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From Mario to Manhunt: The Effects of Violent Video Game Content and Competition on Hostility and Aggressive Cognitions

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GAMES

From *Mario* to *Manhunt*: The Effects of Violent Video Game Content and Competition
on Hostility and Aggressive Cognitions

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Abstract

Research has shown that playing violent video games can lead to increases in aggressive thoughts, feelings, and behaviors. This study further examined this effect using a specially designed video game that allowed for precise manipulation of violent game play. Competition was independently manipulated and the interactive effects of competition and violence were studied. It was hypothesized that violence combined with competition would lead to greater aggressive thought and feelings. Consistent with this hypothesis, results show that male participants in the high violence, high competition condition report significantly greater hostility than participants in other conditions. Female participants show significantly greater hostility in response to competition but no evidence of greater hostility in response to violence.

Introduction

In the United States more than ninety percent of children between the ages of two and seventeen play video games, spending an average of seven hours a week on video games (Gentile & Walsh, 2002). Analyses have shown that almost eighty percent of these games contain some violence, either as a success strategy or as the main component of the game (Dietz, 1998). In a study by Funk (1993), almost half of the participants listed violent video games as their preferred genre of play. For the typical game player, these numbers add up to substantial amounts of exposure to violent video games.

With so many violent games on the market, recent research has focused on the relationship between violent games and aggressive outcomes. Some studies have focused on the connections between violent content and variables such as hostile affect and aggressive cognitions (e.g. Scott, 1995; Carnagey & Anderson, 2005), while other researchers have studied the changes in physiological responses that occur after exposure to violent video games (e.g. Carnagey, Anderson, & Bushman, 2007). A key area of study is the link between playing violent video games and increases in aggressive behavior (e.g. Carnagey & Anderson, 2005; Anderson & Morrow, 1995; Anderson & Murphy, 2003). Results generally indicate that playing violent video games can result in many negative outcomes, including increases in aggression.

Competition is also an intrinsic part of almost any gaming experience. Players often compete against real-life or computer opponents, or play individually to beat a high score or complete a task. Competition between individuals in everyday interactions can lead to increases in aggression (Deutsch, 1993; Anderson & Bushman, 2002), and

exposure to highly competitive video games can result in similar outcomes (Williams & Clippinger, 2002; Anderson & Morrow, 1995).

The current study examined potential links between competition, violent content, and aggressive outcomes. Researchers tend to agree that exposure to violent games increases aggressive outcomes (e.g. Carnagey & Anderson, 2005; Carnagey, Anderson, & Bushman, 2007; Eastin & Griffiths, 2006) and that competition and aggression are strongly correlated (e.g. Anderson & Morrow, 1995; Williams & Clippinger, 2002). What remained unclear were possible interaction effects between violent content and competition; the current study focused on this issue. Based on a review of the literature it seems likely that aggressive outcomes will be greatest in games with high degrees of violent content and competition. Games that minimize one or both variables should generate lower levels of aggression. The current study tested these hypotheses by examining the main and interaction effects of competition and violence on various measures of aggression.

Literature Review

Violent Video Games

Definition of Violence

Many of the studies on violent video games do not provide a clear definition of the term violence. Anderson and Bushman (2002) define violence as “aggression that has extreme harm as its goal (e.g., death)” (p. 29). Other researchers adopt a similar definition although measurement of extreme harm varies widely across studies. For example, Anderson and Morrow (1995) interpret participants causing in-game characters to jump on the heads of cartoon villains as aggressive; other experimenters refer to the

shooting or punching of a lifelike human opponent as aggressive behavior (Eastin & Griffiths, 2006). Despite these variances, Anderson and Bushman's (2002) definition of violence seems to generalize across studies, and it was adopted for the purposes of this research.

Differences Between Games

An important concern in video game studies is the complexity of the typical gaming experience (Eastin & Griffiths, 2006). The gaming industry has come a long way in a relatively short time. Content has become more immersive as graphics and controls become more lifelike, and many games are programmed in three dimensions and use complicated cell-shading techniques to make graphics increasingly realistic. In contrast some games are programmed in only two dimensions and require more traditional input from players using a simple control pad or keyboard.

These differences between games affect how involved game players are and to what extent they become immersed in the fictional world of the game (Eastin & Griffiths, 2006). It is likely that different types of in-game stimuli affect players in different ways. It is therefore important in video game studies to compare games that are identical in terms of graphics and controls so that stimuli are similar throughout the experiment (Arriaga, Esteves, Carneiro, & Monteiro, 2006). The current study utilized the same game for each experimental condition to minimize potential confounds.

Violent Games and Undesirable Social Behaviors

Researchers have found links between violent game exposure and undesirable social behaviors. Sheese and Graziano (2005) examined the effects of video game violence on cooperative behaviors and observed that exposure resulted in decreased

prosocial behavior and increased exploitation of others. Playing violent video games may also result in decreased physiological arousal when witnessing real world violence, which in turn may decrease prosocial helping behaviors. Specifically, Carnagey et al. (2007) conducted a study in which participants played a violent or nonviolent game for twenty minutes and then watched a ten-minute movie containing scenes of real-life violence. Those who played the violent game exhibited lower heart rate and galvanic skin response than the members of the nonviolent group, indicating desensitization to violence. This desensitization may lead to reduced attention to violent incidents, lower perceived severity of observed violence, and a decreased desire to help victims.

