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# The Effects of Violent Video Games on Aggression

Sarah Ryan

*The College at Brockport*, [sarahrya@buffalo.edu](mailto:sarahrya@buffalo.edu)

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Graduating with Honors:  
The Effects of Violent Video Games on Aggression

A Senior Honors Thesis

Presented in Partial Fulfillment of the Requirements  
for graduation in the College Honors Program

By  
Sarah Ryan  
Psychology Major

The College at Brockport  
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Thesis Director: Dr. Laurel McNall, Assistant Professor, Psychology

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## Abstract

With the increase in both violence in video games and aggression in children and young adults, psychologists are investigating whether these are related. The purpose of this review will be to look at the existing empirical research in order to discover whether there is a causal relationship between playing violent video games and aggression. The conclusions will help parents and educators make decisions about what games they allow their children and students to play.

### The Effects of Violent Video Games on Aggression

In 1999, two teenage boys committed one of the most deadly school shootings in history. The boys, Dylan Klebold and Eric Harris, brought guns and other weapons into their high school in Littleton, Colorado, on April twentieth (Kassin, Fein, & Markus, 2008). Violent acts such as this occur alarmingly often in the United States. Violence of any kind spurs thoughts of why one human would wish to injure or take the life of another? Psychologists worldwide wish to answer these and other questions related to human aggression. One interesting aspect of the Columbine Shooting mentioned above is that Klebold and Harris were avid players of the video game, Doom. Findings even go so far as to say that Klebold and Harris used the game to help plan the shooting (Kassin et al., 2008). This incident along with other similar tragedies has fueled research to discover if there is a link between media violence and violent acts committed by children and teenagers. This review will look at empirical research investigating the relationship between video game violence and aggression to assess if a causal relationship exists and whether this relationship varies as a function of sex, culture, and other variables (e.g. amount of blood in the game, competition).

#### Social Learning Theory

Social learning theory is defined as “the theory that behavior is learned through the observation of others as well as through the direct experience of rewards and punishments.” (Kassin et al., 2008, p. 402). The theory demonstrates that people, including children, learn by watching others. This theory is directly based on Bandura, Ross, and Ross's (1961) Bobo doll experiment and has continued to influence the way psychologists have viewed human aggression in the years since it was first published.

The goal of the Bobo study was to clarify whether young children imitate aggressive adult models (Bandura et al., 1961). The children were aged three to five and were divided up into groups based on gender. Different aggressive groups watched either a same sex or opposite sex model acting

in an aggressive manner, the nonaggressive group viewed the adult model acting in a nonaggressive manner, and the control group did not view an adult model (Bandura et al., 1961). In the experiment, the aggressive group children watched their adult model hitting, punching, and kicking a Bobo doll. The adult models were also told to shout a few aggressive and nonaggressive phrases. The nonaggressive group children watched an adult model play quietly. After the children watched the models, they were taken individually into the room with the Bobo doll and observed by judges.

Results found that participants in the aggressive condition acted significantly more aggressive to the Bobo doll than those in the nonaggressive and control conditions (Bandura et al., 1961). Not only were participants more physically aggressive, they also displayed more verbally aggressive acts in the aggressive condition than the other two conditions. Interestingly, participants in the aggressive and control conditions hit the Bobo doll with a mallet significantly more times than participants in the nonaggressive condition. Bandura and his colleagues predicted that boys would act more aggressively than girls, but this was only partially supported by the results. Boys displayed more physical aggression than girls, but the two groups were similar in verbal aggression. Boys tended to display more physical aggression than girls when they observed a male model, as opposed to girls who displayed more verbal aggression than boys while observing a female. Nonaggressive behavior, in respect to the other toys in the room, was also observed and the researchers found that girls spent more time playing with dolls while boys spent more time playing with toy guns. Participants in the nonaggressive group spent significantly more time engaged in nonaggressive play than the other two groups and spent over twice as much time sitting quietly than those in the aggressive groups.

The results in this study clearly demonstrated that children were likely to imitate adult behaviors, both aggressive and nonaggressive. Previous studies had been conducted on this topic, but most had involved rewards or punishments for behavior. In this case, rewards or punishments were not used; children were simply given the opportunity to play in a room after watching an adult model do

the same. These results were very significant to the development of social learning theory and this theory may have implications for the link between violent video games and aggression.

