is much poorer and less realistic than on television (e.g., Silvern & 'Williamson, 1987). Research on violent television has shown that children are more likely to be affected and more likely to imitate aggressive acts if the violence is depicted more realistically (Potter, 1999). To the extent that video game graphics are of poor quality or are cartoonish, we might expect them to have less impact on children's aggression. Second, some of the "violent" actions in video games are abstract and are therefore not easily imitated. For example, games that include shooting at space ships (e.g., *Galaxian, Space Invaders)* or shooting at incoming missiles to protect your cities (e.g., *Missile Command)* model behaviors that are difficult to imitate in everyday life. Third, many games involve violence against creatures that are not human (e.g., space aliens, robots, etc.) or are unrealistic humanoids (e.g., zombies).

However, even though some research suggests that realism can increase the negative effects of media violence, the research literature on this issue is not very strong. In fact, many IV and movie violence studies have shown that cartoonish, unrealistic characters can increase children's and adults' aggression (e.g., Kotler & Calvert, chapter 9, this volume). And, as will be seen shortly,



although these three arguments are reasonable, they have become less relevant as video games have become more graphically realistic and involve more imitatable forms of violence directed against realistic human characters.

## WHY VIOLENT VIDEO GAMES MAY HAVE A GREATER EFFECT THAN VIOLENT TV

The public health community has concluded from the preponderance of evidence that violent television leads to "increases in aggressive attitudes, values, and behavior, particularly in children" (AAP, APA, AACAP, & AMA, 2000). Although the research on violent video games is still growing, there are at least six reasons why we should expect violent video games to have an even greater impact than violent television (Anderson & Dill, 2000; Gentile & Walsh, 2002). These reasons are based on what we already know from the television and educational literatures.

1. *Identification with an aggressor increases imitation of the aggressor.* It is known from research on violent television that children *will* imitate aggressive actions more readily if they identify with an aggressive character in some way. On television, it is hard to predict with which characters, if any, a person will identify. One might identify most closely with the victim, in which case the viewer would be less likely to be aggressive after watching. In many violent video games, however, one is required to take the point of view of one particular character. This is most noticeable in "first-person shooter" games, in which the players "see" what their character would see as if they were inside the video game. Thus, the player is forced to identify with a violent character. In fact, in many games, players have a choice of characters to play and can upload photographs of their faces onto their character. This identification with the aggressive character is likely to increase the likelihood of imitating the aggressive acts.
2. *Active participation increases learning.* Research on learning shows that when one becomes actively involved in something, one learns much more than if one only watches it. This is one reason computer technology in the classroom has been considered to be educationally beneficial. Educational video games are theorized to be effective partly because they require active participation. With regard to violent entertainment, viewers of violent content on television are passive observers of the aggressive acts. In contrast, violent video games by their very nature require active participation in the violent acts.
3. *Practicing an entire behavioral sequence is more effective than practicing only a part.* If one wanted to learn how to kill someone, one would quickly realize that there are many steps involved. At a minimum, one needs to decide whom to kill, get a weapon, get ammunition, load the weapon, stalk the victim, aim the weapon, and pull the trigger. It is rare for television shows or movies to display all of these steps. Yet, violent video games regularly require players to practice each of these steps repeatedly. This helps teach the necessary steps to commit a successful act of aggression. In fact, some video games are so successful at training whole sequences of aggressive behaviors that the U.S. Army has licensed them to train their forces.

For example, the popular violent video game series *Rainbow Six is so* good at teaching all of the steps necessary to plan and conduct a successful special operations mission that the U.S. Army has licensed the game engine to train their special operations soldiers (Ubi Soft, 2001). Furthermore, the U.S. Army has created their own violent video game as a recruitment tool (Associated Press, 2002).

4. *Violence is continuous.* Research with violent television and movies has shown that the effects on viewers are greater if the violence is unrelieved and uninterrupted (Paik & Comstock, 1994; Donnerstein, Slaby, & Eron, 1994). However, in both television programs and movies, violent content is rarely sustained for more than a few minutes before changing pace, changing scenes, or going to commercials. In contrast, the violence in violent video games is often continuous. Players must constantly be alert for hostile enemies, and must constantly choose and enact aggressive behaviors. These behaviors expose players to a continual stream of violent (and often gory) scenes accompanied by screams of pain and suffering in a context that is incompatible with feelings of empathy or guilt.
5. *Repetition increases learning*. If one wishes to learn a new phone number by memory, one often will repeat it over and over to aid memory. This simple mnemonic device has been shown to be an effective learning technique. With few exceptions (e.g., *Blue's Clues),* children rarely see the same television shows over and over. In a violent video game, however, players often spend a great deal of time doing the same aggressive actions, (e.g., shooting things) over and over. Furthermore, the games are usually played repeatedly, thus giving a great deal of practice repeating the violent game actions. This increases the odds that not only will children learn from them, but they will make these actions habitual to the point of automaticity.
6. *Rewards increase imitation. There are* at least three different processes involved. First, rewarding aggressive behavior in a video game (e.g., winning extra points and lives) increases the frequency of behaving aggressively in that game (see number *5,* above). Second, rewarding aggressive behavior in a video game teaches more positive attitudes toward the use of force as a means of solving conflicts. Television programs rarely provide a reward structure for the viewer, and it would be rarer still to have those rewards dependent on violent acts. In contrast, video games often reward players for participating. Third, the reward patterns involved in video games increase the player's motivation to persist at the game. Interestingly, all three of these processes help educational games be more effective. The last process can make the games somewhat addictive.

