PLAYING VIOLENT VIDEO GAMES ALONE OR WITH OTHERS PRESENT: RELATIONS WITH AGGRESSIVE BEHAVIOR, AGGRESSIVE COGNITION, AND HOSTILITY

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A Dissertation

Submitted to the Graduate College of Bowling Green State University in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2014

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ABSTRACT

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In the present study, I sought to further explore the relation between exposure to video game violence and aggressive behavior by examining the relation between social video game play and negative outcomes associated with playing violent video games. I examined whether there were differences in aggressive cognition, state hostility, and aggressive behavior (a computer reaction time task against a fictitious opponent) after playing a violent or nonviolent video game either alone or with another person present, and whether trait aggression or normative beliefs about aggression moderated any relations found. The study included 100 male participants randomly assigned to one of four experimental conditions: The first group played a violent video game alone; the second group played a violent video game against a confederate; the third group played a nonviolent video game alone; and, the fourth group played a nonviolent video game against a confederate. Prior to the game play period, participants completed measures of trait aggression, normative beliefs about aggression, exposure to video game violence, video game experience, and demographic variables. After the game play period, participants completed measures of aggressive cognition, state hostility, and aggressive behavior. A series of ANOVAs were computed to determine if video game content and social play condition affected behavior, cognition, or state hostility. A series of regressions were computed to determine if the aggression outcomes were moderated by trait aggression or normative beliefs. As expected, playing a violent video game was associated with increases in state hostility and aggressive behavior. Contrary to what was predicted, playing in a social setting was associated with decreases in aggressive cognition and was unrelated to state hostility or aggressive

behavior. Moderation analyses indicated that neither normative beliefs nor trait aggression moderated the effects found. Limitations of the current study design, and their effects on the findings of the present study, were discussed, including issues regarding generalizability of the findings, short video game play time, and the artificiality of the play condition. Future directions were discussed, including the need to better understand possible differences in exposure to video game violence when it happens while playing with another person present. To Sarah, Lily, and Jace for their support, love, and bringing a smile to my face even during the difficult times in this process. I never would have made it without you. Also, to Jeremy Athy who provided me unwavering support and gave pep-talks like a champion coach. You are the best friend a person could ask for. Finally, I would like to thank my family, be they a Drummond or Rex, for all of the support they have given in so many different ways throughout my years in graduate school.

ACKNOWLEDGMENTS

I would first like to thank my advisor, Eric Dubow, for his commitment, support, and guidance throughout this project. His support, direction, and humor have helped shape me into the clinician and scientist I have always dreamed of being. I would like to thank Jean Gerard and Dara Musher-Eizenman, both committee members for every project I have done throughout my graduate career, for their ongoing support, flexibility, and pushing me to continually grow and improve as a scientist. I would be remiss if I did not mention how lucky I have been to have committee members who genuinely enjoy the research process and have made meetings comfortable while also challenging me to develop my skills. I would also like to thank Montana Miller, my graduate faculty representative, for her patience, flexibility, and valuable feedback that contributed greatly to this project. I would further like to thank my wonderful research assistant, Chris Lippert, for all of the hard work he put in and showing a genuine interest in learning more about being a psychologist. I am grateful to each of the individuals mentioned here as they all contributed to the success of this project and I never would have been able to complete it without them.

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INTRODUCTION

Video games first began their foray into popular media in the 1970's (Kent, 2001). Their popularity grew steadily from the 1980's to the mid-1990's, after which time it grew exponentially. At present, the video game industry rivals the movie and music industries in terms of revenue (Entertainment Software Association, 2012). Throughout this rise in the popularity of video games, there has also been consistent concern on the part of parents, lawmakers, and researchers that exposure to video game violence may have negative consequences. The most common concern about video games is that the interactive nature of the games will result in increased aggressive and violent behavior in those who are exposed to violent video games. This concern about the possible negative effects of video game violence has shown sharp increases as the games have grown more visually detailed and realistic. Due to these concerns, much of the extant literature on video games has focused on possible negative consequences of exposure to video game violence, such as aggressive behavior, desensitization to human suffering, and decreases in prosocial behavior.

Much of the extant literature has focused on aggregate exposure to video game violence (e.g., examining relations between time spent playing violent video games and aggression) or playing violent video games in a solitary manner (e.g., having participants play a violent video game alone). It is possible that players experience different effects of violent video game exposure when they play alone compared to when they play socially (e.g., playing with another person in the room, playing with a friend over the internet). However, very little research has examined the difference between solitary and social video game play. It is possible that playing in a social context may have important negative (or positive) impacts of the effects of exposure to video game violence. This has led some researchers to question what the effects of social interaction may be. Griffiths (2009), for example, proposed that parents should encourage children to spend their video game playing time in social play as it increases their time spent in social interactions. Despite these recommendations, there is very little research to suggest this will make a difference. In fact, the literature, which will be addressed later, has been supportive of links between exposure to video game violence and aggressive behavior. Additionally, the theoretical models used to examine video game violence exposure, again discussed later, suggest that playing with others may result in increased aggressive behavior through moderating factors such as learning, observation of another person's aggressive behavior, and increased acceptance of aggressive norms. Thus, this is an area that warrants further examination to determine if there are differences in the effects of playing alone compared to playing with another person. The goal of the current project is to extend the literature further into this line of questioning.

I will begin with a review of the extant literature regarding video game play behaviors in children and adolescents, including play in general, solitary play, and social play (i.e., with others present or online). The discussion will then turn to an examination of the theoretical literature regarding the relation between video game violence exposure and aggressive behavior, aggressive cognition, and hostility. I will then review the empirical literature regarding the relation between exposure to violent video game content, physiological arousal, and aggression, including discussion of solitary and social video game play. Next, the discussion will focus on limitations of the current literature. Finally, I will conclude with a discussion of the present study which seeks to examine possible differences between playing violent and non-violent video games alone compared to playing them with another person present. The study will examine

differences in aggressive cognition, hostility, and aggressive behavior.

Video Game Play Behaviors among Children and Adolescents

Since 1999, the Kaiser family foundation has released three reports based on three largescale surveys that provide the most comprehensive examination of child and adolescent media use, the most recent being conducted in 2009 with published results coming in 2010 (Roberts, Foehr, Rideout, & Brodie, 1999; Roberts et al., 2005; Rideout, Foehr, & Roberts, 2010). These studies gathered data from large groups (i.e., each study consists of over 2000 participants) of national representative samples of children from age 8-18 years-old. Data from these studies consisted of surveys as well as media-use diaries. These studies are widely regarded as the most comprehensive examinations of video game play behavior. For the sake of brevity, information will generally be taken from the most recent study conducted in 2009, unless otherwise noted.

Rideout et al. (2010) indicated, based on the results of the 2009 survey, that children are living in a media-saturated world and have experienced consistent increases in media exposure (e.g., television, video games, music). It continues to be very rare to find a home that does not have at least one television, as TVs are found in 99% of homes. In fact, the average home in the study had 3 or more televisions. Video game systems continue to grow in availability, with 87% of homes having at least one video game console, up 4% from the prior study (Roberts et al., 2005). In addition, 93% of homes have a computer, which is another avenue for children and adolescents to access video games (Rideout et al., 2010). It is also likely that children who do not have the means to play a video game in their own home will access video games in the home of a friend, at the library, or at an internet café. Studies conducted in other countries indicate that this is not a situation unique to the United States. For example, studies have indicated that children spend similar amounts of time per day playing video games in Germany and Taiwan (Chou & Tsai, 2007; Möller & Krahé, 2009). The overwhelming evidence indicates that children and adolescents have access to video games on a daily basis and thus video games are likely an important influence in their lives.

In examining the rates of video game usage, Rideout et al. (2010) found that participants reported an increase of 24 minutes *per day* in video game usage, going from 49 minutes per day in the 2005 study to 73 minutes per day in the 2009 study (also see, Rideout et al., 2005). When daily use is broken down by demographics, studies show an interesting pattern (Drummond & Dubow 2009; Rideout et al., 2010). This pattern is marked by an increase in play time during ages 11-14 followed by a steady decline. Specifically, Rideout et al. (2010) found that 8-10 yearolds play an average of 61 minutes per-day, 11-14-year-olds display the highest amount of play with 85 minutes per day, followed by a decline to 68 minutes per day between the ages of 15 and 18. This pattern is similar to the one found in other studies and the prior study by Roberts et al. (2005; Drummond & Dubow, 2009). However, in previous studies, 8-10 year-olds were found to have higher rates of play than the other age groups. The reason for this decline in later adolescence is unclear, but it is possible that this may represent changes in how adolescents choose to spend their time, as well as older adolescents having more responsibilities and activities, such as social time with friends, school, events, sports, or homework, that are taking up more of their time. However, despite the decline, older adolescents do play on average 68 minutes per day, indicating video games continue to take up a significant portion of their free time (Rideout et al, 2010). Unfortunately, these studies have not examined play of adolescents as they transition to early adulthood, thus no data exist in scientific literature on the play behavior

of college-age students. However, sales information from the Electronic Software Association (2012) indicate that video game sales among college age students are similar to those among high school students, indicating it is likely that play patterns similar to earlier in adolescence continue.

In previous studies, Roberts et al. (2005) found significant differences between male and female youth in their video game play. Several other studies have also supported this general finding (e.g., Drummond & Dubow, 2009; Gentile & Walsh, 2002; Griffiths, Davies, & Chappell, 2004b). Similarly, in the latest Rideout et al. (2010) study, the authors found that boys spend significantly more time playing video games than girls, with daily usage rates of 97 and 49 minutes, respectively. Interestingly, further examination of the data indicated that the differences in use can be accounted for by boys spending more time playing video game consoles than girls, with daily usage rates of 56 minutes and 14 minutes, respectively. However, boys and girls showed similar rates of video game play on hand-held devices and cell phones with girls playing 34 minutes per day and boys playing 41 minutes per day. In addition, previous studies have found that boys are more likely to play for longer periods of time. For example, Roberts et al. (2005) found that 31% of boys spent more than an hour playing video games each day compared to just 11% of girls. Additionally, research by Gentile, Lynch, Linder, and Walsh (2004) found that males not only played more often and for longer periods of time, but they were also more likely to pick video games with higher levels of violence than girls. Rideout et al.'s (2010) data supported this finding: 70% of males they surveyed reported having played the game Grand Theft Auto, widely regarded as a very violent video game that includes high levels of antisocial behavior (e.g., prostitution, crime).

Thus, the extant data provide solid evidence that children and adolescents are spending significant amounts of time, hours per week, engaging with video games. Additionally, data also indicate that many children and adolescents are being exposed to video game violence on a regular basis. It is also likely that regular video game play continues into the college years, although little concrete information on play behaviors exists.

Solitary video game play. General play patterns have been established in the literature but when we examine the data in more depth, some gaps become apparent. Specifically, the extant literature has failed to address the amount of time children and adolescents spend in solitary video game play versus playing with others, either in the same room or online. As video games continue to evolve, they provide greater possibilities for playing with others whether it be on the same console system, over the internet, or even through wireless communication between handheld video game systems. With this growing popularity for "multiplayer" gaming, research has begun to examine play behaviors online as well as at events organized to bring people together to play video games, such as LAN parties at which players play games together over a Local Area Network (LAN) or computers connected directly to one another. These will be discussed further later. Contrary to the way social play has been studied, the literature to-date has not examined extensively how often children and adolescents play video games alone.

The data that have been gathered indicate that playing video games alone is a rather common behavior among children and adolescents (Drummond & Dubow, 2009). Specifically, Drummond and Dubow found that 56% of students played violent video games alone at least once per week. However, the data also indicated that it is rare to find children who primarily play video games either alone, with others present, or with others online. Rather, if a child plays video

games alone, he or she is likely to also play them with others in some context as well. Thus, there is likely a large overlap in these behaviors, so it is even more difficult to determine if there are different outcomes associated with playing alone or with others.

When one examines early studies, some evidence does arise on motivations for playing video games alone. In a study by Colwell, Grady, and Rhaiti (1995), conducted at a time when the choices were to either play alone or play with someone in the room, children's solitary video game play was examined to determine what needs may be met by such behavior. It was found that males who reported heavy video game play were more likely to prefer playing video games to playing with friends; this finding did not hold for females. Interestingly, the preference for video games over friends was unrelated to actual time spent with friends. With regard to females, those with less social experience were found to be more likely than those with robust social experience to use video games to gratify needs normally met by social interaction. A factor that was left unexamined was whether preference for video games had any effect on time spent playing video games with friends. This makes it difficult to determine if preference for video games led to playing them with friends more or to them substituting time with friends for time with video games. In sum, this study found that some children did report a preference for video games over friends but that this was not a common experience and did not appear to decrease chances for social interaction.

In summary, researchers have tended to focus on general video game play without regard to specific context (i.e., alone, with others present, or with others online) rather than parsing out solitary and social video game play. The result has been a lack of data about specific correlates of video game play alone versus play with others. *Social video game play.* As discussed previously, researchers have gathered a great deal of data on the general video game play behaviors of children and adolescents. But, similar to solitary video game play, there is relatively little information regarding social video game play. However, there are more data available regarding social video game play than for play in a solitary context.

In recent years there has been a growth in the popularity and availability of multiplayer options in video games as well as an increase in access to the internet allowing remote social play (Kent, 2001; Rideout et al., 2010). Although multiplayer games were previously restricted to genres such as "First-Person Shooters" (FPS; games in which the player takes control of a character from a first-person point -of-view and does battle with other characters), Massive Multiplayer Online Games (MMOGs; games which allow the player to interact with large numbers of other players in a persistent online world through logging on to an online server), and Strategy Games (games in which players command an army or lead a virtual country), now almost every genre (including sports games and music games) includes some level of online play in most games. In addition, in the past it was only possible to play video games with others when they were in the same room. In recent years, social play has evolved to allow multiple methods of play. Players can now play, cooperatively or competitively, when in the same room, via the internet, via a LAN, via wireless communication devices, and even on social networking websites. With these factors in mind, there are multiple combinations in which social game play can occur and it is clear that social play is not a homogeneous experience.