In 1961 when Bandura et al. conducted their study, most of the models children were exposed to were the adults around them. With the recent advances in technology, children started to become exposed to a greater variety of models that are not necessarily in real life, such as those on television. Now, children are able to view models on computers as well as television and even have a direct impact on what is happening on the screen. There is a very wide variety of video games available for children, both violent and non-violent, and these games allow children to both view violent acts and participate in them. For example children can take on the role of the shooter and directly cause physical harm to their opponents. In the advent of such video games, psychologists have wondered whether social learning theory applies the same way it applied during Bandura et al.'s study. Do children imitate models in video games the same way they do people in real life? Does playing violent video games directly cause aggressive acts in children?

#### Effects of Violent Video Games on Aggressive Behavior in Laboratory and Real Life Settings

Anderson and Dill (2000) were interested in the effects of both short-term and long-term exposure to video game violence on aggression in real life and whether an individual's personality will result in even greater aggression. To test this, Anderson and Dill first conducted a correlational study, using 227 undergraduate students. They measured irritability, trait aggression, delinquency, and world view (i.e., how likely participants felt they would be a victim of a crime and how safe they felt) using reliable and valid self-reported questionnaires. There was also a video game questionnaire, where participants named their five favorite video games and were asked to rate them for violent content and categorize the game into the following categories: education, fighting with hands, sports, fighting with weapons, fantasy, and skill. Next participants answered questions about how frequently they currently played video games and how long they spent each time they played them, as well as how often they

played video games in middle and high school. Lastly, researchers measured academic achievement using participants' GPAs, which were provided by the registrar (Anderson & Dill, 2000).

Results of this correlational study indicated that there is a long-term effect of playing violent video games on aggression. Anderson and Dill found that both aggressive and nonaggressive delinquency was positively correlated to exposure to violent video games and trait aggression, although aggressive delinquency was more strongly related to exposure and trait aggression. Both aggressive and nonaggressive delinquency were positively correlated to time spent playing video games. Violent video game exposure was positively related to aggressive personality (Anderson & Dill, 2000). Moreover, this study also produced a large amount of gender related correlations. The results found that males played more violent video games, played more video games in general, and felt more safe than females. GPA was significantly negatively related to time spent playing video games in general (Anderson & Dill, 2000). Participants who scored higher on trait aggression also scored higher on aggressive behavior. Those with high aggressive personality had a high positive correlation between exposure to violent content and aggression and this relationship was stronger for men than women. Aggressive personality was also positively correlated with nonaggressive delinquency. Women felt that violent crimes were more likely to happen (Anderson & Dill, 2000).

Overall, the results of this first study state that there is concern about the effects of exposure to violent content on aggressive and nonaggressive delinquency. However, since the study was correlational, causal conclusions cannot be drawn. Due to this, the researchers chose to complete an experimental study in addition to the correlational one. The experimental study was also able to assess the short-term effects of exposure to violent content on aggression (Anderson & Dill, 2000).

This study consisted of two separate laboratory sessions in which participants played either a violent or nonviolent video game. The participants were 210 undergraduate students, preselected due to their scores on a trait irritability measure; those who scored very high and very low were selected

(Anderson & Dill, 2000). During the first laboratory session participants played the game, filled out the world view and State Hostility Scale measures, and then played the game again. During the second laboratory session participants played the game again and filled out the behavioral measure.

Participants conducted the first session in pairs and were lead to believe that a second participant was present during the second session. During the second session the Taylor Competitive Reaction Time task was used, as it was used in the previous studies discussed (Anderson & Dill, 2000).

Results from this study found that participants who scored higher in irritability also scored higher in state hostility, whereas those low in irritability scored lower in state hostility. Interestingly enough, women scored higher in hostility than men (Anderson & Dill, 2000). Similarly to the correlational study, women were more likely to believe violent crimes would be committed and felt less safe than men (Anderson & Dill, 2000). Participants who scored high on the Aggression Accessibility Index had a greater access to aggressive thoughts. Participants who played the violent video game also had higher scores on the Aggression Accessibility Index, which means that the violent video game was a primer for aggressive thoughts. Gender also played a role in the results of Aggressive Accessibility Index. Men scored higher in Aggressive Accessibility than women. There was no effect of irritability on Aggressive Accessibility. The researchers suggested that these results may be because participants did not play the violent video game long enough for irritability to affect Aggressive Accessibility (Anderson & Dill, 2000). Results from aggressive behavior analyses were divided into two sections, aggression after win trials and aggression after lose trials. For win trials, women gave longer noise blasts than men. For the lose trials, women also gave longer noise blasts than men, and those who scored high on irritability also gave longer noise blasts. Participants who played the violent video game gave longer noise blasts than those who played the nonviolent game after lose trials. Another interesting result was that scoring high on irritability increased aggression for men, but not for women (Anderson & Dill, 2000).