Formation and Effects of Hostile Biases

Exposure to games with violent content has been implicated in the formation of hostile expectation and attribution biases. Eastin and Griffiths (2006) studied the connection between violent game play and participants' expectations for others' behavior during conflict, finding that participants in the violent experimental conditions had greater hostile expectation biases than those in a nonviolent control group. Individuals with a hostile expectation bias are likely to expect others to behave aggressively during conflict, and research has shown links between hostile expectation biases and aggressive behaviors (Anderson & Bushman, 2002). Another study produced similar results, showing that participants who played a violent game behaved more aggressively toward others, choosing to deliver bursts of white noise of longer durations and higher intensities to participants with whom they were angry (Carnagey & Anderson, 2005).

Hostile attribution biases, or beliefs that people are purposefully acting aggressively, may also develop due to exposure to violent video games. Kirsh (1998)

found that children who played violent games were more likely to attribute negative intentions to wrongdoers in ambiguous social situations, such as being bumped while in the cafeteria. Anderson and Murphy (2003) examined the link between exposure to violent games and retaliatory behavior in aggressive situations, finding that participants in the violent game conditions were more likely to retaliate against imaginary enemies. They concluded that this increase in retaliatory behavior was due to attributing negative intentions to the enemies.

Violent Games and Affective State

Carnagey and Anderson (2005) studied the effects of playing violent video games on affective state. Results indicate that exposure to violent content can increase hostile affect, or negative feelings of anger and hostility. Other researchers have found similar results (Arriaga et al., 2006; Anderson & Dill, 2000). Researchers conclude that exposure to violent video games can increase violent feelings, which in turn may increase violent thoughts and behaviors (Carnagey & Anderson, 2005; Anderson & Dill, 2000).

Violent Games and Aggressive Cognitions

Violent video games can also affect the accessibility of aggressive cognitions. Anderson and Dill (2000) found that violent video games can affect players' thoughts in both long- and short-term ways. In the long-term, participants who reported often playing violent video games perceived the world as less safe. In the short-term, after playing a violent video game, participants rated aggressive thoughts as more easily accessible than participants who played a nonviolent game. Other research also found that violent games increase the accessibility of aggressive cognitions; participants in a study by Carnagey and Anderson (2005) completed a task that required them to complete

several words by filling in missing letters, and those who played violent games were more likely to provide aggressive answers. These results indicate that exposure to violent video games primes players to thoughts of aggression.

Violent Video Games and Aggressive Behaviors

Research indicates that violent video games also encourage aggressive behaviors. As discussed previously, violent video games can cause players to develop hostile expectation and attribution biases (e.g. Eastin & Griffiths, 2006; Kirsh, 1998), hostile feelings (e.g. Carnagey & Anderson, 2005), and aggressive thoughts (e.g. Anderson & Dill, 2000). These negative outcomes can all result in short-term increases in aggressive behaviors (Carnagey & Anderson, 2005).

Some researchers have also found long-term behavioral effects of violent video game exposure. Anderson and Dill (2000) found that participants' frequent exposure to violent video games correlates with high trait aggression and delinquent aggressive behaviors. It is possible that constant exposure to violent content desensitizes people so that they no longer view aggressive behavior as negative (Carnagey, Anderson, & Bushman 2007), or that viewing violence may reinforce preexisting aggressive habits so that they become more common (Kirsch, 2003).

Summary

Across studies, most researchers seem to agree on one thing—exposure to violent games enhances negative outcomes (i.e. Carnagey & Anderson, 2005; Carnagey et al., 2007; Eastin & Griffiths, 2006). Following exposure to violent video games, increases are seen in aggressive behaviors, affects, and cognitions (Carnagey & Anderson, 2005), desensitization to violence (Carnagey et al., 2007), and the formation of hostile biases

(e.g. Eastin & Griffiths, 2006; Kirsh, 1998). The current study took into account the strengths and weaknesses of past research and further explored the links between exposure to violent games and the development of aggression.

Competitive Video Games

Competitive Content in Video Games

It is extremely difficult to think of a gaming situation that does not involve some element of competition. Even in single-person games, players must often race against the clock to complete a task or outperform computer-controlled opponents. It is because of this pervasiveness that an explicit definition of competition is hard to find. Anderson and Morrow (1995) assert that “competition is necessarily aggressive . . . both in the relatively positive sense of being assertive and in the more negative sense of inflicting harm” (p. 1021). Williams and Clippinger (2002) view competition as a “foundational element in games” (p. 496) and relate it to aggression and hostility. Deutsch (1993) is so certain that aggression and hostility are components of competition that he advocates minimizing competition in schools as much as possible. These studies give examples of components of competition but fail to authoritatively define the word itself. For the purposes of this study, competition was defined as “rivalry between two or more persons or groups for an object desired in common” (Merriam-Webster, 2004).

Competition and Affective State

Williams and Clippinger (2002) examined how different types of opponents may change how competition affects aggression. Participants played a computerized version of *Monopoly* against either the computer or a face-to-face opponent, and results indicated that participants expressed higher levels of aggressive feelings after playing against the

computer. Williams and Clippinger (2002) concluded that game developers might be able to reduce aggressive outcomes by humanizing computer opponents. However, the experiment tested only a very specific type of game (board game) which is not normally played by the typical gamer; the results may not generalize to other types of competitive games. For example, Eastin and Griffiths (2006) failed to find differences in aggressive feelings between participants who played against human or computer opponents.