## THE EFFECTS OF VIOLENT VIDEO GAMES

Over the past 20 years, a number of scholars have expressed concern over the potential negative impact of exposing youth to violent video games (e.g., Dominick, 1984; Kestenbaum & Weinstein, 1985). The first comprehensive narrative review (Dill & Dill, 1998) found evidence that such concern was warranted, but also noted that there were a number of weaknesses and gaps in the extant research. One problem in summarizing the results of existing video game studies is that they are sometimes hard to interpret in an environment that is continually evolving in terms of violent content. In order to compare the violence in video games from different studies, it is useful to understand how violence in video games has changed with time.



## A BRIEF HISTORY OF VIOLENT VIDEO GAMES

The very first "violent" video game, *Death Race,* was released in 1976 by Exidy Games. It was a free-standing, driving simulator arcade game. In it, one attempted to drive a "car" over little stick figures that ran around. When hit by the car, the stick figures would turn into tiny gravestones with crosses.

> Every time you made a hit, a little cross would appear on the monitor, signifying a grave. Nice game. Fun. Bottom line, the game really took off when TV stations started to get some complaints from irate parents that this was a terrible example to set for children. The industry got a lot of coast-to-coast coverage during news programs. The end result was that Exidy sales doubled or quadrupled. (Eddie Adlum, publisher of *RePlay Magazine,* cited in Kent, 2001, p. 91)

In order to compare the violence in video games from different studies, it is useful to partition the console gaming history into three distinct eras.[1] We focus on console systems because of their dominance of the video game industry and widespread use by children. The first era (1977-1985) was dominated by Atari, the second (198 5-1995) was dominated by Nintendo, and the third (1995-present) has been dominated by Sony (although at the time of this writing it may be changing). Throughout the Atari era, the graphic capability of games was very simplistic, to the point that video game violence was largely abstract (Dill & Dill, 1998). "The protagonist in many video games is a computer-generated blip on the screen under the control of the player" (Cooper & Mackie, 1986). In 1984, Dominick commented, "video game violence is abstract and generally consists of blasting spaceships of stylized aliens into smithereens. Rarely does it involve one human being doing violence to another" (p. 138).

According to Nolan Bushnell, founder of Atari, this was no accident. "We [Atari] had an internal rule that we wouldn't allow violence against people. You could blow up a tank or you could blow up a flying saucer, but you couldn't blow up people. We felt that was not good form, and we adhered to that all during my tenure" (Kent, 2001, P. 92).

The Nintendo era (1985-1995) began with the release of the Nintendo Entertainment System MS) in America. Nintendo publicly listed insufficiencies of older game systems such as Atari, including limited graphics, few colors, and poor audio qualities. Nintendo improved the graphic and audio capabilities of home console systems. This era was one of experimentation with what the public wanted and would accept in video games. Although Nintendo targeted younger children as their core audience, violent taboos

were tested one by one. Gradually it became clear that games sold better if they contained more violence. One-on-one fighting games such as *Double Dragon* and *Mortal Kombat* became all-lime bestsellers while pushing the boundaries of violence. During this era, Nintendo sold over one billion video games, and by 1995 Nintendo had placed an NES in over 40 percent of American homes ("Nintendo sells one billionth video game," 1995). The violence in the games was still fairly stylized, although it began to become more realistic. In 1992, *Wolfenstein 3D,* the first "first-person shooter" game, was released. In a first-person shooter, one "sees" the action as if one was holding the gun, rather than seeing it as if looking on from afar (as in almost all of the previous fighting games). One could move around exploring a three-dimensional environment and shooting at various game characters. The effect is to make the game player feel as if he is in the game-that he is the one fighting. This additional realism was followed by other realistic touches. Video game historian Steven Kent noted that "part of *Wolfenstein's* popularity sprang from its shock value. In previous games, when players shot enemies, the injured targets fell and disappeared. In *Wolfenstein 3D,* enemies fell and bled on the floor" (Kent, 2001, p. 458). This caused a revolution in the way violent games were designed. By 1993, the next major first-person shooter, *Doom,* included more blood and gore, and also allowed players to hunt and kill each other rather than attacking monsters and demons.

The Sony era (1995-present) began with the release of the Sony PlayStation. The PlayStation revolutionized the gaming industry by increasing the graphic capability of games, switching from a cartridge-based system to a CD-based system. With CD technology, PlayStation games were able to deliver fast video game action as well as motion-picture-quality prerendered screens. Sony targeted adults as their main audience, in a move that caused the children who grew up during the Nintendo era to switch to PlayStation as adults.

The advances in technology over the past few years have been remarkable. Electronic game images are composed of polygons, making polygons/second a good measure of graphic quality. The original Sony PlayStation processed 350,000 polygons per second (pg/s). Sega's Dreamcast, released in 1999, boosted that to over 3 million, and PlayStation 2 rocketed to 66 million pg/s. Microsoft's Xbox, released in 2001, increased graphic capability to 125 million pg/s. The stated goal for PlayStation 3 is 1 billion pg/s. The dramatic increase in speed and graphic capability has allowed for more realistic violence than ever before possible. For example, in 2000, the game *Soldier of Fortune* was released for personal computers, marking an all-time high in video game violence realism. This first-person shooter game was designed in collaboration with an ex-army colonel, and features 26 different "killing zones" in the body. The characters in the game respond realistically to different shots depending on where in the body they are shot, with what weapons, and from what distance. For example, shooting a character in the arm at close range with a shotgun rips the arm from the socket leaving exposed bone and sinew while blood rushes from the wound.



