The Effect Of Cooperative Gameplay On Aggression And Prosociality In Violent Video Game Play

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THE EFFECT OF COOPERATIVE GAMEPLAY ON AGGRESSION AND PROSOCIALITY IN VIOLENT VIDEO GAME PLAY

Thesis Defense for Master of Arts, Clinical Psychology

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ABSTRACT

The aim of this study was to determine what impact (if any) the context (isolated vs. social) of playing different types (violent vs. non-violent) of video games have on people's aggression and positive social behaviors. Participants were randomly assigned to play either a violent video game or a non-violent video game in an isolated context or with another player for 30 minutes, after which they completed the same questionnaires again. Data were then collected on behavioral tasks measuring aggression and prosociality. This experiment failed to find significant effects of violent video game exposure on aggression. Participants who played a violent video game cooperatively scored higher on self-report scales of public prosociality after gameplay. Additionally, participants who played a non-violent game cooperatively scored higher on self-report scales of altruism after gameplay than participants who played a violent video game cooperatively.
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I. INTRODUCTION

Before the invention of video games, the market for electronic entertainment was monopolized by the television. In 1958, the first electronic game, named Tennis for Two, was developed in a laboratory. However, the entrance of video games into consumer’s hands did not occur until the 1970s with the introduction of stand-up machines into establishments of entertainment such as bowling alleys and other consumer centers such as malls. Since their introduction, electronic games have seen a robust growth in myriad ways. The market for video games has exploded in recent years, with video game releases out-selling movie releases for over a decade now (Gentile, 2009) and a doubling of profit from 7.3 billion dollars in revenue five years ago to 16.6 billion dollars last year (Entertainment Software Association [ESA], 2012). The increase in revenue for companies producing these games has allowed for more investment in new titles, resulting in the conscription of assets from the ranks of Hollywood’s greatest talent. This talent includes resources such as actors, script writers, musical composers, and storyboard artists. The resultant increase in quality for video game entertainment has drawn larger crowds and allowed for more content diversity in the marketplace, both of which have contributed to the rapid growth in consumption of video games by a larger and broader consumer base. Among American children, for example, 92% reported that they played video games (Gentile & Walsh, 2002).
Not only are more Americans playing video games, they are spending increasingly more
time playing them (Anderson, Gentile, & Buckley, 2007), most often at the cost of time spent in
other hobbies. Not only is gaming becoming a more popular hobby, then, but other hobbies are
becoming less popular, further increasing the relative recreational time spent playing video
games. In a large-scale survey, Gentile (2009) found that 88% of males and females from ages 8
to 18 play video games, and 1 out of 10 of them play their games in what he defined a
“pathological” way. The criteria for pathological play that Gentile set out was that the game play
had “to damage multiple levels of functioning, such as family, social, school, occupational, and
psychological functioning” (Gentile, 2009, p. 1). Questions in the survey meant to assess
addiction were drawn from criteria for a diagnosis of Pathological Gambling from the Diagnostic
and Statistical Manual of Mental Disorders (4th ed., text rev.; DSM-IV-TR; American
Psychiatric Association, 2000). Caution should be taken in interpreting these findings however,
since these criteria are still currently unfounded and controversial in the field. For example,
Charlton (2002) and Danforth (2007) demonstrated that DSM criteria for other addictions may
not be used to assess for addiction in computer and gaming behavior. They found that only the
addiction factors that are responsible for describing high, non-pathological levels of engagement
were appropriate factors in describing high usage of electronic media, quite tautologically. High
levels of engagement alone are not indicative of a diagnosis for any addiction. Due to the lack of
empirical support for the construct of gaming addiction (Shaffer, 1999; Shaffer, Hall, & Vander
Bilt, 2000), many researchers and clinicians have remained skeptical of this concept.

As previously mentioned, video games are being designed to appeal to a much wider
audience than ever before. To accurately assess the demographics of video game users, one
hurdle that must be overcome is describing what makes up a “game.” Many researchers adopt
traditional gaming media, restricted to dedicated console games, dedicated computer software, and dedicated handheld games. Others include more liberal definitions, including a range of games from quiz show games for cell phones to flash-based games on social media websites. Adopting more inclusive criteria for the term games by allowing the respondent to define “game” results in slightly different demographical data. According to a recent large-scale, multi-purpose academic survey, there are slightly more females than males among online gamers (45% male, 54% female), with the average age of gamers being between the ages of 35 and 44 (Youn, Lee, & Doyle, 2010). One unifying trend across these different definitions of games is that the number of gamers is rising. As the number of individuals who self-identify as a “gamer” increases, the relevance of scientific inquiry in this field continues to grow along with it. More specifically, researchers have sought to answer questions regarding the way in which playing video games affects the lives of gamers.

**Learning from Video Games**

There is a relatively short history of research on human learning through electronic media, no doubt due to the technological milestones required to allow these media to be widely consumed. However, researchers have investigated the facilitation of learning through many other apparatuses for quite some time before that. The famous “teaching machines” invented by B. F. Skinner (Skinner, 1958; Hothersall, 2003) sparked public interest as well as created a vein of research in programmed instruction that is still active today (Escobar & Lattal, 2011). While much has been discovered about electronic media learning principles and how they operate when intentionally teaching academic material, incidental learning from entertainment software is a much newer field. Previously, the explicit purpose of the material of programmed instruction
was to facilitate learning of a very specific curriculum. With entertainment software, some content is intended to be learned, such as control scheme and game objectives, but the individual playing the game may also be affected in many other, unintentional ways. If learning is a relatively permanent change in behavior resulting from experience (Kimble, Hilgard, & Marquis, 1961), then gamers may be learning how to behave in contexts not related to gaming, as well. This concern is at the core of the field of video game research. If individuals are only learning controls and gameplay, then there is no cause for alarm. If, however, they are learning to think and behave differently, then researching what they are learning and how they are learning it is important since an increase in violence or aggression due to incidental learning is perhaps outside of the scope of awareness of the person responsible for purchasing these games. To date, there has been research done in this area. It is complex, multidimensional, and typically examined in artificial environments with a very limited scope, but scientists have studied it and this begins a review of what they have found.

The Function of Aggression

Definition of Violence and Aggression. This section will focus on how video games relate to violence and aggression specifically. Before discussing more on the constructs of aggression and violence, though, it is important to delineate the two concepts. Originally, research into what people have learned from video games started with violence since it is a potential public health concern. Unfortunately, there has been controversy over assigning operational definitions of violence with two of the field’s most prolific researchers, Craig Anderson and Brad Bushman, broadly defining violence as “extreme forms of aggression, such as physical assault and murder” with aggression defined as “behavior intended to harm another
individual who is motivated to avoid that harm” (Anderson & Bushman, 2001, p. 354). They have used these definitions to drive their methodologies as well as their interpretations which, by their own admission, allow the inclusion of specious categorizing such as defining “Mighty Mouse,” “Road Runner,” or “Pac-Man” as violent media (Anderson & Bushman, 2001, p. 354) despite their ranking as harmless for all audiences by their respective ratings’ boards.

