Research Article

The Effects of Reward and Punishment in Violent Video Games on Aggressive Affect, Cognition, and Behavior

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ABSTRACT—*Three experiments examined the effects of rewarding and punishing violent actions in video games on later aggression-related variables. Participants played one of three versions of the same race-car video game: (a) a version in which all violence was rewarded, (b) a version in which all violence was punished, and (c) a nonviolent version. Participants were then measured for aggressive affect (Experiment 1), aggressive cognition (Experiment 2), and aggressive behavior (Experiment 3). Rewarding violent game actions increased hostile emotion, aggressive thinking, and aggressive behavior. Punishing violent actions increased hostile emotion, but did not increase aggressive thinking or aggressive behavior. Results suggest that games that reward violent actions can increase aggressive behavior by increasing aggressive thinking.*

> All the people will be part of the physics environment, which will enable us to create spectacular crashes, and remove arms, legs, heads, etc. in a shower of blood.
>
> —Mat Sullivan, development manager for Stainless Software, describing Carmageddon 2 (SCi Games, 2003)

Recent content analyses reveal that as many as 89% of video games contain some violent content (Children Now, 2001); approximately half of video games include serious violent actions toward other game characters (Children Now, 2001; Dietz, 1998; Dill, Gentile, Richter, & Dill, in press). Playing time by children has increased from about 4 hr per week in the mid-1980s (Harris & Williams, 1985) to more than 9 hr per week, with girls playing about 5.5 hr per week and boys playing 13 hr per week (Anderson, Gentile, & Buckley, 2005; Gentile, Lynch, Linder, & Walsh, 2004). More than 90% of U.S. children ages 2 through 17 play video games (Gentile & Walsh, 2002).

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KNOWN EFFECTS OF EXPOSURE TO VIOLENT VIDEO GAMES

Because violent video games are a relatively new type of violent media, the literature examining negative effects on players is small compared with the literature on negative effects of television and film violence. However, a clear consensus has already been reached: Playing violent video games increases aggression. Numerous studies have demonstrated that exposure to violent video games increases aggressive affect (e.g., Anderson & Ford, 1986; Funk, Flores, Buchman, & Germann, 1999), aggressive cognitions (e.g., Calvert & Tan, 1994; Kirsh, Olczak, & Mounts, 2005; Krahé & Möller, 2004), and aggressive behavior (e.g., Anderson & Dill, 2000; Irwin & Gross, 1995). Recent meta-analyses of the effects of violent video games on aggressive behavior and other aggression-related outcome variables (e.g., Anderson et al., 2004) have demonstrated average effect sizes (in correlation terms) in the .2–.3 range.

REWARD AND PUNISHMENT IN VIOLENT MEDIA

Although reward for violent actions is a dominant characteristic of many violent video games, other video games may punish some forms of violence (e.g., shooting hostages instead of terrorists). This raises an intriguing question: Do video games that reward violent actions increase aggression-related variables compared with similar games that punish violent actions or that are nonviolent? Currently, there are no published studies that address this question, so one must look to earlier media-violence research. For example, Bandura (1965) demonstrated that participants who viewed a televised character being punished for physically attacking a "Bobo" doll displayed significantly fewer imitative behaviors than those in a reward or control condition. Bandura, Ross, and Ross (1963) found similar results.

Given the similar nature of violent video games and violent television programming, it is reasonable to suspect that rewarding violent actions in a game could also increase aggression. There are important differences between television and video games, however. In the case of video-game violence, the player is immersed in the game and rewarded directly (e.g., by points), whereas in the case of televised violence, the viewer is not rewarded directly. Additionally, the aggression-enhancing effects might be more powerful for games than television because direct rewards for violence should increase the amount of violent actions within the game. This same immersion in video games (relative to television) makes hypotheses concerning the punishment of violence in video games less certain. Viewers who observe violence being punished on TV may vicariously learn that violence has negative consequences, but players who are continually and directly punished for violent actions in a video game could become frustrated, and therefore more aggressive than if they had played a nonviolent game. Thus, reward for violence should increase aggression in video-game players, as it does in television viewers, but although punishment of violence decreases aggression in television viewers, it may not necessarily do so in video-game players.

