kid Stuff

Marketing Sex and Violence
to America's Children

Edited by

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Video Games and Aggressive Behavior

Craig A. Anderson

Rule the streets of Prohibition-era America with your own brand of violence and greed as you build the perfect organized crime machine. It's terribly wrong. Of course, that's what makes it fun.

-Advertisement for Gangsters : Vendetta

In 2002 the video game industry turned 30. The first commercial video game—*Pong*—appeared in 1972. As older readers of this chapter may recall (along with the author), *Pong* was an electronic ping pong game in which one or two players tried to hit an electronic ball back and forth with electronic paddles.

Media violence was, of course, quite a large industry prior to the arrival of video games, and the early video games were, for the most part, nonviolent. In recent years, violent video games have added considerably to the total media violence that was mostly found on television, in movies, and in music. Today, youth between the ages of 8 and 18 spend over 40 hours per week using some type of media, not counting what they use for school or homework assignments.[1] Television is the most frequently used electronic medium, but video games are rapidly gaining in

popularity and in total time spent per week. In the United States, the average 2 to 17-year-old child plays console and computer video games 7 hours a week.[2] In 1999, 2.5 percent of entering college men reported playing video games over 20 hours per week.[3] More than 191 million video games worth $6.5 billion were sold in 2000.[4]

Violent Video Games: History and Content

The history of video games can be divided into three eras.[5] The first era (1977-85) was dominated by Atari console video games. The first video games contained little violence. What violence existed was largely abstract, such as shooting alien spaceships. Indeed, Nolan Bushnell, the founder of Atari, recently noted that "We 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."[6] Another factor involved in the relatively low amount of violence in the early video games was that the computing power of the console games was so low that only simple graphics could be displayed.

But as graphics became better and the potential for profits became larger, more frequent violence began to appear, even in children's games. The second era (1985-95) was dominated largely by the Nintendo console games. Even Nintendo's seemingly innocuous Super Mario Brothers games included the capacity to destroy harmful creatures that got in the way of the main characters by jumping on top of them or by throwing fireballs at them. One pair of studies showed that college students typically think of competitive events as more aggressive than cooperative ones and that competitive instructions dramatically increased their propensity to kill these on-screen creatures.[7]

In this second era, violent content began to appear in more and more games. The computing power of console game systems increased, enabling more complicated graphics, including more realistic portrayals of violence. It was also during this era that video games became common on desktop computers and in hand-held mini-games systems such as Game Boy. As it became apparent to manufacturers that violent games sold well, the level of violence in the games also increased. Truly violent video games came of age in this era with the killing games Mortal Kombat, Street Fighter, and Wolfenstein 3D.[8] The goal in such games is to maim, wound, or kill opponents. For example, 1993's Mortal Kombat (and its successors) entails a series of fights to the death between the game player and various opponents. Particularly popular are the various "fatal" moves that a player can use to finish off an opponent, such as ripping out a beating heart or popping off the head and spine. Both Sega and Nintendo released home console versions of the popular arcade game Mortal Kombat at about the same time. However, Nintendo released a sanitized version of the game, removing the most graphically violent features and the worst of the fatal moves; Sega released the full version. The Sega version outsold the Nintendo version by about three to one. When Nintendo released Mortal Kombat 2, it included all of the blood and gore and fatal moves of the Sega version. This time, the Nintendo version outsold the Sega version, possibly because more people had the Nintendo hardware.

Some of the basic characteristics and labels of video games also emerged in this era. Mortal Kombat represents a type of game now known as "third-person fighting" games. It is a "third-person" game because the player can see the character that he or she is controlling. It is a "fighting" game because virtually all of the game action consists of fighting other game characters. A variety of third-person fighting games were very popular in this era. Street Fighter is one such game. As in Mortal Kombat, the main theme is that the player engages in a series of fights with various opponents. Another interesting feature of many third-person fighting games is that the player can choose who he or she wants to "be" from an array of male and female characters. In part, this was an attempt to attract more female consumers. It was believed that part of the reason that so few girls and young women played video games was that the vast majority of the early games had only male heroes.

Wolfenstein 3D was one of the first very popular three-dimensional "first-person shooters." In Wolfenstein 3D the human hero can choose from an array of weaponry including a revolver, a knife, automatic weapons, and a flamethrower. There are a number of different levels and versions of this game, but the basic story line is similar. In Wolfenstein3D, you are B.J. Blascowitz, an American soldier caught and taken prisoner while trying to infiltrate a top-secret Nazi experimentation lab. In one version, you have to shoot your way out of the prison and kill everything that moves. Your goal is to get out alive so you can tell the Allies what the Nazis are doing. In another version, your goal is to use these weapons to kill Nazi guards in Castle Wolfenstein in order to advance through a number of levels; the ultimate goal is to kill Adolph Hitler. The graphics

of this game are very violent; a successful player will see multiple bloody murders and hear victims scream and groan. This game is "3D" because the character can move through a three-dimensional setting, opening doors, turning around and retracing steps, and so on. It is "first-person" because the player "sees" the world through the eyes of the character she or he is controlling. The player can see his or her own hands and arms, as well as the weapons being used, but does not see his or her whole character. It is called a "shooter" because most of the action involves shooting enemies with one kind of weapon or another, though the player can also fight with hands or nonshooting weapons such as knives.

We currently are in the third video game era (1995-present). The console game market is largely dominated by the Sony Playstation and Playstation[2]. Their graphic capabilities have been greatly enhanced not only by improvements in computer technology but also by Sony's decision (emulated by others) to switch from cartridge-based systems to CD-ROM-based systems. The growth of video gaming on computers has been phenomenal in recent years. The best selling video games are usually available on computers as well as on console systems. Many games can now be downloaded from the Internet. This includes "demo" versions of extremely violent games that include most or all of the most graphic features of the full game. Such demos can be downloaded at no charge by virtually anyone with a computer and a modem, at no charge.