Competition and Aggressive Behaviors

Anderson and Morrow (1995) compared aggressive behaviors of participants who either cooperated with or competed against a partner in a video game. In the cooperation condition participants traded control of the same game character back and forth until losing a life and their progress as a team was recorded. In the competitive condition, each participant controlled his or her own unique character and progress was compared between subjects. Both groups' game play was scored for kill ratio, the percentage of villains that were actually killed, and all participants completed paper-based measures of video game perceptions, interpersonal liking, and affective state. Results showed that participants in the competition group exhibited increases in some but not all aggressive outcomes. The kill ratio was higher for those in the competition group, but no differences between groups existed for interpersonal liking. Participants in each group also rated the game as equally violent, and affective states did not differ between groups.

The findings of the Anderson and Morrow (1995) research can be interpreted in different ways. Although aggression may increase during competition, these behaviors may not be focused on a particular person or group. An opposing hypothesis is that aggressors may not interpret their actions as aggressive and hence not realize that they are

behaving violently (Anderson & Morrow, 1995); such thoughtless aggression would be problematic because people need to be able to correctly assess their own behaviors so that they may minimize their aggression (Deutsch, 1993).

Summary and Conclusions

The literature seems clear on two issues: exposure to violent video games increases aggressive outcomes (e.g. Carnagey & Anderson, 2005; Carnagey et al., 2007; Eastin & Griffiths, 2006), and competition may cause people to act aggressively (e.g. Anderson & Morrow, 1995; Deutsch, 1993). What is currently unknown is how violent content and competition together can moderate or enhance aggressive effects. As almost eighty percent of video games include violence (Dietz, 1998) and most games are fundamentally competitive, it is important to know how violent content and competition interact.

The current study assessed the effects of competition and violent content in video games on aggressive measures. The study was designed such that the independent and interaction effects of violence and competition could be assessed through independent manipulation of both variables. The experimental design of the study allowed for the examination of the effects of violence and competition in detail. Competition and in-game violence have been independently shown to increase aggression in post-game measures but have not been studied together. The current study sought to verify the hypothesis that playing a game that is highly competitive and violent will produce greater aggressive outcomes than games that are only violent or only competitive.

The study utilized a 2x2 factorial design that independently manipulated violence and competition. Participants were randomly assigned to the low or high violence

condition and the low or high competition condition. Thus, four experimental conditions were generated: low violence, low competition; low violence, high competition; high violence, low competition; and high violence, high competition.

The first hypothesis of the current study was that violent content and competition would both independently lead to increases in aggressive outcomes. In other words, there would be main effects of both variables. The second hypothesis was that the main effect of violent content would be greater than the main effect of competition. Finally, it was hypothesized that there would be an interaction effect of violent content and competition such that participants in the high violence, high competition condition would score higher on measures of hostility and aggressive cognitions than could be explained by the main effects alone.

Methods

Participants

Data was collected from 83 students at Illinois Wesleyan University, a highly selective undergraduate liberal arts college in a mid-sized city in central Illinois. All of the participants were General Psychology students who received course credit for their participation. The sample included 35 men and 48 women. The average age of each participant was nineteen ($SD=.96$). Each participant was randomly assigned into one of four experimental conditions; Table 1 shows how men and women were divided within these conditions.

Setting and Apparatus

The study took place in a computer lab in the Center for Natural Sciences. Each participant was seated at his or her own computer, and participants were spaced around

the room such that there was an empty computer desk in between them during testing. During the signing of the informed consent, while giving any instructions, and during debriefing the experimenter stood at the front of the room. The experimenter sat at a computer station away from the participants during game play and testing.

Independent Variables

Two independent variables, violent content and competition, were manipulated in this experiment. After learning the controls of the game during a brief training period, participants played one of four versions of a level from *Unreal Tournament 2004* (UT), a popular computer-based first-person shooter game. UT was rated “M for Mature” by the Entertainment Software Review Board (ESRB; 2006), indicating that the game content is appropriate for adults 17 and older. The experimenter and an independent video game design consultant designed the level versions and the training condition.

Violent content. There were two manipulations of violent content. In both conditions, participants could switch between a gun and grenades as their weapon of choice. In the low violence condition, participants shot at 25 inanimate targets in a series of rooms. The targets were spread throughout the level and required varying degrees of skill to find and shoot, though the level was appropriate for novice game players. In the high violence condition, participants shot at people. The people were in the same locations as the targets. When shot or hit with a grenade, the people bled and died. Both the targets and people were illuminated by a red light that went out after a successful hit. In-game activity was recorded, and the experimenter watched each participant’s activity after each session to record the number of targets that were successfully hit. Images of each type of target are presented in Figure 1.

Competition. There were two manipulations of competition. In the low competition condition, participants were told that one person from the study would be selected at random to receive a prize as a reward for participating in the study. The prize was a fifty dollar gift card to a popular electronics store. In the high competition condition, participants were told that the person who earned the top score would be given the prize. Participants in both conditions were told that some targets were harder to find than others were but that the difficulty of the game was appropriate for novice game players.

Measures

State Hostility Scale. The State Hostility Scale (SHS; Anderson, Deuser, & DeNeve, 1995), a measure of anger and other hostile feelings, has often been used in similar research (e.g. Arriaga et al., 2006). The SHS contains 35 “feeling” statements. Roughly half of these items represent positive feelings (“I feel friendly”; “I feel understanding”) with the other half representing negative feelings (“I feel furious”; “I feel offended”). After playing the video game participants were asked to rate their feelings using a 5-point scale. Scale values range from 1, “strongly disagree,” to 5, “strongly agree.” An individual’s affective state following video game exposure was determined by averaging the 35 responses, with higher scores indicating greater hostility. High internal consistency existed within this measure, $\alpha=.94$.