The main difference between children viewing adult models acting aggressively and playing violent video games is that they are active participants in the video games. Players of video games are given the opportunity to act violently against their opponents. A study was conducted by Polman, Orobio de Castro, and van Aken (2008) investigated whether there is a difference in children's aggression if they watch another child play a violent video game versus actually playing a violent video games. The study was completed with 56 children whose ages were 10 to 13. Children participating in the study were divided up into three conditions. In the first condition, the children actively played a violent video game, in the second they watched a violent video game being played, and the third played a non-violent video game (Polman et al., 2008). The children played or watched the video games in a room by themselves, and once all of the children had participated, they were given a questionnaire about their video game habits together. After the children played the game (either immediately, a half hour, or one hour afterwards), they were given free play time with the other children. Then children filled out a questionnaire about which of their classmates had acted aggressively during free play and what the aggressive acts were (Polman et al., 2008).

Results were analyzed separately for boys and girls. They found that boys were more aggressive after playing the violent video game than boys who watched the violent video game. There was no difference in aggressive acts in those who played the violent versus non-violent video game for boys as well as the non-violent versus passive violent condition (Polman et al., 2008). There was no relationship between any of the conditions and aggression for the girls. The results found that boys who had just played or watched the violent video game displayed more aggressive acts than boys who had played an hour or more prior to free play. Time of play was not looked at for girls (Polman et al., 2008).

#### Sex Differences

The Anderson and Dill (2000) and Polman et al. (2008) study illustrated differences in

aggression amongst the two sexes. Bartholow and Anderson (2001) conducted a study that not only sought to discover whether violent video games caused aggression, but whether there was a difference between men and women. The study was conducted with 43 undergraduate students playing either a violent or a non-violent video game against a confederate. After each participant played the video game, they took part in a competitive reaction task where they punished the confederate with loud tones (Bartholow & Anderson, 2001).

Results found that male participants who played the violent video game punished the confederate with higher intensity tones, and more often, than participants who played the non-violent video game (Bartholow & Anderson, 2001). Men punished the confederate with higher intensity tones than women did. Overall, the effects of playing the violent video game were greater for men than they were for women (Bartholow & Anderson, 2001).

Anderson and Murphy (2003) completed a study that investigated the relationship between violent video games and young women, excluding men from the study. This experiment is interesting to look at because studies, such as the Bartholow & Anderson (2001) study, have found a much higher relationship for men and therefore do not look at women as closely. The results of such studies have been interpreted as violent video games having a small or no effect on women (Anderson & Murphy, 2003). Such findings, as well as the fact that men tend to commit more violent crimes than women, have resulted in men being the focus for research on this subject (Anderson & Murphy, 2003). Anderson and Murphy chose to investigate the effects of violent video games on women as well as the effect of the gender of the character being used in the game.

The study was conducted with 91 undergraduate students, who were split up into three groups. A third played a violent video game with a female character, a third played a nonviolent video game, and a third played a violent video game with a male character (Anderson & Murphy, 2003). Once participants finished playing their assigned game, they completed the Taylor Competitive Reaction

Time (TCRT) task in order to measure their levels of aggression. After this, participants completed a questionnaire about the decisions they made in the TCRT task, as well as their reasoning behind these decisions (Anderson & Murphy, 2003).

Results found that revenge motivation and instrumental motivation, as measured by the TCRT, were positively correlated with each other, and both were positively correlated with the number of high intensity noise blasts given to opponents (Anderson & Murphy, 2003). Results also showed that those who played the violent video game demonstrated a much higher level of aggressive motivation than participants who played the nonviolent video game. While the effect of the sex of the character was deemed nonsignificant, those who played the female character had slightly higher levels of aggressive motivation (Anderson & Murphy, 2003).

#### Cross-Cultural Studies

With the exception of the Polman et al. study, all the studies that have been discussed thus far have been conducted in the United States. The results of these studies have agreed with each other in that playing violent video games causes aggression, but since the data was only collected in the United States, researchers must wonder whether the results are generalizable to other cultures. Moller and Krahe conducted a study in 2009 that sought to research whether violent video games cause aggression in German adolescents. This study is also interesting to look at because the researchers chose to use a longitudinal design, looking at participants levels of aggression at a first time measurement and then a second, thirty months later (Moller & Krahe, 2009).