THE GENERAL AGGRESSION MODEL

The General Aggression Model (GAM) is an integration of several prior models of aggression (e.g., social learning theory, cognitive neoassociation) and has been detailed in several recent publications (Anderson & Bushman, 2002; Anderson & Carnagey, 2004; Anderson & Huesmann, 2003). It is not specifically a model of media effects, but can easily be applied to such effects. GAM describes a cyclical pattern of interaction between the person and the environment. Input variables, such as provocation and aggressive personality, can affect decision processes and behavior in three primary ways: by influencing current cognitions, affective state, and physiological arousal.

GAM and Rewarding Violent Actions

Exposure to violent media theoretically can and empirically does affect all three of these internal states. Rewarding violence within a video game might further increase aggression outside of the game. For example, it could increase the frequency of aggressive game behaviors, which might well increase aggressive thinking, hostile feelings, or both in the immediate situation, thereby increasing the likelihood of aggressive behavior in that situation. Rewarding game violence might also yield more positive attitudes toward and beliefs about using aggression to solve real-world conflicts. This sequence could lead to long-term increases in aggressive behavior.

GAM and Punishing Violent Actions

Although GAM predicts that rewarding violent actions should increase aggression-related variables, it is unclear whether punishment will decrease them. If punishment in a violent video game does lead to a reduction in aggressive game play, GAM predicts this type of video-game exposure will decrease aggressive behavior in real-life situations compared with exposure to video games that reward aggressive game play. However, if a player insists on using an aggressive playing strategy and is continually punished for violent actions in a violent video game, frustration could increase. Increases in frustration frequently cause increases in aggressive behavior (Berkowitz, 1989).

Aggressive Behavior: Driven by Cognition or Affect?

Although GAM allows three possible routes of influence on aggressive behavior (cognitions, affect, and arousal), little is known about their relative responsibility for short-term increases in aggression induced by playing violent video games. To better understand the effect of exposure to violent video games on aggressive behavior, one must examine which route is the primary route of influence. Some work has found that violent games can increase aggression through the cognitive route, even when the affective and arousal routes are controlled (Anderson et al., 2004; Anderson & Dill, 2000). Because both violent and nonviolent games can increase arousal, the arousal route is scientifically less interesting than the other two. We therefore designed the following three studies to control for arousal so that we could focus on the potential effects of reward and punishment of game violence on aggressive cognition, aggressive affect, and aggressive behavior. Our approach was to compare the patterns of effects to determine which route (affect or cognition) has effects more similar to those on aggressive behavior and therefore most likely drives the effects of video-game violence on aggressive behavior.

COMPETITION HYPOTHESIS

One alternative explanation of many previous studies is that the increases in aggressive behavior (and aggression-related variables) associated with violent content may be due to an increased level of competition in violent relative to nonviolent video games. Violent games typically entail a strong competition aspect, whereas nonviolent video games are frequently noncompetitive. Furthermore, there are good theoretical and empirical reasons for thinking that competitiveness itself might increase aggression, either by increasing arousal or by increasing aggressive thoughts (Anderson & Morrow, 1995; Deutsch, 1949, 1993). The arousal version of the competition hypothesis is based on other research showing that increases in physiological arousal can lead to increases in aggression under some circumstances (Berkowitz, 1993). This version of the competition hypothesis has been effectively refuted by experiments in which violent games led to increased aggression even when compared with equally arousing nonviolent games (Anderson et al., 2004; Anderson & Dill, 2000). The aggressive-thoughts version of this hypothesis has not been as effectively tested, but could be by using similarly competitive nonviolent and violent games. The present experiments used this approach.

OVERVIEW

The present studies had three primary purposes. The first was to examine the effects of reward and punishment for violent actions within a video game on later aggressive cognition, affect, and behavior. The second was to determine whether violent-game-induced changes in affect or cognition seemed to drive any observed elevation of aggressive behavior. The third was to test the competition hypothesis by using a modified violent video game, one that still contained a competitive aspect but was nonviolent, in the control condition.