Word Completion Task. To measure aggressive cognitions, the Word Completion Task (WCT; Anderson, Carnagey, Flanagan, Benjamin, Eubanks, & Valentine, 2004) was administered. The WTC is often used as a standardized set of cognitive stimuli, and was chosen for its widespread use in similar research (e.g. Carnagey & Anderson, 2005).

Each of the 98 items in the set appears as a word with certain letters omitted. The participants filled in the missing letters to complete the words. Fifty of the items could yield responses that were clearly aggressive (“mu __ er” could be completed as “murder”) but all had multiple possible responses (the same item could be completed as “mutter” or “muster”). Answers were coded as aggressive, ambiguous, neutral, or non-words. Aggressive cognitions were measured by dividing the number of aggressively coded words by the number of completed words. A higher average indicated a higher number of aggressive cognitions.

Video game ratings. Participants rated their perceptions of their gaming experience with the Video Game Rating Sheet (VGRS; Anderson & Ford, 1986). Participants were asked to rate various dimensions such as the violent content, pacing, and difficulty of the game. Scale values ranged from 1 to 7. For example, when rating violent content, participants could have responded 1, “no violent content” or 7, “very violent content.”

Demographics questionnaire. Participants were asked to complete a short demographics questionnaire, which consisted of items involving gender, age, and major. Participants also indicated how much time they spent playing video games in an average week.

Procedure

The experiment took place in a computer lab. The experimenter or an assistant administered all measures. Participants were asked to read a copy of the informed consent form. The participant was allowed to ask questions, and then both the

experimenter and the participant signed and dated the form. The participants were each given a copy of the form to keep for future reference.

After consenting, all participants played in the training level. They practiced for a maximum of ten minutes with the controls of the game. The experimenter read from a script that gave instructions about the controls. Each participant received a card which had instructions printed on it, and they were allowed to use it throughout the duration of the experiment. The training level was a single large room, two-thirds of which was blocked off by a fence. The larger portion of the room held two inanimate targets at varying distances. Participants could move around in the smaller portion and shoot at the targets. The purpose of this training level was to introduce novice players to the controls of the game so that all participants entered the experimental level with at least some level of competence.

The participants then played in the experimental condition to which they were randomly assigned. Game play lasted for ten minutes, and participants in all conditions were instructed to play continuously during the experiment. The level automatically ended and the computer froze at the end of the ten minutes. After playing the video game, participants completed the WCT, SHS, VGRS, and the demographic questionnaire. Following the experimental session, participants were debriefed. The experimenter answered any questions and thanked each participant for his or her involvement in the study. Each testing session lasted an average of one hour and 45 minutes, with no session lasting longer than two hours.

Results

Analyses were conducted to determine if men and women performed similarly within the video game. Results show that men ($M=22.79$, $SD=1.79$) hit significantly more targets than women ($M=17.17$, $SD=3.73$), $t(79)=8.13$, $p<.001$. Men and women also differed in self-reported amount of video games played each week, with men ($M=3.57$, $SD=2.20$) scoring significantly higher than women ($M=1.23$, $SD=.66$), $t(81)=6.97$, $p<.001$. A correlation was performed to examine the relationship between video game performance (number of targets hit) and experience (number of hours spent playing video games each week). These variables were significantly related, $r=.54$, $p<.001$. Since gender was potentially confounded with video game performance and experience, subsequent analyses were conducted using performance and experience as covariates.

Hostility

The means and standard deviations for the SHS scores are presented in Table 2. A 2x2x2 analysis of covariance (ANCOVA) was performed with gender, competition, and violent content as independent variables, performance and experience as covariates, and SHS score as the dependent measure. The main effect of competition was significant, with participants in the competitive condition ($M=2.51$, $SD=.62$) reporting significantly higher feelings of hostility than participants in the noncompetitive condition ($M=2.11$, $SD=.43$), $F(1, 71)=9.54$, $p=.003$, $\eta^2=.12$. Main effects of gender and violent content were nonsignificant. The main effect of competition was qualified by a three-way interaction between gender, violent content, and competition, $F(1, 71)=6.61$, $p=.01$, $\eta^2=.09$.

To examine further this three-way interaction, ANCOVA analyses were performed separately for men and women. For women, a main effect of competition was found, with women in the competitive condition ($M=2.52$, $SD=.61$) scoring significantly higher than those in the noncompetitive condition ($M=2.13$, $SD=.41$), $F(1, 41)=5.91$, $p=.02$, $\eta^2=.13$. No evidence was found for a main effect of violent content or an interaction.

For men, there was no main effect of violence, $F(1, 28)=1.03$, $p=.32$, $\eta^2=.04$. There was a main effect of competition such that participants in the competitive condition ($M=2.49$, $SD=.66$) reported significantly higher hostility than participants in the noncompetitive condition ($M=2.08$, $SD=.46$), $F(1, 28)=4.36$, $p=.05$, $\eta^2=.14$. The main effect of competition was qualified by a two-way interaction between violent content and competition, $F(1, 28)=5.03$, $p=.03$, $\eta^2=.15$. This interaction is presented in Figure 3. Follow up analyses using pair-wise comparisons were conducted, and results indicated that men in the high violence, high competition condition ($M=2.71$, $SD=.76$) reported significantly higher hostility than men in any other condition. The other conditions did not significantly differ from each other.

Aggressive Cognitions

The means and standard deviations for the WCT are presented in Table 3. A 2x2x2 ANCOVA was performed with gender, competition, and violent content as independent variables, performance and experience as covariates, and WCT score as the dependent measure. No main or interaction effects were found.