As one might have expected given prior trends, even more graphically violent games are now available to players of all ages and, indeed, are marketed to young children as well as teens and adults. For example, a recent "mystery shopper" study conducted by the U.S. Federal Trade Commission had underage children (13-16), unaccompanied by an adult, attempt to purchase games rated as Mature (17 or older) from various retail outlets. They were successful in 85 percent of the 380 stores sampled. Similar results have been obtained by others.[9]

Many of the early games have been updated with more realistic graphics, more weapons, and more gore. Newer versions of *Mortal Kombat, Wolfenstem 3D,* and *Street Fighter* have been released several times. One of the newest of the violent games is *Soldier of Fortune.* This computer-based 3D first-person shooter game is most noteworthy for its attempt to accurately portray real life responses of people to the physical traumas performed in the game. For instance, a shotgun blast to the arm from close range results in a graphically realistic portrayal of the arm be–

ing ripped from its socket, leaving exposed bone and sinew dangling, and lots of blood gushing from the wound.

Another fairly recent 3D first-person shooter is *Duke Nukem.* This is an extremely violent game, with provocative pictures of almost-nude women and disgusting alien piglike things that carry shotguns and disintegrate into little piles of blood and gore. The aliens have taken over Hollywood and you (the player) must take it back. The player assumes the role of Duke Nukem. To win the game, you blast away at the aliens, their flying warships, and anything else that strikes your fancy, including semi-nude women chained to pillars who, in some cases, beg to be killed. One notable feature of this game is that it is one of the first to pair extreme violence with sex.

Other types of violent games currently available to most children and adolescents include games that train players in how to conduct terrorist attacks, how to lead an antiterrorist assault team, how to fly modern fighter aircraft, and how to plot assassinations. For instance, in *Rainbow Six,* the player trains and leads a unit of secret U.S. government antiterrorists through a series of scenarios. This game, based on author Tom Clancy's Rainbow Six novels, teaches many of the skills needed by such real-life military units.

There are many wonderful educational, nonviolent strategy, and sports games available, but the most heavily marketed, sold, and played video games are extremely violent in nature, involving brutal mass killings as the primary goal in winning the game. This has been true at least since the early 1990s. For example, one mid-1990s study found that 4th grade girls (59%) and boys (73%) report that the majority of their favorite games are violent ones.[10] Many of the nonviolent games are very exciting and challenging, and when marketed with the same intensity as the violent games, have sold very well. For instance, there are a number of nonviolent racing games, such as the various versions of Indy Car and NASCAR racing games. Of course, there are also some driving/racing games that are extremely violent. For example, in Carmageddon, one of the main goals is to run over as many pedestrians as possible. One gets extra points for particularly spectacular kills.

Some of the better games may actually teach some useful skills; and as these games have become more sophisticated, they begin to resemble training simulators. Some of the driving games, for instance, may well improve the driving skills of the game player. Similarly, there are a number

of nonviolent flight simulation games that have been very popular. Indeed, a few years ago my son (then in middle school) attended one of the NASA week-long space camps along with a large number of other kids. The activities included learning about a number of aspects of space flight and exploration, including a simulated mission on board a simulated space shuttle. In the year prior to attending the space camp, my son had spent a number of hours with the nonviolent flight simulator game *Flight Unlimited.* At space camp, he was the only "shuttle pilot" to successfully "land" the space shuttle at the completion of his team's simulated mission. The skills and knowledge gained while playing *Flight Unlimited* almost certainly aided him in landing the space shuttle in one piece.

Of course, the same technology that helps people learn how to fly a plane or drive a car can also be used to train people how to behave in a variety of antisocial ways. Most flying games are basically first-person shooters in the sky (for example, those involving fighter planes and bombers) or in space (Star Wars-based video games and other types of fantasy space war games). Though such games may teach some motor skills, the inclusion of a violent theme may well also teach some fairly antisocial perspectives on how one should deal with disagreement and interpersonal conflict.

Exposure to Violent Video Games

Though video games are now, like movies, subject to industry ratings, numerous problems remain. The rating systems differ by outlet (video arcade vs. console and home computer); they are not well understood by parents or children; they are not reliably enforced; and they apparently have little impact on the marketing efforts of the companies that produce the games. As mentioned above, a Federal Trade Commission study found that M-rated games were easily available to children under 17. This same study found that over 90 percent of surveyed companies producing M-rated games target children under 17 in the marketing of such games.[11]

Two additional problems concern the assignment of ratings and underlying assumptions of the rating systems. First, a recent study showed that the video game ratings provided by an "independent" board funded by the video game industry do not match those provided by other adults and game-playing youngsters.[12] Many games involving vio-

lence by cartoon-like characters are classified by the industry as appropriate for general audiences, a classification with which adults and youngsters disagree. Furthermore, games rated E (Everyone) can contain any of the following descriptor categories: Mild Animated Violence, Mild Realistic Violence, Animated Violence, Realistic Violence, Animated Blood, and Realistic Blood. The only two categories of violence that are prohibited in E games are Animated Blood and Gore, and Realistic Blood and Gore. Teen games (13 and older) may contain either of these types of violence as well.

Second, it is assumed that cartoon violence is not harmful to younger children. A long history of research on other forms of media violence (TV, movies), however, has demonstrated that such cartoon violence is indeed harmful to children.[13]

Finally, there is a problem with lack of parental oversight. Ninety percent of teens in grades 8-12 report that their parents never check the ratings of video games before allowing their purchase, and only i percent of the teens' parents had ever prevented a purchase based on its rating. Furthermore, 89 percent reported that their parents never limited time spent playing video games.[14]

Negative Effects of Media Violence

Though many educational nonviolent TV shows and video games clearly have positive effects on young people,[15] the potential negative effects of violent video games drives most current public discussions of media violence. The recent school shootings in Paducah, Kentucky; Jonesboro, Arkansas; and Littleton, Colorado, played a major role in stimulating such discussions, largely because the shooters were students who habitually played violent video games. Eric Harris and Dylan Kiebold, the Columbine High School shooters, enjoyed the bloody video game Doom. In fact, Harris created a customized version of Doom with two shooters, extra weapons, unlimited ammunition, and victims who couldn't fight back-features that are eerily similar to the actual shootings at Columbine High.

The video game industry denies any link between playing violent video games and aggression, of course, just as the TV and movie industries continue to deny links between their violent products and aggression. For example, in a May 12, 2000, CNN interview, Doug Lowen–

stein, president of the Interactive Digital Software Association, said, "I think the issue has been vastly overblown and overstated, often by politicians and others who don't fully understand, frankly, this industry. There is absolutely no evidence, none, that playing a violent video game leads to aggressive behavior."