These changes in technology likely produced changes in the nature of empirical studies of violent video game effects across time. Consider the first experimental studies, in which participants played either a randomly assigned violent or nonviolent video game and then engaged in some task that allowed a measure of aggression to be obtained. The difference between the treatment condition (violent game) and the control condition (nonviolent game) was likely to be relatively small in early studies, mainly because the early violent video games were not very violent. Now consider correlational studies, in which video game habits and aggressive behavior habits of participants are simultaneously measured and compared. In early studies of this type, participants who preferred violent video games and those who preferred to play nonviolent games likely had fairly similar video game experiences because there weren't any extremely violent games available. Thus, in both types of studies, early studies probably had pretty small differences in the independent variable of interest (i.e., amount of exposure to video game violence) and therefore might have discovered fairly weak effects. In a later section, we present two somewhat different ways of addressing this potential problem in the analysis of what the video game research literature shows. First, we take a look at the most comprehensive meta-analytic summary of video game research.

## META-ANALYTIC SUMMARY OF VIOLENT VIDEO GAME EFFECTS

Narrative reviews of a research literature, such as that by Dill and Dill (1998), are very useful ways of examining prior studies. Typically, the researchers try to find an organizing scheme that makes sense of the varied results that typically occur in any research domain. However, as useful as such reviews of the literature are, meta-analyses (studies of studies) are a much more powerful technique to find the common effects of violent video games across multiple studies (see chapter 11). Specifically, a meta-analysis uses statistical techniques to combine the results of various studies of the same basic hypothesis, and provides an objective answer to the questions of whether or not the key independent variable has a reliable effect on the key dependent variable, and if so, what the magnitude of that effect is. Only recently have there been enough studies on violent video games to make meta-analysis a useful technique. In 2001, the first comprehensive meta-analysis of the effects of violent video games was conducted (Anderson & Bushman, 2001). A more recent update to that meta-analysis produced the same basic findings (Anderson, 2003a). A consistent pattern of the effects of playing violent games was documented in five areas.

*1. Playing violent video games increases physiological arousal.* Studies measuring the effects of playing violent video games tend to show larger increases in heart rate and systolic and diastolic blood pressure compared to playing nonviolent video games (e.g., Gwinup, Haw, & Elias, 1983; Murphy, Alpert, & Walker, 1992; Segal & Dietz, 1991). The average effect size across studies between violent game play and physiological arousal was 0.22[2] (Anderson & Bushman, 2001). For example, Ballard and West (1996) showed that a violent game *(Mortal Kombat* with *the blood* "turned on") resulted in higher systolic blood pressure responses than either a nonviolent game or a less graphically violent game *(Mortal Kombat* with the blood "turned off").

Other physiological reactions have also been found. Adult males' brains have been shown to release dopamine in response to playing a violent video game (Koepp et al., 1998). In addition, Lynch (1994, 1999) has found that the physiological effects of playing violent video games may be, even greater for children who already show more aggressive tendencies. Adolescents who scored in the top quintile for trait hostility, measured by the Cook and Medley (1954) scale, showed greater increases in heart rate, blood pressure, and epinephrine and testosterone levels in the blood. There were also trends for increased levels of norepinephrine and cortisol in the blood for the higher hostile children. This interaction with trait hostility is important, because it suggests that the harmful effects of playing violent games may be even greater for children who are already at higher risk for aggressive behavior.

*2. Playing violent video games increases aggressive cognitions.* Studies measuring cognitive responses to playing violent video games have shown that aggressive thoughts are increased compared to playing nonviolent video games (e.g., Anderson & Dill, 2000; Calvert & Tan, 1994; Graybill, Kirsch, & Esselman, 1985; Kirsh, 1998; Lynch et a!., 2001). The average effect size across studies between violent game play and aggressive cognitions was 0.27 (Anderson & Bushman, 2001). These effects have been found in children and adults, in males and females, and in experimental and nonexperimental studies.

Aggressive cognitions have been measured in several ways. For example, Anderson and Dill (2000) found that playing a violent game primed aggressive thoughts, as measured by the relative speed with which players could read aggression-related words. Calvert and Tan (1994) asked adults about their thoughts after they had played a violent virtual reality game, and found that they had more aggressive thoughts than control subjects.

Studies of children's social information processing have shown that playing violent games increases children's hostile attribution biases. Kirsh (1998), in an experimental study, had third and fourth grade children play either a violent video game or a nonviolent video game. Children were then presented with stories in which a same-sex peer caused a negative event to occur, but where the peer's intent was ambiguous. Children who had played a violent video game gave responses attributing greater aggressive intent to the peer (i.e., they had higher attribution biases) than children who played the nonviolent



game, and they also were more likely to suggest retaliation. In a correlational study, young adolescents who exposed themselves to more violent games also had higher hostile attribution biases (Lynch et al., 2001). Hostile attribution bias is important because children who have this social problem-solving deficit are also more likely to act aggressively, and are likely to be socially maladjusted (Crick & Dodge, 1994). Along these same lines, Bushman and Anderson (2002) showed that young adults who had just played a violent video game generated more aggressive endings to story stems than those who had played nonviolent video games.

