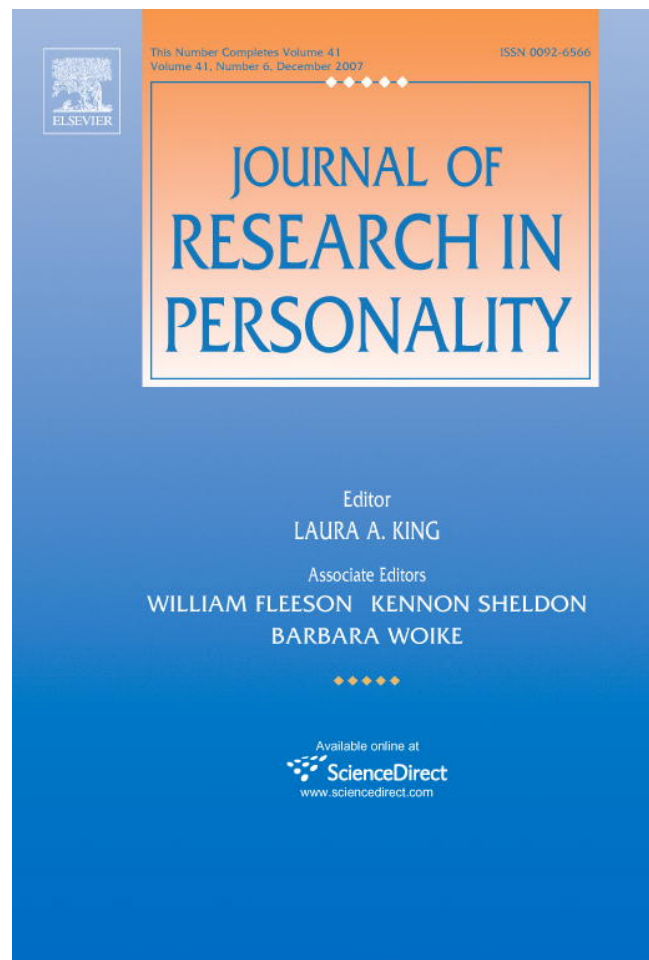


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Violent video games and anger as predictors of aggression [☆]

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Abstract

Considerable research has demonstrated that playing violent video games can increase aggression. The theoretical framework upon which a good deal of this research has rested is known as the General Aggression Model (GAM; [Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, 53, 27–51]). The current study tested an assumption of the GAM by examining if the dispositional trait of anger moderated the relation between violent video games and aggression. A total of 167 undergraduate students (79 females, 88 males) first completed a measure of anger and were then randomly assigned to play either a non-violent or violent video game. After the video game play period, participants completed ambiguous story stems in order to assess aggression. Consistent with predictions of the GAM, anger significantly moderated the effect of video game violence on aggression. Specifically, participants who were angry were more affected by violent video games than participants who were not angry.

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1. Introduction

Following the 1999 Columbine High School shootings, lawmakers, researchers, activists, and laypersons became increasingly concerned with the potentially dangerous effects

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of violent video games. Jack Thompson (2000), a lawyer who has argued for the acquittal of defendants in violent video game cases, notes, “In every school shooting, we find that kids who pull the trigger are video gamers.” Of course, given the popularity of video games, it is clear that most children who play these games are not so affected by this violent medium that they actually commit murder. In fact, although many of the children who have engaged in violent school rampages are video game players (Anderson, 2004), these children are also commonly described by themselves and others as being extremely angry (Gibbs & Roche, 1999; Sandler & Alpert, 2000). Such anecdotal observations suggest that individuals who are generally angry may be more adversely affected by violent video games than individuals who are not. To this end, the current research examines if the trait of anger moderates the effect that violent video games have on aggression.