As multiplayer experiences have become more common, the research in this area has also grown. In one of the first studies in this area, Griffiths, Davies, and Chappell (2004a) conducted an online survey of players of the MMOG *Everquest* with the goal of determining player characteristics. Through this study the authors gathered data from 540 players, of which 431 were males. The study revealed that adolescents are among those who play this MMOG with 59% of their sample falling between the ages of 12 and 17. Additionally, the authors found that, among the teenage portion of the sample, males accounted for 93% of the sample. Interestingly, these data seemed to indicate that the disparity between male and female play in MMOGs is greater than that found for video game play *in general*.

More recently, Williams, Yee, and Caplan (2008) conducted a study to examine whether commonly held stereotypes about online video game players, namely that they are young males who are physically unfit, socially awkward, and avoid in-person social interaction, had a basis in reality. To carry out this study, the authors gathered data from 7,000 players of the MMOG Everquest 2 regarding their personal characteristics, motivation for playing this game, and physical and mental health. Along with these data, the researchers also used logs from the game to gather further data on play behaviors, something that had not been done previously. Results of the study indicated that the average player tended to be adult (mean age=31.16), male, and Caucasian. Children and adolescents only made up approximately 7% of the sample. In addition, rather than the stereotypical picture of a teenage male spending hours in front of the computer playing the game, it was found that adult *females* tended to spend longer periods of time playing. Also noteworthy, was the fact that respondents tended to report higher physical health but poorer mental health than the general population. Again, this stands contrary to the stereotype of MMOG players being physically unfit. In addition, the poorer mental health findings appeared to be related to higher levels of depression, especially in the female portion of the sample. Adding

to these findings is a study out of Taiwan in which the personality characteristics of online video game players were compared to those of college students who do not play these games (Teng, 2008). Researchers found that online game players scored higher than non-players in the areas of openness and conscientiousness. The authors also found, contrary to the stereotype discussed earlier, that online players tended to have higher scores on extroversion. Although all of these data are based on self-reports, and suffer from the related problems of this type of data, they do paint a picture that is not in line with the stereotype held in popular culture.

In two related studies, Jansz and Martens (2005) and Jansz and Tanis (2007) examined social play in the context of FPS games. In the first study, Jansz and Martens (2005) conducted a survey at a "LAN event" where players gathered to play video games together via a Local Area Network or LAN. The authors obtained surveys from 176 (6 female) participants asking them about their motivations for attending the event. Adolescents were found to be a key demographic among the participants, as the ages of participants ranged from 11 to 35 with a mean age of 19.5 years-old. Additionally, although prevailing theories about the effects of video game violence (discussed later) propose that participants would likely be motivated by pseudo-aggressive drives (e.g., desire to prove superiority), the majority of players placed a higher level of importance on social interaction and socializing with others who have similar interests. In the second study, Jansz and Tanis (2007) conducted an online survey of people indicating they enjoy playing FPS games online. Again the mean participant age was in late adolescence (18.09; SD=3.92). Similar to the earlier study, players who chose to participate in the study identified social interaction as the predominate motivation for playing. The importance of competition was found to be related to a desire to play FPS games "professionally," competing in tournaments for money and/or

prizes.

When it comes to playing with others present on a day-to-day basis in the home, there are little data available. We do not know how often children and adolescents have each other over to their homes to play games, how often family members play together, or if parents and children are playing together, among other questions. What we do have is evidence that children are among those who play games online or through LANs (Griffiths et al., 2004a; Jansz & Martens, 2005; Jansz & Tanis, 2007; Teng, 2008; Williams et al., 2008). We also have evidence that many children are reporting playing video games with others online and in-person on a weekly basis (Drummond & Dubow, 2009). Given increases in the popularity of multiplayer options in video games, it is likely that children and adolescents are engaging in a range of social video game play behaviors on a regular basis. Additionally, theoretical models of the relation between exposure to video game violence, discussed in more detail in the next section, would suggest that social play would increase the learning of aggressive behavior and the acceptance of aggressive norms. This being the case, it is important to know if playing in a social context differs from solitary play in terms of the correlates of playing in either context. That is the aim of the current project. Theoretical Models Explaining the Relation between Violent Video Game Play and Aggression

Multiple theoretical models have been employed to explain why a relation may exist between violent video game play and aggressive behavior. I will begin with a discussion of early theories applied to this topic and move to a discussion of the most widely used, more inclusive model: the General Aggression Model.

Early models in video game research. Early research on video game violence focused on explanations derived from Bandura's Social Learning Theory (SLT; Bandura, 1994; e.g., as cited

in Chambers and Ascione, 1987; Schutte, Malouff, Post-Gorden, & Rodasta, 1988). The primary proposal of SLT is that humans learn behavior primarily through the observation of others (Bandura, 1994). Those who cite SLT further indicate that the important factors are repeated exposures to a behavior, aggressive behavior being rewarded, identification with the person acting out the behavior, and how often the person being observed is successful in reaching goals (Bjorqvist, 1997).

Based on this line of reasoning, it is easy to see how violent video games may affect aggressive behavior. When a person plays a video game, the player observes many repetitions of violent behaviors which result in the character meeting instrumental goals and earning rewards (e.g., points, in-game money, experience used to purchase in-game improvements to make characters more effective), with a low incidence of negative outcomes (e.g., loss of points, character death, failure of a level). In addition, video game companies spend a great deal of time and effort creating characters that are relatable and/or interesting, increasing identification or idealization. Results from a study by Park and Henley (2008) found supporting evidence for the importance of identification with characters in video games. Participants in this study were asked to complete the Big Five Inventory to assess personality and then were asked to choose among several characters for a fantasy video game based on descriptions provided by the researchers. Results indicated that participants were likely to select characters with whom they had personality traits in common. For example, participants scoring high on extroversion were more likely to choose characters with high charisma scores. Therefore, based on the tenets of SLT, video games may provide a strong medium for the learning of behaviors, including aggression. When playing video games, players are in control of characters with whom they are able to

identify and given many presentations of violent behavior with positive outcomes.

Another early model used to explain the possible effects of video game violence was the neo-associative networks or priming model (e.g., Anderson & Ford, 1987; Anderson & Morrow, 1995). This model proposes that humans learn a variety of behaviors and have "scripts" or mental representations which provide guidance for behavior in certain situations (Berkowitz, 1990; Eron, 1994, Huesmann, 1998). For example, a person may have a script for how to behave when his or her cell phone rings during a meeting (e.g., the individual pulls the phone out of his or her pocket, silences the phone, and apologizes to those around him or her). Additionally, the priming model holds that positive and negative events (e.g., a car accident on the way to work, dropping your cereal bowl on your lap in the morning resulting in needing to change clothes before work) prime networks that make certain associated feelings and behaviors more accessible. Based on this model, video game violence serves to prime cognitive networks related to aggressive behavior, making aggressive cognitions, behavior, and feelings (e.g., hostility) easier to access, increasing the likelihood that a person will choose an aggressive solution to a real or perceived threat. In addition, a person in this state is more likely to interpret neutral stimuli as a threat to the self. With this in mind, video game violence was said to prime aggressive behavioral scripts for short to moderate periods of time, increasing the likelihood of aggressive behavior.

The General Aggression Model. Proposed by Anderson and Bushman (2002), the General Aggression Model (GAM) arose as a way to consolidate models that had previously been applied to understanding violent media effects on aggressive behavior. According to the GAM, possible effects of video game violence come from the interaction between time-limited, situational

factors such as general levels of arousal, present emotional state, state hostility, and currently active cognitive schemas and more long-term, personological factors such as hostile attribution bias and beliefs about the appropriateness of aggression (Anderson et al., 2004). Additionally, this model suggests separate but mutually dependent ways in which exposure to video game violence may have both short- and long-term consequences.

The GAM proposes that exposure to violence in video games has the short-term effect of activating aggressive cognitive scripts and increasing the arousal level of the player (Anderson & Bushman, 2002). Consistent with the priming model, the GAM proposes that people have a multitude of scripts for behavior in certain situations (e.g., how to react if they feel someone has been staring too long, how to respond to someone bumping into them in a crowded hallway) which have been learned over time and are accessible as guides for future behavior. Video game violence is believed to prime aggressive behavioral scripts, making aggressive behaviors more readily available. However, the availability of these scripts does not mean aggressive behavior necessarily will result. Rather, factors such as aversive or noxious stimuli, emotional state, hostile thoughts, arousal from previous events during the day, and beliefs about the appropriateness of aggression, interact with the priming that has taken place to determine the likelihood of aggressive behavior (Anderson & Bushman, 2002; Berkowitz, 1997; Eron, 1994). When these factors combine in specific ways, players may overreact to small provocations, which may result in aggression in the face of neutral stimuli being misinterpreted as threats. Thus, after exposure to video game violence, a person, based on the GAM, is more likely to choose aggressive behaviors than prosocial behaviors as solutions to problems.

The GAM also provides a rationale for the long-term effects of repeatedly playing violent

video games. Throughout one session of violent video game play, lasting perhaps 30 minutes to one hour, players are given multiple exposures to violent behavior and pro-aggression attitudes. Many characters in popular video games solve the majority of the problems encountered with various levels of aggressive or violent behaviors. For example, if a non-player character (NPC; those controlled by the computer) is in possession of a desired object, rather than using a prosocial or appropriate assertive response (e.g., negotiation, asking authorities to procure the return of stolen goods), the most common response is to use some level of violence to procure the object. Through situations such as this, video games teach children that the best solution to a problem is to use violence to get one's way. Interestingly, video game creators are now providing more non-violent options for problem solving in video games, but discussion of these is beyond the scope of this project. In addition to this focus on aggressive solutions, as mentioned previously while discussing SLT, video game designers create characters with whom the player can identify. This identification with the main character makes it more likely that the player will have positive feelings about the character and accept the aggressive behavior as a logical, and possibly necessary, solution to the problem at hand. Additionally, the GAM proposes that when someone sees violent behavior in a video game, as opposed to viewing it in television or the movies, he or she will be more likely to identify with the character because the player is directly controlling the action (Anderson & Bushman, 2002). Based on these factors, the GAM posits that children and adolescents who are frequently exposed to video game violence will learn scripts for aggressive behavior, will adopt attitudes supportive of aggressive behavior as appropriate, and will learn an array of aggressive behaviors.

In addition to the learning and priming effects of violent video games, GAM also

proposes that exposure to violent video games will have long-term effects on the player, including increasing hostility and desensitizing the player to violence. The GAM proposes that chronic exposure to video game violence will result in lowered physiological responses to human suffering and viewing violence, leading to desensitization (Bartholow, Bushman, & Sestir, 2006; Bushman & Anderson, 2009; Carnagey, Anderson, & Bushman, 2007). Through repeated exposures to realistic violence in video games, players are believed to acclimate to viewing the violent acts perpetrated by characters in the video games and to become more accepting of their own hostile thoughts. Thus, Bushman and Anderson (2009) proposed that those who frequently observe video game violence will have decreased negative reactions to aggressive behavior, decreased belief in the seriousness of injuries sustained as a result of aggression, increased blaming of the victim, and less ability to accurately perceive the pain of others.

In addition to desensitization, the GAM also proposes that physiological changes in neuronal connections occur. Research from the field of neurology has increased scientific understanding of how the brain stores information and creates connections between various concepts. Throughout one's life, certain connections are made between concepts, based on experience. Connections between different areas of the brain result in generation of pathways, called neurogenesis, or are lost, in a process called pruning, based on experience (Wallenius, Punamaki, & Rimpela, 2007). Pathways that are activated in tandem with relative frequency are strengthened, while those that are less frequently used are removed through pruning. Violent video game play exposure is expected to activate areas of the brain related to aggressive behavior, making them more accessible and increasing connections with other areas, such as those related to assessing threats in the environment. Conversely, connections between areas of the brain that monitor threats and those that allow for prosocial problem solving will likely be stimulated less frequently, resulting in a decrease in their relative strength. This combination of strengthening of certain pathways while weakening of others may result in aggressive behavioral scripts and attitudes in favor of aggressive behavior becoming more readily accessible. These pathways can also make it easier to access scripts related to hostile attribution bias when a possibly neutral, but aversive, stimulus is encountered (e.g., someone accidentally bumping into a person in the hall).

In summary, the GAM provides a comprehensive model for the prediction of outcomes of exposure to video game violence. This model has gained wide acceptance among researchers and it has become the most frequently cited model in the literature. Based on these factors, I will use this model to guide predictions throughout this project.

Empirical Research on the Relation between Violent Video Games and Aggression

Much of the literature to date has focused on the relation between exposure to video game violence and indices of negative adjustment (e.g., desensitization to violence, aggression). This section provides a brief review of the literature regarding the relation between playing violent video games and aggressive behavior.

On the one hand, multiple studies have found links between playing violent video games and aggressive behavior (for example, Anderson & Dill, 2000; Bartholow et al., 2005; Gentile & Gentile, 2008). On the other hand, some studies have failed to produce significant relations (for example, Colwell & Kato, 2003; Williams & Skoric, 2005). Four meta-analyses have found significant relations between video game violence exposure and aggressive behavior (Anderson & Bushman, 2001; Bushman & Huesmann, 2007; Sherry, 2001). Anderson and Bushman (2001) reported significant effect sizes supporting a relation between video game violence and physiological arousal and aggressive behavior with Pearson's r scores ranging from .18 to .26. Similar connections were found between aggressive behavior and video game violence by Sherry (2001), who reported Pearson's r's ranging from .13 to .16. Bushman and Huesmann (2007) also reported "modest" significant effect sizes, although they did not report specific numbers, for violent media (i.e., movies, television, and video games) and short- and long-term aggressive behavior. More recently, Anderson et al. (2010) completed a meta-analysis of the literature using conservative analyses to examine studies from both eastern (e.g., Japan, South Korea) and western (e.g., United States, England, Swedish) cultures. The authors found that exposure to video game violence predicted increased aggressive behavior, aggressive cognition, and aggressive affect, as well as decreases in empathy and helping behavior. This result was consistent across type of study (e.g., experimental, cross sectional, longitudinal studies) and across culture (i.e., eastern, western). It is noteworthy that the more recent studies found stronger effect sizes for adults who had participated in laboratory studies while effect sizes were higher for children in longitudinal field studies. The authors proposed that adults may experience greater effects of arousal and priming of aggressive scripts and hostile cognitions that have already been encoded stronger than in children. Children, on the other hand, have scripts which are not as well established and thus show greater learning effects than adults. Contrary to these meta-analyses, two meta-analyses by Ferguson (2007a; 2007b) failed to find significant relations between violent video game play and negative outcomes (e.g., aggressive behavior). In fact, he proposed that the links between aggression and violent video game play were related to publication bias. However, others have proposed that Ferguson's results were related more to the statistical methods he used and that he tended to discount small effects that were nonetheless statistically significant (Bushman, Rothstein, & Anderson, 2010). Despite these conflicts, the trend in the meta-analytic data that have been presented in the literature indicate there is at least a modest, but significant, relation between playing violent video games and aggressive behavior. In addition, these relations are strong enough to be maintained even when other factors (e.g., trait aggression) are taken into account.