In fact, the research literature on the effects of media violence in general (including TV and movie violence) is quite large and conclusive. By 1975, eighty studies had been published on the effects of media violence on aggressive behavior. A meta-analysis of those early studies clearly showed that there was no room for doubt: exposure to media violence causes increases in aggression, and this relation between media violence and aggression exists in both laboratory and in real-world settings. One particularly disturbing aspect of the more general question about media violence concerns the misinformation typically presented in the news media. By 1975, the scientific community had ample evidence of a significant (and causal) link between media violence (mostly on TV) and aggressive behavior. In subsequent years, the scientific evidence has grown even stronger. But news media reports on the link between exposure to media violence and aggression have moved in the opposite direction over time. On average, more recent news reports imply that media violence effects are weaker than did earlier news reports. [16]

The state of scientific knowledge about a research question changes over time as more research is conducted. One reason is that, over time, there are improvements in research instruments and research design. Another is that, in general, a larger sample of studies provides a more accurate picture of the true hypothesized effect than a smaller sample of studies. For example, a single study of the link between smoking and lung cancer using 500 people provides one picture. But 100 studies, each using 500 people, would provide a much more accurate over-all picture. After many studies have been conducted, one can examine the results of the studies to get an idea of what was known by a particular date. For example, we can get an idea of the best scientific estimate of the relation between smoking and lung cancer in 1960 by averaging the results of all smoking-lung cancer studies that had been published by 1960. We can similarly look at the best estimates in 1965, 1970, and so on, each time averaging the results of all studies published by that date. By plotting such repeated estimates across time, we can then see how the state of scientific knowledge about that research question changed over time.
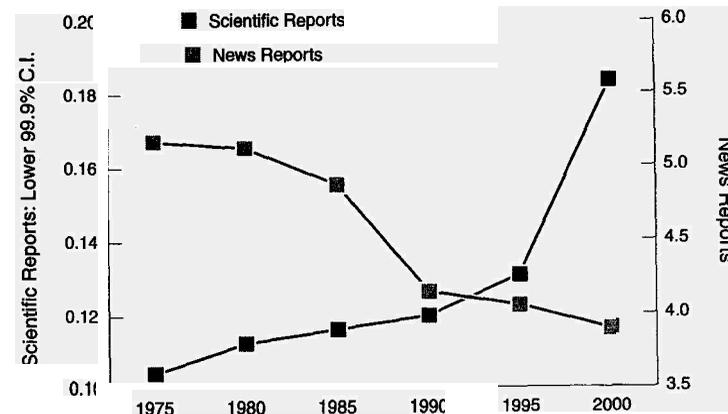

Fig. 7. I. Scientific vs. News Reports of the Effect of Media Violence on Aggression. Based on data reported in Brad J. Bushman and Craig A. Anderson, "Media Violence and the American Public: Scientific Facts Versus Media Misinformation," American Psychologist 56, no. 6/7 (2001): pp. 477-89.

We can then ask whether news reports about the research question match the scientific evidence and whether changes in news reports over time reflect changes in the state of scientific knowledge. The most direct way to do this is to gather all of the news reports (for example, all newspaper articles) on the research question, rate each on its conclusions concerning this question, and then average those ratings for various time periods. This is precisely what Brad Bushman and I have done with the research question of whether exposure to media violence is linked to aggression.

Figure 7.1 displays the shifts in the accumulated scientific knowledge base about media violence effects on aggression since 1975; it also displays the shifts in the news reports about the scientific evidence linking media violence and aggression. The Scientific Reports line in the figure displays a very conservative estimate of the true relation between media violence and aggression. In a sense, it can be thought of as what a skeptic might conclude from the research. A score greater than zero indicates that a statistical summary of all studies published by that date yielded a highly significant result that increased exposure to media violence was linked to increases in aggression. A score of zero would indicate that there appears to be no link between media violence and aggression. A

negative score would indicate that increased exposure to media violence is linked to decreases in aggression. The Scientific Reports line shows that since 1975, even a skeptical assessment of the research literature would conclude that media violence is linked to increases in aggression. It also shows that as additional research studies were conducted, evidence of this link has grown stronger.[17]

The News Reports line in figure 7.1 is the average rating of all relevant written news reports (newspapers, magazines) over the preceding five-year period. These averages were based on a 21-point rating scale with verbal anchors at –10 (the article said that viewing violence causes a decrease in aggression), - 5 (urged parents to encourage their children to consume violent media), 0 (the article said that there was no relation between media violence and aggression), +5 (urged parents to discourage their children from consuming violent media), and +10 (the article said that viewing violence causes an increase in aggression). If news reports accurately reflected the actual state of scientific knowledge, the two lines in figure 7.1 should be parallel. At worst, the news media reports should show the same pattern as the scientific evidence but with a lag of a few years. In fact, as the state of scientific knowledge supporting a significant and causal link between media violence and aggression grew stronger, news media reports actually grew weaker .

The central question of this chapter concerns whether or not playing violent video games has an impact on aggressive behavior and on other aggression-related variables, such as aggressive feelings. Research specifically focusing on the effects of exposure to violent video games has been slowly accumulating in recent years. The first comprehensive meta-analysis of these studies was published by my colleague Brad Bushman and me.[18] Results of this meta -analysis of studies of violent video games, and a more recent analysis conducted for this chapter, are the focus of the next sections.

Negative Effects of Violent Video Games

Meta-analysis is a set of statistical procedures used by researchers to combine results across studies in order to test specific hypotheses. It is less subject to the specific biases or expectations of the reviewer than is the older style narrative review. For instance, one can summarize statistically the results of all empirical studies that have examined the effects of violent video games on aggressive behavior. In addition to getting a more accurate statistical estimate of the effect under consideration, meta-analysis also allows the researcher to test whether certain characteristics of the studies are systematically related to the effect under consideration. For example, one can ask whether the effect of violent video games on aggressive behavior is greater for males than it is for females .

Effects for Adults and Children Combined

Our meta-analysis uncovered thirty-two research reports on the effects of violent video games on aggression and aggression-related variables. These thirty-two reports included forty-six independent samples of participants. Over 3,800 individuals participated in these studies; slightly more than half (57%) were children under 18. These studies focused on five types of dependent variables. Of most interest, of course, is aggressive behavior. Across the various studies, the types of aggressive behavior assessed varied widely. For example, in some studies children's fighting behaviors were observed in a free play period that took place after the children had played either a violent or nonviolent video game. In other studies, aggressive behavior was assessed by standard laboratory aggression tasks, by teacher ratings, by self-reports of violent criminal behaviors, by self-reports of aggressive (but not criminal) behavior, and by parent reports. Three additional aggression-related variables assessed in some studies were: aggressive affect (e.g., anger), physiological arousal (e.g., heart rate), and aggressive cognition (e.g., thoughts about aggression). Finally, several studies assessed the effects of violent video games on subsequent prosocial (helping) behavior.