The study was completed with 295 secondary school students living in Germany. Four measures were used in each study, the first three (normative beliefs, hostile attribution, and aggressive behavior) being the same at both measurement times. The fourth measure, the assessment of game violence exposure, was different at each measurement time. At the first measurement, the measure consisted of a list of popular video games and participants indicated how often they played each game,

how often they played video games in general, and for how long they play video games when they do play them. The measure used at the second time of measurement gave participants a list of different categories of games and participants were to indicate how often they played each category, how often they played video games in general, and for how long they played video games when they did play them (Moller & Krahe, 2009).

The results of the longitudinal analysis found that physical aggression at the second time measurement was significantly predicted by violent video game exposure at the first time of measurement, but the opposite (physical aggression at the first time measurement and violent video game exposure at the second) was nonsignificant (Moller & Krahe, 2009). This indicates that participants who preferred violent video games at the first measurement were likely to be aggressive at the second. Exposure to violent video games at the first measurement was not significantly related to relational aggression at the second measurement, which means that exposure to physical violence does not cause an increase in relational aggression over a thirty month time period as seen in this data (Moller & Krahe, 2009). Exposure to violent video games at the first measurement significantly predicted the normative acceptance of aggression at the second measurement. Violent video game exposure was not related to normative beliefs, hostile attributions, or aggressive behavior. Overall, the results indicate that exposure to violent video games is correlated with an increase of normative acceptance of aggression and physical aggression over a span of thirty months (Moller & Krahe, 2009).

Results also found that there were significant interaction effects for time and gender. At the time of the first measurement, boys played video games more often and for longer periods of time than girls. Across the two different measurements, boys remained approximately the same in their game usage while girls lowered the amount of time they played games and how often they played them (Moller & Krahe, 2009). At the first measurement, boys had higher scores of game violence exposure and hostile attribution bias for physical scenarios while girls had higher scores for hostile attribution

bias for relational scenarios. At the second measurement, boys had higher scores on violent video game usage, normative acceptance of physical aggression, hostile attribution bias for physical scenarios, physical aggression, and relational aggression (Moller & Krahe, 2009). The cross-sectional data analysis for the first measurement found that there were not any interactions between violent video game usage and gender on norms, attributional bias, and aggressive behavior which means that while males and females had different scores on these aspects, the relationship between the scores were the same for both males and females (Moller & Krahe, 2009).

#### Other Variables: Amount of Blood in a Video Game, Competition, and Reward and Punishment

Barlett, Harris, and Bruey (2007) conducted an experiment investigating the effects of the amount of blood in a violent video game on aggression. The experiment was composed of two different studies. The first study proposed that participants who played the violent video that had the highest amount of blood would have the most aggressive thoughts (Barlett et al., 2007). Seventy-four participants were randomly assigned to either maximum blood, medium blood, low blood, or no blood conditions. Prior to playing the game, participants filled out the Aggression Questionnaire and the State Hostility Scale, and had their heart rate measured. After playing the game, participants had their heart rate measured again and filled out the State Hostility Scale, the demographics questionnaire, and the suspiciousness questionnaire (Barlett et al., 2007).

Results revealed a significant increase in hostility and heart rate after the game was played (Barlett et al., 2007). Hostility significantly increased for the maximum and medium blood conditions. The increases in low and no blood conditions were not significant. However, heart rate was only significantly increased in the maximum blood condition. Participants in the blood conditions used their weapons more often than those in the no blood condition (Barlett et al., 2007).

The results of this first study, which found that participants in the maximum and medium blood conditions were more aggressive and aroused than those in the low and no blood conditions, lead the

researchers to conduct a second study, investigating whether the amount of blood would affect aggressive thoughts (Barlett et al., 2007). The study was conducted using 31 undergraduate students. The same questionnaires were used in this study as in the first, as well as the Word Completion Task. Participants filled out the Aggression Questionnaire and half of the Word Completion Task prior to playing the video game. The other half was filled out after playing the video game, as well as the remaining questionnaires (Barlett et al., 2007).

Results found a significant difference in gender for trait aggression. Males scored higher on trait aggression than females (Barlett et al., 2007). However, when gender was analyzed with condition in an analysis of covariance, no significant interaction was found. Participants in the maximum blood condition had a larger amount of aggressive thoughts than those who played the game without any blood. Therefore the researchers concluded that the amount of blood in a video game does effect the amount of aggressive thoughts a person has, and more specifically, larger amounts of blood increase aggressive thoughts (Barlett et al., 2007).