Meta-analytic data are important in understanding a body of research, but it is also important to examine specific studies regarding video game violence. One of the most influential studies of video game violence effects comes from Anderson and Dill (2001). This publication examines two studies conducted by the authors. The first study used surveys to gather self-report data from 227 (149 female) college students regarding trait aggression (how likely, in general, a person is to respond to a problem with aggressive solutions), irritability (general impulsive responsiveness to provocation), delinquency (e.g., engaging in property damage, drug use, physical fighting) and GPA, as well as scales measuring video game exposure. Results revealed significant positive relations of trait aggression and delinquency to exposure to video game violence. Negative outcomes were predicted by experience with violent video games rather than general video game experience. In a follow-up to the first study, Anderson and Dill asked 210 (104 female) participants to return to participate in a laboratory study. In the second study, participants were split into two groups based on either high or low irritability scores. Participants were then randomly assigned to play either a violent or non-violent video game and completed measures of aggressive cognition and hostility afterward. After controlling for trait hostility and gender, no relation was found between type of video game (violent vs. non-violent) and state

hostility. On the other hand, playing a violent video game was found to be significantly related to higher levels of aggressive cognition regardless of irritability score. These studies were deemed to be supportive of the tenets of the GAM as video game violence over time (in the first study) was found to relate to trait hostility and delinquent behavior while short-term exposure to video game violence (in the second study) appeared to prime cognitive scripts related to aggression, making aggressive choices more available.

More recent studies have provided support for early research, as well as expanding upon previous knowledge. Specifically, studies have begun to examine short-term physiological effects, as proposed by the GAM, and how they relate to aggressive behavior. The reader will recall that the GAM posits that exposure to video game violence results in physiological arousal along with priming of aggressive cognitive scripts. A study by Barlett, Harris, and Bruey (2008) sought to examine the relation between exposure to various levels of blood and gore in video game, arousal, and aggression. Participants in the study were exposed to four different levels of blood in a video game ranging from high levels of detailed and persistent blood and gore down to no blood. Data were then gathered on arousal (heart rate) and aggressive behavior. Aggressive behavior was measured as the number of times participants chose to use weapons within the game, something that is not necessary to success but increases the violence of the game. Participants who were exposed to the highest levels of blood and gore showed the highest levels of aggression, increased arousal, and higher state-hostility. Related research has shown that it is not only the amount of blood shown in a violent game that matters, but also the level of detail (Barlett & Rodeheffer, 2009). Specifically, increases in arousal were found as games grew more detailed in their depictions of violent action. The detail of a violent video game is a relevant

factor in the possible effects of video game violence, as game designers are able to produce games with increasingly accurate simulations. It could also be argued that sometimes game developers may be able to create visuals that are more gore-filled than a realistic situation. This may make "real-world" effects of violence against another seem less significant than what is seen in a video game, and therefore less aversive. Additionally, increased graphical detail may also make it easier to identify with a character in a game as the character appears more lifelike and realistic than the lower resolution characters of the past. As mentioned previously, identification with models is seen as a key component to learning new behaviors. Additionally, research has supported this link. For example, research has indicated that adolescents' identification with "warriors" in video games is related to higher levels of aggressive behavior (Konijn, Bivnak, & Bushman 2007). Thus, increases in graphic details in video games allow for more detailed depictions of violent action while concurrently allowing for greater identification with video game characters. As this happens, the likelihood that exposure to video game violence will result in aggressive behavior increases.

Although the experimental studies examined so far provide important information, they cannot necessarily support a causal link between video game violence exposure and long-term effects on aggression. To provide such evidence multiple longitudinal studies are needed, the first of which was published in recent years. Researchers Möller and Krahé (2009) conducted a longitudinal study following 143 (72 male) German adolescents for 30 months to examine possible relations between violent video game play, aggressive behavior, hostile attribution bias, and norms regarding the appropriateness of violence. The results did not support a direct link between video game violence and aggression. However, the authors did find a relation between

higher levels of violent video game play, norms supportive of aggression, and hostile attribution bias. In turn, it was also found that norms supportive of aggression and hostile attribution bias could then be directly linked to aggressive behavior. This provides an indirect link between playing violent video games and aggressive behavior through the mediating factors of hostile attribution bias and norms accepting aggressive behavior. A second year-long longitudinal study was conducted with 324 German third and fourth grade students in the hopes of determining if playing violent video games leads to aggression through socialization or if aggressive youth pick violent games (von Salisch, Vogelgesang, Kristen, & Oppl, 2011). The authors in this study found that children who were rated as higher in aggression were found to increasingly prefer violent video games over time. The authors did not find strong support for effects on children who were not aggressive at the beginning of the study. Thus, some preliminary evidence points to long-term relations between video game violence and aggression, especially for children already higher in aggressive behavior, but further longitudinal research is needed.

Research examining social video game play. The research I examined so far has either examined solitary video game play or did not specifically parse out social video game play. To date, there is a dearth of data regarding differences between social and solitary video game play. However, there are some interesting studies in this area which are worth review. In the first published study on social video game play, Williams and Clippinger (2002) examined differences in responses to playing a video game either against a computer or against another person. In the study, participants (N=54; 26 female) played a video game version of *Monopoly* against both a person of the same sex and the computer. Even though the game had no violent content, participants showed increased levels of frustration and aggression after playing the computer, with no such changes when playing another person. This points to there being differences in reactions based on whether a player is competing against a computer or a person in the same room. It is possible that the lack of increased aggression in the social condition is related to social play of a non-violent game activating prosocial scripts. Specifically, a non-violent game played socially may activate those scripts used for positive social interaction due to the game supporting competition, but not aggression or violence. It is unclear if the same results would have been found if the game used in the study had called for violent behavior in-game. Additionally, it is possible that the presence of another person activates beliefs about the inhibition of aggressive behavior in response to frustration. When playing against the computer, these scripts may not be activated leading the person to accept aggression induced by a non-living entity (i.e., the computer).

A similar study examined differences between playing violent video games alone, observing others playing a violent video game, or playing a non-violent video game (Pollman, de Castro, & van Aken, 2008). The authors had 57 (28 female) participants between the ages of 10 and 13 either play a violent or non-violent video game or observe the action of a violent video game. After the video game exposure, children were allowed to engage in a free-play session with other children, after which the authors collected ratings of aggressive behavior. Results did not reveal any differences between conditions for girls. Boys, on the other hand, showed higher levels of aggressive behavior after playing a violent video game. From these results, it was concluded that playing violent video games leads to more aggression than simply watching video games. However, the data also appear to raise other questions. For example, what would happen if children traded off between playing and observing? Would the aggression levels be similar to those of children who either observed the game or played a nonviolent game? What would happen if conditions in which participants played with each other were added (children in the observation condition did not see the other person who was playing the game but were rather separated by a screen)? Thus, while this study examined the effects of watching a video game played by another person, it did not directly examine what happens when a person plays with someone else.

Williams and Skoric (2005) also conducted a study to examine multiplayer gaming. The authors recruited 213 participants (45 female) aged 14 to 68 (mean=27.7) with prior gaming experience to play Asheron's Call 2 (AC2; chosen for being one of the most violent MMOG on the market at the time) for one month. The researchers used AC2 as a means to examine the effects of long-term exposure to video game violence as proposed in the GAM. Participants in the study completed measures of cognition and behavior both before and after the month-long period of play. Participants also tracked their play behaviors over the month, with reports indicating that participants played on a regular basis over the month, with most playing on a daily basis. Despite repeated exposure to the violence in AC2, no significant increases in aggressive cognition were found over a month's time. At first glance, these results appear to contradict the conclusions of the GAM, but they may be supportive of other findings. The reader will recall that Bushman and Huesmann (2007) found that adult participants tended to show greater short-term effects of exposure to video game violence than children, who tend to show greater longitudinal effects of exposure. The sample in this study appears to be skewed towards adulthood with a mean age of 27.7, making it possible that participants' general behavior and scripts were resistant to change based on exposure to video game violence. Additionally, there

have been some critiques of this study suggesting that it was able to say more about aggressive cognition than aggressive behavior, which was examined via self-reports of aggressive behavior in the past month (Anderson et al., 2010).

Throughout the literature, only one study to-date has directly examined playing video games with someone else present. Jerabeck and Ferguson (2013) conducted a study in which they had participants play either a violent video game with largely antisocial action (e.g., hunting enemy characters, destroying objects), a violent video game with largely prosocial action (e.g., heroes trying to save a planet), or a nonviolent video game. All participants played the game with another person in the room with half of the participants playing the same game cooperatively and half of the participants playing individually on separate games. After playing the game for 45 minutes, each person prepared a "hot sauce taste test" for the other participant. Aggression was measured by the amount of hot sauce assigned to the other person. Participants also completed the Prisoner's Dilemma, a two person game designed to measure cooperative/prosocial behavior in which each person can choose to act either in a self interested way with the hope of achieving the largest reward, but also risking receiving no reward, or act in cooperation with the other person in the hopes of receiving a moderate reward. The researchers did not find any effect for content of the video games on either aggressive or prosocial behavior. They did find that participants who played in a cooperative manner showed lower levels of aggression than those who played alone. Cooperative play was not found to be related to cooperation on the Prisoner's Dilemma. These results provide some information about the effects of violent video game play in a social context. They indicate that cooperation while playing video games leads to decreased aggressive behavior regardless of violent video game content. It is unclear if these decreases in
aggressive behavior will remain when video games are played in a competitive manner as in the current study.

In conclusion, much data have been gathered regarding playing violent video games and possible negative effects. Much of the data has been consistent with the proposals of the GAM, namely that both short- and long-term exposure to video game violence has a positive relation to aggressive behavior, cognitions, and physiological arousal. However, the research, with a few exceptions (e.g., Jerabeck & Ferguson, 2013; Williams & Clippinger, 2002; Williams & Skoric, 2005), has focused primarily on solitary video game play. Despite the lack of data, at least one major contributor to this area of study has suggested there may be benefits to encouraging social over solitary video game play (Griffiths, 2009). Due to this assertion, and some evidence that there are differences in social and solitary video game play (e.g., Jerabeck & Ferguson, 2013; Williams & Clippinger, 2002), it is important to gather data that provide a comparison of the effects of exposure to video game violence in social and solitary contexts.

Limitations of the Literature Regarding Exposure to Violent Video Games

Despite the well-established literature regarding possible effects of exposure to video game violence, limitations continue to exist. The most significant deficit in the current research is the lack of longitudinal data. It is difficult to draw conclusions about the long-term effects of playing violent video games without having this longitudinal data. The longitudinal research by Möller and Krahé (2009) provides a first step in bridging this gap, but their sample begins at age 10 and cannot provide information based on sampling beginning at an earlier age, or effects on older adolescents.

It is also noteworthy that much of the experimental research is done with college-age

students rather than children. It is often difficult obtain approval for studies where children are randomly assigned to play a violent video game. Thus the tradition has been to use college-age students for experimental studies. This is a limitation the current research project encountered as well.

Another relevant limitation is the lack of information regarding social play. As mentioned previously, in recent years video games have grown by leaps and bounds when it comes to providing social experiences. New video games are often partly judged on their ability to provide a multiplayer experience. In fact, in certain genres (e.g., FPS, Sports) it is almost unheard of to *not* include these types of experiences. The literature has begun to examine some factors related to social, especially online, game play such as who is playing, social consequences of playing online video games, and addiction to online games. However, there is little research on playing with others present. It is likely that there are differences regarding playing with someone else present, versus playing by oneself. The GAM suggests that the effects of playing violent video games would likely be greater due to increased observation of the behavior of other players, increased normalization of aggressive norms, and increased validation of aggressive cognitions. *Present Study*

In summary, the literature has provided relatively strong evidence for a relation between exposure to violent video games and aggressive behavior, cognitions, and state hostility. However, little research to date has examined the context of play (e.g., alone, with others present) and whether this somehow moderates the effects. It was my goal to add to this body of research by examining if there are differences in aggressive cognition and behavior after playing a violent video game in a social or solitary context. In order to gather these data, I conducted a laboratory study in which participants played either a violent or non-violent video game either alone or with another person present. Participants were split into four groups based on two factors: 1) participants played either a violent game or non-violent game; and 2) they either played alone or with another person present. Participants then completed a competitive reaction time task in which they were asked to set the level of a punishment for a person with whom they believe they were competing (although this was simulated by a computer without the participant's foreknowledge). The level and duration of the punishment serve as ratings of aggressive behavior. Participants also completed one measure measuring state hostility and another measuring aggressive cognition.

Consistent with the GAM and current literature, it was hypothesized that participants who played the violent video game would have higher levels of aggressive behavior, aggressive cognition, and hostility than those who played the non-violent video game, regardless of the presence of another person. Additionally, although no authors have yet addressed what the GAM would say about social video game play, the most likely hypothesis was that social video game play would allow for increased priming of aggressive cognitions and behavior as the participant would not only be enacting the violence in the video game but also would observe another person doing the same behavior, making it more acceptable. Additionally, in this study, participants played a violent video game against a confederate. This was thought to be likely to result in increased arousal and access to violent scripts as the participants will likely feel the need to engage in more violent in-game behavior than their opponent in order to win. Thus, it was hypothesized that higher levels of aggressive behavior, aggressive cognition, and hostility would be observed after playing with another person than when the participant plays alone. Finally, based on prior research (e.g., Anderson & Dill, 2001), it was likely that trait aggression and normative beliefs about aggression would act as moderator variables. Specifically, it was expected that those participants with higher levels of trait aggression and normative beliefs accepting of aggressive behavior would show stronger responses to video game violence in the form of higher levels of aggressive behavior, aggressive cognition, and hostility.