3. *Playing violent video games increases aggressive emotions.* Studies measuring emotional responses to playing violent video games have shown that aggressive emotions are increased compared to playing nonviolent video games. The average effect size across studies between violent game play and aggressive emotions was 0.18 (Anderson & Bushman, 2001). These effects have been found in children and adults, in males and females, and in experimental and nonexperimental studies. In one study, adults' state hostility and anxiety levels were increased after playing a violent game compared to controls (Anderson & Ford, 1986). In a study of third through fifth grade children, playing a violent game increased frustration levels more than playing a nonviolent game (Funk et al., 1999).

*4. Playing violent video games increases aggressive behaviors.* Studies measuring aggressive behaviors after playing violent video games have shown that aggressive behaviors are increased compared to playing nonviolent video games (e.g., Anderson & Dill, 2000; Cooper & Mackie, 1986; Irwin & Gross, 1995; Lynch et al., 2001; Schutte, Malouff Post-Gorden, & Rodasta, 1988; Silvern & 'Williamson, 1987). The average effect size across studies between violent game play and aggressive behaviors was 0.19 (Anderson & Bushman, 2001). These effects have been found in children and adults, in males and females, and in experimental and nonexperimental studies.

In studies of children aged four through seven, violent game play has increased both aggressive play with objects and aggressive behaviors toward peers (e.g., Schutte et al., 1988; Silvern & 'Williamson, 1987). Studies with elementary school-age children have found similar effects. For example, in a study of second grade boys, those who played a violent video game were more likely than those who played a nonviolent game to be both verbally and physically aggressive toward peers in a free-play setting and a frustrating task setting (Irwin & Gross, 1995). Neither arousal nor impulsivity moderated the effects.

In a correlational study, young adolescents who played more violent video games reported getting into arguments with teachers more frequently and were also more likely to become involved in physical fights (Gentile et al., in press). Exposure to violent video games was a significant predictor of physical fights, even when subject sex, hostility, and weekly amount of video game play were statistically controlled.

*5. Playing violent video games decreases prosocial behaviors.* Studies measuring responses to playing violent video games have shown that prosocial behaviors are decreased compared to playing nonviolent video games (e.g., Ballard & Lineberger, 1999; Chambers & Ascione, 1987; Silvern & Williamson, 1987; Wiegman & Van Schie, 1998). The average effect size across studies between violent game play and prosocial behaviors was - 0.16 (Anderson & Bushman, 2001). These effects have been found in both experimental and nonexperimental studies. In one study of 278 seventh and eighth graders, children who named violent games as their favorite games to play were rated by their peers as exhibiting fewer prosocial behaviors and more aggressive behaviors in the classroom (Wiegman & Van Schie, 1998).

## CHANGES ACROSS TIME

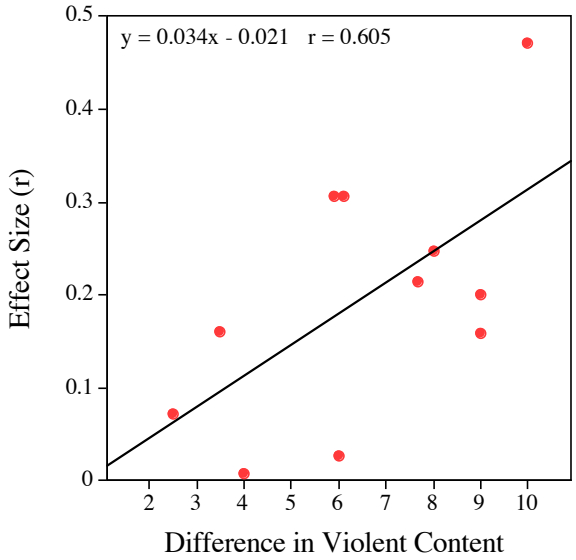
As previously mentioned, early studies of violent video games probably tended to compare mildly violent games to nonviolent ones, resulting in relatively small effects, whereas later studies may yield somewhat larger effects because "violent" games have gotten much more violent. Anderson and Bushman (2001) did not find a significant time trend in their meta-analysis, but the small number of studies may well have hindered finding statistical significance. In this section we examine this question in two different exploratory approaches, one for experimental studies and one for correlational ones.

*Experimental studies.* The real question of interest is whether studies using video game stimuli that differ greatly in violent content tend to yield larger effect sizes than those using stimuli that don't differ much in violent content. For experimental studies, in which we know what game was used in each condition, the best way to address this question is to create a rating scale to assess the amount of violence in treatment (violent) and control (nonviolent) games. Then, for each study, one can assess the magnitude of the violent content difference between the violent and nonviolent conditions. Across experimental studies, we can then see if there is a correlation between the violent content difference and the size of the violent versus nonviolent condition effect on aggressive behavior. Figure 7.1 displays the results of such an analysis (Anderson, 2002). It reveals that, indeed, studies that have a more powerful manipulation of violent content tend to produce bigger effects on aggressive behavior.

*Correlational studies.* One cannot do such a direct analysis of the violent content differences between violent and nonviolent video games played by participants in correlational studies, simply because such studies typically do not identify (or report) what games each participant most frequently plays. However, we know that video games have become much more violent over time, so one way to address this question for correlational studies is to see whether the effect sizes tend to be larger in the later studies. Figure 7.2 presents the results of such an analysis. As can be seen, there is a positive correlation between year and magnitude of effect size. Of course, there may well



Figure 7.1
Relation between the Violent Content Difference of Violent and Nonviolent Video Game Conditions and Effect on Aggressive Behavior: Experimental Studies




Source: Anderson (2002).