Another study that delved deeper than simply researching whether there was a correlation between violent video games and aggression was completed by Carnagey and Anderson (2005). This particular study investigated whether rewards and punishments in violent video games had an effect on aggressive affect, cognition, and behavior. This question is interesting because violent video games tend to reward aggressive behavior through points (Carnagey & Anderson, 2005). This study also sought to investigate whether competition is at all involved with aggression in violent video games, since violent video games tend to be competitive while nonviolent video games tend not to be competitive (Carnagey & Anderson, 2005). Three different hypotheses were investigated in three different experiments.

The first experiment sought to investigate the effects of rewards and punishments on aggressive cognition, affect, and behavior (Carnagey & Anderson, 2005). Seventy-five participants were

randomly assigned to one of three groups, each of which played a variation of the same car racing violent video game. The first version rewarded (given points) the participant with points for killing pedestrians, the second punished (took away points) the participant for killing pedestrians, and the third was nonviolent and did not involve killing pedestrians at all. Blood pressure and pulse measurements were taken before participants played the game, while they filled out the State Hostility Scale (which was filled out after playing the game), and then after they filled out the State Hostility Scale (Carnagey & Anderson, 2005). Results found that all three games produced the same amount of arousal, which was what the researchers were trying to accomplish. The participants who were rewarded for killing pedestrians killed a significantly larger amount of pedestrians than the participants who were punished, which means that the manipulation of the reward and punishments on the video game were successful (Carnagey & Anderson, 2005). The analyses that were conducted on the State Hostility Scale found that there was no difference in hostile affect in participants in the reward condition as opposed to the punishment condition, but both groups resulted in higher hostile affect than the nonviolent group. Interestingly, women were significantly more hostile than men. The results also found that those who gave higher ratings for how frustrating and addicting the game was were more hostile (Carnagey & Anderson, 2005). Since the reward condition resulted in participants killing significantly more pedestrians, yet their hostile affect was not higher than those in the punishment condition, the researchers concluded that hostile affect was not a direct result of the killing of pedestrians in the game (Carnagey & Anderson, 2005).

The second experiment used the same procedure as the first experiment, but it sought to investigate if the different conditions' changes in affect and cognition produced any increase in observable aggressive behavior (Carnagey & Anderson, 2005). Sixty-six undergraduates were the participants. Results of this study found that participants in the reward condition had a higher level of aggressive cognitions than those in both the punishment and nonviolent conditions. The results of sex

and game interaction were not significant (Carnagey & Anderson, 2005). The results of this experiment do not coincide with those of the first experiment since in the second experiment those in the punishment condition did not have elevated aggressive cognitions (Carnagey & Anderson, 2005).

The differing results in these two experiments is what fueled the third experiment, which sought to investigate whether this aggressive behavior caused by the violent video games was due to affect or cognition (Carnagey & Anderson, 2005). The experiment used 141 undergraduates. This experiment was slightly different from the first two. It involved participants being told they were partnered with another participant and were told to form an opinion of them based on an essay that they were told the person wrote, which held an opposing view of a topic. Each participant also wrote their own essay, which supposedly would be given to their partner to rate. Participants read the essays and rated them on a variety of traits. Then the participants played which ever video game condition they had been assigned to (the same video games as the first two experiments). Next the participant was given their essay back, supposedly rated by their partner, and rated harshly. After this the participants completed the Taylor competitive reaction time task, supposedly competing against their partner. Then the participants rated the video game and filled out two partner evaluation forms (Carnagey & Anderson, 2005). The results of this experiment found that there was no difference in aggressive behavior amongst participants in the punishment and nonviolent groups, while those in the reward group were significantly more aggressive than the two other groups. Males rated higher in aggression than females. These results showed that people who play violent video games that reward violent behavior display more aggressive behavior than those who play a game with the same competitiveness that does not reward violence or it is punished (Carnagey & Anderson, 2005).

More recently, Anderson and Carnagey (2009) completed another study, this one investigating the effects of sports video games on aggression, specifically asking the question of whether the aggression is due to violence or the competitive nature of the games. Like their previous 2005 study,



this study involved multiple experiments, as well as a pilot study to make sure that the video games chosen were equivalent in competitiveness and different in levels of violence. The pilot study was a success and the chosen video games were deemed usable for the experiments (Anderson & Carnagey, 2009). The researchers chose to complete three different experiments that examined the effects of violence on aggressive cognition, the relationship between attitudes towards violence in sports and aggressive affect, as well as aggressive behavior (Anderson & Carnagey, 2009).