METHOD

Participants and Procedures

Participants for the present study included 100 male undergraduate students recruited from Bowling Green State University (BGSU) psychology classes. The number of participants was chosen via a power analysis done with the G*Power 3 interface (Faul, Erdfelder, Lang, & Buchner, 2007) using an effect size of .4 based on findings in the literature regarding the relation between aggressive behavior and violent video game play in experimental settings. Previous studies using the same measures as the current study to examine aggressive behavior, cognition, and affect found effect sizes ranging from .3 to .5 (Anderson & Carnagey, 2009; Anderson & Dill, 2000; Bartholow, Bushman, & Sestir, 2006; Carnagey & Anderson, 2005). Only male participants were recruited for the purpose of this study. This decision was based on prior research that shows males are more likely to play violent video games than females and that males tend to show stronger reactions to exposure to video game violence than females (e.g., Krahe & Moller, 2004; Rideout et al., 2010).

Participants ranged in age from 18- to 25-years-old with a mean age of 19.19-years old. The majority of participants (76%) described their cultural background as "white or Caucasian," with 18% describing themselves as "African American or black," 5% describing themselves as multicultural, and 1% describing themselves as "Hispanic or Latino." The majority of the participants (55%) were in their freshman year of undergraduate study, with 35% indicating they were in their sophomore year, 9% indicating they were in there junior year, and 1% indicating they were in their senior year. GPA's among the participants were distributed as follows: 5% between 1.0 and 2.0, 41% between 2.01 and 3.00, 50% between 3.01 and 4.00, and 4% failing to indicate their current GPA. Forty-five percent of the sample indicated they were employed at least part-time with the other 55% indicating they were not currently employed. See Table 1 for a full review of the demographic characteristics of the sample.

Data were also gathered on the video game play behavior of participants. In terms of general daily video game play behaviors, the average daily play of participants ranged from zero to 7.43 hours with a mean of 1.47 hours per day. Four percent of the sample indicated they do not currently play video games. The amount of time spent playing video games by participants was as follows: 26% played between 0.1 and 1.0 hours per day; 33% played between 1.01 and 2.0 hours daily; 17% played between 2.01 and 3.0 hours daily; 10% played between 3.01 and 4.0 hours in an average day; and 10% played more than 4.0 hours per day. In terms of video game play in an online format where players can communicate with one another, participants played video games in this format between zero and 7.43 hours per day with a mean of 1.29 hours daily. Twenty-four percent of participants indicated they did not play video games in this format. The amount of time spent playing video games in an online format breaks down as follows: 32% played between 0.1 and 1.0 hours per day; 22% played between 1.01 and 2.0 hours per day; 10% played between 2.01 and 3.0 hours per day; 9% played between 3.01 and 4.0 hours per day; and 3% played more than 4.01 hours per day. Participants also reported the amount of time they spent each day playing video games with someone else who was in the room with them. Participants played video games in this setting between zero and 7.43 hours per day with a mean of .93 hours per day. Twenty-three percent of the participants indicated they never played video games with someone else in the room. The amount of time spent playing video games with others who were physically present is as follows: 47% played between 0.1 and 1.0 hours per day; 15% played

between 1.01 and 2.0 hours daily; 10% played between 2.01 and 3.0 hours per day; 4% played between 3.01 and 4.0 hours daily; and 1% played more than 4.0 hours daily.

Participants were randomly assigned to, and equally distributed between, one of four groups: the first condition consisted of participants playing a non-violent video game alone; the second condition involved participants playing a non-violent video game with a confederate; the third condition consisted of participants playing a violent video game alone; the final condition involved participants playing a violent video game with a confederate. A male undergraduate research assistant with experience playing a variety of Xbox video games participated as the confederate. The same confederate was used throughout the study in order to control confederate gaming experience and skills across conditions. Participants in the violent video game condition played the video game Gears of War 3 (G0W3) and participants in the non-violent video game condition played the video game Dirt 3. These games were chosen because a play test revealed them to be similar in terms of pacing, excitement, and accessibility. The play test consisted of 10 adults (2 female) who played the games and rated them, on a 5-point-likert scale, for the factors of frustration (reverse scored; GoW3 M=4.5; Dirt 3 M=4.1), ease of play (GoW3 M=4.5; Dirt 3 M=4.1), pace of play (GoW3 M=4.1; Dirt 3 M=4.2), and entertainment (GoW3 M=4.2; Dirt 3 M=4.2). Additionally, *Gears of War 3* was chosen due to its high level of detailed graphic violence (ESRB rating Mature due to "blood and gore," "intense violence, and "strong language"), while Dirt 3 was chosen for its lack of aggression between characters (ESRB rating Everyone, no violence). The games were played on an Xbox 360 video game console as it allowed for split-screen play of the video games chosen using a single television.

Study participants were recruited through the BGSU Psychology Department's scheduling

system. Participants who met study requirements were able to sign up for the experiment online. In order to avoid biases based on participant knowledge of the aims of the study, a cover story was initially given to all participants (see Appendix A). When participants arrived at the Psychology building, informed consent was obtained by providing them with an outline of the study that also explained the risks and benefits (see Appendix B). For participants playing with a confederate, the confederate sat in an adjacent chair and completed the same paperwork as the participant. Participants completed a series of measures aimed at examining trait aggression, normative beliefs about aggression, demographic variables, and video game play experience. After completing these measures, participants playing in the solitary condition were provided with a short overview of the game play and allowed to view a diagram of the controls for the game. Confederates received the overview simultaneously with the participant and took turns with the participant reviewing the diagram of the controls. This process generally took less than five minutes to complete. Once players had been briefed in the basic mechanics of the games, they either played alone or with the confederate for a period of 10 minutes. Timing of the game play began upon the initiation of player controlled action in each game (i.e., in Gears of War 3 timing started when combat started, in Dirt 3 timing started when the first player entered the race course).

During social play periods, the participant and confederate played on one X-box seated in chairs located in the same room. The confederate was a male undergraduate who had extensive prior experience playing video games. The confederate was trained to engage in light conversation with the participant while allowing the participant to lead the conversation. Specifically, the confederate only made neutral or mildly positive comments about his own play (e.g., "it's going to take me a little bit to get used to these controls," "I think I'm starting to get the hang of it now"), supportive or playful comments about the participant's performance (e.g., "You're pretty good at this," "You totally got me that time"), answered questions posed by the participant, or reciprocating questions asked by the participant (e.g., if asked if he had participated in other research studies he might respond, "This is my first one. Have you done any other experiments?"). The confederate generally did well following this pattern and most participants appeared to be comfortable playing with him. Due to the characteristics of the game, it was impossible to control the number of rounds played during each session. However, the confederate was trained in adapting his level of play to that of the participant with whom he was paired. The confederate was trained to attempt to maintain an equal win/loss record so as not to either appear too unskilled at the game or frustrate the participant by being overwhelmingly skilled. The confederate was generally able to keep the wins and losses relatively close as he adjusted his play behavior to the skill level of each participant.

After the period of game play was finished, participants completed two written tasks meant to measure aggressive factors: 1) a word completion task assessing aggressive cognition; and, 2) a measure of state hostility. Next the participant was told he would be playing another game in which his reaction time was being compared to a player in a different room. The participants then completed the Competitive Reaction Time (CRT) measure on a computer in the same room. Participants completed 25 trials of the CRT, of which the computer was programmed to inform the participant he had won 50% chosen at random. At the end of the experiment, the participant was debriefed as to the true purpose of the experiment (see Appendix C). He was informed that the true purpose of the experiment was to examine aggressive behavior, cognition,

and affect after playing violent or non-violent video games alone or in a social situation. Participants were also provided with a thank you letter containing resources for counseling should they become necessary in the future (see Appendix D). Participants were rewarded for participation with research credit for a class in the psychology department. The total time investment for the experiment was approximately one hour.

Control Measures

Time spent playing video games. As previous experience with video games may affect a person's comfort level with, skill related to, and possible frustration with playing video games, prior video game experience was measured. A measure was completed by the participant to assess his experience with video games (see Appendix E). Participants were asked to indicate how many hours each day they spend playing video games alone, with others present, or with others online. The number of hours reported daily were averaged to create values for how much time a participant spends playing in each context daily. This variable was used to determine if there were differences in video game play experience between the groups. No difference was expected as participants were randomly assigned to the various experimental groups.

Exposure to violent video games. This measure was adapted from Anderson and Dill's (2000) measure of violent video game exposure (see Appendix F). Participants were asked to list their five favorite video games. They were then be asked to indicate on a 7-point scale how frequently they play each game (1=rarely, 7=often) and the level of violence in each game (1=little or no violent content, 7=extremely violent content). Each game received a violence exposure score based on multiplying how often the game is played by how violent it is rated. The five scores were averaged to create a control variable measuring exposure to violent video

games. Anderson and Dill (2000) found a reliability coefficient for this measure of .86. In the current study the scale had an alpha of .50, suggesting that there is some variability in the violence level of the participants' favorite games.

Demographics. Participants completed a measure asking them to provide basic demographic information including age, number of years of college experience, GPA, and race/ethnicity (see Appendix G). These variables were used to examine demographic differences and determine if they needed to be included in the controls for later analyses. No significant differences were expected due to participants being randomly assigned to the different experimental groups

Potential Moderating Variable Measures

Normative beliefs regarding aggression. Consistent with the GAM, prior research has shown that normative beliefs in support of the use of aggression increase the likelihood a person will choose to engage in aggressive behavior. Additionally, the more a person believes the use of aggression is appropriate, the lower his threshold will be when it comes to what noxious stimuli result in an aggressive response. Thus, participants were asked to complete the Normative Aggressive Beliefs Scale (NABS; Anderson, Gentile, & Buckley, 2007; see Appendix H). This measure asks the participant to estimate what percentage of Americans engage in nine different aggressive behaviors. This scale measures how frequently the participant believes that certain aggressive behaviors happen. Higher ratings of the commonality of the aggressive behaviors are believed to be an indicator of the perceived normativeness of aggression. This scale showed acceptable reliability with a coefficient alpha of 0.84 in a study by Anderson, Gentile, and Buckley (2007). It was also found to correlate well with other scales measuring normative beliefs regarding aggression. In the present study, the scale resulted in an alpha of .81.

Trait aggression/aggressive personality. Aggressive personality was measured using Buss and Perry's (1992) Aggression Questionnaire (AQ) (see Appendix I). Trait aggression has previously been associated with higher levels of baseline aggression and may therefore influence the responses of participants on the Competitive Reaction Time task. The GAM proposes that a person's baseline level of aggression will set the tone for his behavioral choices. Thus, a person who is more aggressive at baseline is more likely to respond aggressively when he encounters a real or perceived provocation. Additionally, a person with higher levels of trait aggression will have a larger repertoire of aggressive behavioral responses, making it more likely aggressive behaviors will be elicited by violent video game play. This scale measures trait aggression and is comprised of four subscales measuring physical aggression, verbal aggression, anger, and hostility. Each scale includes multiple items that are rated on a 5-point scale from 1="not characteristic of me" to 5="extremely characteristic of me." The Physical Aggression subscale is comprised of nine items including, "I get into fights a little more than the average person." The Verbal Aggression subscale consists of five items including, "I can't help getting into arguments when people disagree with me." The Anger subscale is comprised of seven items including, "I sometimes feel like a powder keg ready to explode." The Hostility subscale consists of eight items including, "I sometimes feel that people are laughing at me behind my back." Scores are calculated by summing all items, with two being reverse coded, resulting in scores that range from 29 to 145 with higher scores corresponding to higher levels of aggressive personality.

Buss and Perry (1992) found an alpha of .89 and a retest reliability of .80 for the entire scale. They also found the following alphas for the individual scales: Anger, .83; Hostility, .77;

Physical Aggression, .85; and Verbal Aggression, .72. The retest reliability scores for the individual scales were: Anger, .72; Hostility, .72; Physical Aggression, .80; and Verbal Aggression, .76. This scale also correlated well with other measures examining impulsiveness, assertiveness, emotional responding, competitiveness, and peer nominations for aggression, leading the authors to conclude it has good validity. Alphas for the current study were as follows: Anger, .71; Hostility, .55; Physical Aggression, .70; Verbal Aggression, .63; and Total Scale, .82. *Experimental Variable Measures*

Competitive Reaction Time (CRT) task. Aggressive behavior was examined via the Competitive Reaction Time Task (CRT; Taylor 1967). This measure has been used in multiple recent studies and has been found to be a reliable and valid measure of aggressive behavior (Anderson & Carnagey, 2009; Anderson & Dill, 2000; Barthalow et al., 2006; Carnagey & Anderson, 2005). Participants were told that they were competing in a reaction-based task which required them to attempt to respond faster to a tone than another participant in a separate room. They were told they were competing against someone in another room within the psychology building (not the individual they played against in the social play condition) in order to avoid effects on behavioral responses that may result from competing side-by-side with someone (e.g., dampening aggression due to fear of retaliation). Participants were instructed to set the level of a noise blast on a scale from 1 (65 decibels) to 10 (105 decibels) prior to each trial and instructed that the person who loses each trial will receive the noise blast. Participants were initially exposed to noise blasts at intensity levels 1, 5, and 10 with durations of 5.0, 2.5 and .5 seconds, respectively, to familiarize them with the intensity of each level and the relative length of each duration. They were also informed that the noise blast could not result in any permanent hearing

damage regardless of the setting.

After the introduction, participants sat at a computer with a monitor, keyboard, and headphones. Participants were instructed to press a key on the keyboard as quickly as possible after the signal displayed. Participants were then able to practice the mechanics of the program on a screen that allowed the participant to practice setting the intensity and duration of the noise as well as allowing them to practice the reaction tasks until they felt comfortable with the setup. No participant practiced with the interface more than once. Each participant completed 25 trials of the CRT. Rather than relying on the participant's actual response time, the computer simulated a competition with another participant. Each participant randomly "won" 13 trials and "lost" 12 trials. On winning trials, the words "You Won" were displayed on the screen. On losing trials, a noise blast, randomly set at an intensity between 2 and 10 with a duration between .5 and 5.0 seconds, sounded simultaneously with the words "You Lost" displaying on screen. Although the computer randomly assigned wins and loses, participants automatically lost trials on which their reaction time was longer than 750 ms. This was done to avoid suspicion. Participants were able to see their "opponent's" blast intensity level and duration at the end of each trial, regardless of whether they won or lost. The computer tracked and recorded the intensity and duration of noise blasts set by participants as measures of aggressive behavior.