Video games have become one of the major entertainment media for children growing up today (Gentile & Anderson, 2003). The popularity of video games combined with the fact that over 50% of the games available on the market contain some form of violence (Gentile & Anderson, 2003), has caused some concern among parents, researchers, and policy makers. Over a decade of correlational and experimental research has suggested that violent video games are linked to various negative behaviors and cognitions, such as hostility, physical altercations, poor school performance, decreases in pro-social behavior, and aggression (e.g., Anderson et al., 2004; Bushman & Anderson, 2002; Gentile, Linder, & Walsh, 2003; Gentile, Lynch, Linder, & Walsh, 2004; Sheese & Graziano, 2005).

Much of the experimental research that has been conducted on violent video games and aggression suggests that there is some type of causal relationship between the two; namely that violent video games increase aggression. A number of theories about how and why violent video games affect aggression have been posited, but one in particular has garnered much attention—the General Aggression Model (GAM; Bushman & Anderson, 2002; Gentile et al., 2004; Uhlmann & Swanson, 2004). The GAM suggests that the link between exposure to a situational variable (e.g., violent media) and the output variable of aggression is mediated by one’s cognition, affect, and arousal (Anderson & Bushman, 2001; Anderson & Ford, 1986; Bushman & Anderson, 2002). The GAM is unique as a model of aggression because it does not assume that people are “blank slates” before they are exposed to violent media. Instead, it suggests that not all people will interpret and be affected by violent media in a similar manner.

According to the GAM, aggressive behavior is best predicted by considering the person within a situation. In other words, stable dispositions might alter how one interprets or responds to violent or hostile stimuli. For example, in a recent extension of the GAM, Anderson and Bushman (2002) specifically note several reasons why the dispositional characteristic of anger might play a causal role in aggression. First, anger reduces one’s inhibition against aggressive acts. Second, anger primes aggressive thoughts, making one more likely to interpret ambiguous situations as hostile. Third, anger “energizes behavior” by increasing one’s arousal levels, which in turn can lead to aggression if there is significant provocation shortly after the activity. Finally, anger makes one more likely to attend to hostile or violent information.

These assumptions of the GAM imply that anger will have both a main effect on aggressive behavior and will also moderate the effect of violent stimuli. Studies examining the effects of violent media have found consistent evidence demonstrating the notion that

some dispositions may interact with violent or hostile situations to increase aggression. For example, [Bushman \(1995\)](#) examined whether or not trait aggressive individuals displayed higher levels of aggression following exposure to violent movies. The results indicated that trait aggressiveness moderated the effect of violent movies; that is, viewing movie violence brought about more aggression in individuals who were high in trait aggressiveness than in individuals who were low in trait aggressiveness ([Bushman, 1995](#)). In a similar manner, [Malamuth, Addison, and Koss \(2000\)](#) found that aggressive men tended to react to and interpret pornography in a more sexually aggressive manner than nonaggressive men. Also, consistent with the notion that dispositional tendencies might moderate the effect of violent or hostile situations, [Cohen, Eckhardt, and Schagat \(1998\)](#) found that the trait of anger moderated the cognitive effects of interpersonal insults. These results suggest that angry individuals may be more affected by hostile or violent situations than other individuals.

In an attempt to explain why stable dispositions moderate the impact of violent or hostile situations, [Bushman \(1996\)](#) recently extended [Berkowitz's \(1990\)](#) cognitive-neoassociation model of aggression. Berkowitz's model proposes that exposure to situational cues (e.g., a gun) activates ideas with similar meanings to the cue (e.g., shooting, bullets, etc.), which, in turn, activates other semantically associated ideas (e.g., murder, kill, etc.). According to this model, when an individual is exposed to a violent video game his or her network of aggressive thoughts, feelings, and beliefs will become primed, making him or her more prone to hostile behavior. [Bushman \(1995, 1996\)](#) extends this model by arguing that individuals with certain personality characteristics possess more extensive cognitive-associative networks related to these characteristics than individuals who do not possess such characteristics. That is, a person who possesses a specific personality characteristic is more likely to be primed by situational cues related to this particular characteristic than a person who does not possess such a characteristic. For example, a person who is dispositionally angry might possess a more developed cognitive-associative network related to ideas about anger (e.g., hate, rage, mad, fight, fury, clash, destroy, etc.) than individuals who are not angry. When this angry person is exposed to violent media that contains simulated hostile and violent acts (e.g., fighting, killing, destroying, etc.) his or her network of angry thoughts, feelings, and beliefs will become primed and he or she will be more likely to behave in an aggressive manner than a person who is not angry.