Overall, the results showed that exposure to violent video games significantly increases aggressive behavior, aggressive affect, physiological arousal, and aggressive cognition. The results also showed that exposure to violent video games significantly decreases prosocial behavior. Finally, the results showed that the effects of playing violent video games did not systematically differ for adults versus children, males versus females, or for true experiments versus correlational studies. In other words, exposure to violent video games seemed to have roughly the same effect on everyone, and to show up in all types of studies .

Though these results are quite clear, there are several more specific questions that need to be addressed. For instance, even though the re -

sults found no difference in the magnitude of violent video game effects on children versus adults, a motivated skeptic (e.g., representatives of the Interactive Digital Software Association) could argue that only studies that have used children under age 18 should be included. Furthermore, in traditional meta-analyses an attempt is made to include all possible studies, despite their potential methodological shortcomings. For example, consider an experiment in which children play either a violent or a nonviolent video game and are then observed while playing with other children to see who is most likely to fight. In such a study, it is important that the nonviolent video game be as much fun and as easy as the violent game. In some studies, however, the nonviolent game appears to be less fun and more difficult. If the research domain being examined is sufficiently large, one can do statistical tests to see whether such a shortcoming reliably produces unusual results. The new analyses in the next section attend to these issues.

Results of a New Meta-analysis

I conducted a new meta-analysis for this chapter for three primary reasons. First, several new studies of violent video games are now available for inclusion in the meta-analysis. Second, despite the earlier finding of similar effects for children and adults, many people would like to see more specific analyses of video game effects on children. Third, the earlier meta-analysis included as many studies as possible, including some with potential methodological shortcomings. Because there were not enough studies to allow us to factor out these weaknesses statistically, the new analyses addressed this problem by dropping the methodologically weak studies. Additional modifications to the meta-analysis were also made. [19]

Adults and Children Combined. Figure 7.2 presents the average effect sizes for each of the five dependent variables and their 95 percent confidence intervals, for the combined adult-children analyses. The results are very similar to those of the earlier meta-analysis. Once again, exposure to violent video games was found to increase aggressive behavior, aggressive thoughts, aggressive affect, and physiological arousal, and to decrease prosocial behavior.

Children Only. When adult studies were removed from the analyses, there were not enough studies with physiological measures of arousal for
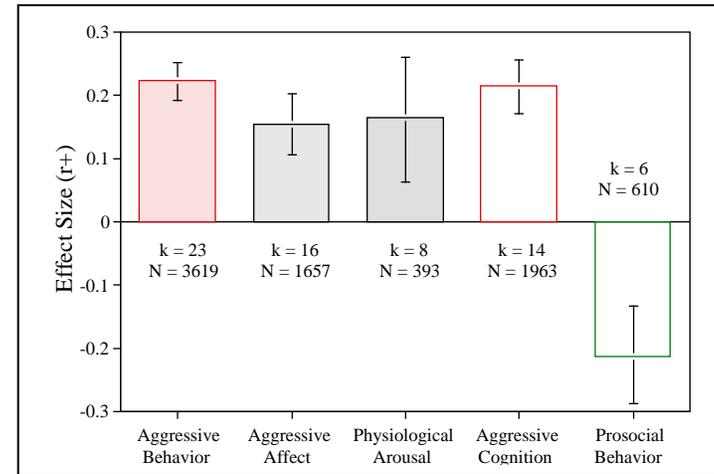

Fig. 7.2. Average Effects of Violent Video Games (*r+*), Adults and Children Combined. Vertical capped bars indicate 95% confidence intervals. Because the vertical capped bars do not include the zero line for any of the measured effects, all of the effects of violent video games are statistically significant. K = number of independent tests. N = number

a meta-analytic study, so the variable of physiological arousal was dropped. The remaining four dependent variables have had sufficient numbers of child studies. Figure 7.3 presents the results for children only. The effect size (r+) can range from + 1 to -1. Zero would indicate that there is no relation between exposure to violent video games and the outcome being measured. Positive scores indicate that video game violence is associated with increases in the outcome being measured. As can be seen, exposure to violent video games significantly increases aggressive behavior, aggressive affect, and aggressive cognition in children and significantly decreases their prosocial behavior.

To gain a clearer understanding of the magnitude of these results, consider the following comparisons to other research findings: The effect of exposure to violent video games on subsequent aggressive behavior in children, as shown in figure 7.3. is larger than: (a) the effect of exposure to passive tobacco smoke on lung cancer; (b) the effect of calcium intake on bone mass; and (c) the effect of homework on academic achievement." In other words, if you believe that children should not be repeatedly exposed to passive tobacco smoke, that adults should be sure to consume sufficient quantities of calcium, and that children need to do
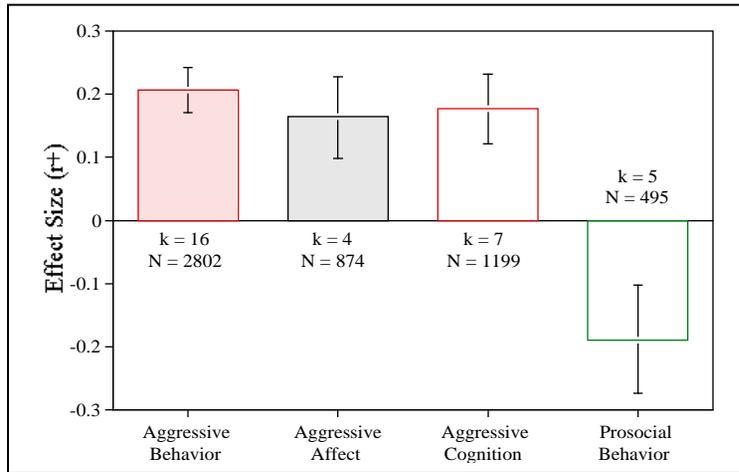
Fig. 7.3. Average Effects of Violent Video Games (r+), Children Only. Vertical capped bars indicate 95% confidence intervals. Because the vertical capped bars do not include the zero line for any of the measured effects, all of the effects of violent video games are statistically significant. k = number of independent tests. N = number of participants.

homework, you should believe even more strongly that children should not be repeatedly exposed to violent video games.