Based on procedures developed during prior research, aggressive behavior was measured based on three features of the participant's performance. First, the participant's first intensity and duration settings were used as measures of Unprovoked Aggression as the initial levels are set without having experienced a noise blast from the participant's "opponent." Second, the number of high intensity noise blasts (those of intensities 8 to 10) were recorded and summed, resulting in a score from 0 to 25, as a measure of High Intensity Aggression. This measure has been used previously as it is believed to be a clearer measure of aggression than when moderate intensity levels are included. The problem typically encountered with this rating is that intensities tend to increase towards the end of the 25 trials. Finally, the average intensity and duration of the 25 noise blasts was calculated as the Average Intensity Aggression and Average Duration Intensity scales. These scales are often calculated as they tend to have more normal distributions and can help detect differences in aggression. Prior research has shown that these measures tend to correlate with one another and thus provide multiple ways to examine aggressive behavior. Prior research has also found that results on these scales tend to correlate well with scores on other measures of aggression (e.g., measures asking participants to assign hot sauce as a punishment; Anderson, 2005). For the present study, alphas were calculated for the intensities and durations set by participants. Intensity settings showed an alpha of .94 and duration settings showed an alpha of .92.

State hostility. Aggressive affect was measured by having the participants complete the State Hostility Scale (Anderson, Deuser, & Deneve, 1995; see Appendix J). The State Hostility Scale consists of 35 items asking participants to rank their current emotional state on a 5-point scale (1=Strongly Disagree; 5=Strongly Agree) based on statements beginning with "I feel..." and ending with various emotional words. Of the 35 items, 24 ask about negative or hostile emotions (e.g., frustrated, angry, disagreeable) with the other 11 asking about prosocial feelings (e.g., tender, amiable, cooperative). Based on procedures developed by Anderson et al. (1995), scores from the 11 prosocial items were reverse scored and then all scores were added to create

an overall hostility score. Higher scores indicate higher levels of state hostility. Several studies have found the measure to have adequate internal consistencies with alphas ranging from .84 to .95 (Anderson & Carnagey, 2009; Barlett et al., 2008; Carnagey & Anderson, 2005). The present study found an alpha of .92 for this scale.

Aggressive cognition. Aggressive cognition was measured by having participants complete The Word Completion Task (Anderson, Carnagey, & Eubanks, 2003; See Appendix K). Participants were presented with a series of 98 words each missing several letters. They were then given three minutes to complete as many words as possible. The majority of the words can be completed in multiple ways. For example, Ki_ can be completed with kiss, kite, kill, kick, etc. In addition, 50 of the words can be easily completed to make words that are clearly aggressive (e.g., kill, harm, choke). I used a coding system created by the original authors to code words as either "non-words," "neutral," "ambiguous," or "aggressive." The ratio of aggressive to non-aggressive words was calculated and used as a measure of aggressive cognition. This measure has been found to correlate well with various features of violent video games and was found to be a valid measure of priming of specific pathways (Anderson, Flanagan, Benjamin, Eubanks, & Valentine, 2004; Roediger, Weldon, Stadler, & Riegler, 1992).

RESULTS

Overview of Statistical Analyses

Preliminary analyses. Group differences in demographic/background variables were first analyzed by computing a series of ANOVAs to determine if the four experimental groups differed in terms of GPA, age, years in college, video game play history, video game violence exposure, trait aggression, and normative beliefs about aggression. Demographic and background variables found to differ by condition would be included as control variables in later analyses. However, no significant differences were expected as participants were randomly assigned to condition groups.

Next, in order to examine the outcome scales for possible data reduction, correlations were computed among the four subscales of the Aggressive Questionnaire. If the scales were found to be moderately or highly correlated (.4 and above) then the total AQ score would be used as the measure of trait aggression. Next, correlations were computed between the various scores provided by the CRT. If these scores showed high levels of correlation (above .7), intensity and duration scores would be combined to form overall measures of unprovoked aggression and mean aggressive behavior. Next correlations among the outcome variables (i.e., aggressive cognition, aggressive behavior--CRT, state hostility) were examined. If the outcome variables were correlated with each other at a moderate to high levels I considered combining them.

Hypotheses 1-5: Social condition and video game violence condition will predict aggressive cognition, state hostility, and aggressive behavior. To examine whether video game violence and social video game play lead to increases in the outcome measures, a series of 2 (condition) by 2 (content) ANOVAs were computed. I expected to find a main effect of content on each outcome variable, with violent video game play producing higher levels of aggressive responding on the CRT, higher state hostility, and higher levels of aggressive cognition. I also expected to find an interaction between the content of the game and the condition in which it is played, with those who played violent video games in a social condition exhibiting the highest levels of aggression, followed by those who played violent video games alone.

Hypotheses 6 & 7: Trait aggression and normative beliefs about aggression will moderate the relation between video game violence condition and social condition with aggressive cognition, state hostility, and aggressive behavior. The analyses described above were computed again as regressions to explore moderation effects. To test these moderation hypotheses, each moderator (i.e., trait aggression, normative beliefs about aggression) was examined through a series of multiple regressions, one for each outcome variable (Cohen & Cohen, 1975). To examine the interaction between these moderators and the outcome variables, the regressions examined the main effects of social condition, video game content, and each moderator variable. The regressions also examined all possible two-way interactions between social condition, video game content, and each moderator variable (e.g., social condition x video game content, social condition x trait aggression, video game content x trait aggression) as well as the three way interaction of social condition x video game content x moderator variable.

Interaction terms were calculated after mean-centering the trait aggression and normative beliefs about aggression scores. The moderator variables were centered to reduce the multicollinearity between the scores being examined in the interaction while maintaining the relation between the variables being examined (Holmbeck, 2002).

As suggested by Holmbeck (2002), any significant interactions were further examined

with regressions computed at 1 *SD* below the mean and 1 *SD* above the mean of the moderator variable to determine the nature of the moderating effect. These would then yield unstandardized regression coefficients that would give a simple slope of the regression line predicting the outcome variables from the main effect (e.g., the relation between video game content and aggressive cognition) at each level of the moderator. At this point, it would be possible to examine the nature of the moderating effects for participants with low (-1 *SD*) to high (+1 *SD*) trait aggression or normative beliefs about aggression through figures displaying the slopes visually. I expected that these interactions would show that violent content would relate stronger to the aggression outcomes for participants with high levels of trait aggression or normative beliefs about aggression.

Results of the Preliminary Analyses

Separate ANOVAs were computed to examine whether the four experimental groups varied on any of the control variables or the two moderator variables. As expected, Table 2 shows that there were no significant differences between the four groups in terms of age, year in school, GPA, total average daily play, average daily play online, average daily play with another person who is present, or exposure to video game violence. Since none of the control variables varied significantly between groups, they were excluded from the main analyses. Additionally, the groups did not vary significantly in terms of trait aggression or normative beliefs about aggression.

Next the four subscales of the AQ were examined to see if they could be combined for future analyses. Moderate to high correlations were found among the four subscales ranging from .21 to .50 (median r=.29). Additionally, as mentioned previously the Total AQ score had a

reliability coefficient of .84. Based on these factors, I decided to use the Total AQ score in future analyses.

To examine further possible data reduction, intercorrelations among scores of the CRT were examined (i.e., CRT initial intensity, CRT initial duration, CRT mean intensity, CRT mean duration, CRT High Intensity). High correlations, ranging between .57 and .86, were found between these scores. The decision was made to use three scores assessing aggressive behavior on the CRT. Prior studies have found that combining these scales is most effectively done by multiplying the duration and intensity scores (e.g., Bartholow et al., 2006). First, the CRT initial intensity and CRT initial duration scores were combined in a multiplicative manner to create CRT initial aggression scale. Next, the CRT mean intensity and CRT mean duration scales were combined in a multiplicative manner to create a CRT mean total aggression scale. Theoretical notions support the usefulness of these scores. The initial levels set on the CRT were deemed important as they represent a measure of unprovoked aggression that is somewhat unique from the rest of the scale. It represents the level to which a participant is willing to enact aggression towards another person who has done nothing to provoke the participant and may represent base levels of aggression. The CRT mean total aggression scale was selected as previous research has shown that this scale has a more regular distribution and may be useful in detecting differences in overall aggressive behavior (Anderson & Carnagey, 2009). Finally, it was decided to maintain the CRT high intensity score as a separate measure to illustrate the frequency with which a participant will resort to the most intense levels of aggression. Additionally, it has been suggested that this measure is useful in communicating results to the public (Anderson & Carnagey, 2009).

After reducing the variables through this process, I was left with five outcome measures: state hostility; aggressive cognition; total initial CRT level; mean CRT level; and number of high intensity blasts on the CRT. Correlations among these measures, as well as the hypothesized moderator variables, are shown in Table 3. Correlations among the various outcome measures indicated that the aggressive cognition measure showed the lowest correlation with the other measures, with correlations ranging from -.16 to.13 (median r = .05). The state hostility measure showed modest to moderate correlations with the three CRT measures, ranging from .24 to .46 (median r=.49). Additionally, the three CRT measures were found to have moderate to high correlations with each other, ranging from .65 to .89 (median r=.70). The data reduction process also resulted in two moderator variables: Total AQ score and a normative beliefs about aggression score (normative beliefs). These scales showed a low correlation of .11. *Main Analyses*

Hypothesis 1: Social condition and video game content will predict aggressive cognition (see Table 4). To examine whether playing a violent video game in a social setting causes an increase in aggressive cognition, a 2 (group) x 2 (content) ANOVA was computed comparing the levels of aggressive cognition across the four experimental groups. There was a significant main effect for social condition, F(1, 99) = 5.87, p = .02. Specifically, participants who played a video game in the solitary condition had higher ratios of aggressive words to non-aggressive words than participants who played in the social condition, regardless of game content. Results did not indicate a significant effect for video game content or the interaction between video game content and social condition.

Hypothesis 2: Social condition and video game content will predict state hostility (see Table 4). To examine whether playing a violent video game in a social setting causes an increase in state hostility, a 2 (group) x 2 (content) ANOVA was computed comparing the levels of state hostility across the four experimental groups. There was a significant main effect for exposure to violent video game content, F(1, 99) = 10.22, p < .01. Specifically, participants who played the violent video game showed higher levels of state hostility than those who played the non-violent game, regardless of social condition. No significant effect was found for social condition or the interaction between video game content and social condition.

Hypothesis 3: Social condition and video game content will predict unprovoked aggressive behavior (see Table 4). To examine whether playing a violent video game in a social setting causes an increase in unprovoked aggression, a 2 (group) x 2 (content) ANOVA was calculated comparing the initial levels of aggression on the CRT across the four experimental groups. There was a significant main effect for video game content, F(1, 99) = 5.03, p = .03. Again, participants who played the violent video game showed higher levels of unprovoked aggression than those who played the nonviolent video game. A marginally significant effect was also found for the interaction between video game and social condition, F(1, 99) = 3.29, p = .07. As shown in Table 4, post hoc analyses revealed that participants who played violent video games, both alone and socially, showed higher levels of unprovoked aggression than those who played is nonviolent. The participants in the social nonviolent group were not significantly different from any of the other groups. Examination of figure 1 indicates that the slope for the solitary condition is much greater than that in the social condition. Thus, social game play appears to moderate the effect of video game violence.

Hypothesis 4: Social condition and video game content will predict mean levels of aggressive behavior. To examine whether playing a violent video game in a social setting causes an increase in mean levels of aggression, a 2 (group) x 2 (content) ANOVA was calculated comparing the mean levels of aggression on the CRT across the four experimental groups. A significant main effect was found for video game content, F(1, 99) = 9.77, p < .01. Again, participants who played the violent video game showed higher mean levels of aggressive behavior than those who played the non-violent game, regardless of social condition. No significant effect was found for social condition or the interaction between video game content and social condition.

Hypothesis 5: Social condition and video game content will predict levels of high intensity aggressive behavior. To examine whether playing a violent video game in a social setting causes an increase in the number of high intensity blasts on the CRT, a 2 (group) x 2 (content) ANOVA was calculated comparing the numbers of high intensity noise bursts across the four experimental groups. A significant main effect was found for video game content, *F* (1, 99) = 5.54, *p* =.02. Again, participants who played the violent video game showed more CRT intensity levels of 8 and above than those who played the non-violent game, regardless of social condition. No significant effect was found for social group or the interaction between video game content and social condition.

Hypothesis 6: Trait aggression will moderate the relations between video game content and social condition with aggressive cognition, state hostility, and aggressive behavior (Table 5). I predicted that participants with higher levels of trait aggression would show higher levels of short-term increases in aggressive cognition, state hostility, and aggressive behavior when they played a violent video game in a social setting. Five regressions were computed to examine this hypothesis, one for each outcome variable. As main effects for aggressive social condition, video game content, and the interaction between video game content and social condition were reported based on the ANOVAs in the previous section, they will not be reported for these regressions. Only the main effects of trait aggression and interactions between trait aggression and social condition and video game content will be reported.

For the regression analysis conducted to examine aggressive cognition as the dependent variable, a significant main effect was found for trait aggression, t = 2.12, df = 7, p = .04. Specifically, higher scores on the AQ were related to higher levels of aggressive cognition. The regression did not indicate that there was a significant effect for the interactions between trait aggression and social condition or video game content.

For the four regression analyses conducted to examine state hostility, unprovoked aggression, mean aggression, and high intensity noise blasts as the dependent variables, no significant main effects for trait aggression or interactions between conditions and trait aggression were found.

Hypothesis 7: Normative beliefs about aggression will moderate the relations between video game content and social condition with aggressive cognition, state hostility, and aggressive behavior (Table 6). I predicted that participants with normative beliefs more accepting of aggressive behavior would show higher levels of short-term increases in aggression when they played a violent video game in a social setting. Five regressions were computed to examine this hypothesis, one for each outcome variable. Because the ANOVAs for Hypotheses 1-5 addressed main and interaction effects of conditions, they will not be reported for these regressions. Only the main effects of normative beliefs about aggression and interactions between normative beliefs about aggression and social condition and video game content will be reported.

For the five regressions examining aggressive cognition, state hostility, unprovoked aggression, mean aggression, and high intensity noise blasts, no significant main effects or interactions were found.

Overall, there was no support for the hypotheses that trait aggression or normative beliefs about aggression would moderate video game content or social play condition effects on aggression.