One of the most vocal critics of these definitions is Christopher Ferguson. He argues against the conceptualization of aggression and violence on the same continuum. He suggests that a definition that allows for differentiation between prosocial forms of aggression, such as those desired in business or military careers, and dysfunctional forms of aggression, such as those penalized by the legal system (Ferguson & Dyck, 2012). He offers “behavior which is intended to increase the social dominance of the organism relative to the dominance position of other organisms” (Ferguson & Beaver, 2009, p. 287) as a potentially less morally-loaded definition of aggression. This allows for different forms of aggression, with only some forms putting the individual at risk for developing violent behaviors later on in life.

In fact, there is not even agreement that there is a youth violence epidemic to investigate. Ferguson and Kilburn (2010) have argued that there is a “phantom youth violence crisis” (p. 176) that is a pervasive myth across media and even the field of psychology. Logically, this appears strong since, while there has been a steady rise in violence across all media, including 70-85% of all video games containing violent content as of 1998 (Dietz, 1998), there has been a significant decline in adult violent crime rates and youth violent crime rates (Federal Bureau of Investigation, 2012) most recently reaching an all-time low since 1960. Anderson originally argued that a decrease in violent media would lead to a noticeable decrease in youth aggression (Barlett & Anderson, 2009), but in response to these trends, he urged caution in any
interpretations of the decreased trend in violence stating that “simple studies of national crime rate changes are difficult to interpret” (Bushman, Rothstein, & Anderson, 2010, p. 185).

The construct of aggression is another concept that has been heavily debated in the literature. Many researchers define aggression as “behavior directed toward another individual carried out with the proximate (immediate) intent to cause harm” (Anderson & Bushman, 2002), especially those who have argued for the causal link between aggression and violence. This definition allows for a somewhat disparate subset of behaviors that legitimately fall under the category of aggression. Striking another person falls within this subset of behaviors as well as an insult to someone, slandering their name, and spreading rumors.

There has been some debate as to the objective nature of the aforementioned definition. Chris Ferguson has criticized this definition as being overly moral and presumptive that all aggression should be and, consequently, is selected against. The previous definition could very well allow for socially appropriate behaviors such as political campaigning against an opponent to fall within the scientific scope of aggression which, he argues, confounds interpretations from subsequent findings (Ferguson & Dyck, 2012). Instead, Ferguson suggests that the definition “behavior which is intended to increase the social dominance of the organism relative to the dominance position of other organisms” (Ferguson & Beaver, 2009) permits a more objective approach to the construct, acknowledging both antisocial, abnormal aggression and socially acceptable practices such as competitive business ventures.

**Aggression and its sequelae.** Aggression has long been a topic worthy of research in its own right. Aggression, especially in children, is a prominent behavior studied in developmental psychology literature due to its oftentimes dysfunctional role in childhood and adolescent
settings. More importantly, it can serve as a warning sign for parents of children of all ages for the possibility of undesirable developmental trajectories (Andreas & Watson, 2009).

For example, aggression is a hypothesized component of etiological theories for various disorders including forms of juvenile delinquency (Granic & Patterson, 2006). Aggression can be related to Oppositional Defiant Disorder (ODD) which has a 10.2% lifetime prevalence (Dickstein, 2010). If left untreated, 26% of children will progress to develop Conduct Disorder (CD) before reaching adulthood (Lahey, Loeber, Quay, Frick, & Grimm, 1992). Conduct Disorder is a very serious childhood disorder, encompassing children who experience legal troubles from theft and assault to battery and perpetrating rape. Considering only youth formally diagnosed with CD, it can be demonstrated that aggression is a serious public health problem given that these cases have been ascertained to cost the United States an additional $70,000 per child over a 7-year period (Foster & Jones, 2005). Physical aggression as a larger problem has reliably been shown to be a precursor to undesirable developmental trajectories (Farrington, 1994; Stattin & Magnusson, 1989; Broidy et al., 2003).

Broader efforts to identify individuals at risk for juvenile violence or subsequent adult violence from previous aggression has proven difficult, however. In the case of school shooters, for example, aggressive cognition and affect were reliably reported by surrounding adults before the perpetrators committed their crime (Vossekuil et al., 2000). Making causal statements from this correlation is difficult, though. In the aforementioned study, the aggressive thoughts and behaviors occurred after being persecuted, bullied, threatened, attacked, or injured by others in the majority of the cases. Also, childhood aggression is very common in early development, with even somewhat frequent displays considered normal (Alink et al., 2006), so aggression alone is not predictive of subsequent violence. In fact, in a recent meta-analysis, Yang, Wong, and Coid
(2010) found that the nine most commonly used assessment tools for violence prediction were statistically not significantly different in their accuracy, and they all predicted with only moderate success. While predicting violence may be somewhat problematic with a great deal of precision, predicting general lawbreaking, nonspecific to solely violent crime, from childhood aggression is much more precise (Stattin & Magnusson, 1989; Broidy et al., 2003; Fergusson & Horwood, 1995, Nagin & Tremblay, 1999). There have been some competing theories of aggressive models proposed to make sense of these somewhat unclear findings.

**Models of aggression.** Historically, there have been a number of theories proposed to make sense of findings in the field of aggression research. The theories are divided on fundamental philosophical approaches, for example, those that espouse the position that exposure to violent media is directly causal to subsequent effects in consumers and the critics of that position. Some critics argue that the context involved in media exposure is the most important element since the form (e.g., cartoon or life-like), social endorsement (e.g., some sports, some wars), and genetic predisposition may be the most influential variables in acquiring aggression.

**General Learning Model.** Researchers who believe that violent media exposure is causal in subsequent aggression acquisition favor the General Aggression Model (GAM; Anderson & Bushman, 2002; Anderson & Carnagey, 2004; Anderson & Huesmann, 2003), which is a social-cognitive, developmental model that attempts to explain how individuals develop aggression. It is essentially the culmination of social-learning script theories and social-cognitive theories (Anderson & Bushman, 2002), where two kinds of input variables, personal and environmental, affect internal state. In turn, an individual’s internal state is hypothesized to subsequently determine the resultant, manifest aggressive behaviors. Personal variables include factors such as
age, gender, socioeconomic status, while environmental variables involve the nature of the stimuli being processed. Any factors that affect the context of the stimuli may be included at this level of analysis. Each of these two kinds of variables, as well as interactions between them, can influence an individual’s internal state which, in turn, influences the interpretation of these aggressive-provoking stimuli. This interpretation is responsible for the ensuing response. Over time, the individual is theorized to develop knowledge structures which have a more reliable and more unconscious affect on how that person perceives and judges incoming stimuli. In sum, the GAM attempts to explain consistency in average aggression acquired from violent media exposure via stable, personality variables and the variation around that average via situation-specific, environmental variables (DeWall & Anderson, 2011). The General Learning Model (GLM; Buckley & Anderson, 2006) is an extrapolation of the GAM model which is proposed to explain not just aggression, but all behaviors attained from media exposure, including both aggression and other behaviors prone to increased frequency on the basis of modeling (e.g., recreational activities, prosocial behaviors, and conflict resolution skills). For the purposes of this paper, the GLM will be referenced from this point forward since this study investigates aggression along with prosocial behavior.