Manipulation Size and Effect Size. Manipulation size refers to how different the two experimental conditions within a study are. For instance, in a study of the effects of alcohol on driving (in a driving simulator), one might have some people drink 16 ounces of vodka and others drink none. Another study might compare driving performance of people who drank 1 ounce of vodka to that of those who drank none. The first study used a rather large manipulation of alcohol, whereas the second used a small one. The results of the first study are likely to show a huge difference in driving skill whereas the second study will likely find little or none. While examining the video game research literature it became clear that there are vast differences in the types of video games used within the "violent" and "nonviolent" conditions of various studies. This occurs partly because of the changes in video games themselves over the years. In the early days of video games, some parents were concerned about the potential consequences of playing the "violent" video game *Pac-Man.* In recent years, that concern seems laughable to many, and *Pac-Man* could reasonably be used as the nonviolent game in some studies. Games categorized as "high violence" in early studies are very different from the

high violence games in more recent studies. It also appears that researchers using younger children often select fairly tame games as their "violent" game, presumably for ethical reasons. In other words, some video game studies have used very small manipulation sizes, comparable to the 1-ounce versus no vodka study described above. Furthermore, several experimental studies have used games with violent content in their "nonviolent" conditions. This is analogous to a driving-skills study comparing those who consumed 1 ounce of vodka with those who consumed .5 ounce. For example, several studies have used *Sonic the Hedge- hog* games in the nonviolent condition. But *Sonic* can be hurt by his enemies and can, in turn, kill them (e.g., by throwing fireballs at them). Thus, some studies that appear to show that violent content has little or no effect may do so because their manipulation size is unreasonably small —the violent and nonviolent games being compared may have about the same level of violent content.

To test this idea, Brad Bushman and I rated the violent content of the video games used in the experimental studies of aggressive behavior. This was possible for only eleven of the experimental studies. We rated each game on a feature-anchored scale ranging from 0 to 10 For each of the eleven studies, we then subtracted the violence rating of the "nonviolent" video game from the violence rating of the "violent" video game. In one study, the ratings of the violent and nonviolent games differed by only 2.5 points out of a possible 10. Figure 7.4 shows that experiments in which the violent and nonviolent games differed a lot in how much violence they contained tended to show a larger effect of violent content on later aggressive behavior.

Summary. This updated meta-analysis clearly shows that playing violent video games causes increases in aggressive behavior as well as in several other aggression-related variables and causes decreases in prosocial behavior.[21] Furthermore, the effects of violent video games are significant even if we totally ignore those studies that used adults (mostly college students). The finding that violent video game effects tend to be larger when the violent and nonviolent games differ most in violent content also fits well with other results in the larger media violence research literature.

Given the relatively small number of studies that have been done on video game violence, the strength of these results is somewhat surprising and certainly is evidence that societal concern about violent video games
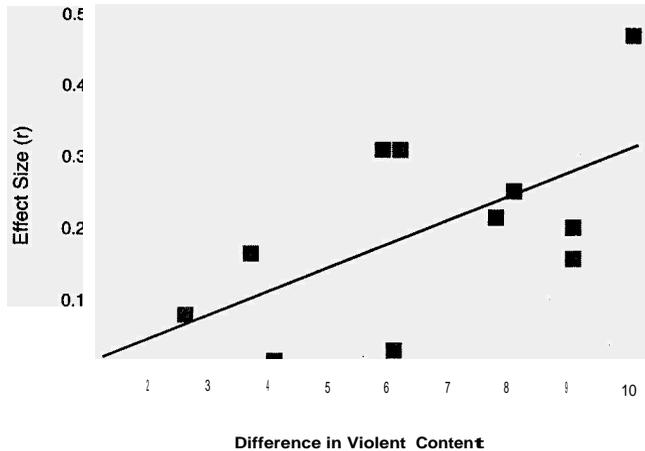
Difference in Violent Content

Fig. 7.4. Relation between the Difference in Violent Content of Violent and Nonviolent Video Game Conditions on the Effect of Violent Content on Aggressive Behavior.

is not misplaced. It is likely that as the research literature on violent video games grows larger and more methodologically sophisticated, some differences in size of effect will emerge, most likely along the lines suggested by Jeanne Funk in chapter eight. For example, there are both theoretical and empirical reasons (from the TV and movie violence research tradition) to expect that as more studies are done on violent video games, we will begin to see that the deleterious effects of playing violent video games will be larger on children than on adults. Nonetheless, the current data suggest that assumptions about large segments of the population being immune to the deleterious effects of playing violent video games are unfounded.

There are a host of unanswered questions in need of additional research. Before discussing them, it is important to put the current state of research on violent video games into a broader theoretical perspective. This perspective is obviously important to researchers but should also be helpful to parents, policy makers, and the general public. My colleagues and I have been working for some time on creating a general model of human aggression, with the belief that such a model should help informed citizens make good decisions.

General Aggression Model

The General Aggression Model (GAM) is a useful framework for understanding violent media effects.[22] Aggressive behavior is largely based on the activation and application of aggression-related ideas or knowledge structures that are stored in memory. Knowledge structure is a general term that refers to ideas, concepts, beliefs, and other types of knowledge that people learn and use in everyday life. Thus, central to GAM are the social learning processes by which the individual acquires these various knowledge structures as well as the social interaction processes that occur during and shortly after exposure to violent media. There are two parts to GAM: the single-episode portion and the multiple-episode portion.