DISCUSSION

In the present study, I sought to explore further the connections previous research has shown between exposure to video game violence and aggressive cognition, state hostility, and aggressive behavior. Specifically, I focused on whether video game players would have different reactions to the video game violence based on whether they played the game alone or with another person present. Although little evidence exists on whether there would be a difference based on social context, some researchers have suggested that playing with another person may decrease the negative effects of playing violent video games (Griffiths, 2009). However, the prevailing theory used to predict how video game violence affects behavior, cognition, and hostility, the General Aggression Model (GAM), would lead one to believe the opposite, that social play would lead to higher levels of aggressive behavior, easier access of aggressive cognition, and higher levels of state hostility. This was expected as the participant would experience increased priming of aggressive cognitions and behaviors as he would not only be enacting the violence in the video game but also observing the same behavior from another person, making aggressive behavior appear more acceptable. Additionally, it was expected that the competition involved in playing a game with another person would result in increased arousal and easier access to aggressive scripts as participants felt they needed to engage in the game more aggressively to win. In the current study, I sought to explore this area of research by comparing the reactions of participants who played either a violent or nonviolent video game in either a solitary or social context. In the sections that follow, I will review each hypothesis, state the results relevant to the hypothesis, place the present findings in the context of existing research findings, and state the implications of the findings. Finally, I will address the limitations

and implications of the study, and indicate future directions for the field.

Hypothesis 1: Social condition and video game content will predict aggressive cognition.

Consistent with the predictions of the GAM, I predicted that both violent video game content and playing in a social context would increase the levels of aggressive cognition. The findings of the current study ran counter to this prediction. In fact, video game violence was not found to have a significant effect on aggressive cognition. Social context, on the other hand, was found to have an effect on aggressive cognition, but it ran counter to what was predicted. In this study, playing in a social setting resulted in lower levels of aggressive cognition, regardless of the video game content.

Prior studies have found clear links between exposure to video game violence and increased ease of accessibility of aggressive cognitions (e.g., Anderson & Dill, 2001; Anderson et al., 2010). It is unclear why this effect was not found in the current study. It is possible that the differences may be somehow related to differences in the games used in this study from those used in previous studies. Specifically, in the study by Anderson and Dill (2001), the video games used had very different levels of action and the play interfaces were different. In that study, the violent game was an action-based first-person shooter where the player took control of the character enacting the violence in the game. The non-violent game in Anderson and Dill's study involved a point-and-click interface where the player simply clicked on objects in the frame of view and the computer carried out the actions for them. This style of interface includes much less action and is more detached, making it markedly different from the violent game played in that study. In the current study, both *Dirt 3* and *Gears of War 3* showed much higher levels of graphical detail than those used by Anderson and Dill. In addition, the action in these games was

much more similar as both games had similar pacing and both put the player in a third person perspective, in which they have control of the action but they are observing the action from an outside perspective. When I completed reviews of the literature, I noticed that the video games played tended to be on "older generation" video game systems, while games in the current study were played on a "current generation" system, were relatively new, and were highly graphically detailed. It is possible that these differences in video game features were one reason for contradictory results.

In terms of social context effects, the results of this study are the opposite of what I predicted. Rather than resulting in higher levels of aggressive cognition, playing with another person present appeared to make aggressive cognitions *less* accessible after play. It is possible playing in a comfortable, social setting results in the activation of more prosocial cognitions as the social interaction calls for the use of positive social skills. The current study is unable to determine if this is the case as prosocial cognition was not measured.

Hypotheses 2-5: Social condition and video game content will predict state hostility and aggressive behavior.

Based on the GAM, I predicted that playing a violent video game and playing in a social context would lead to increases in state hostility and aggressive behavior. Prior research indicated that playing violent video games is related to increases in aggressive behavior and state hostility (e.g., Anderson & Bushman, 2001; Barlett et al., 2008; Barthalow et al., 2005; Gentile & Gentile, 2008). Consistent with these findings the results of the current study found that playing violent video games was associated with increases in state hostility, higher levels of unprovoked aggression, higher mean aggression levels on the CRT, and more high intensity

settings on the CRT. The GAM proposes that these increases are related to both observing and enacting violent behavior within the video games being played. Aggressive behavior in the games is likely coupled with increased levels of hostility as the person enacting the aggression comes to view the behavior of others as more provocative or aggressive in nature. This violent game play also likely makes further aggressive behavior seem less aversive, making it easier to engage in aggressive behavior towards someone else regardless of whether they the other person provoked the participant. Further, when the player encounters aggressive responses directed to him by an opponent on the CRT, he is more likely to return the aggression at a higher level. This results in increases in the overall aggressive behavior of the participant. Finally, as the violent content of the game makes aggression less aversive, the likelihood that a person will engage in higher intensities of aggression becomes more likely, resulting in more assignments of high intensity punishments on the CRT.

Contrary to what was expected, no main effects were found for social condition as far as state hostility and aggressive behavior were concerned. The GAM would predict that observing aggressive behavior in others as well as competition between players would likely result in increases in aggressive responses. It is possible that the lack of effect for social condition is related to the behavior of the confederate. In order to eliminate the effect of confederate's behavioral tone, the confederate was trained to act in a manner that was approachable and did not necessarily encourage further aggression. It is possible that this behavior is different from what happens when playing with either a friend or an uncontrolled stranger, both of whom are likely to exhibit more aggressive responses in their own play in a natural setting. Thus, it is possible that the use of a confederate and his training negated the effect of social play. It is also possible that the

presence of the confederate did not result in differences in aggression on the CRT because the aggressive behaviors were not aimed at the confederate; that is, participants were told they were competing in the CRT with someone other than the confederate. It is possible that increases in hostility and aggressive behavior do not transfer from one person to another. Finally, it is possible that there is truly no effect for social condition where aggressive behavior and state hostility are concerned.

Examination of the results indicates that there was one aggression measure for which the interaction of social condition and video game content approached significance. A marginally significant effect was found for the interaction between video game content and social condition on unprovoked aggression on the CRT. Specifically, participants in the alone/violent and social/violent conditions showed higher levels of unprovoked aggression than those in the alone/nonviolent condition. Participants in the social/ nonviolent condition fell in the middle of all the other conditions with scores that were not significantly different from any other condition. Examination of Figure 1 reveals an interesting pattern. While there is a clear effect for violent video game content in the solitary condition, this effect is not present in the social condition. It appears that social video game play moderates the effect of video game violence in terms of unprovoked aggression. It is unclear why social play would negate the violence effect or why this was only seen on this one outcome measure. However, it is possible that this result is related to the effect social context has on aggressive cognition. Perhaps aggressive scripts are not as accessible immediately after social play without some prior provocation making it less likely that someone who just played a video game with another person present is less likely to engage in unprovoked aggression. Research by Greitmeyer, Agthe, Turner, and Gschwendtner (2012)

supports this possibility. In their study, participants who played a prosocial game showed less aggressive behavior than those who played a neutral game. Further analyses found that a key factor in the reductions found in aggression was increased activation of prosocial cognitions which may have prevented access to aggressive cognitions. Future research should explore this interaction further.

Hypotheses 6 & 7: Trait aggression and normative beliefs about aggression will moderate the relations between video game content and social condition with aggressive cognition, state hostility, and aggressive behavior.

Based on the research of Anderson and Dill (2001) and the GAM, I predicted that trait aggression and normative beliefs about aggression would moderate the relation between video game content and social condition. Specifically, I predicted that participants with higher levels of trait aggression and normative beliefs which viewed aggression as acceptable would show higher levels of aggressive cognition, state hostility, and aggressive behavior after playing a violent video game in the social condition.

A main effect was found for the relation between trait aggression and aggressive cognition in general, with participants who had higher levels of trait aggression showing more aggressive cognition. However, counter to what I predicted, trait aggression did not moderate the effects of video game content and social condition. It is unclear why trait aggression failed to moderate the effects found in the current study. One possibility relates to the discussion earlier about differences in the video game interface. It is possible that the use of "current" generation games which were very similar in their action and interface styles negated effects of trait aggression. Perhaps the effects of trait aggression are most apparent when video games are different in certain key features, unlike in the present study. It should also be noted that video game content showed significant main effects for all outcomes except for aggressive cognition. It is possible that the effect of video game violence is strong enough that it overcomes any moderation effect that may come from trait aggression. On the other hand, the expected main effect (e.g., increased aggression) was not found for social condition. In fact, the only effect of social condition found went against what was predicted in that social play was related to lower aggressive cognition. It is possible that the fact that social condition was not related to increases in aggression led to a situation in which it did not increase aggressive outcomes, regardless of trait aggression. Finally, as is discussed in the limitations section, the participants in this study generally had rather low trait aggression scores. It is possible that no moderation effect was found for trait aggression because the sample used in the present study represents a group that is generally low in aggression.

Contrary to what I had predicted, normative beliefs about aggression were not found to moderate the relations between social condition and video game content and any of the outcome variables. This finding is contrary to what was predicted by the findings of Anderson and Dill (2001). It is possible that this difference is related to differences in the video games used in the two studies, as discussed earlier. It is also possible that the results of the current study indicate that normative beliefs do not have a significant moderating effect on behavior after playing video games. In fact, during my literature review, I was unable to find any other studies that found a relation between normative beliefs and aggressive behavior after playing video games. Furthermore, the only other research examining the relation between normative beliefs about aggression and video games indicated that long-term play of violent video games was related to normative beliefs more accepting of aggression as normal (Moller & Krahe, 2009). Thus, perhaps the relation is that playing violent video games lead a person to view aggression as more acceptable over time. It is also possible that the measure used in this study was unable to detect the differences in normative beliefs I was seeking. I chose to use The Normative Aggressive Beliefs Scale (NABS; Anderson et al., 2007) a measure which has been used in video game studies in the past in order to produce similar results to others in the field. This measure assesses normative beliefs about aggression by asking how often the participant believes certain behaviors occur (e.g., what percentage of married couples have a physical fight each year) and using this as a rating of the normalcy of aggressive behavior in terms of how often it happens. It is possible a measure that asks participants about their own acceptance of aggression as normative would have produced different results. For example, Huesmann and Guerra (1997) designed a measure which asks participants to indicate how appropriate they think it is to respond with aggressive responses in various situations.

Limitations

The present study has several limitations that should be discussed. First, the current sample was found to have rather low levels of trait aggression. An expected mean score on the Aggression Questionnaire (AQ) can be calculated by considering the score that would be produced by a participant answering "3" on every item (the midpoint on the 5-point scale) which would yield a score of 87. Examination of the distribution of scores on the AQ indicated that participants tended to score low on trait aggressiveness (M = 66.65, SD = 13.77). When the frequencies of the total AQ scores are examined, it is found that 96% of the participants fell below the midpoint score of 87. With that being the case, it is possible that some of the lack of

findings for trait aggression may have been due to sample characteristics. It is possible trait aggression would act as a moderator in a group with a more normal distribution of aggressive behavior.

A second limitation of the current study is that the social video game play setting is rather artificial. Rather than examining the outcome after having a participant play with an uncontrolled stranger or a friend, participants played with a confederate who had very specific instructions and training for his play behavior. It is possible that, by controlling the behavior of the confederate, I also eliminated some key factor in typical play between two people (e.g., competitiveness, "trash talking"). Perhaps the presence of these factors would result in more significant effects for social video game play.

A third limitation of the current study pertains to its sample. The current study included only college-age male participants. Due to the characteristics of the sample, I am unable to extrapolate these results beyond this group of male college students. It is likely that participants of different ages and females may have responded to the experimental manipulation differently. For example, children and adolescents are more likely to show long-term changes in behavior related to violent video game exposure over time.

A final limitation of this study is the brief play period involved. Sherry (2001) has suggested that the effects of violent video game content are most significant in the first 10-20 minutes of game play and decrease after this time. It is unknown if differences in the effect of social context would be seen if participants were allowed to play together for longer periods of time. It is possible that it takes more than a few minutes for participants to "warm up" to one another. Perhaps effects of social game play would arise after participants become more comfortable playing and interacting with the confederate. Recent research by Jerabeck and Ferguson (2013) used a longer playing time due to concerns about this factor. In their study, participants played either a violent video game alone or a violent or non-violent video game cooperatively with someone else who was present for 45 minutes. The authors found that participants who played with another person showed lower levels of aggressive behavior regardless of the violent content of the video game. Although the present study used a video game that was played competitively, it is possible that a similar effect could have been found if longer play periods were included.

Conclusions and Future Directions

Video game play is a complex behavior that takes place in multiple contexts (i.e., alone, with others present, with others online). In recent years, video games have increasingly come to include a range of options for playing with others who are present or in remote locations. Furthermore, examination of trade magazines indicates that it is becoming less likely to find games that solely have a solitary play component. With this being the case, it is important to understand any differences that may arise when violent video game content is consumed in a multiplayer format. More specifically, there is a dearth of literature examining the effects of playing video games with someone who is present, especially with multiple online players.

The results of the present study confirmed evidence previously found in the literature that playing violent video games leads to increased state hostility and higher levels of aggression, regardless of social context. On the other hand, social condition of video game play was found to be unrelated to state hostility or aggressive behavior. However, social condition was found to have a significant effect of aggressive cognition, in that participants who played in the social condition showed lower levels of aggressive cognition than those who played in a solitary condition. Additionally, the interaction between social play and exposure to video game violence showed a trend towards significant effects on unprovoked aggression. Specifically, playing in a social setting appeared to dampen the effects of video game violence on unprovoked aggression. Although these results represent only one examination of this phenomenon and only one significant effect was found for social play, these results indicate further study of the effects of social video game play are warranted, in light of the limitation that the social play condition in the present study was artificial. Evidence from other recent studies also indicates that the various forms of social play may be important in examining the relation between exposure to video game violence and negative outcomes. For example, Ewoldsen et al. (2012), using video games played across a LAN, found that playing a violent video game in which players cooperated was associated with higher levels of prosocial behavior compared to playing a competitive violent video game. Additionally, in another study conducted via a LAN, Shafer (2012) found that participants who played a player versus player video game, one in which players compete to kill each other, showed increases in state hostility that were not found when those players played in a player versus environment format, in which players work together to fight the computer.