The first experiment began with 120 undergraduate participants filling out a questionnaire that indicated the five video games they played the most from seventh grade until the present, indicating how often they played the games, and rating each game for violence. These scores were used to calculate a violence exposure score (VGV). Next the participants indicated how often they played a variety of violent and nonviolent sports video games which was used to calculate a violent sports game (VSG) and nonviolent sports game (NSG) score. Participants also indicated how often they watched and played a variety of sports, which was used to calculate a sports interest score. The last questionnaire participants filled out was a physical aggression subscale of the aggression questionnaire (Anderson & Carnagey, 2009). After the questionnaires were filled out participants were randomly assigned to play one of two violent or one of two nonviolent sports video games. Participants had their blood pressure and pulse measured at various points throughout their time playing the video games. Then they completed the Word Pronunciation Task and filled out the video game evaluation questionnaire (Anderson & Carnagey, 2009).

Results found that participants playing the violent games were higher in aggressive cognition accessibility than those participants in the nonviolent conditions and that men were higher than women in aggressive cognition (Anderson & Carnagey, 2009). The results instead supported the hypothesis that since the amount of violence differed in the two groups aggressive cognitions would be higher in the violent game condition (Anderson & Carnagey, 2009).

The second experiment was nearly the same as the first, using the same violent and nonviolent sports video games, except the Word Pronunciation Task was not used. Instead, the State Hostility Scale and the Attitudes Towards Violence in Sports Questionnaire were used. This latter questionnaire was used in order to see whether participants attitudes were affected by the violent or nonviolent video games (Anderson & Carnagey, 2009). One-hundred and fifty-four undergraduates participated in this experiment. The State Hostility Scale was divided into four subscales including feeling unsociable, feeling mean, lack of positive feelings, and aggravation, but results found that only aggravation and feeling mean were relevant to this particular study. For aggravation, results found that participants who played the violent sports video game felt more aggravated than those who played the nonviolent sports video game. Both game frustration and game difficulty were positively correlated with aggravation (Anderson & Carnagey, 2009). Participants in the violent condition felt slightly more mean than those in the nonviolent condition. This second experiment, like the first experiment, only supported the hypothesis that stated that violent content and not competition increased aggression in participants (Anderson & Carnagey, 2009).

The third experiment used the same violent and nonviolent sports video games as the first two experiments, but it added the Competitive Reaction Time Task. This task has been used in numerous other studies mentioned above as a way of measuring aggressive behavior. One-hundred and three undergraduates were used in this experiment. Participants did not fill out the State Hostility Scale or the Attitudes Towards Violence in Sports Questionnaire, but instead filled out the Competitive Reaction Time Task Motivation Questionnaire, which asked them why they chose the intensities of noise for punishing their opponents in the task (Anderson & Carnagey, 2009).

The researchers calculated aggressive behavior in two ways, calling them high intensity aggression and average intensity aggression. Results from the high intensity aggression calculation found that participants in the violent sports game condition were more aggressive than those in the

nonviolent condition, meaning that those who played the violent game gave over 75% more high intensity noise blasts in the Competitive Reaction Time Task than those who played the nonviolent game. Males were more aggressive than females (Anderson & Carnagey, 2009). The average intensity aggression calculation found similar results. Those who played the violent game were more aggressive than those who played the nonviolent game. The ratings participants gave of ability to play the game and difficulty of the game were related to behavior as well. Participants who rated higher ability to play the game were more aggressive than those who rated lower ability to play the game. When the researchers looked at possible motivations for aggressive behavior they found that revenge highly predicted both high intensity and average intensity aggression. While instrumental aggression motivation was not related to high intensity aggression, it did predict average intensity aggression (Anderson & Carnagey, 2009).

Again, the results of this third experiment were similar to the results of the first two experiments and only supported the hypothesis that violent content in the video games caused aggressive behavior, and not competitiveness. The overall study only supported the violent content hypothesis and by measuring heart rate and blood pressure showed that the results could not be attributed to changes in physiological arousal (Anderson & Carnagey, 2009). Since both baseball and football video games were used in the experiments the results are more generalizable to sports, although the use of even more different sports would have increased generalizability even more (Anderson & Carnagey, 2009). The results of this study support the overall finding in the topic of violence in video games in relation to aggression that violence causes aggression. The study is unique in its nature because the researchers sought to investigate another possible cause of aggression in those who play violent video games: competition. However, the results of all three experiments in Anderson and Carnagey's study were overwhelmingly in support of the violent content hypothesis only. This is an important finding in the field because the results can be added to the large body of research that has previously been devised

that show that violent video games cause aggression.