There is some empirical support for the GLM in the literature. Personal factors such as male gender (Anderson & Dill, 2000; Barlow & Anderson, 2002), young age (Andreas & Watson, 2009), and increased hostile attribution bias (Dodge et al., 1990) do appear to moderate subsequent aggressive behavior after exposure to aggressive stimuli, as postulated by the model. Also, evidence suggests that environmental factors such as rejection by peers (De Castro et al., 2003), hostile familial environment (Andreas & Watson, 2009), and painful sensations (Berkowitz, 1983) have some effect on resultant aggression. Furthermore, knowledge structures
in the form of cognitive heuristics, activated via experience and priming, appear to have an affect on interpretation and, subsequently, hostile responses (Fiske & Taylor, 1991; Wegner & Bargh, 1998). The fundamental tenants of the GAM were drawn from empirical bases, as well (Hokanson & Shetler, 1961), including more recent theories of script theory (Huesmann, 1988) and aggressive affect acquisition (Geen, 1990).

**Catalyst Model.** The critics of the Causationist standpoint in the psychology literature have offered more by way of discounting causal statements than they have offered replacement models for the GLM. For example, three meta-analyses to date have shown that over half of the variance in displays of aggression is associated with genetic factors (Ferguson, 2010a; Moffitt, 2005; Rhee & Waldman, 2002). These findings are not without limitations. Genetic research has been subject to criticism over assumptions of equal environments in twin and adoption study modalities. Ferguson and colleagues have produced a substantial number of papers both criticizing the GLM and supplanting the model with a newly developed theory to explain aggressive behavior (e.g., Ferguson et al., 2008). They dubbed the model the “Catalyst Model,” thusly named for its emphasis on learning as less instrumental in the development of aggression than other factors.

The Catalyst Model offers an evolutionary perspective that takes into account context and genetics, both of which are thought to be paramount in organizing findings and guiding future research (Ferguson & Beaver, 2009). It states that aggression is derived from actions and interactions of genetics and early familial and peer experiences. An impulse control device is thought to have evolved to restrain aggressive impulses that are not socially appropriate in certain contexts. One example is antisocial behavior such as violence. A genetic predisposition combined with some early physical abuse, according to the Catalyst Model, could lead to a
violent, antisocial personality. This is theorized to lead to a range of behaviors in any situation which are then filtered through an impulse control device, resulting in the outcome behavior. Violence may occur whenever environmental stressors, or catalysts, act on individuals with these other factors involved. Violent video games would not cause violent behavior, then, but could act as a “stylistic catalyst” (Ferguson, 2010b, p. 45). That means that a violent person with poor impulse control and perhaps under periods of heavy distress, may act in ways consistent with their experience with first-person shooter characters. If that same individual were not exposed to violent video games, he or she would still act violently, but the Catalyst Model predicts that he or she would commit violence in ways not influenced by the first-person characters.

This position is predicated strongly on the basis of criticisms of the GLM that focus on its inability to explain the small effect sizes of tests of aggression (e.g., aggressive word completion tasks) after violent media exposure (Ferguson & Dyck, 2012). By contrast, the Catalyst Model predicts small effect sizes following violent stimuli exposure since aggression is theorized to be predominantly from non-learned sources; therefore, small effect sizes drawn from environmental manipulations are predicted by the model (Ferguson, 2010b). The Catalyst Model is a relatively new theory, so supportive research is still relatively sparse. However, impulse control does appear to lower, resulting in increased aggression in patients with frontal lobe injuries (Hayton, Lovette-Barron, Dumont, & Olmstead, 2010; Grafman et al., 1996). Additionally, violent and criminal behaviors have been shown to be increased in individuals with frontal lobe abnormalities (Brower & Price, 2001). These findings may provide evidence to suggest the presence and function of an impulse control device involved in human aggression.

The Relationship Between Violent Video Games and Aggression
As previously outlined, video games are being played at a rapidly growing rate that places their consumption among the highest for extant forms of media. Possibly as a consequence of this rapid growth, some parents and policymakers are concerned about the effects of video gaming on public health. Researchers have investigated this possibility very specifically with express emphasis on theories of acquiring aggression (i.e., those described above). Public concern was primarily over the effects of violent movies and television shows prior to the popularization of video games, but interest in the effects of violent video games possibly began to build due to a few factors. First, it is important to note that the United States Surgeon General at this time, C. Everett Koop, was a vocal opponent of violent video games of the time (e.g., Centipede and Donkey Kong). He widely publicized his position that video games were harmful (Koop, 1982). His admonishments of video games were worded strongly, and he even suggested that pediatricians limit violent entertainment since it was similar to high-sugar food content to the obesity-prone individual (Koop, 1982). Again, he prefaced this statement with a caveat that his intuition drove him to this conclusion rather than any empirical evidence. The effect of his stance on this subject is arguably immeasurable, but he was considered the first US Surgeon General to so drastically affect public policy in other areas from the seat of Surgeon General (National Library of Medicine, 2013). His statements, along with the increasing prevalence of violence in video games during the late 1980s and early 1990s (e.g., Mortal Kombat, Double Dragon, and Street Fighter), may have played some part in the increase in video game research.