In all three studies, undergraduate participants played one of three versions of the same competitive race-car video game, Carmageddon 2: (a) a version in which killing pedestrians and race opponents was rewarded, (b) a version in which killing pedestrians and race opponents was punished, and (c) a version in which killing pedestrians and race opponents was not possible (nonviolent). The first version was an unaltered form of the original game. Players were awarded points for destroying their opponents and killing pedestrians. The second version was identical to the first except that players lost points for hitting other vehicles and pedestrians. The third version of Carmageddon 2 resembled a nonviolent video game. All pedestrians were removed, and computer-controlled opponent vehicles were reprogrammed to behave more passively than in the other versions; players received points only for passing checkpoints on the racetrack.

All studies used a 2 (sex of participant) × 3 (video-game version) between-subjects design. After participants played one of the three video games, aggressive affect (Study 1), aggressive cognition (Study 2), or aggressive behavior (Study 3) was measured.

Participants in all three studies were selected at random from a larger pool of students who had earlier completed the trait physical-aggression subscale of the Aggression Questionnaire (coefficient $\alpha = .88$; Buss & Perry, 1992) and the Video Game Violence Exposure Questionnaire (Anderson & Dill, 2000). Table 1 presents the results of analyses of sex differences in trait physical aggression and the relation between trait physical aggression and exposure to violent video games.

TABLE 1
Effects of Sex and Exposure to Violent Video Games on Trait Physical Aggression

Variable	Study 1	Study 2	Study 3	Average
Sex (*d*)	.86*	.78*	.90*	.86*
Exposure to violent video games (*r*)	34*	.32*	.23*	.28*
n	75	66	135	276

Note. For sex, a positive effect size means that males were higher in trait aggressiveness than females. For exposure to violent video games, a positive correlation means that as exposure increased, trait aggressiveness increased as well.
*$p < .01$.

EXPERIMENT 1

Method

Forty-three male and 32 female undergraduates participated in this experiment. First, a blood pressure cuff was placed on each participant's nondominant arm. The participant was told that the study was designed to evaluate different types of media. Instructions for playing the randomly assigned video game were given, and the participant played the game for 20 min. Total points earned and, when applicable, the number of pedestrians killed (body count) were recorded by the experimenter from a separate monitor. The participant then completed the State Hostility Scale (SHS; Anderson, Deuser, & DeNeve, 1995). This involves rating various feelings (e.g., "I feel furious," "I feel aggravated," "I feel angry") using a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The participant also rated the video game on various dimensions (difficult, absorbing, action-packed, arousing, boring, enjoyable, entertaining, exciting, frustrating, fun, involving, stimulating, violent, and addicting). Finally, the participant was probed for suspicion and debriefed. Blood pressure and pulse measurements were taken before any tasks (baseline), during completion of the SHS, and after all tasks were complete.

Results

Physiological Arousal

Blood pressure and pulse were assessed to see whether the three games differed in their arousal-enhancing properties. If so, these measures could then be used as statistical controls in the main analyses.

Mean arterial pressure and pulse were examined in separate 3 (video game: reward, punishment, nonviolent) × 2 (participant's sex) × 3 (measurement time: baseline, after video game, during completion of the SHS) mixed-design analyses of variance (ANOVAs). In both cases, the key Video Game × Measurement Time interaction was nonsignificant, *p*s > .25. Thus, the three racing games produced essentially the same levels of arousal, as intended.

TABLE 2
Effect of the Game Manipulation on the Dependent Variables

	Game version		
Dependent variable	Reward	Punishment	Nonviolent
Aggressive affect	2.52_a (0.74)	2.38_a (0.51)	2.02_b (0.39)
Aggressive cognition	$.210_a$ (.066)	$.175_b$ (.046)	$.157_b$ (.050)
Aggressive behavior	177.0_a (167.58)	125.0_b (88.32)	116.9_b (74.67)

Note. Standard deviations are given in parentheses. Within a row, means that do not share a subscript are significantly different from each other ($p < .05$).