Supplemental Analyses

Because gender differences existed in several areas, additional analyses were conducted to determine if men and women rated the video game differently. Results show that women ($M=3.58$, $SD=1.29$) rated the game as significantly more difficult than men ($M=1.71$, $SD=.99$), $t(81)=-7.19$, $p<.001$. Similarly, women ($M=4.08$, $SD=1.43$) rated the game as significantly more frustrating than men ($M=3.29$, $SD=1.71$), $t(81)=-2.31$, $p=.02$. Men and women also differed in reports of how enjoyable the game was, with women ($M=3.44$, $SD=1.58$) reporting that they enjoyed the game significantly less than men ($M=4.51$, $SD=1.60$), $t(81)=3.05$, $p<.003$. These results are presented in Figure 4. ANCOVA analyses were performed with difficulty, enjoyability, and frustration as covariates to see if these factors influenced the gender differences that were found. A pattern of results similar to those reported above was found.

Discussion

Summary and Interpretation of Results

Research has shown that exposure to violent video games can lead to increases in hostility and aggressive cognition. Previous studies have commonly manipulated exposure to violence by assigning participants to play different video games that were considered either more or less violent. The current study utilized specially designed video game levels that allowed for a more strict manipulation of game violence. All participants played a video game that required exploration and shooting targets. However, participants were randomly assigned to shoot at inanimate objects (low violence condition) or to shoot at human characters (high violence condition). This precise manipulation of the content made it possible to examine how a specific type of

violence affects hostility and aggressive cognitions when all other aspects of game play are identical.

The second issue examined in this study was the influence of competition. Video games often incorporate elements of competition as well as violence, and previous studies that have manipulated violence using different games may have inadvertently manipulated competition as well. This study sought to examine each factor independently. Competition was manipulated by assigning participants to a more competitive condition where they were rewarded for outperforming other players, or a less competitive condition where they were randomly selected to receive a reward regardless of performance. Manipulating competition and violent content independently also made it possible to examine whether these two factors interacted to influence hostility and aggressive cognitions.

It was hypothesized that violent content and competition would independently lead to increases in aggressive outcomes. This hypothesis was partially supported; participants in the high competition condition did report significantly higher hostility than those in the low competition condition, but there is no evidence that highly violent content independently leads to increased hostility or aggressive cognitions. It was also hypothesized that there would be an interaction effect of violence and competition. This hypothesis was supported. Men in the high violence, high competition condition reported significantly more hostility than could be explained by main effects alone. Women showed significantly greater hostility in response to competition but no evidence of greater hostility in response to violence. All results were specific to hostile feelings; no effects were found for aggressive cognitions.

Links to Past Research

The effects of violent content in video games on players' thoughts and feelings have been studied extensively. Bartholow and Anderson (2002) found that participants became more hostile and aggressive after playing a game high in violence, a finding that has been replicated in several other studies (e.g. Arriaga et al., 2006; Carnagey & Anderson, 2005). Violent video games were found to have both short- and long-term behavioral effects in a study by Anderson and Dill (2000). Negative effects of violent games have been found for both male participants (Eastin & Griffiths, 2006) and female participants (Anderson & Murphy, 2003).

The current study, however, shows a different pattern of results that suggests a possible qualification of previous conclusions. This study showed no main effects of violence when using a strictly controlled violence manipulation. Participants in the high violence condition did not differ from participants in the low violence condition on measures of hostility and aggressive cognitions. Neither men nor women scored higher on these measures after playing a more violent game.

The current research qualifies previous findings about the effects of violent content by examining the interaction between violent content and competition. Results indicate that violent content does lead to increases in hostility in male participants, but only when paired with high levels of competition. This suggests that other in-game components besides violence are necessary for changes in hostility to occur.

Prior research has examined competition and violent content separately, but these two variables have not previously been manipulated within one study. For example, Carnagey and Anderson (2005) found that participants were more hostile after exposure

to games high in violence, but did not account for possible effects of competition. Similarly, Anderson and Morrow (1995) observed that participants played games more aggressively during competitive situations, but the content of the game was identical across conditions. It is possible that previous findings about the negative effects of video game violence (Carnagey & Anderson, 2005; Arriaga et al., 2006) were due in part to differences in competitive elements between the game conditions.

Previous research has found that exposure to violent video games leads to increased aggressive cognitions (Carnagey & Anderson, 2005; Anderson & Dill, 2000). Participants in the current study, however, did not differ on measures of aggressive cognitions across conditions. It is unclear why this inconsistency occurred. One explanation is the low number of participants in each condition, which contributed to low power. It is possible that had more participants been tested, significant effects would have been found in this area.

Current results illustrate how video game effects differ between men and women. Bartholow and Anderson (2002) found that after exposure to a violent game, men experienced greater increases in hostility than women. Anderson and Morrow (1995) found similar results in their study of differences between competitive and cooperative gaming situations, with men reporting more hostility than women do after exposure to a competitive situation. Results of studies by Anderson and Dill (2000) and Scott (1995), however, indicate that women experience the greatest increases in hostility.

Results of the current study highlight key differences between men and women in how they are affected by exposure to video games. For example, violent content, when paired with competition, appears to cause increased hostility in men. Women did not

differ across conditions in their responses to low or high levels of violence. Both genders were affected by competition.