The current study utilizes a methodology similar [Bushman and Anderson's \(2002\)](#) study, which found that exposure to violent video games caused participants to respond to ambiguous story stems in an aggressive manner. However, these findings will be expanded in order to determine if the main effect of playing violent video games is moderated by the personality trait of anger. Consistent with the predictions of the GAM, it is predicted that both situational (e.g., violent video game) and personality (e.g., anger) characteristics will be related to aggression. First, it is hypothesized that participants who play violent video games will be more likely to respond to ambiguous story stems in an aggressive manner. Second, it is hypothesized that participants who are angry will respond to the story stems in a more aggressive manner than individuals who are not angry. Finally, it is hypothesized that anger will moderate the effect of violent video games. Consistent with [Bushman's \(1996\)](#) notion of cognitive-associative networks, it is predicted that this moderation will occur because violent video games will affect angry individuals more than individuals who are less angry.

2. Method

2.1. Participants

One hundred and sixty-seven university undergraduates, 79 female and 88 male (M age = 19.35 years), participated in the current study. The participants were recruited from undergraduate general psychology classes and were given class credit for their participation in the experiment. Participants performed the study one at a time with the assistance of an experimenter.

2.2. Procedure

After providing informed consent, each participant was told that they were going to be asked to complete a number of different types of tasks that would help the researchers select stimuli for future research projects. Participants completed the study in three phases. In phase one, participants completed a questionnaire packet, consisting of a demographics questionnaire, a measure of anger, as well as several additional questionnaires that were used to hide the true purpose of the current study. In phase two, participants engaged in a brief video game play period. In phase three, participants completed a measure of aggression as well as other unrelated questionnaires in order to maintain the cover story.

2.3. Phase 1: Questionnaire completion

Participants were given as much time as needed to complete the following questionnaires related to the current study.

2.3.1. Demographic variables

The first questionnaire was a measure of demographic information, asking the participant for their age, gender, and year in college.

2.3.2. Anger

The dispositional trait of anger was measured using the 7-item anger scale of the Aggression Questionnaire (AQ; Buss & Perry, 1992). The anger scale of the AQ assesses the tendency for emotional arousal and the preparation of aggressive behaviors, and includes items such as “I sometimes feel like a powder keg ready to explode” and “I have trouble controlling my temper.” The items in the AQ were answered using a 5-point Likert scale ranging from “extremely uncharacteristic of me” to “extremely characteristic of me.” The internal consistency of the anger scale in the current study was .75.

2.4. Phase 2: Video game play

After completing the questionnaires, participants were randomly assigned to play one of three violent video games (*Mortal Kombat: Deadly Alliance*; *Doom 3*; or *Return to Castle Wolfenstein*) or one of three non-violent video games (*Tetris Worlds*; *Top Spin Tennis*; or *Project Gotham Racing*) for a period of 15 min on a 13-in. television. The game console was a Microsoft Xbox® console that had one standard Xbox® controller. Participants

were given a sheet of paper that listed the controls for the game they played so that they would be familiar with the controls.

2.5. Phase 3: Aggression measure

Once participants finished playing the video game, the video game was turned off and participants were presented with three story stems that were adapted from Rule, Taylor, and Dobbs (1987). The story stems used for the current study are entitled, “The Car Accident,” “Persuading a Friend,” and “Going to a Restaurant.” Each of these story stems presented a brief scenario that involved a negative outcome for the main character (e.g., getting into a car accident). After reading a story stem participants were asked to write down 20 unique things they thought the main character might do, think, or feel. Therefore, each of the three story stems produced 20 responses resulting in each participant providing a total of 60 responses that could be examined for aggressiveness. These story stems have been successfully used in past research examining aggression (Bushman & Anderson, 2002). For example, Rule et al. (1987) found that participants who completed story stems in an extremely hot room (92 F) reported more aggressive responses than participants who completed the story stems in a cool room (70 F). As a more direct demonstration of the story stems validity, Dill, Anderson, Anderson, and Deuser (1997) found that aggressive individuals provided significantly more aggressive and hostile responses than nonaggressive individuals.