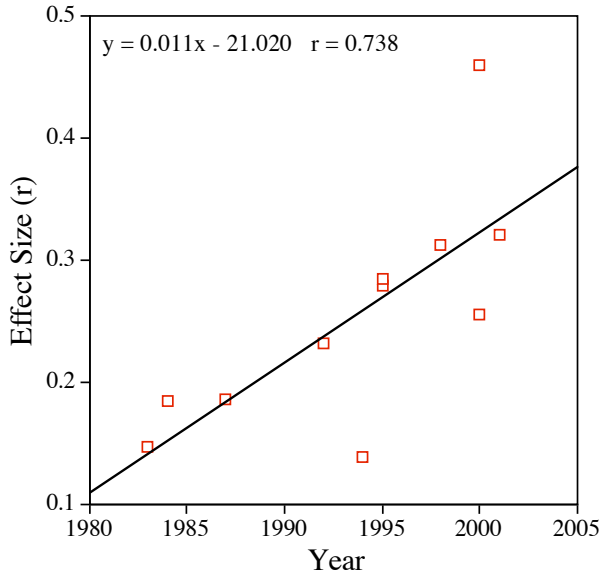
be other factors at work in this correlation, so one should regard this finding as somewhat tentative.

## MODERATORS OF VIDEO GAME EFFECTS

The evidence reveals that violent video games can have negative consequences. The research literature is presently too small to allow sensitive tests of potential moderator effects (moderator variables can enhance or diminish other effects). Such effects, essentially interactions between exposure to video game violence and moderating variables (e.g., sex, age), require very large samples for adequate tests, and this research literature is simply too small. In fact, Anderson and Bushman (2001) reported finding no statistically significant evidence of sex or age moderator effects. Nonetheless, there are theoretical and empirical reasons to expect some groups to be somewhat more susceptible to violent video game effects than others, though there is no valid reason to expect any particular group to be totally immune.

Funk and her colleagues (Funk, 2001, 2003; Funk & Buchman, 1996; Funk, Buchman, & Germann, 2000) have described how many of the effects of video game play could be enhanced by other risk factors. These include player sex, age, status as bullies or victims of bullies, children with poor social problem-

Figure 7.2
Relation between Year of Study and Size of Effect of Video Game-Playing Habits on Aggressive Behavior: Correlational Studies




solving skills, and children with poor emotion regulation abilities. To this list we would add children who are *generally more* hostile in personality, who have a history of aggressive behavior, or whose parents do not monitor or limit their video game play. These risk factors will be described briefly below.

Although there is insufficient research to make strong claims about certain groups being more vulnerable to violent video game effects, there are a few individual studies that provide such evidence. For instance, a number of studies have shown that hostility may moderate the effects of playing violent video games. Lynch (1994, 1999) has shown that the physiological effects of playing violent video games are greater for children who are initially more hostile. Anderson and Dill (2000) found that the relationship between violent video game play and delinquent behaviors was greater for characteristically hostile individuals.

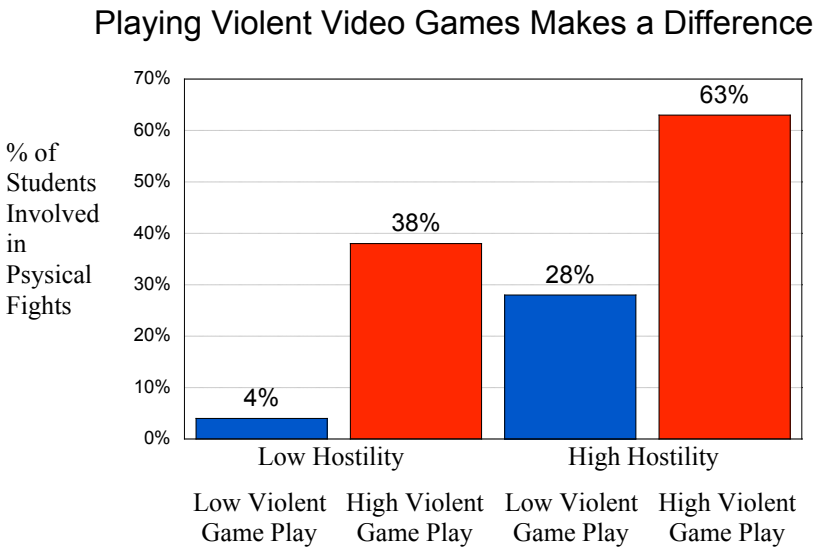
Longitudinal studies have repeatedly demonstrated that the best predictor of future aggressive or violent behavior is past history of aggression and violence (Anderson & Huesmann, in press; Surgeon General, 2001). There is evidence from the TV and movie violence literature that habitually aggressive youths are more susceptible to media violence effects than habitually nonaggressive youths (Bushman & Huesmann, 2000). There is also some evidence that repeated exposure to violent video games has a bigger negative impact on aggressive youth than on nonaggressive youth (Anderson & Dill, 2000).