Body-Count Manipulation Check

Experimenters watched and recorded how many pedestrians were killed during the 20 min of play for the two violent versions of the game. As expected, participants who were rewarded for killing pedestrians killed significantly more pedestrians than participants who were punished, *M*s = 80.7 and 24.2, $F(1, 46) = 112.50$, $p < .05$. These results validate the reward/punish manipulation.

SHS

Aggressive affect was calculated by averaging responses to the 35 items from the SHS. Internal reliability was high, coefficient $\alpha = .93$. SHS scores were analyzed using a 3 (video game: reward, punishment, nonviolent) × 2 (participant's sex) between-subjects ANOVA. Results yielded a significant effect of game, $F(2, 67) = 7.51$, $p < .05$ (see Table 2). There was no difference between the reward and punishment versions of the game, $F(1, 67) = 1.12$, $p > .05$, $d = 0.26$. However, participants who played these two violent game versions reported more hostile affect than did participants who played the nonviolent game, Fs(1, 67) = 13.40 and 7.78, respectively, *p*s < .05, *d*s = 0.89 and 0.68. Women were significantly more hostile than men, *M*s = 2.48 and 2.12, $F(1, 67) = 7.81$, $p < .05$, $d = 0.68$. The Game × Sex interaction was nonsignificant, $F(1, 67) = 3.00$, $p > .05$.

Ratings of the video game, past history of exposure to video-game violence, and trait physical aggression were also entered into the statistical model. Ratings for how frustrating and addicting the game was were significant predictors of SHS score, Fs(1, 65) = 5.33 and 10.91; *b*s = 0.057 and 0.088, respectively; *p*s < .05, indicating that higher ratings were associated with greater hostile feelings. Neither trait hostility nor prior exposure to video-game violence was a significant predictor of SHS score, Fs(1, 66) = 0.58 and 0.78; *b*s = 0.067 and −0.011, respectively; *p*s > .05. Also, no measurements of physiological arousal were significant predictors of SHS score, Fs < 3.0, *p*s > .08.

Discussion

Experiment 1 demonstrated that violence in a video game, regardless of whether it is rewarded or punished, can increase hostile affect. The fact that there were huge differences in the body count between the reward and punishment conditions suggests that the increased hostile affect was not a direct result of active attempts to kill game characters. Note that the effect of violence was obtained even though the violent and nonviolent games were equally arousing and all games were competitive.

EXPERIMENT 2

Method

Twenty-nine male and 37 female undergraduates participated in Experiment 2. The procedures were identical to those of Experiment 1 except that the SHS was replaced with the Word Fragment Task (Anderson, Carnagey, & Eubanks, 2003). This task required participants to complete as many word fragments (total of 98) as possible in 5 min. Half of the word fragments contained aggressive possibilities. For example, "K I __ __" could be completed as "kind," "kiss," "kick," or "kill." This task has been shown to be a valid measure of aggressive cognition (Anderson et al., 2003, 2004). Similar tasks have been used in research on implicit memory (e.g., Roediger, Weldon, Stadler, & Riegler, 1992).

Results

Physiological Arousal

Mean arterial pressure and pulse were examined in separate 3 (video game) × 2 (participant's sex) × 3 (measurement time) mixed-design ANOVAs. In both cases, the key Video Game × Measurement Time interaction was nonsignificant, *p*s > .24. Once again, the three racing games produced equivalent levels of arousal.

Body-Count Manipulation Check

Participants in the reward condition killed significantly more pedestrians than participants in the punishment condition, *M*s = 69.1 and 24.0, $F(1, 43) = 60.03$, $p < .05$, again demonstrating a successful manipulation.

Aggressive Cognition

Aggressive cognition was calculated by dividing the number of word fragments that were completed as aggressive words by the total number of word-fragment completions. Results yielded a significant effect of video game, $F(2, 59) = 5.33$, $p < .05$ (see

Table 2). Further analysis demonstrated that there was no difference between the punishment and nonviolent game versions, $F(1, 59) = 1.14, p > .05, d = 0.28$. Participants who played the reward version of the video game were higher in aggressive cognitions than both participants who played the punishment version, $F(1, 59) = 4.62, p < .05, d = 0.56$, and participants who played the nonviolent version, $F(1, 59) = 10.11, p < .05, d = 0.83$.