In order to assess the average aggressiveness of participants' responses, three undergraduate research assistants coded the 60 responses provided by each participant. This was done by having each judge code responses as being either aggressive or nonaggressive. For example, some of the responses coded as aggressive by the judges included, “Punch them in the face” and “Curse at them,” and some of the responses coded as nonaggressive by the judges included, “Ask for their insurance information” and “Take pictures of the scene.” Therefore each judge provided an aggressiveness score for each participant that could range from 0 (i.e., none of the responses were aggressive) to 60 (i.e., all of the responses were aggressive). The coefficient alpha of the three judge's aggressiveness score was .95. Because of the high level of agreement obtained by the judges, their summed scores were averaged in order to provide an assessment of the aggressiveness of each participant's responses.

3. Results

The first hypothesis of the current study set out to replicate past research indicating a general adverse effect of video game violence on aggressive behavior. Fig. 1 displays the mean number of aggressive responses for each video game. Consistent with the first hypothesis, a one-way ANOVA with contrast codes (Kirk, 1995) comparing the three violent video games to the three nonviolent video games revealed that the violent video games (i.e., Mortal Kombat, Return to Castle Wolfenstein, and Doom 3) produced significantly more aggressive responses than nonviolent video games (i.e., Project Gotham Racing, Tetris World, Top Spin Tennis; $t(161) = 2.48, p < .05$). It is also noteworthy that the mean number of aggressive responses for the three nonviolent video games did not differ from each other ($F(1, 79) = .67, p > .05$), nor did the mean number of aggressive responses for the three violent video games ($F(1, 82) = .60, p > .05$). Therefore, for the remaining