Parental monitoring and limiting of children's media use has been shown to be an important moderating factor with other media such as television. Limits on the amount of time, coviewing, and mediation (discussion) of television messages have been shown to have beneficial effects (e.g., Austin, 1993; Gadberry, 1980; Robinson, Wilde, Navracruz, Haydel, & Varady, 2001; Strasburger & Donnerstein, 1999). Active parental involvement, such as rules limiting media use and active mediation (both positive encouragement to watch "positive" media and discouragement of "negative" messages) can be effective in influencing children's viewing, understanding, reactions to, and imitation of program content (Dorr & Rabin, 1995; Lin & Atkin, 1989). When parents are asked how often they put limits on the amount of time their children may play video or computer games, 55 percent say "always" or "often," and 40 percent say they "always" or "often" check the video game ratings before allowing their children to buy or rent video games (Gentile & Walsh, 2002). However, parents may overestimate the amount of monitoring they do. In one study of eighth and ninth grade children, only 13 percent say their parents "always" or "often" put limits on time, and 43 percent say they "never" do (Gentile et al., in press). Similarly, only 15 percent say their parents "always" or "often" check the ratings, and over half (53 percent) say they "never" do. Yet, parental limits on both time and content of video games are significantly related to lower levels of youths' aggressive behavior.

In sum, although there appear to be general effects of playing violent video games (Anderson & Bushman, 2001), we believe the effects are not likely to be identical for all children. The characteristics that are most likely to emerge as significant risk factors for the negative effects of exposure to violent video games are: younger ages, poor social problem-solving skills, low parental monitoring, male sex, hostile personality, and a history of aggression and violence. Yet, this does not mean that violent video games are likely to affect only children who possess these other risk factors. Exposure to video game violence is a significant predictor of physical fights, even when children's sex, hostility level, and amount of video game playing are controlled statistically (Gentile et al., in press). If hostility were a necessary risk factor, then only hostile children would tend to get into fights, and children with the lowest hostility scores would not get into physical fights regardless of their video game habits. Figure 7.3 shows the percentages of eighth and ninth grade students who report being involved in physical fights within the previous year. Children with the lowest hostility scores are almost 10 times more likely to have been involved in physical fights if they play a lot of violent video games than if they do not play violent games (38 percent compared to 4 percent). In fact, the *least* hostile children who play a lot of violent video games are *more* likely to be involved in fights than the *most* hostile children if those children do not play violent video games.

Figure 7.3
Percentages of Eighth and Ninth Graders Involved in Physical Fights, Split by Hostility and Violent Video Game Exposure




*Note:* The low and high hostility bars represent children in the bottom and top quartiles on a measure of trait hostility, respectively. The low and high violent video game play bars represent children in the bottom and top quartiles on a measure of exposure to violent video games. Data are extracted from Gentile, Lynch, Linder, & Walsh, in press. Total N = 607.

## VIDEO GAMES AS TEACHING TOOLS

Video games are excellent teaching tools. For example, video games have been created to teach children healthy skills for the self-care of asthma and diabetes (Lieberman, 1997). Video games were used as the teaching method in these programs because (1) they are so successful at getting children's attention, (2) children participate actively rather than passively, (3) they train children in all the steps necessary to be successful (rehearse the whole sequence of behaviors), (4) they are motivating for children, (5) they provide many opportunities for practice, (6) they provide immediate feedback and reinforcement, (7) they enhance perceived mastery and self-efficacy; and (8) they teach attitudes necessary for successful behaviors. Research showed that the video games were successful at teaching children the attitudes, skills, and behaviors that the games were designed to teach (Lieberman, 1997). If health video games can successfully teach health behaviors, and flight-simulator video games can teach people how to fly, then what should we expect violent, murder-simulating games to teach?



Lieutenant Colonel David Grossman has argued that violent video games can train people to kill in much the same manner that the U.S. Army trains people to kill (1996, 1998). Grossman, a former Army Ranger and teacher of psychology, has noted that almost all people have a natural aversion to the killing of other people. In the army, this aversion is considered to be a problem. Historically, only 15 to 20 percent of infantrymen were willing to shoot at an exposed enemy soldier in World War II. This was unacceptable to the army, so new training regimens were created to "improve" upon this, and by the Vietnam War, the percentage had risen to over 90 percent. Grossman argues that the army uses four steps to systematically reduce the aversion to killing: (1) desensitization, (2) observation and imitation, (3) classical conditioning, and (4) operant conditioning. He argues that all four of these can be shown to be at work in violent media.

## CRITIQUES OF THE VIDEO GAME RESEARCH LITERATURE

Any new research domain has strengths and weaknesses. If all goes well, over time the researchers identify the weaknesses and address them in a variety of ways. When the new research domain appears to threaten the profits of some large industry, there is a tendency for that industry to deny the threatening research and to mount campaigns designed to highlight the weaknesses, obfuscate the legitimate findings, and cast doubt on the quality of the research. The history of the tobacco industry's attempt to ridicule, deny, and obfuscate research linking smoking to lung cancer is the prototype of such efforts. The TV and movie industries have had considerable success in their 40-year campaign against the media violence research community; The same type of effort has now been mounted by the video game industry. We do not claim that there are no weaknesses in the video game research literature. Indeed, we have highlighted some of them in our own prior writings. In this final section, we focus on two types of criticisms, legitimate ones (usually raised by researchers) and illegitimate ones (usually raised by the video game industry and their supporters in the scholarly community).