Correlational studies. Thus, against the social backdrop described above, researchers in the late 80s turned themselves to the task of empirically examining the effect of video games on many aspects of youth development. These efforts often reflected public concern, such as the
research over possible addiction to video games (Shotton, 1989), familial functioning (Egli & Meyer, 1984), and academic functioning (Dominick, 1984). Concern over aggression in particular was initially sparked by a seminal study conducted by Lin and Lepper (1987). In this study, 210 youths completed self-report questionnaires about their leisure and social activities as well as their school functioning. Their teachers and parents also agreed to complete questionnaires about the youths’ social and academic functioning. A small amount of the variance ($r = .3$) of assessed levels of impulsivity and aggression was explained by video game play in an arcade setting. It is important to point out for context, however, that there was no significant relationship between video game play in a home setting and impulsivity and aggression (although the base rate of availability of games at home at that time might have confounded this analysis). Additionally, gaming behaviors were not found to be correlated with children’s popularity, friendliness, or general academic performance in this analysis. The authors stressed the limitations of interpreting data from correlational studies in a causal fashion. They explicitly pointed out that findings could be interpreted as supportive of the hypothesis that violent video games increase impulsivity and aggression but could also reflect the idea that impulsive and aggressive youth are more prone to play video games. Furthermore, they pointed out that their results explained less than 10% of the variance between groups. Finally, it is possible that parents who fail to regulate their children’s impulsive and aggressive behaviors also fail to regulate their children’s consumption of video games. These limitations were expressly laid out by the authors, and the authors failed to demonstrate a relationship between academic or social dysfunction. Despite this, it has become widely-cited as one study in a long list of studies providing evidence for a deleterious effect of video games (e.g., Anderson & Dill, 2000; Griffiths, 1999).
Fling et al. (1992) distributed a survey to sixth to twelfth graders ($N = 153$) asking about video game use, self-reported aggression, and self-reported self-esteem. Their teachers also completed questionnaires asking about the children’s levels of aggression and self-esteem. The data collected from middle school children and junior high children came from participants from public schools. The high school children participants were drawn from a private school for “disturbed young people” (p. 40). They found that the amount of video game play was positively correlated with higher levels of self-reported aggression ($r = .26$) and teacher reports of aggression ($r = .25$). It is unclear as to the interpretability of the results, however. The authors did not report how the older participants, drawn from the school for troubled youths, affected the analysis. Without knowing how the “troubled youths” were troubled, it is difficult to make any interpretations from their presence in the data set. Additionally, the authors did not control for gender in their analysis of video game play and aggression, even after reporting that boys were both significantly more aggressive and played video games at much higher rates than girls in the sample [$t(150) = 4.44, p < .0001$]. These positions were not particularly novel, as both were consistent with previous studies and have since been replicated many times (Dominick, 1984; Irwin & Gross, 1995; Bartholow & Anderson 2002; Zimmer-Gemback, Geiger, & Crick, 2005). Thus, the finding of a main effect for the role of gaming in promoting aggression without interpretation of context was confounded and did little to elucidate the relationship between these constructs.

Van Schie and Wiegman (1997) conducted a survey of children ($N = 346$) from the seventh and eighth grade from seven schools in the Netherlands. Van Schie and Weigman had the children complete diaries for one week detailing their leisure activities. They also administered brief, 1-hour intelligence tests to the children along with an unnamed measure of
aggressive behavior used previously by Wiegman, Kuttschreuter, and Baarda (1986). The measure asked children to identify other children in their class that displayed certain aggressive behaviors (e.g., fighting and sticking out their tongues). They found that time spent playing video games was not significantly correlated with peer-nominations of aggressive behavior but was significantly, positively correlated with intelligence ($r = .09, p < .05$). The authors speculated that this was possibly due to the set of cognitive skills required by some video games selecting for individuals of higher intelligence. Van Schie and Wiegman pointed out one substantial limitation to this study. Only 9% of the participants in this sample endorsed playing video games more than one hour per day, and video gaming was ranked eighth in duration of engagement when compared to 12 other hobbies measured in this study. The small proportion of video game players in this overall sample of video game players may have contributed to the lack of significant findings for their hypotheses. This fact in conjunction with the fact that absence of evidence do not necessarily provide evidence for an absence restricts our ability to interpret these results.

To investigate his longstanding criticism of the extant literature, Ferguson, along with San Miguel and Hartley (2009), collected data from 603 students (96.8% Hispanic) from ages 10 to 14 years ($M = 12.35, SD = 1.34$). The authors used hierarchical regression and structural equation modeling (SEM) to examine the predictive validity of negative life events, family environment, family violence, violent media consumption, and self-reports of depression for the outcomes of aggression, bullying behavior, and delinquent behavior. More complex structural analyses built and tested models with consideration for all previously noted significant predictors of aggression. The best supported model was one containing depression, delinquent peers, and partner-oriented parental aggression. This model was also broadly identified as a strong fit for
the data via prevalent standardized metrics of evaluation (NFI = .95, CFI = .97, RMSEA = .06).

Notably, violent video game exposure was absent from the final, statistically best-fitting model.
The authors concluded that their oft-published criticisms of the literature examining the relationship between violent video games and aggression was bolstered by these conclusions. Additionally, they posited that relatively unsophisticated methods utilized in most previous examinations may have contributed to small effect sizes, which, as outlined above, have been notable. Regardless of this study’s impact on future methodology, these findings (produced using stringent methods and statistical techniques designed to reduce measurement error) muddy the water with regard to a cohesive understanding of the association between violent video games and aggression.

**Experimental and quasi-experimental studies.** One of the earliest papers published investigating aggressive behavior related to video game exposure was published in the 1980s by Anderson and Ford (1986). This paper contained two studies. In the first study, college students \( N = 55 \) were given two computer games from a library of 11 and rate them on a number of variables on a follow-up questionnaire. The purpose of this study was to select a matched pair of video games from the 11 provided games that varied on level of aggression but were otherwise similar in the aspects of action, amount of pauses, difficulty, enjoyment, and frustration for use in the subsequent study. The two games ranked highest and lowest for violent graphics and violent content while remaining comparable on the other aspects measured were Zaxxon and Centipede. In the second study, college students \( N = 60 \) were randomly assigned to one of three groups; participants in one group played Zaxxon, participants in the second group played Centipede, and those in the third group played no game. Afterward, they were asked to complete two dependent measures. First, they completed the Multiple Affect Adjective Checklist
(MAACL; Zuckerman, 1960; Zuckerman, Lubin, Vogel, & Valerius, 1964) which measures hostility, anxiety, and depression by having participants circle words which describe how they’re feeling at the moment. Next, they completed a questionnaire that the authors only describe as a confidential department questionnaire that asked how the participants were feeling toward the actual people they interacted with (i.e., the researchers). The researchers hypothesized that playing the video game rated higher on aggression would correlate with higher scores of aggression on the MAACL. The departmental questionnaire yielded “no reliable effects on these measures,” and no interpretation was made (Anderson & Ford, 1986, p. 397). Nonetheless, participants who played video games scored higher on the MAACL subscales for hostility \[ F(2, 54) = 8.45, p < .001 \] and anxiety \[ F(2, 54) = 4.13, p < .05 \] in comparison to the group that did not play games. There was no significant difference between the low aggression game and the high aggression game in terms of hostility, however. While violent media such as movies and television had previously been researched, this paper provided some of the earliest experimental evidence that some forms of aggression may be related to exposure to displays of aggression in video games. Some questions still remained in the minds of aggression researchers, however. The reasons why low aggression video games would be related to statistically the same amount of aggression acquisition as high aggression video games, even after being deliberately selected to be significantly different, remained unclear.