Men were slightly but not significantly higher in aggressive cognitions than women, *M*s = .195 and .167, $F(1, 59) = 3.52, p < .07, d = 0.49$. The Sex × Game interaction was nonsignificant, $F(1, 59) = 1.43, p > .05$. Systolic blood pressure at baseline was also a significant predictor of aggressive cognitions, $F(1, 59) = 5.79, p < .05, b = -0.0015$. Neither trait aggression nor exposure to video-game violence was a significant predictor of aggressive cognitions, Fs(1, 57) = 1.05 and 0.02; bs = 0.011 and 0.00026, respectively; ps > .05. Also, video-game ratings were not significant predictors of aggressive cognitions, Fs(1, 59) < 3.10, ps > .08.

Discussion

In Experiment 2, participants who played a video game in which violence was rewarded exhibited increased aggressive cognition, whereas those who played a game in which violence was punished and those who played a nonviolent game had lower levels of aggressive cognition that were about equal. This pattern differs from that of Experiment 1, which found participants had elevated levels of hostile affect after playing either of the violent games. This difference enabled us to pursue our third goal in Experiment 3, which investigated whether game-induced effects on aggressive behavior were based primarily on affect or cognition.

EXPERIMENT 3

Method

Sixty-eight male and 73 female undergraduates participated in Experiment 3, which employed a version of the Taylor competitive reaction time (CRT) task. This task is a widely used and externally valid measure of aggressive behavior (see Anderson & Bushman, 1997; Anderson, Lindsay, & Bushman, 1999; Bushman & Anderson, 1998; Giancola & Chermack, 1998). Participants are told they are competing with another person to see who can press a mouse button faster after hearing an auditory cue. The "loser" of each trial receives a burst of white noise. Participants select the intensity level and the duration of the noise they want their opponent to hear prior to each of 25 trials. These selections constitute the measure of aggressive behavior. Our CRT task was preprogrammed for participants to win 13 and lose 12 trials. The computer recorded participants' intensity and duration settings. The pattern of wins and losses and of noise blasts presented to each participant was uncorrelated with trial number.

Participants were told that their job was to form an impression of another person via two tasks: a writing task and a computerized interaction task. Also, participants were told they would form an impression of a second person through a media-evaluation task. The experimenter instructed each participant to write a brief essay on the issue of abortion, supporting whichever position he or she chose. After 5 min, the experimenter returned and took the essay. The experimenter came back shortly with another handwritten essay, supposedly written by the first partner. This essay endorsed the opposing viewpoint. The participant read the essay and evaluated it on the following dimensions: organization, originality, writing style, clarity of expression, persuasiveness of arguments, and overall quality. Ratings were made on a scale from −10 (*poor*) to +10 (*excellent*). The form also allowed open-ended comments.

Next, the participant played one of the three video games for 20 min. The participant was informed that after playing the video game, he or she would fill out a rating form for the game and exchange game evaluations with the second partner, who played the same game. Total number of pedestrians killed (body count), when applicable, and points accumulated by the participant were recorded by the experimenter, who observed game play on a separate monitor.

After 20 min, the experimenter returned and gave the participant an essay evaluation form that was supposedly from the first partner. This evaluation was very harsh, criticizing the participant's writing skills and arguments. The form showed the following ratings: organization, −9; originality, −10; writing style, −10; clarity of expression, −9; persuasiveness of arguments, −9; and overall quality, −10. Also, a handwritten comment at the bottom of the evaluation stated, "This is the worst essay I have ever read!!" This procedure has been used successfully in prior research to mildly provoke participants (e.g., Bushman & Baumeister, 1998; Bushman, Baumeister, & Phillips, 2001; Bushman, Baumeister, & Stack, 1999).