### Illegitimate Criticisms

*1. There are too few studies to warrant any conclusions about possible negative effects.*

This can be a legitimate concern if the small number of studies yields a lack of power to detect small effects. However, it is an illegitimate argument when it is used to claim that the current set of video game studies do not warrant serious concern about exposure to violent video games. If anything, it is remarkable that such reliable effects have emerged from such a relatively small number of studies (compared to TV and movie violence studies), and

that the studies that vary so much in method, sample population, and video game stimuli.

*2. There are problems with the external validity of lab experiments due to demand characteristics, participant suspicion and compliance problems, trivial measures, artificial settings, and unrepresentative participants.*

These old arguments against laboratory studies in the behavioral sciences have been successfully debunked many times, in many contexts, and in several different ways. Both logical and empirical analyses of such broad-based attacks on lab experiments have found little cause for concern (Anderson, Lindsay, & Bushman, 1999; Banaji & Crowder, 1989; Kruglanski, 1975; Mook, 1983). Furthermore, more specific examination of these issues in the aggression domain have consistently found evidence of high external validity; and have done so in several very different ways (Anderson & Bushman, 1997; Berkowitz & Donnerstein, 1982; Carlson, Marcus-Newhall, & Miller, 1989; Giancola & Chermack, 1998).

*3. Complete dismissal of correlational studies: "Correlation is not causation."*

This is an overly simplistic view of how modern science is conducted. Psychology instructors teach this mantra to introductory psychology students, and hope that they will gain a much more sophisticated view of methods and scientific inference by the time they are seniors. Whole fields of science are based on correlational data (e.g., astronomy). Correlational studies are used to test causal theories, and thus provide falsification opportunities. A wellconducted correlational design, one which attempts to control for likely "third variable" factors, can provide much useful information. To be sure, correlational studies are generally (but not always) less informative about causality than experimental ones. What is most important is the whole pattern of results across studies that differ in design, procedure, and measures. And the existing research on violent video games yields consistent results (Anderson & Bushman, 2001).

*4. Arousal accounts for all video game effects on aggressive behavior.*

Physiological arousal dissipates fairly quickly (Cantor, Zillman, & Bryant, 1975). Therefore, the arousal claim does not apply to studies that measure aggressive behavior more than 30 minutes after game play has occurred, or studies in which aggression is measured by a retrospective report. For example, this criticism generally doesn't apply to correlational studies, but correlational studies show a significant link between violent video game exposure and aggression (Anderson & Bushman, 2001). Furthermore, there are a few experimental studies in which the violent and nonviolent game conditions were equated on arousal, and significant violent-content effects still occurred (e.g., Anderson & Dill, 2000, Study 2).

*5. There are no studies linking violent video game play to "serious" or actual aggression.*

This criticism is simply not true. A number of correlational studies have linked repeated violent video game play to serious aggression. For example,



Anderson and Dill *(2000,* Study 1) showed that college-student reports of violent video game play in prior years were positively related to aggression that would be considered criminal (e.g., assault, robbery) if known to police. Similarly, Gentile et al. *(2003)* found significant links between violent game play and physical fights.

*6. Violent media affect only a few who are already disturbed.*

As discussed earlier, there are reasons (some theoretical, some empirical) to believe that some populations will be more negatively affected than others. However, no totally "immune" population has ever been identified, and populations sometimes thought to be at low risk have nonetheless yielded significant violent video game exposure effects (e.g., Anderson & Dill, 2000; Gentile et al., in press).

*7. Effects of media violence are trivially small.*

Once again, this is simply not true. Violent video game effects are bigger than: (a) effects of passive tobacco smoke and lung cancer; (b) exposure to lead and IQ scores in children; (c) calcium intake and bone mass (for more comparisons, see Anderson & Bushman, 2001; Bushman & Anderson, 2001).

Note that the critics use these seven illegitimate criticisms to basically dismiss all research on violent video games. Once one has dismissed all correlational studies (number 3, above) and all experiments that use laboratory or other "trivial" measures of aggression (number 2, above), the only potential type of study left Is clearly unethical: an experimental field study in which violent crime is the measure of aggression. Such a• study would require randomly assigning children to high versus low video game violence conditions for a period of years and then following up on their rates of violent criminal activity over the course of their lives. It is not an accident that all ethically feasible types of studies are dismissed by the industry and its supporters.

## Legitimate Criticisms

*1. Sample sizes tend to be too small in many studies.*

If the average effect size is about r = 0.20 (Anderson & Bushman, 2001), then N (the number of study participants) should be at least 200 for 0.80 power (power is the likelihood of being able to find a legitimate difference between groups). When N is too small, individual studies will *appear* inconsistent even if they are all accurate samples of the true r = 0.20 effect. For this reason, the best way of summarizing the results of a set of too-small studies is to combine the results via meta-analysis, rather than using the more traditional narrative review. When this is done, we see that the video game studies yield consistent results (Anderson & Bushman, 2001).

2. *Some studies do not have "violent" and "nonviolent" games that are sufficiently different in actual violent content.*

This problem was noted earlier in this chapter in the discussion of how early studies might find weaker effects because the "violent" video games in

the early years were not very violent by contemporary standards. Figures 7.1 and 7.2, described earlier, confirm this problem. Future studies need to do a better job of assessing the violent content of the video games being compared.