Cooper and Mackie conducted a widely-cited experiment in 1986 in which they randomly assigned fourth and fifth grade children \( N = 84 \) into sets of two. The first partner was asked to play either Missile Command, Pac-Man, or a paper and pencil maze game for eight minutes. These groups were meant to represent an aggressive video game, a non-aggressive video game, and a non-aggressive non-video game. It is worth mentioning here that Pac-Man
successfully meets criteria for a violent video game in many researchers’ opinions (e.g., Anderson & Bushman, 2001) as well as the acting Surgeon General at the time of this study (Koop, 1982). The other partner simply watched the other partner play the game from within the same room. They then asked the youths to play with different types of toys ranging from highly aggressive (a warrior action figure that fired plastic projectiles) to non-aggressive (a skills-based toy). Finally, they were asked to press a buzzer to indicate how long of punishment an imaginary same-sexed, same-aged child who had just engaged in a bad behavior was to receive. The authors hypothesized that playing the aggressive game would be related to more intense administrations of punishment. The results of this experiment offered no support for that hypothesis. That is, there were no significant results by condition although, unsurprisingly, there was a main effect of gender in the toy condition. Boys chose to play with the warrior action figure more often than girls did, regardless of condition. While this experiment failed to find a relationship between aggressive video game exposure and either subsequent choice of toy or level of punishment, there are some limitations to its methodology. First, the depictions of violence were not at all realistic in the 1980s possibly muting any effect exposure may have had. Second, the outcome measures of toy choice and punishment choice may not be valid indicators of real-world aggressive behavior, especially in the long term.

In another experimental design study Anderson and Dill (2000) sought to determine the relationship between violent video games and aggressive cognitions and affect. The researchers initially screened a group of undergraduate volunteers by administering a measure of irritability (the Caprara Irritability Scale; CIS; Caprara et al., 1985), over the phone. The individuals who scored in the lowest quartile (low irritability participants) and those who scored in the highest quartile (high irritability participants) were invited to participate in the study. The participants
were asked to come into the laboratory to be randomly assigned to play one of two video games – Myst (nonviolent) or Wolfenstein 3D (violent). After the session, they completed the State Hostility Scale (SHS; Anderson, 1997; Anderson, Deuser, & DeNeve, 1995) and a modified version of the Taylor Competitive Reaction Time Test (Anderson & Bushman, 1997). The participants were presented aggressive words (e.g., attack), anxiety words (e.g., humiliated), escape words (e.g., flight) and control words (e.g., behold) in sequential order and asked to read them aloud. Their reaction time was measured, and they were deceived to think that their times were competing against a human opponent. If they won, they were allowed to choose the intensity and duration of a noise blast given to their fictional opponent. Regardless of their actual reaction time, the participants were noise blasted by their fictional opponent, a computer, at random for half of the number of trials. Every participant was noise blasted in the same pattern in every condition. No significant correlation was found between game type and scores on the SHS nor between game type and CIS scores. The authors did discover a significant difference in an index score that one of the authors had developed in an earlier study (Anderson, 1997). Anderson had developed an Aggression Accessibility Index score by combining reaction times to all three of the non-aggressive conditions (i.e., anxiety words, escape words, and control words) into a composite score. Average reaction times to the aggressive words were then subtracted from averages from the new composite score to produce the Aggression Accessibility Index score. Differences in these index scores were found to be significantly different with respect to game condition \([F(1, 198) = 31.35, p < .0001, MSE = 246.05]\). The participants exposed to the violent condition reacted 5.54 milliseconds more quickly on average to the aggressive words than the non-aggressive words while those exposed to the nonviolent condition reacted 6.69 milliseconds more slowly to the aggressive words than the non-aggressive words. Cautions toward the
meaningfulness of these characteristic findings in this field as well as effect sizes in violent video game research, in general, will be addressed later in this paper. Additionally, the TCRRT has also been criticized in recent years, since there is no evidence for external validity to real-world aggression from this measure (Ferguson, 2007; Ferguson et al., 2008), and it is easily confounded if many other factors are not controlled for (Tedeschi & Quigley, 2000), such as arousal (Welford, 1980), gender (Der & Deary, 2006), fatigue (Welford, 1980), order of stimulus presentation (Sanders, 1998), and personality type (Brebner, 1980). Without controlling for these variables, interpreting findings from this study is problematic.

Ferguson, an explicit proponent of the Catalyst Model and an explicit critic of the General Learning Model, and colleagues (Ferguson et al., 2008) conducted a study to determine if the statistically significant results of previous research could be explained by extraneous, unmeasured “third variables” (p. 312). Undergraduates ($N = 101$) were brought in to the laboratory and asked to complete a demographics sheet and the Aggression Questionnaire—Short Form (AQ; Buss & Warren, 2000), then were randomly assigned to one of three groups. The first group played Medal of Honor: Allied Assault (a violent video game), the second group played Myst (a nonviolent video game), and the third group was presented with a short description of each video game and asked to choose which game they would like to play. All three groups completed their gameplay and, finally, were asked to answer a questionnaire regarding how fun, exciting, and frustrating the game was. Next, all of the participants completed 25 trials of the TCRRT that only measured noise blast intensity since, as aforementioned, duration has historically been shown to have poor validity. The TCRRT task and its verbal instructions were chosen in this study to remain procedurally identical to the majority of widely-cited GLM research (e.g., Anderson & Dill, 2000). The authors explicitly sought to determine
which of two models, the GLM or the Catalyst Model, would be best supported by the outcome of this experimental design. If both of the non-violent conditions (random and assigned) scored significantly less on laboratory measures of aggression than both of the violent conditions (random and assigned), then the GLM would be supported since it theorizes that violent video game exposure results in increased aggression. If, however, the violent game conditions do not differ from the non-violent game conditions, then the Catalyst Model would be predicted. This is because the Catalyst Model predicts that people with violent predispositions may select violent video games, but that violent video game exposure does not significantly increase aggression. To determine if the third group’s choice between violent or non-violent video game could be predicted from gender, ethnicity, trait aggression or hours spent playing video games, each of these variables were entered into a logistic regression with video game choice as the dependent variable. An overall positive, predictive relationship from a combination of these four variables resulted ($\chi^2 = 15.98, p \leq .01$). However, the only individual variable predictive of violent or nonviolent condition choice was gender ($b = -3.05, p \leq .01$). To examine the effect that violent video game exposure had on TCRRT scores, an analysis of covariance (ANCOVA) was employed with a 4 (video game condition) x 2 (gender) factorial design with excitement and ethnicity as covariates. Selection of these two variables for covariance was based upon both game excitement ($r = .14$) and ethnicity ($r = .19$) having been found to be slightly correlated with participant intensity settings on the TCRRT. Consistent with previous findings, a main effect for gender was found for TCRRT scores ($r = .27, p < .01$). No significant effect was found for video game condition nor was there a significant difference from the free-choice group from the assigned groups on TCRRT scores. One additional notation the authors made was to follow Loftus’ (1996) suggestion that the null hypothesis could effectively be interpreted as true if the
95% confidence intervals in group differences were reasonably small. A series of Tukey post hoc comparisons between control group (randomized non-violent group) and the experimental groups (randomized violent group, free-choice violent group, and free-choice non-violent group) was made with a Bonferroni correction (corrected to a \( p \) value of 0.016) which failed to find any significant difference between each group's confidence intervals. The authors also pointed out that Cohen (1994) suggested that if the confidence interval around the effect size crossed a zero effect (beyond which is an impossibility), the null results can then be considered to have been supported. The authors found that the effect size for group differences, when converted to \( r \), was found to have a confidence interval crossing zero (-0.14 \( \leq r \leq 0.25 \)). Thus, the null hypothesis could be considered to have been supported.