It is unclear why this sex difference occurred. Identification with characters' sex has been suggested as a cause of gender differences in previous research (Eastin & Griffiths, 2006; Anderson & Murphy, 2003). However, the sex of the character controlled by participants in the current study was unknown to the participant, so it is unlikely that men and women differed in how strongly they identified with the character. Arriaga et al. (2006) hypothesize that gender differences are due to male participants being more experienced with gaming. However, current results were found when controlling for video game experience and performance. Women did report more frustration with the game, rated it as more difficult, and enjoyed playing less than men. These differences are also not likely to be responsible for the current results, as analyses were run with these variables as covariates and similar results were found.

Bartholow and Anderson (2002) suggest that men are more sensitive than women are to aggressive cues because they are generally more aggressive. Men may be more likely to identify ambiguous behaviors as aggressive and give more of their attention to aggressive situations. This increased sensitivity may predispose men to increases in hostility following exposure to violence.

One interpretation of the current results is that men may be more sensitive to the aggressive cues in competitive situations than in violent ones. There was a main effect of competition such that men in the high competition condition reported significantly higher hostility than men in the low competition condition. Additionally, violent content only caused increased hostility in men when paired with high levels of competition. It is

possible that exposure to competition increases sensitivity to the aggressive cues present in games with violent content. Previous studies, which did not separate the two variables, may have found effects due to this combination of competition and violence, rather than to the presence of violence alone.

Limitations

Results of the current study identify ways in which video games can negatively affect players' thoughts and feelings. The precise manipulation of violent content and the inclusion of competition as an independent variable were important strengths of this research. However, conclusions should be considered with respect to some methodological limitations.

As is common in video game research, all of the participants in the current research were college-aged students enrolled in a four-year university. Results may not generalize to other populations. It is important to consider how game players who are younger or older and non-collegiate populations may differ from participants in this study.

While the strength of the violence manipulation provided precise control over the video game content, it also resulted in some limitations. The targets in the violent conditions were stationary and did not shoot at or attempt to harm the participants in any way. This makes the game different from typical game play, where enemies often run around the room and fight back. It is unclear how well the current results can generalize to regular game play. The precision of the manipulation also required that participants in both the low violence and high violence conditions have access to a gun and grenades. There was therefore a degree of violence in all of the conditions, although it was minimal

in the low violence conditions. Results may be different if it were possible to remove all elements of violence from these conditions while still maintaining a precise manipulation.

The results of the current study provide useful information about how violent content and competition interact to increase hostility in video game players. However, hostility was tested shortly after game exposure and participants were not re-tested later. Conclusions can only be made about short-term effects of video game exposure. The current findings do not provide information about long-term effects. Similarly, the current study addressed only cognition and affect and did not measure aggressive behaviors. Additional research will be required before conclusions about behavioral effects of violent content and competition can be drawn.

Summary and Conclusions

The current study examined the effects of competition and violent content within video games on increases in negative thoughts and feelings. Past research has suggested that exposure to violent video games can lead to outcomes such as increased hostility (e.g. Carnagey & Anderson, 2005; Arriaga et al., 2006) and greater aggressive cognitions (e.g. Carnagey & Anderson, 2005; Anderson & Dill, 2000). Results of the current study indicate that violent content alone does not cause significant increases in aggressive thoughts or feelings. Competition has also been implicated in the formation of aggression (e.g. Anderson & Morrow, 1995; Williams & Clippinger, 2002), a finding which is supported by the results of the current study.

In the United States more than ninety percent of children between the ages of two and seventeen play video games (Gentile & Walsh, 2002). Eighty percent of these games contain some violent content (Dietz, 1998), and competition is an intrinsic element of

almost any gaming experience. The combination of violent content and competition is common in games currently on the market. Current results indicate that higher levels of violent content alone do not result in negative outcomes, but the combination of violence and competition does result in significant increases in hostility. In other words, competition plays a crucial role in producing negative effects of gaming, and past results should be considered in light of this finding. While previous research has focused on the affects of violent content, this study suggests that future efforts should be shifted to researching the role competition plays in increasing negative outcomes after exposure to video games.

The current research points to several additional areas that would benefit from future study. It will be important to see if the effects found in the current study hold when the game content is controlled less rigidly. For instance, future researchers may wish to have enemies move in randomized patterns within a level or shoot at players, as is common in typical gaming scenarios. These changes in design may lead to different results. It will also be important to conduct research to examine further how exposure to video games affects men and women differently, and what mechanisms may have caused the differences found in the current and past research. It will also be necessary to conduct research that studies the long-term and behavioral effects of video game exposure.

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Table 1

Number of Participants in Each Condition by Gender

Gender	LV/LC	LV/HC	HV/LC	HV/HC	Total
Male	12	6	8	9	35
Female	8	15	13	12	48
Total	20	21	21	21	83

LV = Low Violence

HV = High Violence

LC = Low Competition

HC = High Competition

Table 2

Average Scores on State Hostility Scale (SHS) by Condition and Gender

Gender	SHS Scores							
	LV/LC		LV/HC		HV/LC		HV/HC	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	2.17	.45	2.15	.24	1.95	.48	2.71	.76
Female	2.17	.25	2.72	.66	2.11	.48	2.28	.46

LV = Low Violence
 HV = High Violence
 LC = Low Competition
 HC = High Competition

Table 3

Average Scores on Word Completion Task (WCT) by Condition and Gender

Gender	WCT Scores							
	LV/LC		LV/HC		HV/LC		HV/HC	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	.20	.07	.18	.05	.17	.08	.22	.09
Female	.18	.09	.21	.05	.18	.06	.17	.08

LV = Low Violence
 HV = High Violence
 LC = Low Competition
 HC = High Competition