### Discussion

This review of the literature suggests that violent video games may cause increased aggression. In fact, playing violent video games may be even more problematic than viewing violent television shows because playing a video game allows a person to control a character and directly effect what that character does on screen. There is also the issue of identification with the aggressor. By controlling the character (the aggressor), a person is deemed the hero of the game and causes any violent acts made by that character. The person playing the game is choosing to act in violent ways towards other characters in the game. Another reason the effects of violent video games may be more pronounced than the effects of violent television is the fact that they are more addictive. Video games, since they require active participation, offer their players rewards and punishments for actions in the game. These reinforcements often cause players to become addicted to the games. Such addictions cause people to play more and more video games, possibly increasing the effects. When it comes to violent video games, the games in essence teach players to become aggressive by offering these rewards and punishments (Anderson & Dill, 2000).

The results of the experiments discussed in this review demonstrated that playing violent video games increases aggression in undergraduate students. Most of the experiments discussed used a laboratory setting and therefore causation can be drawn. Anderson and Dill (2000), Bartholow and Anderson (2002), Anderson and Murphy (2003), Barlett et al. (2008), Carnagey and Anderson (2005), and Anderson and Carnagey (2009) all demonstrated to some degree that playing violent video games causes an increase in aggression. This result is important to look at alongside of the Polman et al. (2008) study since they it used elementary school children, yet the results were similar to the studies using undergraduates. Such results demonstrate that the effect of violent video games can be generalized across multiple age groups. When looking at the undergraduate studies and then looking at

the Polman et al. study, it can be concluded that the effect on aggression begins at a young age and then continues as a person grows up. Bandura et al.'s 1961 Bobo doll study is also relevant to this particular result because the children in Bandura et al.'s study were younger than those in the Polman et al. study yet there was still increased aggression (Bandura et al., 1961). While Bandura et al. used live models and not video games in his study, the results are still relevant to look at because they demonstrate that the effect holds true even with a model on a television screen rather than a live model.

The studies discussed in this review provide evidence that there is a gender effect in whether violent video games cause aggression. However, this effect is inconclusive. Some of the studies discussed found that playing violent video games increases aggression in males but the effect on females is not significant (Polman et al., 2008). Yet other studies conducted found that playing violent video games did increase aggression in females as well as males (Anderson & Dill, 2000), (Bartholow & Anderson, 2002), and (Anderson & Murphy, 2003). These studies are proof that researchers should not ignore women in their research. Males and females alike are subject to the effects of violent video games on aggression. However, Anderson and Dill did provide a possible explanation as to why the effects were greater for women than for men in their study. They suggested that women may have been less familiar with video games than men or that they were unhappy about having to play the games in the study. They also suggested that the measure they used fit well with how aggression in females is seen in society but did not fit as well for how aggression in males is viewed in society (Anderson & Dill, 2000). Nevertheless, the results clearly stated that violent video games do effect both males and females.

Related to the gender effect, an aspect of the Bandura et al. study that is relevant to the Bartholow and Anderson study and that is the effect of the model's gender on the level of aggression. In their discussion, Anderson and Bartholow mentioned that the characters in the violent video game used were all males and this may have contributed to the higher amounts of aggression found in male

participants. They hypothesized that the male participants may have felt more of a connection to the characters and been more involved in the game, therefore increasing their aggression scores (Bartholow & Anderson, 2001). A very similar result was found in Bandura et al.'s study, where results found that male participants displayed more aggression when they viewed a male model (Bandura et al., 1961). This points to a possible confounding variable in the Bartholow and Anderson study and asks the question as to whether male participants would still have higher aggression scores than females if they had played a violent video game with a female character. It also asks whether female participants would have increased aggression scores when playing a violent video game with a female character. Bartholow and Anderson also proposed that females might not be as engaged in the game since the character was a male. Anderson and Murphy's study seems to confirm this suspicion. This small correlation might be more pronounced with a higher sample size than the 91 undergraduates that were used in Anderson & Murphy's (2003) study.

The studies discussed demonstrate that the effects of violent video games on aggression are generalizable throughout multiple cultures. While the majority of the studies were conducted in the United States, two of them were not. Moller and Krahe as well as Polman et al. conducted their studies in Germany and the Netherlands, respectively. Both of these studies found similar results to the studies taking place in the United States, finding that playing violent video games does increase aggression.