**Longitudinal studies.** Cross-sectional studies have made up the majority of research in the field, but longitudinal data have been tracked, as well. Slater, Henry, Swaim, and Anderson (2003) followed children \( (N = 1,778) \) from 20 middle schools across the U.S. for 2 years with a 30.27% attrition rate. They developed a theory that violent media consumption and aggression caused a mutually reinforcing relationship with each other. That is, they hypothesized that individuals who consume violent media are more likely to be aggressive and, subsequently, to seek out more violent media. To investigate this theory, they collected data at four time points via a questionnaire with items addressing violent media consumption and aggressive behavior. Violent media exposure was addressed by three items (Cronbach’s alphas ranged from 0.60 to 0.69 across administrations) while cognitions about aggressive behavior, values over aggressive behavior, and aggressive behavior involvement were addressed by six items (Cronbach’s alphas ranged from 0.87 to 0.91). The study provided evidence for a cross-sectional correlation between aggression and violent media consumption, but there was no evidence for a lagged effect of
aggression on violent media consumption. One interpretation is that aggressive youths are selectively exposing themselves to violent media, but increased aggression does not appear to be predictive of increased violent media exposure at later time points. Consistent with predictions made by the Catalyst Model, the authors found that aggressiveness “should be considered as a stable characteristic of an adolescent, rather than a time-varying predictor” (p. 729). The authors suggested that their findings support the relationship between violent media and aggression but without accounting for potential confounds or explaining the lack of longitudinal association, it is difficult to make a clear interpretation.

Ferguson, Miguel, Garza, and Jeraback (2012) began collecting data in 2009 from 165 Hispanic children between the ages of 10 and 14 (M = 12.3) along with their families. Youth reported on video game use, negative life events, antisocial personality traits, family attachment, association with delinquent peers, and depression, while their guardians reported on familial violence. These inputs were used to assess validity in predicting serious aggression via guardian and child reports on the Child Behavior Checklist (Achenbach & Rescorla, 2001) and dating violence for those who indicated that they had been involved in a romantic relationship at some point in the last six months at the last time point for measurement. Data were collected across three time points with six months between each. Hierarchical regression analyses were run for each outcome variable with video game exposure run as the last step. Consistent with Ferguson’s repeated criticism of lack of control for relevant variables, violent video game exposure failed to attain significance in predicting serious aggression but they were found to have a negative correlation with dating violence. That is, increased violent video game exposure at time points 1, 2, and 3, predicted decreased dating violence incidence at time point three (-.22, -.25, and -.27 respectively, ps < .05). The authors then analyzed fit of a time-lag trend between violent game
exposure and aggression, and the model was found to be a poor fit of the data. The authors interpreted these findings to support their criticisms of the majority of previous research. Once variables already established as predictors of serious aggression and violence are controlled for, the correlations found in earlier research was hypothesized to fail to attain significance.

**Meta-analytic studies.** The individual studies outlined above have been examined in aggregate in numerous meta-analyses as prevalence of research in this area has increased due to varying interpretations of the data (e.g., Adachi & Willoughby, 2011; Greitemeyer & McLatchie, 2011; Ferguson, 2013). The authors of the earliest of these analyses (Anderson & Bushman, 2001) stated that they were inspired to conduct their first meta-analysis by media attention toward the effects of violent video games, particularly “the industry’s denials” (p. 353) of an effect. Of all of the articles returned in a literature search, 35 studies with a total of 4,262 participants met the criteria of having a calculable effect size in the report or the ability to retrieve the necessary data via contact through email. Additionally, the studies must have included aggressive behavior, cognition, affect, arousal, or prosocial behavior in relation to violent video games. The results indicated that, across the studies, aggressive behavior \( r^+ = .19, K = 33, N = 3,033 \), aggressive cognition \( r^+ = .27, K = 20, N = 1,495 \), aggressive affect \( r^+ = .18, K = 17, N = 1,151 \), arousal \( r^+ = .22, K = 7, N = 395 \), and prosocial behavior \( r^+ = -.16, K = 8, N = 676 \) were all found to be significant with small effect sizes across samples of children and college-aged adults. The authors made no mention why they chose to report \( r^+ \) versus more traditional statistics. However, this method of reporting became quite common in this field of study. The authors went on to make a somewhat controversial claim that the effect size of violent video game exposure is functionally equivalent to that of smoking and lung cancer. The evidence they drew this conclusion from became hotly contested since the authors claimed to have
estimated their correlation (Bushman & Anderson, 2001, Figure 2, p. 480) from the highest odds ratio found in the literature to date (Paik & Comstock, 1984). Two medical doctors, Block and Crain (2007), questioned their techniques since they claimed that at least 6 of the 9 calculations were calculated incorrectly, and, considering the magnitude of their claim, they felt that opening the analytical method to scientific scrutiny would clarify some discrepancies in their claims. Furthermore, Block and Crain attempted to replicate Bushman and Anderson’s analysis using data from the medical literature and found that the correlation was .86 compared to the .40 reported by Bushman and Anderson. Bushman and Anderson defended their numbers by responding that they could not replicate Block and Crain’s calculations, either and they expressed doubt that such a large correlation could reflective of the true risk value in light of other moderating variables (Bushman & Anderson, 2007).