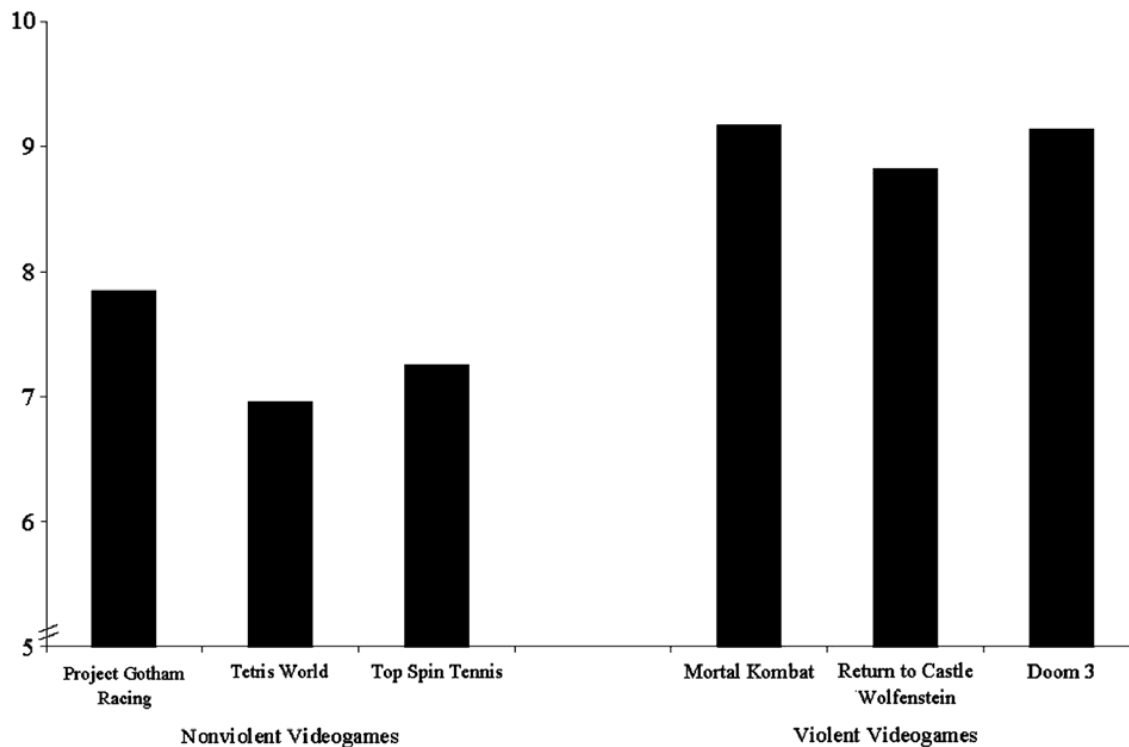


Fig. 1. Mean number of aggressive responses for each type of video game played.

analyses the three violent video games were collapsed into the general category “violent video game” and the three nonviolent video games were collapsed into the general category “nonviolent video game.”

A simple Pearson’s correlation was computed to examine the relation between anger and aggression. Contrary to the second hypothesis, anger was not significantly related to aggression ($r(165) = .12, p > .05$). A step-wise regression analysis was next computed to examine whether or not anger moderated the effect of violent video games on aggression. In this analysis, video game condition and anger were entered in the first step and the interaction between these variables was entered in the second step. To reduce issues associated with multicollinearity, the trait of anger was centered and the video game condition was dummy coded (0 = nonviolent video game and 1 = violent video game) before computing the interaction term (Cohen & Cohen, 1983). Consistent with the third hypothesis, anger significantly moderated the effect of video game condition (see Table 1).¹

In order to examine exactly how anger moderated the effect of the video game condition, a graphical representation of the interaction was created (see Fig. 2), which was derived by calculating simple regression equations corresponding to individuals scoring at the mean (i.e., moderate anger individuals), .75 standard deviations above the mean (i.e., high anger individuals), and .75 standard deviations below the mean for anger (i.e., low anger individuals; Aiken & West, 1991). The simple slopes presented in these regression equations reflect the predicted change in aggressive responses for individuals

¹ To be certain the moderating effect of anger was not caused by possible gender differences on this trait, a second regression analysis was conducted in order to control for the main effect of gender as well as its interactions with video game condition and anger. Results indicated that neither gender nor any of its interaction terms were significant and, more importantly, anger still significantly moderated the effect of video game condition.

Table 1
Multiple regression analysis predicting number of aggressive responses

	<i>B</i>	<i>SE B</i>	β
Step 1 ($R^2 = .051^*$)			
Constant	7.38		
Video game condition (VG)	1.65	.67	.19*
Anger (A)	.73	.49	.11
Step 2 ($R^2 = .082^{**}$, $\Delta R^2 = .032^*$)			
Constant	7.33		
VG	1.66	.66	.19*
A	-.69	.77	-.10
VG \times A	2.34	.98	.29*

Note. $n = 167$.

* $p < .05$.