Figure 7.5 displays the single episode portion of GAM. It illustrates how recent exposure to violent media can cause short-term increases in aggression and other related variables. Playing a violent video game can increase aggressive behavior through its impact on the person's present internal state, represented by cognitive, affective, and arousal variables.
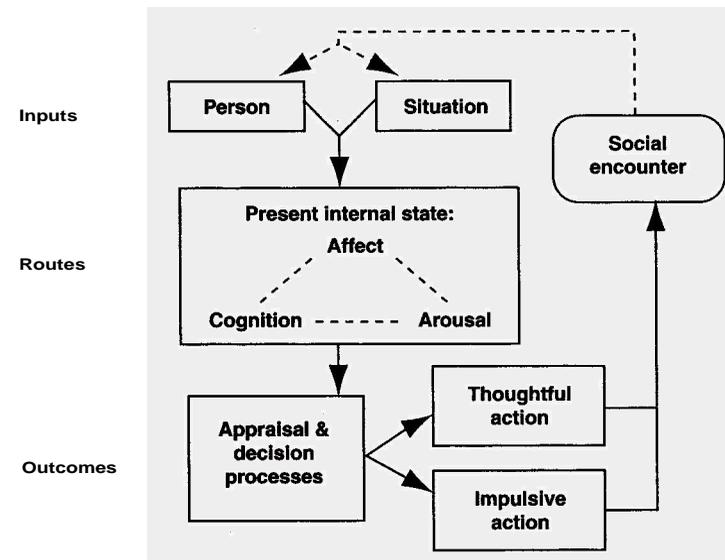

Fig. 7.5. Single Episode General Aggression Model.

In other words, violent media can increase aggression by increasing aggressive cognitions (thoughts), by increasing general physiological arousal, or by creating an aggressive affective (feeling) state. It seems obvious that increasing aggressive thoughts, feelings, and behavioral tendencies must also decrease various prosocial thoughts, feelings, and behavioral tendencies. The effects of a single episode of playing a violent video game are likely to be fairly short-lived, similar to the relatively short-lived effects of smoking one cigarette. However, the effects accumulate over time with repeated exposures, just as the effects of repeatedly smoking cigarettes accumulate and result in serious chronic health problems.

Long-term effects of repeated exposure to media violence involve learning processes, such as learning how to perceive, interpret, judge, and respond to events in the physical and social environment. Such learning develops over time, and is based on day-to-day observations of and interactions with other people, real (as in the family) and imagined (as in the media). Each violent media episode, as outlined in figure 7.5. is essentially one more learning trial. Over time and with repeated exposure these various knowledge structures become more complex, differentiated, and difficult to change. An individual's personality is determined to a large extent by their learning experiences, including their media experiences.

The five types of relevant knowledge structures changed by repeated exposure to violent media are shown in figure 7.6. This figure also links these long-term changes in aggressive personality to aggressive behavior in a given situation through both types of input variables (person and situation) described in the single episode portion of the General Aggression Model. The link to person variables is obvious; the individual is now more prepared to be aggressive in many ways because of aggression-congruent beliefs, attitudes, expectations, and values. Less obvious is how repeated exposure to violent media can change situational variables. What happens is that as people become more aggressive, their social environments change. The people who are willing to interact with them, the types of interactions they have, and the types of situations made available to them all change. Interactions with teachers, parents, and nonaggressive peers are likely to decline in frequency and quality, but interactions with "deviant" peers are likely to increase.
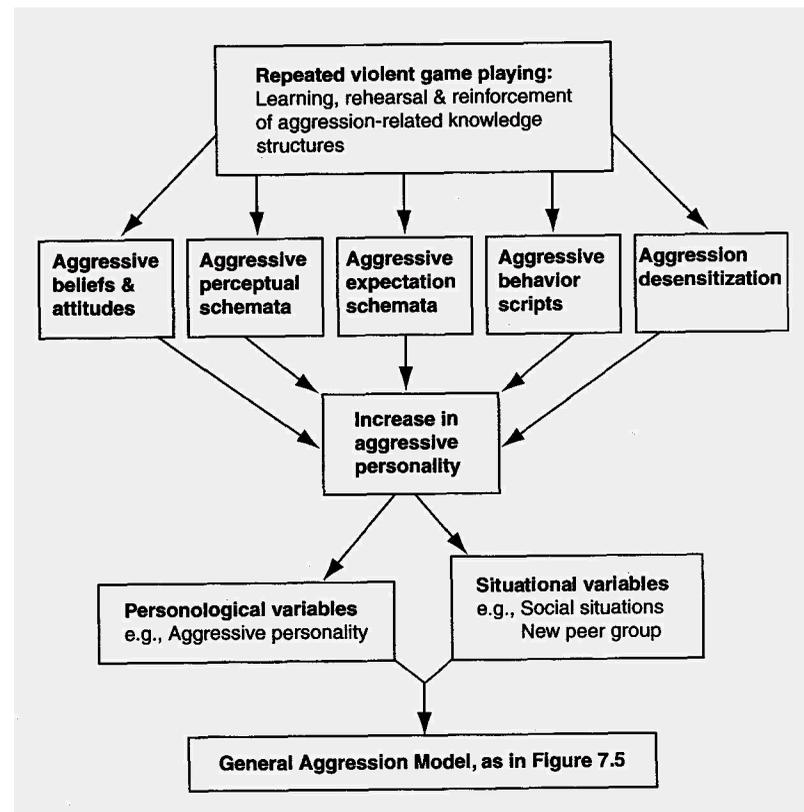

Fig. 7.6. Multiple Episode General Aggression Model: Long-Term Effects of Video Game Violence. Adapted from Craig A. Anderson and Karen E. Dill, "Video Games and Aggressive Thoughts, Feelings, and Behavior in the Laboratory and in Life," *Journal of Personality and Social Psychology* 78, no. 4 (2000): pp. 772-90.

The schema illustrated in figure 7.6 further suggests that the short-term effects of violent media on aggressive cognition are especially important. Temporary mood states and arousal dissipate over time, but the repeated rehearsal of aggressive cognitions can lead to long-term changes in multiple aspects of aggressive personality. The literature on the development of behavioral scripts suggests that even a few rehearsals can change a person's expectations and intentions involving important social behaviors.[23]

Implications for Parents and Public Policy Makers

When considering potential implications of research on violent video games, it is important to keep three factors in mind. The first and most obvious factor is the set of results from studies of violent video games. Though the research literature specifically devoted to violent video games is still relatively small compared to research on the effects of violence in TV and movies, there is now sufficient evidence to state that playing violent video games can cause significant increases in aggression in the short term and that increases in the amount of exposure to violent video games is positively linked to aggression in real world contexts as well as in laboratory-based situations. The second factor is the voluminous research literature on media violence in general. That literature has documented that media violence has significant causal effects on aggression and on interpersonal violence and has successfully withstood a variety of challenges. The processes underlying the effects of TV and movie violence are very similar to those presumed to underlie the effects of violent video games, and therefore findings from the former domain are very relevant to implications for the latter. The third factor concerns advances in understanding the various processes underlying human aggression in general. Numerous advances in understanding human aggression have been achieved in recent years, advances that allowed the formulation of the General Aggression Model. As Kurt Lewin once said, "There is nothing so practical as a good theory.[24] Though no theory is ever complete in all respects, a good one allows accurate predictions about the likely effects of certain actions. Social scientists' understanding of human aggression in general and of media violence effects in particular is now good enough to allow fairly accurate predictions of the likely effects of actions that parents and policy makers might take.