Sherry conducted a meta-analysis of 30 studies to clarify the discrepant results of previous studies. No comparison between the studies selected for this study and those selected for the previous meta-analysis can be made since Anderson and Bushman (2001) did not disclose which studies were ultimately included in the analysis. For those studies measuring multiple constructs of aggression (e.g., cognition and affect), Sherry took the mean of the effect sizes for the constructs measured as the effect size for the study as a whole. The meta-analysis found a positive correlation between violent video games and measures of aggression ($r = .15$, $n = 2722$) with a small effect size ($d = .30$) but offered some caution in interpreting these results. First, all of these studies were cross-sectional by design, so the author warned readers against making causal statements. The meta-analysis also found that paper-and-pencil measures of aggression yielded larger effect sizes than behavioral measures. Since the majority of the studies were paper-and-pencil measures, the effect size could be artificially inflated. Finally, length of play
was found to have a negative relationship with aggression meaning that longer amounts of gameplay of violent video games resulted in less aggression, suggesting the presence of a moderator variable. Sherry conducted a post-hoc analysis for moderator variables and found that the age of the subject ($r = .20$) and the year the study was published ($r = .39$) were both moderating the relationship between the violent video game exposure and aggression. That is, the effect size was found to be larger in more recent studies and in older subjects. This was the first meta-analysis to investigate the presence of moderating variables in this relationship.

Ferguson conducted a new meta-analysis in 2007 (2007a) to address a fourfold problem he identified in previous meta-analyses. First, he criticized the studies conducted to that date for equivocating the term “significant” to mean both statistically significant and having a substantial effect size. He pointed out that only small effect sizes, if any at all, were found in the research to date. Second, aggression and violence were used interchangeably in many of the papers with no research to suggest that there was a link between socially acceptable levels of aggression, such as playing pretend with toy swords, and unacceptable levels of violence, such as school shootings. Third, some of the most widely-cited papers were from a small group of researchers who reliably found correlations between violent video games and aggression when other researchers in the field published much more disparate findings. Finally, the literature contained no meta-analyses examining the possibility of publication bias in the literature. In this study, Ferguson used the same publication search engine parameters as Anderson and Bushman (2001) but with different selective criteria for meta-analytic appropriateness. Where Anderson and Bushman selected publications between 1975 and 2001, Ferguson selected publications between the years of 1995 and 2005 since video games were more graphically realistic, taken from the first-person perspective, and in an online context which, according to Sherry (2001), resulted in higher effect
sizes. Additionally, Ferguson only included publications from peer-reviewed journals in contrast to Anderson and Bushman’s (2001) method of including studies that their colleagues could provide via email from non-peer-reviewed sources. To maintain fidelity with Anderson and Bushman’s (2001) statistical approach, he transformed Pearson’s $r$s to Fisher’s $z$s, then weighted, averaged, and pooled them back to $r$, resulting in the annotation of $r^+$. The meta-analysis found that studies from 1995 to 2005 provided support for aggressive behavior ($r^+ = .29$, $K = 5$, $N = 483$), aggressive thoughts ($r^+ = .25$, $K = 12$, $N = 992$), and prosocial behavior ($r^+ = .30$, $K = 3$, $N = 374$). As a first step to attempt to address the fourfold criticism of previous research, Ferguson sought to investigate those studies that utilized “best practices” (p. 478), an operationally defined quality of measurement group with the sole criterion that the measure must have evidenced a .70 or better reliability (38% of the studies met this criteria). All other research was dichotomously, dummy coded into a second group for comparison. Results indicated that “best practices” measurements were negatively correlated with both effect sizes ($r = -.32$) and publication year ($r = -.32$) suggesting that unstandardized assessment has led to an over-inflation of effect size and more recent studies have increasingly used less standardized measurements. In a second step to address the fourfold criticism in the field, moderator variables were then appropriated and applied as controls to elucidate these results. Tests of homogeneity were examined and found to be positive across aggressive behavior [$\chi^2(4) = 15.27, p \leq .05$], aggressive thoughts [$\chi^2(11) = 50.23, p \leq .05$], and prosocial behavior [$\chi^2(2) = 10.76, p \leq .05$], indicating the presence of moderator variables. Age of the subject ($r = .29$) was identified as a moderating variable but, inconsistent with Sherry’s (2001) meta-analysis, year of publication was not found to be a moderating variable. In a third step to address criticism of previous research, Ferguson conducted publication bias analyses. Results indicated that the constructs of aggressive cognition and prosocial
behavior appear to be free of publication bias (ps ≥ .05). Aggressive behavior, however, does appear to be affected by publication bias with consensus across all five analyses of publication bias.

Anderson and seven of his colleagues responded to this criticism by conducting a new meta-analysis which reviewed the extant literature over the effect of violent video games on aggression, empathy, and prosocial behavior (Anderson et al., 2010). Additionally, the authors sought to account for the rapid growth in the past of violent video game research since Ferguson’s (2007a) meta-analysis was published. Finally, the authors stated that they intended to investigate the possibility of variables moderating the relationship between violent video games and aggression, empathy, and prosocial behavior. Their findings suggested that exposure to violent video games is a small risk factor in the development of state aggressive behavior ($r^+ = .189, K = 140, N = 68,313$), state aggressive cognition ($r^+ = .162, K = 95, N = 24,534$), state aggressive affect ($r^+ = .139, K = 62, N = 17,370$), decreased empathy ($r^+ = -.177, K = 32, N = 8,528$), and decreased prosocial behavior ($r^+ = -.101, K = 23, N = 9,645$). The methodology and subsequent conclusions outlined in this paper were met with some criticism.

Ferguson and Kilburn (2010) were the first to publish a paper outlining their criticisms of Anderson et al.’s (2010) study. They mentioned their agreement on many points, but they emphasized the need for more standardized and valid measurements for aggression before interpretations were worthwhile. Additionally, the authors pointed out that the measurements currently used for aggression are essentially uninformative since they fail to establish clinical cut-off scores. If, for example, aggression is seen to rise shortly after playing a violent video game, it is unknown whether that is a point of concern or simply an inconsequential variance in normal behavior. The authors also criticized Anderson et al.’s (2010) lack of fidelity to their own
“best practice” inclusionary standards with multiple studies used in the analysis explicitly contraindicated by the exclusionary criteria outlined in the purported methods. Finally, the authors reiterated Ferguson’s importunate criticism by way of four premises that, together, warrant a conclusion directly contradictory to Anderson et al.’s findings (2010). First, youth violence is at a record low since the 1960’s (Federal Bureau of Investigation, 2012). Second, video game sales are at an all-time high (Gentile, 2009). Third, violence in video games is at an all-time high with the vast majority of video games containing “violent” content (Dietz, 1998). Fourth, amount of video game play is at an all-time high (Anderson, Gentile, & Buckley, 2007). Ferguson and Kilburn pointed out that the conclusion that video games increase a child’s risk for subsequent violence appears contrafactual.