** $p < .01$.

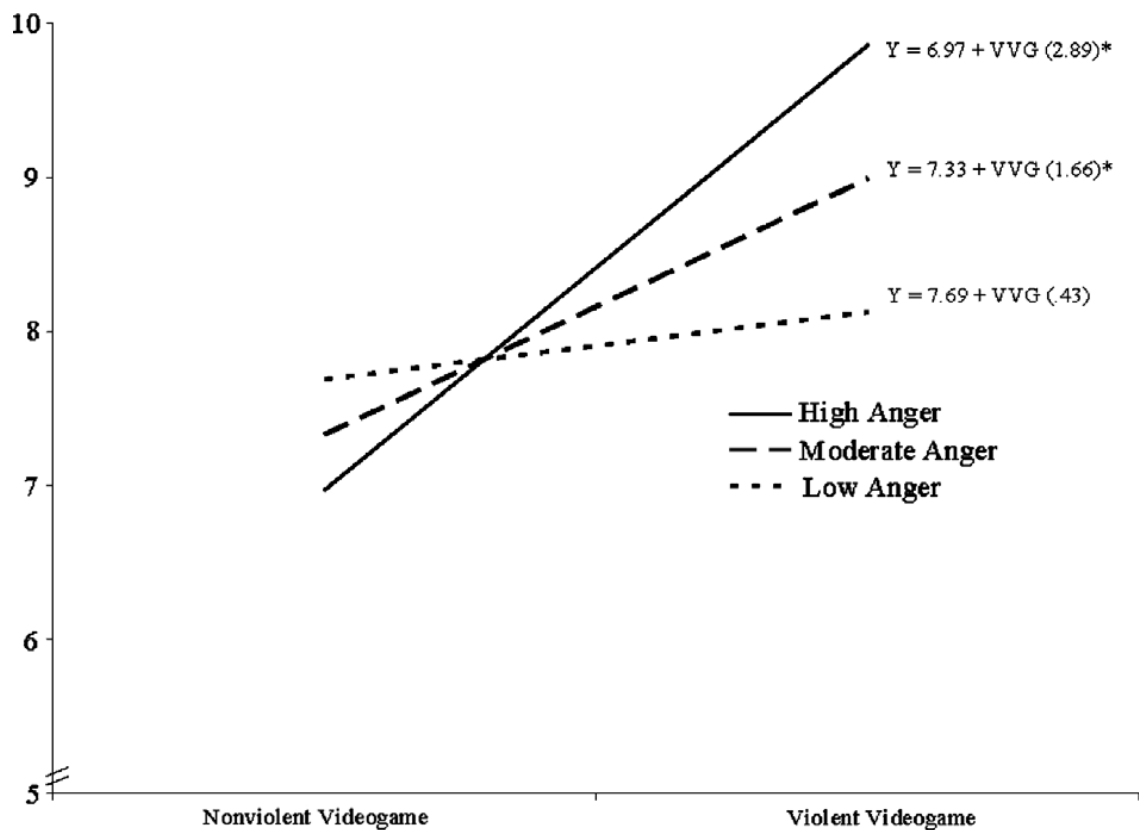


Fig. 2. A graphical representation of the regression equation, Aggressive Responses = 7.33 + 1.66 (Video game condition) - .69 (Anger) + 2.34 (Video game condition \times Anger), for participants scoring at the mean, .75 standard deviations above the mean, and .75 standard deviations below the mean on anger.

with high, moderate, and low levels of anger. For example, it is predicted by this equation that high anger individuals will, on average, have 2.89 more aggressive responses if they play a violent video game than if they play a nonviolent video game. In comparison, low anger individuals are predicted to have, on average, about .43 more aggressive responses if they play violent video games than if they play nonviolent video games. Significance tests of the simple slopes (Aiken & West, 1991) presented in Fig. 2 reveal that

violent video games significantly increased the number of aggressive responses provided by both high anger ($t(162) = 3.48, p < .01$) and moderate anger ($t(162) = 2.47, p < .01$) individuals. However, individuals with low levels of anger were not significantly affected by violent video games ($t(162) = .52, p > .05$).

4. Discussion

Research examining the effects of violent media has demonstrated that it can have a negative impact on people's behavior in the short-term as well as the long-term (Hogben, 1998). Violent video games are the most recent form of violent media to receive attention; research has found that violent video games increase aggressive thoughts, feelings, and behaviors, as well as decrease pro-social behaviors (Anderson et al., 2004; Bushman & Anderson, 2002; Gentile et al., 2003, 2004; Sheese & Graziano, 2005). The current study extended these findings by examining if the dispositional trait of anger moderated the effect of violent video games on aggression. Specifically, it was hypothesized that, consistent with previous research (e.g., Bushman & Anderson, 2002), participants who played violent video games would be more likely to respond to ambiguous story stems in an aggressive manner. Second, it was hypothesized that participants who were angry would respond to the story stems in a more aggressive manner than individuals who were not angry. Finally, it was hypothesized that anger would moderate the relationship between violent video games and aggression.