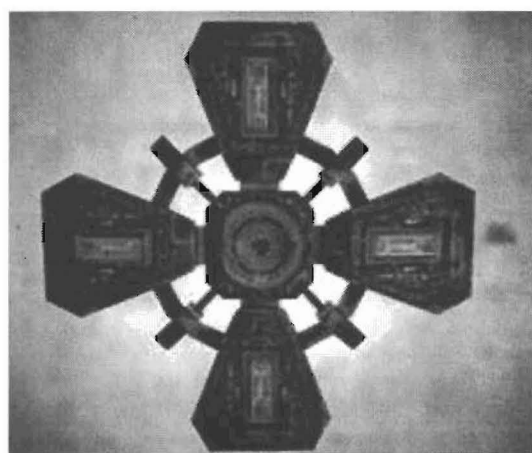
Figure Captions

Figure 1. This image represents the type of target used in the low violence condition.

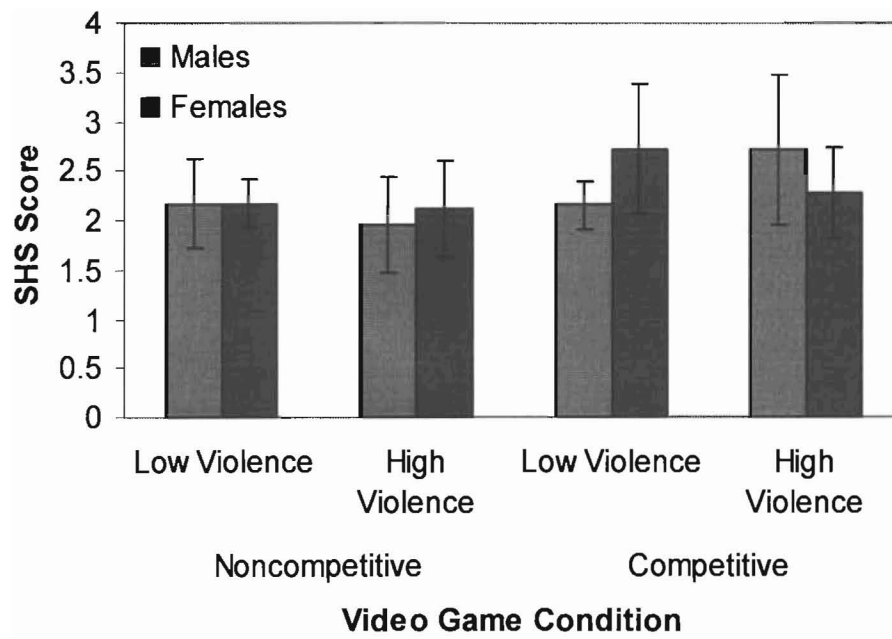
Figure 2. This image represents the type of target used in the high violence condition.

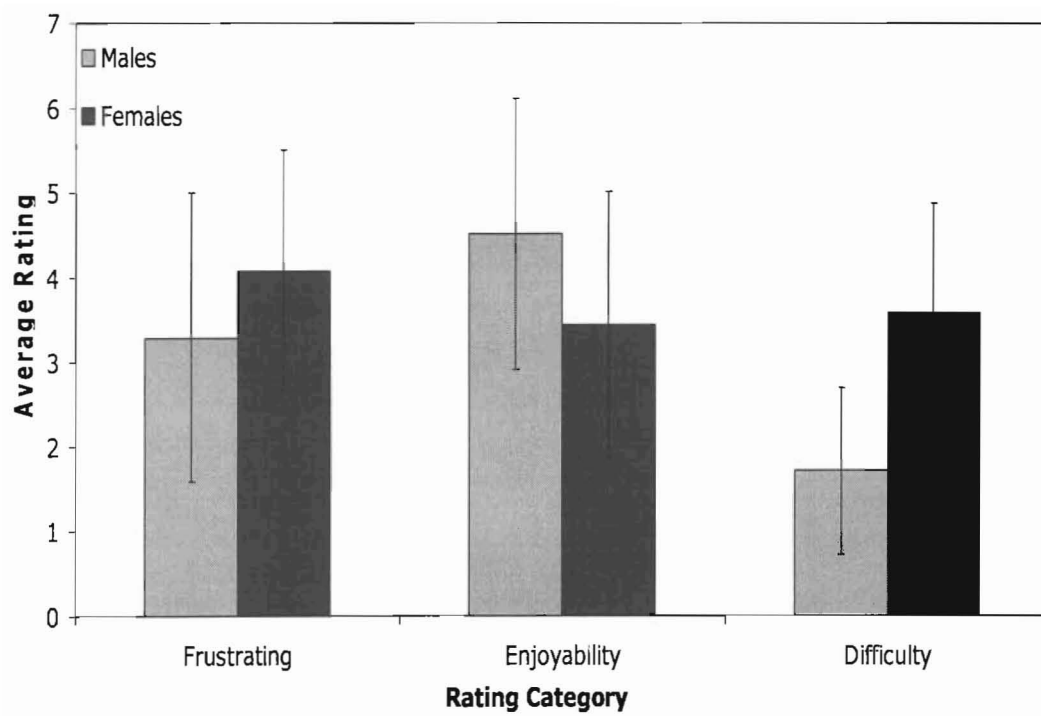
Figure 3. Participants' mean State Hostility Scale (SHS) score as a function of video game condition.

Figure 4. Participants' scores on three video game rating categories.









Demographics Questionnaire

Please complete the information below.