While many studies simply look at whether the games increase aggression or not, such as Anderson and Murphy's 2003 study, Barlett et al. as well as Carnagey and Anderson, and Anderson and Carnagey's studies delved further and sought to try and figure out what it was about the video games that increases aggression. Barlett et al. chose to look at the amount of blood in the game, while Anderson and Carnagey, and Carnagey and Anderson chose to look at competitiveness and reward and punishment. Barlett et al.'s results clearly demonstrated that the amount of blood has an effect on aggression, although that does raise more questions. One question that was mentioned in their

discussion section was why those in the low or no blood condition displayed less aggression than those in the medium and maximum blood conditions. Anderson and Carnagey found that it was violent content that increased aggression, not competitiveness. Carnagey and Anderson found that rewarding violent acts in a video game increases aggression.

The results of Moller and Krahe's study provide many interesting insights into the question of the correlation between violent video games and aggression. The researchers' design was quite different from the previously discussed studies, most notably because it was longitudinal and non-experimental. However, the results were similar to the results in the previous studies. Moller and Krahe demonstrated that participants who were exposed to violent video games at a certain time increased in aggression by the second measurement. Their results did not support a hypothesis that stated that aggressive participants choose to play violent video games, but that participants who played violent video games became more aggressive (Moller & Krahe, 2009). At the end of their discussion section, Moller and Krahe suggested that a replication of this study should include measures of arousability and sensation seeking to further discover who is more at risk for the effects of violent video games on aggressive tendencies.

Despite the fact that a causal relationship can be drawn with the current research, there are opportunities for more research done in the field. With the exception of the Moller and Krahe study the current research lacks longitudinal studies, so that would be one good starting place for psychologists who would like to continue the investigation. Another aspect of the research that needs to be looked at in future studies is the effects of violent video games on women. Very few studies give women the focus that they give men since the effect is usually more pronounced for men. Anderson and Murphy did complete a study that only used women and they found that violent video games did cause aggression, which proves that women should not be ignored in research. More studies like Anderson and Murphy's need to be carried out, and perhaps they should focus on aspects such as competitiveness

or the amount of blood in the games in order to see if the relationship holds true for females as well. Anderson and Dill's 2000 study was interesting in the fact that it required participants to organize the types of video games they regularly played into different categories. An interesting future study would be to run an experiment to investigate whether these different categories of video games have different effects on aggression in participants. The Anderson and Carnagey study completed in 2009 about whether competitiveness in video games could possibly cause aggression provided a unique look at the situation. While its results did show that violent content caused the aggression in participants and not competitiveness, the study is currently the only one of its kind. To make sure the results would hold true with another group of participants, the study should be replicated, perhaps using an even larger group of participants.

Due to the large body of current research pointing to the fact that violent video games cause aggression, people cannot ignore it and there are many implications of the research. The first relates to the future research ideas discussed above. Psychologists need to continue research in this area in order to further explain how violent video games cause aggression. Other implications relate to people directly involved with the production, sales, and use of violent video games. The idea of video game censorship is very often brought up in the topic of violent video games and a way for children to not have access to violent video games is simply to not make them anymore. However, this is not a very realistic solution for a variety of reasons. The video game industry is very lucrative and the chances of companies discontinuing the production of violent video games is slim to none due to the possibility of them losing a great deal of money. New technology is also allowing people to create their own video games that no one will control the level of violence in. A more realistic way to control who has access to violent video games is to educate parents, teachers, and video game salesmen on the risks involved with playing the games. Parents and educators need to be aware of the research that has been done and keep it in mind while choosing games for their children and students. Video game salesmen should



have some level of understanding about the research as well and keep it in mind while deciding whether to sell certain video games to children or not. Anyone purchasing video games needs to check the rating before purchasing a game as well. It is possible that tighter restrictions are needed in who is allowed to buy what games as well. The carrying out of those restrictions would fall upon those people selling video games.

Bushman & Huesmann published research that demonstrated that the correlation between media violence and aggression is greater than the correlation between calcium intake and bone mass, and homework and academic achievement (2001). Social Learning Theory has been studied for decades and its conclusions can be related to video game violence and resulting aggression. The increase in the amount of video games available to children and the amount of aggressive acts carried out by young people have fueled this ongoing research. Psychologists have completed many experimental studies that prove that violent video games cause aggression, at least in the short term. This conclusion coincides with Bandura's Social Learning Theory and his Bobo doll study (Bandura et al., 1961). Video game characters are models that people look up to, much like the adult models in Bandura et al's study. However, more research is needed to find out whether this conclusion stands in a longitudinal study. Parents, educators, and video game salesmen need to be aware of this relationship between video game violence and aggression and keep it in mind while choosing games for their children and students to play, and what games to sell to children.

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