It is likely the field would benefit from replication of this study with a more diverse sample and longer periods of play. These alterations in future studies would allow for more generalizable results and may allow for greater examination of possible effects of social play. They would also allow for examination of the effects of play time on the outcomes observed in the study. Some studies have found that longer periods of play tend to cancel out the effects of video game violence on aggressive behavior (Jerabeck & Ferguson, 2013).
The field would also likely benefit from further studies in which social video game play is more natural in nature. In future studies, perhaps it would be more natural to have two participants play together instead of having them play against a confederate. Alternatively, perhaps pairs of participants familiar with one another (e.g., roommates, friends) could be recruited for the social play condition. Playing with a friend or roommate is likely a much more natural experience than playing with a stranger. Research with players of the Massive Multiplayer Online Role-Playing Game World of Warcraft has shown that there are differences between playing with "offline friends" compared to playing with friends players only met online (Snodgrass, Lacy, Dengah, & Fagan, 2011). In this study, playing with "real-life" friends led to an enhancement of relationships among the social group as they were able to share experiences and achievements. Furthermore, the authors found that playing with "real-life" friends led to players being better able to identify and address negative effects of excessive play (e.g., damaging relationships, taking time away from real-world commitments). It is possible that playing with friends would allow players to monitor other negative effects of violent video game play, such as increases in aggression, as well.

A final future direction that may be useful would be repeating the study with participants in the social condition being told they were competing against the confederate on the CRT. It is possible that the effects of playing with another person on behavior do not transfer between people. Thus, it is possible that differences in aggressive behavior would be found if the participant thought he was competing against the confederate with whom he had just finished playing the video game.

Gathering more data on social game play in which both players are present would help us

further determine whether social video game play has an effect on aggressive cognition, state hostility, and aggressive behavior, especially because social video game play is now a predominant mode of video game play.

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APPENDIX A

PARTICIPANT RECRUITMENT SCRIPT

My name is Jason Drummond and I am a graduate student in the psychology department here at BGSU. I am currently recruiting participants for a study examining the relation between playing video games, either alone or with another person present, and competitive reaction time. Participants will be asked to play the games *Dirt 3* or *Gears of War 3* either by themselves or with another person who is also participating in the study. Participants are required to be males over the age of 18-years-old. If you decide to participate in this experiment, you will come to the psychology department where you will initially complete some personality and video game experience questionnaires. Afterward you will play one of the games mentioned previously for 10 minutes either by yourself or with another person who is also participating in the study. You will then be asked to complete a computer-based reaction time task and a few paper measures. In total, your participation should require approximately one hour. Those who participate will be given research or extra credit for a psychology class.

APPENDIX B

VIDEO GAME EXPERIMENT INFORMED CONSENT

HSRB Approved for use between 02/26/2013 and 02/05/2013 IRBNet ID # 412261

- ▲ You are invited to participate in a research study examining how playing video games either alone or against another person affects your reaction time.
- ▲ To be eligible to participate in this study, you must be a male who is a BGSU student and over the age of 18-years-old.
- ▲ If you choose to participate, you will first be answering a series of questions about how often you play video games and what games you play and questions about your personality. You will then play 10 minutes of *a* video game either against another person who will be present in the room with you or by yourself. You will then complete reaction time tasks. One of these tasks will involve you playing against another participant (different from the one you played the game against). We anticipate that your participation will take approximately 60 minutes.
- The benefits of participating include helping us understand more about video game play behaviors among university students and how it relates to other variables like reaction time and personality. Additionally, you will have the opportunity to receive research credit or extra credit in a Psychology class if your instructor allows this.
- Please note that you are free to change your mind and stop participating at any time, even after you begin to participate in the experiment. If you choose to stop participating just notify the research investigator. None of your information will be used if you choose to terminate the experiment before it is completed.
- The anticipated risks to you are no greater than those normally encountered in daily life. Deciding to participate or not will not impact your grades, class standing, or relationship to the institution
- \bigstar
- ▲ Please note that your participation is completely voluntary and you are free to skip any questions you do not want to answer.
- ▲ It is important for you to know that all responses provided on the measures you will be asked to complete will be kept completely confidential. Any contact information you provide to the researchers will NOT be linked to your survey answers or results on any experimental task. The information you provide if you are able to earn extra credit or research credit will be stored in the SONA database on a secure server separate from your survey responses, and will be used only to inform your instructor that you participated and should receive credit. Any information you provide will be accessed only by the research investigators.
- ▲ It is the researchers' hope that the data of this study will be reported in an article

summarizing the overall results of this study. No one person's answers will be reported, only summary data.

- If you have any questions about the study, you may contact the principal investigator: Jason Drummond, M.A., Graduate Student, Psychology Department, BGSU, by phone (419) 372-2301, or by email drumm@bgsu.edu or the investigator's advisor, Eric Dubow, by phone at 419-372-2556 or by email at <u>edubow@bgsu.edu</u>
- You may also contact the Chair of the Human Subjects Review Board, Bowling Green State University, (419) 372-7716, hsrb@bgsu.edu, if any problems or concerns arise during the course of the study.

Video Game Experiment Consent Page

I have been presented with and have read the above statement of risks and benefits of participating in this experiment and I agree to participate. My signature also indicates that I am at least 18-years-old and am a student at BGSU. I have been given a copy of the information page to keep for my own records

Signature_____

APPENDIX C

DEBRIEFING SCRIPT

(adapted from Mills, 1976)

Thank you very much for your participation in this study. There is more to this study than I have told you so far. Before I tell you exactly what it is, I want to explain why it is necessary in some psychological studies not to tell people all about the study at the very beginning. This is because it could affect the results so they would not be a good indication of how people react in a real-life situation. In certain studies, if we tell people what the purpose of the study is and what we predict about how they will react in certain situations, they might deliberately do what it is they think we want them to do, in order to help us out and give us the results we want. It is also possible that the opposite could happen, where participants would deliberately try not to do what we predicted would happen to show us we could not figure them out. In both situations the results would be invalid. So, can you see why in some kinds of studies we can't tell people all about the whole purpose of the study at the beginning?

Now I would like to explain what we were actually looking at in this study. What we were really interested in is playing video games either alone or with another person present may affect how a person feels, what thoughts they have, and their behavior. We are also interested in how playing a violent or nonviolent video game affects feelings, thoughts, and behaviors. We were not actually measuring reaction time during the computer task. We expect that players who play against another person will show more aggressive behaviors, thoughts, and feelings than when playing alone. Furthermore, we expect that people who play violent video games will show more aggressive behaviors, thoughts, and feelings than those who play a nonviolent video game. We wanted to ensure that we had some control over the behavior you would be exposed to during this study. Therefore, the person you just played with was a member of the research staff who was given specific directions for his behavior during the video game play. All participants play against the same opponent so everyone's experience playing the game is similar. We randomly assigned participants to four groups: one where they played a violent video game alone, one where they played a violent video game with another person, one where they played a nonviolent video game alone, or one where they played a nonviolent video game with another person. You condition so you played a video game . The last were in the thing we were unable to tell you before the study began was that during the reaction task where you pressed the button as fast as you could, you were playing against the computer rather than another participant. This allowed us to control the number of trials you won and lost. Instead of measuring reaction time as you were told, this task measures aggressive behavior by examining the levels of the noise blasts you set. It was necessary that we originally misled you about the purpose of this test and whether you were playing against another person or the computer. Had you been aware of the purpose of this study or what was being measured during this task, it would have been impossible for you to act naturally. If we had asked you to pretend to play

against another person on the reaction time task, it is likely this would have affected your performance and the noise blasts you set. It was our goal to make this task as realistic as possible so that you believed you were truly playing against another person. This was necessary to ensure that we receive accurate results so that we know whether what we find is true. If we were already sure of the results it would not have been necessary to conduct this experiment with participants. Do you see why we couldn't tell you about the true purpose of the experiment beforehand? Do you have any questions so far?

I would like to emphasize that this experiment is not a test of your personality, ability, or character. There are no correct responses. We are looking for people's natural responses. Also, we are not interested in the responses of any one individual. Instead, we are interested in how the average person playing a video game is affected by playing a violent or non-violent video game with another person present. In order to figure this out, we need to collect the responses of many participants and then average them together. Due to this situation, it is going to be necessary for us to ask you not to say anything about the study to anyone else. If you talked to someone else about the study, then if they participate it would be the same as if I told them at the beginning the whole purpose of the study. Their responses wouldn't be spontaneous or natural and would not be able to be used. If this happened enough times, then we wouldn't have data to give us valid results and so all the data you provided us and all the data from those who already participated would be wasted. I hope you can see why it is extremely important that I have to ask you not to talk about the study with anyone. It may seem that the more I tell you about the experiment the more you may want to tell others, so it might seem that we are taking a chance in telling you all about it. My experience has actually been the opposite, that if I try to explain the experiment thoroughly and describe the reason for doing it the way we did, people are more likely to cooperate and not talk about the experiment. We also explain all this so you can get an educational experience out of this. I hope you learned something about research and experiments while participating and after this explanation. Do you have any other questions about this experiment or research on video games and aggression in general? I do hope that you will not talk about the experiment with others so that they can have the full experience that you did. Thank you again for all your help!

APPENDIX D

THANK YOU LETTER WITH LIST OF RESOURCES PROVIDED TO PARTICIPANTS

Video Game Project

Thank You!!!

Thank you for again participating in this Psychology Department research project. Should you find yourself in need of resources at some time in the future, here is a list of resources that can be helpful:

BGSU Counseling Center- 104 College Park Office Building Phone: (419) 372-2081 Psychological Services Center- Psychology Building Suite 200 Phone: (419) 372-2540

APPENDIX E

VIDEO GAME PLAY HISTORY

How many hours do you typically play video games each day?

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Hours							

How many of the hours you listed above do you play online where you can communicate with other players?

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Hours							

How many of the hours you listed above do you play with another person who is in the room with you?

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Hours							

APPENDIX F

VIOLENT VIDEO GAME EXPOSURE

		(Aı	nderson & Dill, 2	000)		
What is your	favorite game?					
How often do	o you play this g	game?				
1 Rarely Often	2	3	4 Decasionally	5	6	7
Do you play this in an online format where you can communicate with other players (i.e., by talking to them on a headset or by typing messages to them)? Yes No						
How often do players?	o you play this g	game in an	online format wh	ere you can coi	nmunicate wi	th other
1 Rarely Often	2	3	4 Occasionally	5	6	7
How violent 1 Little or no violent conte content	is the content o 2 nt	f this game 3	? 4	5	6	7 Extremely violent
How violent 1 Little or no violent graph	are the graphics 2 iics	s of this gar 3	ne? 4	5	6 violer	7 Extremely nt graphics
Compared to	others who pla	y this game	, how would you \int_{A}	rate your skills	s at this game?	, 7

1	2	3	4	5	6	7
I never win			My abilities ar	e		I always win
or do well			average			or do the best

APPENDIX G

DEMOGRAPHIC QUESTIONNAIRE

Age: _____ years How would you describe your ethnic background? Year in school: Freshman Sophomore Junior Senior GPA: 1.0-1.49 1.5-1.99 2.0-2.49 2.5-2.99 3.0-3.49 3.5-4.0 Do you currently have a job? Yes, full time Yes, Part time No What was the last grade your mother completed in school? Less than 12th grade Graduated his Graduated high school Some College **Associates Degree Bachelor Degree Masters Degree** Advanced graduate degree (e.g., MD, MBA, PhD, JD) What was the last grade your father completed in school? Less than 12th grade Graduated high school Some College **Associates Degree Bachelor Degree Masters Degree** Advanced graduate degree (e.g., MD, MBA, PhD, JD)

APPENDIX H

NORMATIVE AGGRESSIVE BELIEFS SCALE

Used Open Source from Craig A. Anderson, 2004

Read each of the following items, and indicate how often you believe the described behavior occurs by indicating a percentage from 0% to 100%. Write your estimate in the blank that precedes the item.

1. What percentage of parents in the U.S. spank their children? 2. What percentage of married couples have a physical fight (involving hitting, slapping, or other physical fighting behaviors) in a given year? 3. What percentage of dating couples have a physical fight (involving hittina. slapping, or other physical fighting behaviors) in a given 6-month period? 4. What percentage of college men get into a physical fight with another person (any person) at least once a year? 5. What percentage of college women get into a physical fight with another person (any person) at least once a year? 6. What percentage of married couples have a verbal fight (involving velling, screaming, or other verbal fighting behaviors) in a given year? 7. What percentage of dating couples have a verbal fight (involving yelling, screaming, or other verbal fighting behaviors) in a given 6-month period? 8. What percentage of college men get into a verbal fight with another person (any person) at least once a year? 9. What percentage of college women get into a verbal fight with another person

(any person) at least once a year?

APPENDIX I

AGGRESSION QUESTIONNAIRE

(AQ; Buss & Perry, 1992)

Scale: 1 = not characteristic of me to 5 = extremely characteristic of me Physical Aggression

- 1. Once in a while I can't control the urge to strike another person.
- 2. Given enough provocation, I may hit another person.
- 3. If somebody hits me, I hit back.
- 4. I get into fights a little more than the average person.
- 5. If I have to resort to violence to protect my rights, I will.
- 6. There are people who pushed me so far that we came to blows.
- 7. I can think of no good reason for ever hitting a person.*
- 8. I have threatened people I know.
- 9. I have become so mad that I have broken things.

Verbal Aggression

- 1. I tell my friends openly when I disagree with them.
- 2. I often find myself disagreeing with people.
- 3. When people annoy me, I may tell them what I think of them.
- 4. I can't help getting into arguments when people disagree with me.
- 5. My friends say that I'm somewhat argumentative.

Anger

- 1. I flare up quickly but get over it quickly.
- 2. When frustrated, I let my irritation show.
- 3. I sometimes feel like a powder keg ready to explode.
- 4. I am an even-tempered person.*
- 5. Some of my friends think I'm a hothead.
- 6. Sometimes I fly off the handle for no good reason.
- 7. I have trouble controlling my temper.

Hostility

- 1. I am sometimes eaten up with jealousy.
- 2. At times I feel I have gotten a raw deal out of life.
- 3. Other people always seem to get the breaks.
- 4. I wonder why sometimes I feel so bitter about things.
- 5. I know that "friends" talk about me behind my back.
- 6. I am suspicious of overly friendly strangers.
- 7. I sometimes feel that people are laughing at me behind my back.
- 8. When people are especially nice, I wonder what they want.