Gender: Male Female

Age: _____

Major: _____

In the average week, how many hours do you spend playing video games?

0-1 1-2 2-3 3-4 4-5 5-6 6-or more

Video Game Rating Sheet

1. How difficult was the video game?

1	2	3	4	5	6	7
Easy						Difficult

2. How enjoyable was the video game?

1	2	3	4	5	6	7
Not Enjoyable						Very Enjoyable

3. How frustrating was the video game?

1	2	3	4	5	6	7
Not Frustrating						Very Frustrating

4. How exciting was the video game?

1	2	3	4	5	6	7
Not Exciting						Very Exciting

5. How fast was the action of the video game?

1	2	3	4	5	6	7
Slow Action						Hectic Action

6. How violent was the content of the video game?

1	2	3	4	5	6	7
No Violent Content						Very Violent Content

7. How violent were the graphics of the video game?

1	2	3	4	5	6	7
No Violent Graphics						Very Violent Graphics

Current Mood

Please indicate the extent to which you agree or disagree with each of the following mood statements. Use the following 5 point rating scale. Write the number corresponding to your rating on the blank line in front of each statement.

Strongly Disagree 1	Disagree 2	Neither Agree Nor Disagree 3	Agree 4	Strongly Agree 5
1 ____ I feel furious.				19 ____ I feel like I'm about to explode
2 ____ I feel willful.				20 ____ I feel friendly.
3 ____ I feel aggravated.				21 ____ I feel understanding.
4 ____ I feel tender.				22 ____ I feel amiable.
5 ____ I feel stormy.				23 ____ I feel mad.
6 ____ I feel polite.				24 ____ I feel mean.
7 ____ I feel discontented.				25 ____ I feel bitter.
8 ____ I feel like banging on a table.				26 ____ I feel burned up.
9 ____ I feel irritated.				27 ____ I feel like yelling at somebody.
10 ____ I feel frustrated.				28 ____ I feel cooperative.
11 ____ I feel kindly.				29 ____ I feel like swearing.
12 ____ I feel unsociable.				30 ____ I feel cruel.
13 ____ I feel outraged.				31 ____ I feel good-natured.
14 ____ I feel agreeable.				32 ____ I feel disagreeable.
15 ____ I feel angry.				33 ____ I feel enraged.
16 ____ I feel offended.				34 ____ I feel sympathetic.
17 ____ I feel disgusted.				35 ____ I feel vexed.
18 ____ I feel tame.				

Word Completion Task

In the following task, you will examine a list of words. Each word has some missing letters. You will be given five minutes to complete as many of the words as you can. Skip any items that you are unable to complete.

- | | | | |
|-------------------|-----------------|-----------------------|-------------------|
| 1. b _ h _ _ _ | 26. p _ _ s o n | 51. _ r y | 76. p r o v _ _ e |
| 2. i n _ _ r e | 27. p _ s t _ r | 52. w a _ | 77. p _ n b _ l l |
| 3. e x _ e _ _ | 28. m _ _ g l e | 53. f _ m _ | 78. o u t _ _ _ e |
| 4. m u _ _ e r | 29. b l _ n d | 54. s l _ p | 79. c _ l l |
| 5. p r _ _ e | 30. s n _ r e | 55. b _ _ k | 80. r _ d e |
| 6. s p e a _ | 31. b _ e | 56. r _ p e | 81. m _ n _ g e |
| 7. f l i _ _ e r | 32. h _ t | 57. f o _ e _ t | 82. i n s _ _ _ |
| 8. e x p l _ _ e | 33. g _ _ p e | 58. o f f _ _ _ | 83. s _ d _ |
| 9. w _ _ m | 34. s m _ c k | 59. l _ _ o n | 84. b _ _ t |
| 10. k i _ _ | 35. s m _ _ e | 60. c r _ _ l | 85. b r _ _ z e |
| 11. t _ p _ | 36. k n _ _ _ | 61. c _ e _ t e | 86. r e v _ _ t |
| 12. h _ r _ | 37. t _ n e | 62. s t _ r _ y | 87. c o o _ |
| 13. a _ t _ r | 38. s _ _ b | 63. m _ t c _ | 88. s _ _ y |
| 14. c h o _ e | 39. s h _ r _ | 64. f _ r _ _ | 89. d _ _ r |
| 15. s _ m p _ _ | 40. d r _ _ n | 65. t _ _ t e | 90. s m _ c k |
| 16. a t t _ c _ | 41. p _ _ n e | 66. n _ _ t _ | 91. f r _ _ t |
| 17. c _ m p _ _ t | 42. a n g _ _ | 67. w _ _ d _ w | 92. _ u n c h |
| 18. d e s _ _ _ _ | 43. f l _ _ t | 68. w _ _ k e d | 93. s h _ r e |
| 19. s h _ l _ | 44. f i _ _ t | 69. v i s _ _ n | 94. a _ u s e |
| 20. s h o _ t | 45. p _ c k | 70. e n _ a g e | 95. c l _ _ r |
| 21. r _ p _ _ t | 46. h a _ e | 71. s c r _ _ n | 96. h _ n t |
| 22. s t r _ _ e | 47. a _ t | 72. h _ t r _ d | 97. w _ t _ r |
| 23. l _ _ e | 48. c _ t | 73. t _ l _ p h _ _ _ | 98. s _ a s h |
| 24. b _ r n | 49. w _ n | 74. d i s _ _ s _ e d | |
| 25. s t _ r _ o | 50. a _ e | 75. c _ n t _ _ l | |