First and foremost, parents need to discover what kinds of media, including video games, their children are ingesting, and then take steps to ensure that their media diet is a healthy one. It can be a daunting task, especially for parents whose computer skills are considerably inferior to those of their children. Nonetheless, it is imperative for parents to control their children's media diets, and the first step in doing this is to discover what they currently are exposed to, where they are exposed to it, and how to take control of that exposure. Some parents lament that it is impossible to totally control what their children see and do and therefore throw up their hands in dismay. It is true that they cannot totally control their children's media diets, but this is no reason to give up all attempts at media diet control. For example, it is difficult to control what games your child plays at a friend's house. However, it is also difficult to control what your child eats when at a friend's house, but the solution is not to abandon your parental responsibility to provide nutritious meals at home. As the General Aggression Model illustrates, the long-term negative effects of exposure to violent video games is related to frequency of exposure. Steps that reduce such exposure in any environment, especially the home, can be beneficial. Such steps might include removing the TV, the video game console, and the computer from the child's room to an area that is more easily monitored by the parent. One can also monitor and control what kinds of computer games are on whatever computers the child uses and can restrict the Web sites that the computer can access while in use by the child. Along these same lines, parents should encourage the parents of their children's friends to provide a healthy media diet rather than a violent one. None of these monitoring and control tasks is easy, but a lot can be accomplished by a committed parent. For example, after completing a TV interview for a San Antonio news show, the interviewing reporter told me that whenever she finds in her house a CD-ROM video game disk that has a violent game on it, she breaks it in half and tosses it in the trash, regardless of whether it belongs to her son or to one of her son's friends. If it belonged to one of her son's friends, she invites that child's parents to discuss the inappropriateness of providing violent games to children, especially to someone else's children.

Second, public policy makers can aid parents in their attempts to provide a healthy media diet to their children by giving them back some of the parental control that has been lost to the media industry and their marketing departments. Legislation that restricts access of minors to violent media, for example, legislation that requires parental permission for minor children to buy, rent, or play violent video games in arcades, is likely to be helpful. Creating a single, unified rating system for various types of entertainment media would also help parents regain some control by simplifying the current confusion of systems. The new rating system should be applied by a group that is truly independent of the entertainment media industries. It should also be based on the best available research. We now know from research, for example, that strictly age-

based systems encourage children to seek out media that are "too old" for them. [25] A rating system that more clearly labels the content of the video game might well be more informative to parents and might provide less encouragement to youth to violate age targets. Research also shows that even "cartoon" violence has a negative impact on children, especially on the youngest ones for whom the cartoon violence is supposedly created. In brief, parents need to be on the alert for any video game that encourages or allows the player to harm another creature, human or nonhuman. Such games are very likely teaching the game player subtle but harmful aggression lessons, regardless of how cute the game characters are or how unrealistic the violence appears.

Third, parents can actively teach their children the reasons behind the restrictions they place on certain types of media, why such media can be bad for them. In a sense, this is teaching them to become more media savvy. Similarly, discussing alternative nonviolent solutions to interpersonal conflicts with one's children can help teach more positive values as well as practical guides to life. This can be done in the context of violent media themselves, as well as in numerous everyday situations as conflicts arise.

Finally, reducing the amount of time children spend on electronic media and substituting increased time in social contexts and activities is likely to improve social skills and functioning over time. Chapter 8 describes one such study.

New Directions in Research

We now know that playing violent video games increases aggressive behavior and decreases prosocial behavior in children and in young adults. There are many unanswered questions in need of high quality research. Here are just a few such topics

1. The short- and long-term effects of realistic gore on desensitization, aggression, and prosocial behavior.
2. Game features that increase or decrease the game player's identification with aggressive characters in video games.
3. The effects of pain cues in the game on short - and long-term desensitization, aggression, and prosocial behavior .
4. The design of exciting games teaching prosocial problem-solving skills.

5. Types of people who are most and least susceptible to the effects of violent video games.

What we've learned so far about the effects of violent video games has taken almost twenty years, in part because of the lack of federal research funding. Given the ubiquity of video games in modern life and the continual increase in the realism and extremity of violence in the games, it is imperative that research on these and related topics be undertaken soon .

NOTES

Epigraph: PC Gamer (February 2001): p. 41.

1. Donald F. Roberts, Ulla G. Foehr, Victoria J. Rideout, and Mollyann Brodie, *Kids & Media @ the New Millennium: A Comprehensive National Analysis of Children's Media Use* (Menlo Park, Calif: The Henry J. Kaiser Family Foundation, 1999).

2. Douglas A. Gentile and David A. Walsh, "A Normative Study of Family Media Habits," *Journal of Applied Developmental Psychology* 23, no. 2 (2002): pp. 157-78.

3. CIRP, *Cooperative Institutional Research Program Survey Results* (Ames, Ia.: Office of Institutional Research, 1998, 1999).

4. *Video Game Sales Slide 5 Percent in 2000* (Reuters, January 19, 2001) .

5. Douglas A. Gentile, Paul J. Lynch, and David A. Walsh, "The Effects of Violent Video Game Habits on Adolescent Aggressive Attitudes and Behaviors" (National Institute on Media and the Family, Minneapolis).

6. Steven L. Kent, *The First Quarter: A 25 -year History of Video Games* (Bothell, Wash.: BWD Press 2000).

7. Craig A. Anderson and Melissa Morrow, "Competitive Aggression without Interaction: Effects of Competitive Versus Cooperative Instructions on Aggressive Behavior in Video Games," *Personality and Social Psychology Bulletin* 21, no. 10 (1995): pp. 1020-30.

8. Craig A. Anderson and Karen E. Dill, "Video Games and Aggressive Thoughts, Feelings, and Behavior in the Laboratory and in Life," *Journal of Personality and Social Psychology* 78, no.4 (2000): pp. 772-90.