After reading the evaluation, the participant performed the CRT task. The participant believed that he or she was competing against the first partner (the same person who provided negative essay feedback). Next, the participant completed a video-game evaluation form. The participant received game ratings supposedly from the second partner and was asked to review them. Next, to corroborate the cover story, the experimenter asked the participant to complete two partner-evaluation forms, which asked the participant to rate a variety of statements (e.g., "I like my partner," "I think my partner is intelligent," "I think my partner is a good person") concerning his or her partners on a scale from 1 (*strongly disagree*) to 10 (*strongly agree*).[1] Finally, the participant was probed for suspicion and debriefed.

[1]Evaluations of the partners were initially considered as a secondary measure of aggressive behavior. However, because there were no interesting predictors of these evaluations (e.g., no effect of video-game exposure), they are not discussed here.

Results

Body-Count Manipulation Check

Participants in the reward condition killed significantly more pedestrians than participants in the punishment condition, $Ms = 65.6$ and 20.9, $F(1, 92) = 85.38$, $p < .05$. Again, the manipulation was successful.

Aggressive Behavior

An aggressive-energy score was calculated for each trial by taking the square root of the duration of noise chosen for the opponent and multiplying this value by the intensity of the noise chosen. A total aggression score was calculated by averaging the energies across the 25 trials. Aggressive energy has been shown to be a valid measure of aggressive behavior (e.g., Baron & Bell, 1975; Bartholow, Anderson, Carnagey, & Benjamin, 2005).

Aggressive behavior was analyzed using a 2 (participant's sex) × 3 (video game) between-subjects ANOVA. Results yielded a significant effect of video game, $F(2, 135) = 3.83$, $p < .05$ (see Table 2). Further analysis demonstrated that there was no difference between the punishment and nonviolent versions of the game, $F(1, 135) = 0.14$, $p > .05$, $d = 0.06$. Participants who played the reward version were more aggressive than both those who played the punishment version, $F(1, 135) = 4.84$, $p < .05$, $d = 0.38$, and those who played the nonviolent version, $F(1, 135) = 6.50$, $p < .05$, $d = 0.44$.

Men were higher in aggressive behavior than women, $Ms = 159.2$ and 118.9, $F(1, 135) = 4.58$, $p < .05$, $d = 0.37$. Prior exposure to video-game violence did not predict aggressive behavior, $F(1, 133) = 0.23$, $b = -5.15$, $p > .05$. Trait aggression was positively related to aggressive behavior, $F(1, 127) = 9.45$, $b = 32.24$, $p < .05$. Also, several video-game ratings (absorbing, boring, enjoyable, entertaining, exciting, fun, involving, stimulating, addicting) predicted aggressive behavior, $Fs(1, 134) > 4.75$, $ps < .05$. However, controlling for trait aggression and video-game ratings did not affect the relationship between video-game exposure and aggressive behavior. Therefore, to simplify the model, we did not include these covariates in the primary analyses of the effect of video-game exposure on aggressive behavior.

In summary, Experiment 3 demonstrated that people who play a video game in which violent actions are rewarded exhibit increased aggressive behavior, compared with people who play versions of the same competitive game in which violence is punished or does not occur.

GENERAL DISCUSSION

These three studies accomplished all three main goals. First, they demonstrated that rewarding violence in video games can increase aggressive affect, aggressive cognition, and aggressive behavior.[2] All three experiments also found that rewarding game violence increases game violence. Furthermore, Experiment 1 showed that playing a violent video game, regardless of whether the game rewards or punishes violence, increases aggressive affect relative to playing a nonviolent video game. However, Experiments 2 and 3 showed that playing a game in which violent actions are punished does not produce significantly more (or less) aggressive thought or behavior than playing a nonviolent version of the same game.

Second, these studies contradict the alternative hypothesis that increases in aggression-related variables induced by violent video games are solely the result of the competitiveness of these games. If this competition hypothesis were correct, then the game in which violence was rewarded and the nonviolent game should have yielded the same levels of aggression-related variables (affect, cognition, and behavior), because both were competitive. However, players rewarded for violent game actions were higher in all three aggression-related variables than participants who played the nonviolent game. Of course, this does not mean that competition never increases aggressive affect, cognition, or behavior.