Consistent with the first hypothesis, participants who had played a violent video game listed significantly more aggressive responses to the three ambiguous story stems than did participants who had played a non-violent video game. It should also be noted that the effect size between violent video games and aggression that was found in the current study (see Table 1) is similar to the effect sizes reported in meta-analytic reviews of media-related aggression (e.g., Anderson, 2004; Paik & Comstock, 1994). Contrary to the second hypothesis, there was not a significant main effect of anger on participants' aggressive responses. It is possible that the current study found no association between anger and aggression because past research suggests explicit assessments (e.g., the Anger Scale from the AQ) tend to be unrelated to implicit assessments (e.g., the story stems used to assess aggression; see McClelland, Koestner, & Weinberger, 1989). However, consistent with the third hypothesis, results indicated that anger moderated the relationship between playing violent video games and aggression. As shown in Fig. 2, participants who were angry tended to be more aggressive if they were exposed to violent video games than if they were exposed to nonviolent video games. In contrast, participants who were not angry tended to be relatively unaffected by exposure to violent video games. These findings are consistent with the GAM, which suggests that aggressive behaviors can be predicted by considering both a person's individual characteristics (e.g., anger) and his or her environment (e.g., playing a violent video game). Specifically, these results are consistent with Anderson and Bushman's (2002) recent theorizing suggesting that anger might moderate the effect of violent video games.

The findings of the current study should be considered in the context of the study's limitations. First, since college students served as participants, the generalizability of the findings from this study to a population other than college students is unknown. Additionally, although the laboratory design utilized in the current study allowed for causal conclusions concerning violent video game exposure, it is limited in determining how well these results

generalize outside the laboratory. For example, violent video games might affect participants' aggression differently if they freely select to play violent video games rather than being assigned to play violent video games. Finally, although other researchers have successfully used the story stem instrument that was used in the current study, it still only assesses how a person thinks someone will react to a situation and does not assess how a person actually reacts. An examination of violent video games, anger, and aggressive behavior outside the laboratory seems like a logical next step in this line of work.

Further study of violent video games and aggression is most certainly warranted given that both the popularity of video games and the technology used to create them continues to increase. The changes in technology that have resulted in newer and better consoles with increased memory space and graphic capabilities allow for more realistic game play than ever before (Anderson, 2004). Since technology continues to outrun our ability to empirically study it, future studies will need to examine the newest and most advanced consoles in order to best understand how this form of media violence impacts individuals. In addition to using the most advanced technology, it is equally important to consider other potential moderators of violent video games. Perhaps other traits such as hostility, psychoticism, or neuroticism will also play a part in the relation between violent video games and aggression. Knowledge of whether or not other traits moderate this relation will help us to better understand and illustrate the importance of considering personality when examining the effects of violent video games.

The results of this study could have important implications for parents and policy makers. If a person with a certain type of personality (e.g., an angry individual) is more likely to become aggressive in the short-term after playing a violent video game, then perhaps a parent will want to know this when they are making decisions about whether or not their child should play violent video games. Perhaps those children, teenagers, or young adults who have a certain type of personality will be discouraged from playing violent video games because of the increased likelihood that they may become aggressive. Of course, these results also suggest that some individuals (e.g., individuals who are not angry) are likely to be unaffected by short-term exposure to violent video games. This is not to imply that a child or young adult who is not angry should play extremely violent video games, but it does suggest that individuals are not “blank slates” and that one's general disposition moderates the effect of violent media. It appears that general policy recommendations based on the notion that violent video games are simply “bad” and that individuals who play violent video games will inevitably become aggressive may be unwarranted. Instead, it appears that it is crucial to consider the dispositional characteristics of the person playing the video game when predicting what type of effect the violent video game might have on his or her thoughts and behaviors.

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