9. FTC, "Marketing Violent Entertainment to Children: A Review of Self-Regulation and Industry Practices in the Motion Picture, Music Recording, & Electronic Game Industries," *Report of the Federal Trade Commission. Federal Trade Commission* (2000), available at www.ftc.gov/reports/violence/ ; David Walsh, "Fifth Annual Video and Computer Game Report Cards" (National Institute on Media and the Family, Minneapolis, 2001) .

10. Debra D. Buchman and Jeanne B. Funk, "Video and Computer Games in the '90s: Children's Time Commitment and Game Preference," *Children Today 24*

(1996): pp. 12- 16; Tracy L. Dietz, "An Examination of Violence and Gender Role Portrayals in Video Games: Implications for Gender Socialization and Aggressive Behavior," *Sex-Roles* 38, no. 5/6 (1998): pp. 425-42; Jeanne B. Funk et al., "Rating Electronic Games: Violence Is in the Eye of the Beholder," *Youth and Society* 30, no. 3 (1999): pp.283-312; Eugene F. Provenzo, *Video Kids: Making Sense of Nintendo* (Cambridge: Harvard University Press, 1991).

11. FTC, "Marketing Violent Entertainment to Children: A Review of Self-Regulation and Industry Practices in the Motion Picture, Music Recording, & Electronic Game Industries," *Report of the Federal Trade Commission.* Federal Trade Commission (2000): available at www.ftc.gov/reports/violence/ .

12. Jeanne B. Funk et al., "Rating Electronic Games," pp. 283-312.

13. Brad J. Bushman and L. Rowell Huesmann, "Effects of Televised Violence on Aggression," in *Handbook of Children and the Media,* Dorothy Singer and Jerome Singer, eds., (Thousand Oaks, Calif.: Sage Publications, 2001): pp. 223-54.

14. David Walsh, "Interactive Violence and Children: Testimony Submitted to the Committee on Commerce, Science, and Transportation," downloaded from www.mediaandthefamily.org/senateviolence-full.html on March 24, 2000 (March 21, 2001)

15. Douglas A. Gentile and David A.Walsh, "The Impact of Video Games on Children and Youth" (Arlington, Va.: Educational Research Service, 2001): Singer and Singer, eds., *Handbook of Children and the Media* .

16. Brad J. Bushman and Craig A. Anderson, "Media Violence and the American Public: Scientific Facts Versus Media Misinformation," *American Psychologist* 56, no. 6/7 (2001): pp. 477-89.

17. What is plotted is the lower boundary of the 99.9 percent confidence interval of the average effect size (in terms of r+) of studies of media violence effects on aggressive behavior. This is an unusually conservative criterion for establishing the existence of a true relation between scientific variables. The usual criterion is 95 percent.

18. Craig A. Anderson and Brad J. Bushman, "Effects of Violent Video Games on Aggressive Behavior, Aggressive Cognition, Aggressive Affect, Physiological Arousal, and Prosocial Behavior: A Meta-Analytic Review of the Scientific Literature," *Psychological Science,* 12, no. 5 (2001): pp. 353-59.

19. The following newly available studies were added: Michael C. Brooks, "Press Start: Exploring the Effects of Violent Video Games on Boys" (Ph.D. diss., University of Texas at Austin, 1999); Douglas A. Gentile, Paul J. Lynch, and David A. Walsh, "The Effects of Violent Video Game Habits"; Bradley A. Janey, "Masculine Ideology, Television Viewing, and Father Availability As Risk Factors in the Development of Aggression in Preadolescent Males" (Ph.D. diss., Kansas State University, Manhattan, Kans., 1999); Rebecca P. Tews, "The Effect Of Video Games on Anxiety Level and Heart Rate in College Students" (Ph.D. diss., Marquette Univer-sity, Milwaukee, Wisc., 1999). In addition, the following methodological changes were implemented: (a) effect sizes were collapsed across sex rather than averaged, where possible; (b) for studies in which the "low violence" video game condition actually contained some violent content and the "no game control condition was not particularly boring or frustrating, the control condition was used as the comparison group, instead of the "low violence" condition; (c) for studies in which the "no game" control condition was particularly boring or frustrating, the "low violence" video game condition was used as the comparison group; (d) studies which reported only combined video game player/observer results were dropped; (e) self and observer reports of aggressive behavior were averaged; (f) studies in which the aggressive behavior was not targeted toward another person were dropped; (g) one experimental study was dropped because the only control condition was rated by participants as significantly less entertaining or exciting than the comparison violent video game.

20. Brad J. Bushman and Craig A. Anderson, "Media Violence and the American Public," pp. 477-89.

21. The ability to draw strong causal conclusions derives from the fact that the true experiments, in which participants are randomly assigned to play either violent or nonviolent video games, produce statistically significant effects by themselves. This characteristic of true experiments is one of the main advantages of this type of study. One main advantage of correlational studies is that they generally assess aggressive behaviors that are more like aggression in the real world. The fact that both types of studies of violent video games yield similar effects provides strong and converging evidence that these effects are substantial and real.

22. Craig A. Anderson and Brad J. Bushman, "Human Aggression," *Annual Review of Psychology* 53 (2002): pp. 27-51.

23. Craig A. Anderson, "Imagination and Expectation: The Effect of Imagining Behavioral Scripts on Personal Intentions," *Journal of Personality and Social Psychology* 45, no. 2 (1983): pp. 293-305; Craig A. Anderson and Sandra Godfrey, "Thoughts about Actions: The Effects of Specificity and Availability of Imagined Behavioral Scripts on Expectations about Oneself and Others," *Social Cognition* 5, no. 3 (1987): pp. 238 -58; Richard L. Marsh, Jason L. Hicks, and Martin S. Bink, "Activation of Completed, Uncompleted, and Partially Completed Intentions," *Journal of Experimental Psychology: Learning, Memory, and Cognition* 24, no. 2 (1998): pp. 350-61

24. Kurt Lewin, "Problems of Research in Social Psychology," in *Field Theory in Social Science,* Darwin Cartwright, ed. (New York: Harper and Row, 1951): p. 169.

25. Brad J. Bushman and Angela D. Stack, "Forbidden Fruit Versus Tainted Fruit: Effects of Warning Labels on Attraction to Television Violence," *Journal of Experimental Psychology: Applied* 2, no. 3 (1996): pp. 207-26.