*reversed scored

APPENDIX J

STATE HOSTILITY SCALE

(Anderson, Deuser, & DeNeve, 1995)

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		Neithe	r Agree		Strongly
Disagree	Disagree	Nor Di	sagree	Agree	Agree
1	2		3	4	5
I feel I feel I feel I feel I feel	furious. willful. aggravated. tender.* stormy		I fee I fee I fee I fee I fee	l like I'm abou l friendly.* l understanding l amiable.* l mad	t to explode. g.*
	polite.*			l mean.	
I feel	discontented. like banging on a	table.	I fee	l bitter. l burned up.	
I feel I feel	irritated. frustrated.		I fee	l like yelling a I feel coope	t somebody. rative.*
	kindly.*		I fee	l like swearing	
I feel	unsociable. outraged.		I fee	l cruel. l good-natured	.*
I feel	agreeable.*		I fee	l disagreeable.	
I feel	offended.		I fee	l sympathetic.*	k
I feel	disgusted. tame.*		I fee	l vexed.	

*Item is reverse-scored

APPENDIX K

WORD COMPLETION TASK TO MEASURE AGGRESSIVE COGNITIONS

(Anderson et al., 2004)

This is a list of words with letters missing. Fill in as many of the blanks as you can in 3 minutes.

Code#_____

1 b _ h	36 k n	71 s c r n
2 in re	37 t_n e	72 h _ t r _ d
3 e x _ e	38 s _ b	73 t_l_ph
4 muer	39 s h r_	74 d i s s e d
5 p re	40 d r n	75 c n t 1
6spea_	41 p _ n e	76 p r o v e
7flier	42 a n g	77 p_n b_ll
8 expl_e	43 flt	78 oute
9 w m	44 fit	79 c 11
10 k i	45 p _ c k	80 r d e
11 t _ p _	46 h a _ e	81 m_n_g e
12 h _ r _	47 a _ t	82 i n s
13 a _ t _ r	48 c _ t	83 s _ d _
14 c h o _ e	49 w _ n	84 b t
15 s _ m p	50 a _ e	85 b r z e
16 att_c_	51 _ r y	86 r e v t
17 c _ m p t	52 w a _	87 соо_87
18 d e s	53 f _ m _	88 s <u>y</u> 88
19 s h _ l _	54 s l _ p	89 d _ r
20 s h o _ t	55 b k	90 s m _ c k
21 r_pt	56 r _ p e	91 frt
22 s t r e	57 f o _ e _ t	92 _ u n c h
23 le	58 o f f	93 s h _ r e
24 b _ r n	59 l o n	94 a _ u s e
25 s t _ r _ o	60 c r l	95 c l r
26 p s o n	61 c_e_t e	96 h _ n t
27 p _ s t _ r	62 s t _ r _ y	97 w_t_r
28 m g l e	63 m_t c_	98 s _ a s h
29 b l _ n d	64 f_r	
30 s n _ r e	65 tt e	
31 b _ e	66 n _ t _	
32 h _ t	67 w d _ w	
33 gp e	68 w k e d	
34 s m _ c k	69 v i s n	
35 s m e	70 e n _ a g e	

APPENDIX L

HUMAN SUBJECTS REVIEW BOARD PROJECT APPROVAL

DATE:	February 26, 2013
TO:	Jason Drummond, MA
FROM:	Bowling Green State University Human Subjects Review Board
PROJECT TITLE:	[412261-2] Social Versus Solitary Video Game Play and Aggressive Behavior, Aggressive Cognition, and State Hostility
SUBMISSION TYPE:	Revision
ACTION: APPROVAL DATE: 2013	APPROVED February 26,
EXPIRATION DATE:	February 5, 2014
REVIEW TYPE:	Expedited Review

REVIEW CATEGORY: Full Committee review category

Thank you for your submission of Revision materials for this project. The Bowling Green State University Human Subjects Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

The final approved version of the consent document(s) is available as a published Board Document in the Review Details page. You must use the approved version of the consent document when obtaining

consent from participants. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that you are responsible to conduct the study as approved by the HSRB. If you seek to make any changes in your project activities or procedures, those modifications must be

approved by this committee prior to initiation. Please use the modification request form for this procedure.

You have been approved to enroll *100* participants. If you wish to enroll additional participants you must seek approval from the HSRB.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. All NON-COMPLIANCE issues or COMPLAINTS regarding this project must also be reported promptly to this office.

This approval expires on February 5, 2014. You will receive a continuing review notice before your project expires. If you wish to continue your work after the expiration date, your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date.

Good luck with your work. If you have any questions, please contact the Office of Research Compliance at 419-372-7716 or hsrb@bgsu.edu. Please include your project title and reference number in all correspondence regarding this project.

APPENDIX M

TABLES

Table 1

Frequencies and Percentages of Sample Demographic Variables

n=100	Frequency
Age	
18	24
19	46
20	24
21	2
22	3
25	1
Participant Ethnicity	
Caucasian/White	76
African American/Black	18
Hispanic/Latino	1
Multiracial	5
Year in School	
1st	55
2nd	35
3rd	9
4th	1
GPA	
1.0-1.49	1
1.50-1.99	4
2.0-2.49	16
2.50-2.99	25
3.0-3.49	31
3.50-4.0	19

Employment	
Unemployed	54
Part-time	43
Full-time	2
Missing	1
Mother Education	
<12 th grade	2
Completed High School	20
Some College	16
Associates Degree	18
Bachelor Degree	31
Masters Degree	12
Advanced Degree (e.g., M.D., Ph. D.)	1
Father Education	
<12 th grade	2
Completed High School	24
Some College	24
Associates Degree	15
Bachelor Degree	21
Masters Degree	11
Advanced Degree (e.g., M.D., Ph. D.)	2
Missing	1
Daily Video Game Play (Total)	
Range (hours per day)	0-7.43
Mean (hours per day)	1.9
Daily Video Game Play Online	
Range (hours per day)	0-7.43
Mean (hours per day)	1.29
Daily Video Game Play with	

Others who are Present	
Range (hours per day)	0-7.43
Mean (hours per day)	0.93

Note: Video game play statistics are presented in terms of range and means as there was a large

spread in playing time.

ANOVA Results and Means and Standard Deviations for the Between Group Differences in Demographic Variables and Moderator Variables for the Four Experimental Groups

	Nonviolent Game/Alone	Nonviolent Game/Social	Violent Game/Alone	Violent Game/Social	Overall Sample
Age					
Mean (SD)	19.08 (1.38)	19.12 (1.01)	19.40 (1.08)	19.16 (.80)	19.19 (1.08)
F (df)	.44 (3, 99)				
Year in School ^a					
Mean (SD)	1.52 (.71)	1.52 (.77)	1.60 (.71)	1.60 (.65)	1.56 (.70)
F (df)	.11 (3, 99)				
GPA ^b					
Mean (SD)	4.77 (1.31)	4.42 (1.28)	4.32 (.99)	4.28 (1.10)	4.44 (1.17)
F (df)	.84 (3, 99)				
Total Daily Video Game Play					
Mean (SD)	2.03 (1.57)	2.08 (1.37)	1.79 (1.48)	2.05 (1.51)	1.99 (1.47)
F (df)	.20 (3, 99)				
Daily Video Game Play Online					
Mean (SD)	1.32 (1.65)	1.48 (1.34)	1.16 (1.26)	1.17 (1.23)	1.29 (1.37)
F (df)	.30 (3, 99)				
Daily Video Game Play with Someone Present					
Mean (SD)	1.10 (1.61)	1.02 (.90)	.75 (.97)	.85 (.97)	.93 (1.14)
F (df)	.50 (3, 99)				
Exposure to Video Game Violence					
Mean (SD)	19.73 (6.07)	18.31 (7.57)	16.41 (8.10)	18.96 (7.17)	18.35 (7.26)
F (df)	.96 (3, 99)				
Trait Aggression					
Mean (SD)	64.72 (11.93)	67.64 (14.40)	63.80 (14.96)	70.44 (13.44)	66.65 (13.77)
<i>F (df)</i>	1.20 (3, 99)				
Normative Beliefs					
Mean (SD)	53.40 (12.92)	52.63 (14.24)	55.03 (9.35)	55.49 (13.83)	53.39 (12.57)

F(df)	.21 (3, 98)				
(-5)	. (-3)				
^a 1= Freshman 2=Sophomore 3=Lunior 4=Senior b 1= 1 0-1 49 2=1 50-1 99 3=2 0-2 49 4=2 50-2 99 5=3 0-3 49 6=3 50-3 99					
F(df) ^a 1= Freshman, 2=Sop	.21 (3, 98) homore, 3=Junior, 4=Se	enior ^b 1= 1.0-1.49, 2=1	.50-1.99, 3=2.0-2.49, 4	=2.50-2.99, 5=3.0-3.49	0, 6=3.50-3.99

Correlations between Normative Beliefs about Aggression, Trait Aggression, Aggressive Cognition, State Hostility, CRT Unprovoked Aggression, CRT Mean Aggression, and CRT High Intensity Aggression

	Normative Beliefs about Aggression	Trait Aggression	Aggressive Cognition	State Hostility	CRT Unprovoked Aggression	CRT Mean Aggression	CRT High Intensity
Normative Beliefs	1						
Trait Aggression	0.11	1					
Aggressive Cognition	0.19	0.17	1				
State Hostility	-0.05	0.23*	0.13	1			
Unprovoked Aggression	0.15	.20*	-0.16	.24*	1		
Mean Aggression	0.13	.21*	0.08	.49**	.70**	1	
High Intensity	0.16	0.19	0.03	.46**	.65**	.89**	1

*p < .05 ** p < .01

Hypotheses 1-5: F-values, Means, and Standard Deviations for Video Game Content, Social Group, and the Interaction between Social Group and Video Game Content Effects for ANOVAs Predicting Aggressive Cognition, State Hostility, and CRT Aggressive Behavior

			CRT Aggressive Behavior		
	Aggressive Cognition	State Hostility	Unprovoked Aggression ^a	Mean Aggression ^a	High Intensity Aggression ^b
Measure Range	-	35-175	1-100	1-100	0-25
Video Game Content	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Nonviolent	.23 (.12)	53.16 (11.63) _b	14.42 (14.89) _b	20.72 (12.09) _b	4.84 (4.67) _b
Violent	.25 (.11)	61.48 (14.21) _a	21.92 (18.62) _a	31.24 (20.30) _a	7.50 (6.40) _a
<i>F (df)</i>	.77 (1,99)	10.22 (1,99)**	5.03 (1,99)*	9.77 (1,99)**	5.54 (1,99)*
Social Group					
Alone	.27 (.13) _a	57.76 (15.63)	17.10 (17.12)	25.60 (19.21)	5.94 (5.48)
Social	.22 (.09) _b	56.88 (11.32)	19.24 (17.72)	26.35 (15.67)	6.40 (6.02)
<i>F (df)</i>	5.87 (1,99)*	.11 (1,99)	.41 (1,99)	.05 (1,99)	.17 (1,99)
Social Group x Video Game Content					
Alone/Nonviolent	.26 (.13)	52.00 (12.39)	10.32 (10.81) _b	19.15 (12.96)	4.60 (3.94)
Alone/Violent	.28 (.13)	63.52 (16.63)	23.88 (19.64) _a	32.05 (22.33)	7.28 (6.49)
Social/Nonviolent	.21 (.10)	54.32 (10.97)	18.52 (17.34) _{ab}	22.29 (11.20)	5.08 (5.37)
Social/Violent	.22 (.09)	59.44 (11.30)	19.96 (17.72) _a	30.42 (18.47)	7.72 (6.43)
F(df)	.04 (1,99)	1.51 (1,99)	$3.29(1,99)^+$.50 (1,99)	.00 (1,99)

Note. Means in the same column with different subscripts are different from each other in a between-groups comparison test. ^a Item created by multiplying intensity level (1-10) by duration level (1-10). ^b Measured as the number of times intensity was set at 8 or above on each of the 25 trials.

⁺p<.10.*p<.05. **p<.01.

Hypothesis 6: Regression Results Predicting Aggressive Cognition, State Hostility, and CRT Aggression (Unprovoked Aggression, Mean Aggression, and High Intensity Aggression) from Social Group, Video Game Content, and Trait Aggression

			CRT Aggression		
	Aggressive Cognition	State Hostility	CRT Unprovoked Aggression	CRT Mean Aggression	CRT High Intensity Aggression
Predictor	ß	ß	ß	ß	ß
Social Group	-0.23 ⁺	0.1	0.26 ⁺	0.09	0.04
Video Game Content	0.07	.41**	0.39**	.35*	0.21
Social Group x Video Game Content	-0.02	-0.21	-0.35*	-0.11	0.01
Trait Aggression	0.49*	-0.03	-0.09	0.01	0.11
Social Group x Trait Aggression	-0.29	0.08	0.32	0.04	-0.17
Video Game Content x Trait Aggression	-0.22	-0.2	0.13	0.14	0.22
Social Group x Video Game Content x Trait Aggression	0.11	-0.27	-0.12	-0.23	-0.17
Total P ²	0.12 ⁺	0.10**	1 / *	17*	0.1

⁺p<.1.*p<.05. **p<.01.
Table 6

Hypothesis 7: Regression Results Predicting Aggressive Cognition, State Hostility, and CRT Aggression (Unprovoked Aggression, Mean Aggression, and High Intensity Aggression) from Social Group, Video Game Content, and Normative Beliefs

			CRT Aggression		
	Aggressive Cognition	State Hostility	CRT Unprovoked Aggression	CRT Mean Aggression	CRT High Intensity Aggression
Predictor	ß	ß	ß	ß	ß
Social Group	-0.2	0.08	0.24^{+}	0.09	0.01
Video Game Content	0.12	0.42**	.40**	.38**	0.23
Social Group x Video Game Content	-0.05	-0.21	-0.30 ⁺	-0.11	0.03
Normative Beliefs	0.1	-0.03	0.02	-0.03	-0.07
Social Group x Normative Beliefs	-0.17	0.04	0.01	0.09	0.15
Video Game Content x Normative Beliefs	0.25	0.09	0.04	0.17	0.24
Social Group x Video Game Content x Normative Beliefs	0.02	-0.08	0.18	-0.01	-0.06
2	+		+	+	
Total <i>R</i> ²	0.14^{+}	0.11	0.14^{+}	0.14^{+}	0.12

⁺p<.1.*p<.05. **p<.01.

APPENDIX N

FIGURES

Figure 1. Interaction between social group and video game content related to unprovoked aggression