Third, the studies provided evidence that the game-induced changes in aggression may be driven primarily by changes in aggressive cognition. Because cognition and affect were not measured in the same experimental session as aggressive behavior, we cannot definitively conclude that cognition mediates the relation between aggressive behavior and exposure to violent video games; however, such similar patterns of results for aggressive cognition and aggressive behavior do lend that hypothesis considerable support. Although it might seem advisable to measure aggressive cognition, hostile affect, and aggressive behavior in the same study to more directly test mediational models, prior research (e.g., Anderson et al., 2003; Lindsay & Anderson, 2000) has demonstrated that measuring one of these variables changes subsequent measures of the others. Thus, one must compare the patterns of means (Fig. 1) to get a good idea of which state variable (affect or cognition) more likely drives the effect of violent video games on aggressive behavior. The pattern of aggressive behavior in Experiment 3 more closely resembles the pattern of aggressive cognition in Experiment 2 than the pattern of hostile affect in Experiment 1.

Finally, it is important to note that prior exposure to violent video games was positively associated with self-reported physical aggression in all three studies (see Table 1). This result supports the growing literature on long-term effects of repeated exposure to media violence.

[2]It is possible that in addition to direct reward for violent actions, increased exposure to violent actions within the rewarding game plays a role in increasing aggressive cognition or behavior. It is important to consider that every time the player engages in a violent action and is rewarded, two things occur: (a) The player witnesses his or her own aggressive act, and (b) the player is positively reinforced for that act. These two factors are thus inherently confounded in video games, and their influence cannot be meaningfully disentangled.

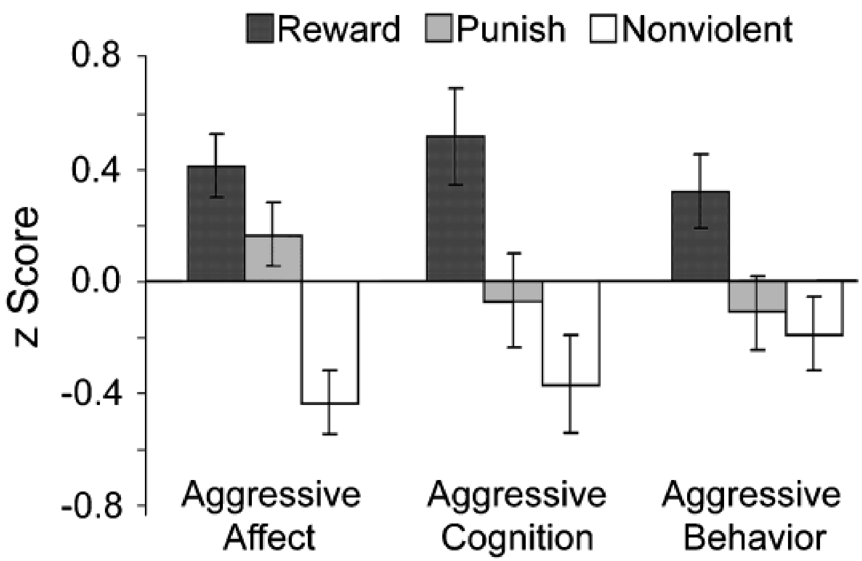

Fig. 1. Effect of video-game exposure on aggressive affect, aggressive cognition, and aggressive behavior. Results are shown separately for participants who played a game in which violence was rewarded, participants who played the same game but with violence punished, and participants who played a nonviolent version of the same game. Capped vertical bars denote ±1 *SE*. Raw-score means were converted to *z* scores for this graph.

One issue these studies do not address is the effect of violent video games that neither directly punish nor directly reward participants for violent actions. The effects of these games on players should depend on how the games are played. If players choose to engage in aggressive game play rather than nonaggressive game play, it is more likely that exposure to the game will increase aggressive behavior in real-life situations. However, it is worth mentioning that even though some games may not have explicit rewards for violence (e.g., points, verbal praise, advancement to higher levels), most violent video games contain indirect rewards, such as intriguing visual and sound effects (e.g., hearing and seeing a person being squished by a car). These subtle characteristics often encourage players to engage in violent actions and can be just as rewarding as more explicit rewards.

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