*3. Some experimental studies have used a "control" or "nonviolent game" condition that was more boring, annoying, or frustrating than the violent game.*

The obvious solution for future studies is to do more pilot testing or manipulation checks on such aggression-relevant dimensions. In trying to summarize past research, one can sometimes find a more appropriate comparison condition within the same experiment.

*4. Some studies did not report sufficient results to enable calculation of an effect size for participants who actually played a video game.*

This problem arose in several cases in which half of the participants played a video game while the other half merely observed. Reported means then collapsed across this play versus observe dimension. Future reports should include the individual means.

*5. Some studies that purportedly study aggressive behavior have used dependent variables that are not true aggressive behavior*

A surprising number of past studies have used trait or personality aggression scales as measures of aggressive behavior in short-term experiments. This is a problem because there is no way that a short-term manipulation of exposure to violent versus nonviolent video games (e.g., 20 minutes) can influence one's past frequency of aggression. In this short-term context, such a trait measure might possibly be conceived as a measure of cognitive priming, but clearly it is not a measure of aggressive behavior.

A related problem is that some studies have included hitting an inanimate object as a measure of aggressive behavior. Most modern definitions of aggression restrict its application to behaviors that are intended to harm another person (Anderson & Bushman, 2002a; Anderson & Huesmann, in press; Geen, 2001).

The obvious solution for future studies is to use better measures of aggression. In the analysis of past research one can sometimes disaggregate the reported composite measure to get a cleaner measure of aggression.

*6. There are no longitudinal studies.*

This is true. Major funding is needed to conduct a large-scale longitudinal study of video game effects. To date, such funding has not been forthcoming. Thus, one must rely on longitudinal studies in the TV/movie violence domain to get a reasonable guess as to the likely long-term effects.

### Best Studies

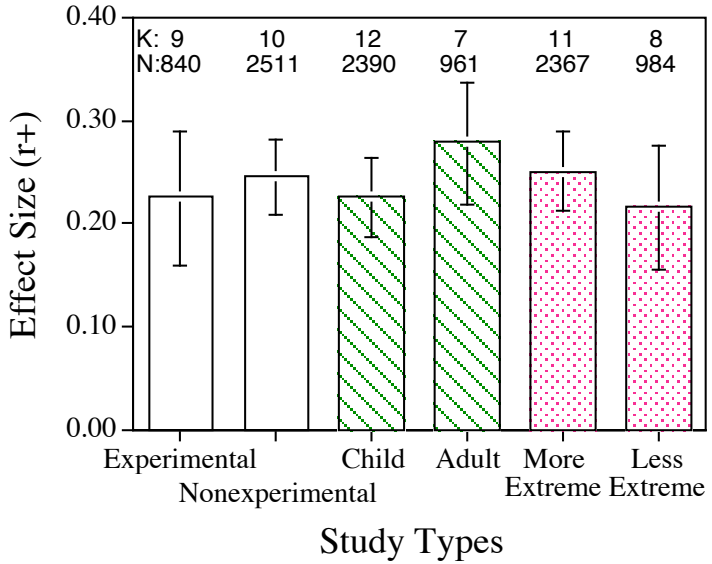
What happens to the meta-analytic estimates of the effects of exposure to violent video games when only the "best" studies are used (as outlined in the preceding section on legitimate criticisms)? Figure 7.4 displays the results for several breakdowns of results for aggressive behavior. Interestingly, each effect size estimate is above 0.20 and is statistically significant, regardless of whether it came from experimental or nonexperimental studies, children or adult studies, or studies that measured more or less extreme forms of aggression.



### SUMMARY

Although there is less research on the effects of violent video games than there is on television and movies, the preponderance of evidence looks very similar to the research on violent television. In particular, violent video games appear to increase aggressive thoughts and feelings, physiological arousal, and aggressive behaviors, as well as to decrease prosocial behaviors. There are many theoretical reasons why one would expect violent video games to have a greater effect than violent television, and most of the reasons why one would expect them to have a lesser effect are no longer true because violent video games have become so realistic, particularly since the late 1990s.

Figure 7.4
Effect of Exposure to Violent Video Games on Aggressive Behavior as a Function of Study Type




*Note:* "More extreme" and "less extreme" refer to the severity of the aggressive behavior measured. K = number of independent tests. N = number of participants.

## APPENDIX A: LETTER TO PARENTS-HOW CAN YOU TELL IF A VIDEO GAME IS POTENTIALLY HARMFUL?

1. Play the game, or have someone else demonstrate it for you.
2. Ask yourself the following six questions:
   - Does the game involve some characters trying to harm others?
   - Does this happen frequently, more than once or twice in 30 minutes?
   - Is the harm rewarded in any way?
   - Is the harm portrayed as humorous?
   - Are nonviolent solutions absent or less "fun" than the violent ones?
   - Are realistic consequences of violence, absent from the game?
3. If two or more answers are "yes," think very carefully about the lessons being taught before allowing your child access to the game.[3]

**NOTES**

1. The authors are grateful for substantial help writing this section from Dr. Paul Lynch.

2. All effect sizes reported in the chapter are scaled as correlation coefficients, regardless of whether the study was experimental or correlational in design. See Cornstock and Scharrer (this volume) for a discussion of how to interpret effect sixes.

3. From Video Game Suggestions from Dr. Craig A. Anderson, April 23, 2002. Copyright by Craig A. Anderson. The entire document can be found at: http://www.psychology.iastate.edu/faculty/caa/VG_Recommend.pdf.

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