**Criticisms of constructs, measurement, and methods.** Criticisms addressing the lack of scientific rigor employed in this field have not all come from within the field of psychology. In 2001, The U. S. Surgeon General David Satcher reviewed the literature on youth violence and consequently reversed the previous Surgeon General C. Everett Koop’s hasty conclusion that even without evidence, it was apparent that violent video games were harmful for youths (Koop, 1982). Satcher stated that, according to what he reviewed, youth violence could not be attributed to traditional learning inputs such as exposure to violent media (U.S. Department of Health and Human Services, 2001). A decade later, the U.S. Supreme Court and the Australian Attorney General’s Department to funded a thorough examination of the scientific findings in the entire body of literature. The Australian government concluded that the findings were too rife with citation bias, publication bias, construct ambiguity of aggression and violent video games, and conflicting findings to inform legislating bodies (Australian Attorney General’s Department, 2010). Similarly, the U.S. Supreme Court found that there was insufficient scientific rigor to use
the extant findings as evidence to inform legislation (Brown v. Entertainment Merchants Association; 2011). In sum, the conclusion of the literature reviewed is that the field of violent video game research has produced, overall, biased, inconclusive, and equivocal results even though there are a number of excellent studies. Many of the more rigorous studies have produced results that are contradictory to the earlier, less well-designed studies, calling into question whether any consensus can be found, at all.

The Relationship Between Video Games and Prosociality

After decades of investigating the possible deleterious effects of video games, a number of more recent studies have sought to determine if there are measurable, beneficial effects from video game play. Many positive effects have been identified such as increased gross motor skills (Deutsch et al., 2008), increased ability to anticipate targets and visualize spatial paths (Subrahmanyam & Greenfield, 1994), decreased time in obtaining and responding to real-world targets (Greenfield et al., 1994), and more broad increases in perception, cognition, and action control with neurological corrective changes in the brain in cases of underdevelopment (Bavelier et al., 2011). More modern modalities of video game consumption such as dance- and exercise-based games have also offered new kinds of benefits for gamers that are only recently being studied. For example, a Nintendo Wii balance board-based video game has been found to increase static balance control in patients with acquired brain injury even in comparison to standard physical therapy (Gil-Gómez, Lloréns, Alcañiz, & Colomor, 2011). There is some evidence that Wii-based therapy also produces improvement in individuals with cerebral palsy (Deutsch, Borbely, Filler, Hughn, & Guarrera-Bowelby, 2008; Gordon, Roopchand-Martin, & Gregg, 2012) and individuals who are recovering from brain surgery (Betker et al., 2006).
Perhaps the most surprising positive effect of gaming came from the results of a study by Rosser et al. (2006) where surgeons who played over three hours per week of video games accounted for the largest amount of variance (31%) in predicting laparoscopic surgery skill above and beyond years of training and number of previous laparoscopic surgeries completed. Furthermore, surgeons who logged over three hours per week of previous video game play were 27% faster, made 37% fewer errors, and scored 42% better on a test of laparoscopic skill than those who never played.

Recently, researchers have begun to specifically investigate the possibility of social effects, either fostering or vitiating, from video game play. While the dependent variable of prosocial behavior has remained the same throughout these studies, the independent variable has varied. Researchers such as Colwell, Grady, and Rhaiti (1995) measured prosocial behavior with regard to amount of general video game play. They used a survey-based study that found positive correlations with video game play and time spent with friends outside of school. They interpreted these findings as refuting the concern that children who spent time playing video games were “missing out” on positive social effects. Indeed, some research in the same year found that there were no functional impairments correlated with playing video game play, even up to 25 hours per week (Phillips, Rolls, Rouse, Griffiths, 1995; Colwell, Grady, Rhaiti, 1995). However, experimental studies such as Sheese and Graziano’s 2005 study have found negative correlations between prosocial behavior and video game play. Bushman and Anderson (2009) measured prosocial behavior shortly after violent video game exposure and found that individuals who played a violent video game waited, on average, one minute longer ($M = 73.3$ s) to help a victim of a simulated assault than those who played a nonviolent video game ($M = 16.2$ s; $p < .02$, $d = 0.61$). Anderson et al.’s meta-analysis (2010) offered further support that violent video game
exposure may be followed by aggressive behavior in finding that a small, negative effect size of prosociality is found across a breadth of studies after violent video game exposure ($r^+ = -.101, K = 23, N = 9,645$). Additionally, Gentile et al. (2009), who distributed surveys to 727 Singaporean children. He found that amount of violent video game exposure predicted lower helping behaviors, although the direction of the relationship was indiscernible due to methodology.

While the aforementioned studies produced dissimilar results in their investigations of possible decreases in social functioning, more recent research explicitly examined prosocial behavior with regard to video game play. The reason for this reversal in hypothesis is unknown. However, it is plausibly due to the release and popularization of massively online video games solely developed for their prosocial content such as Second Life in 2003. The first of these tests was conducted by Greitemeyer and Osswald (2010), who found that after being exposed to a prosocial game, participants were more likely to help someone who had been hurt, commit more time to help with future experiments, and come to someone’s defense who was being harassed. Further research provided evidence for increased accessibility to prosocial thoughts (Greitemeyer & Osswald, 2011) and increased prosocial affect (Greitemeyer, Osswald, & Brauer, 2010). Adding further to the positive social effects, research suggests that prosocial content in video game play has the ability to reduce undesirable social variables that, in some cases, lead to prosocial behavior, as well. For example, video game play containing prosocial content has been shown to reduce aggressive cognitions and behavior (McGinley & Carlo, 2006).

It is important to note that all of the aforementioned outcomes were measured after the individual played the video game in an isolated context. That is, there were no other players interacting with the media alongside them. In fact, until very recently, nearly all of the research has concentrated on isolated video game play. Therefore, the applicability of this early research
on the social effects of video game play is now beginning to wane. Granted, the findings from those studies elucidated some of the questions pertaining to a one-on-one interaction between the subject and the content; however, a new trend in gameplay in the last two decades has been away from isolated play, and nearly all of the earlier research on video game play used this paradigm. The trend toward either competitive or cooperative play with human-controlled entities has grown stronger every year with the most recent poll showing 62% of gamers reporting gameplay with others, either online or in person (ESA, 2012). New research may be more widely applicable, then, if it included cooperative gameplay in its methods versus the isolated methodology that has predominantly been used.

How individuals would react with the methodologies used in previous research in a prosocial context is, as of yet, unknown. Specific desirable behaviors can ostensibly still be shaped by differential reinforcement of more prosocial behaviors. Using real-world teamwork to achieve objectives even by simulated violent means may very well still encourage prosocial behaviors. This possibility has not yet been explored. It is also uncertain as to how, if at all, aggression will be impacted by violent video game play through a prosocial process. According to earlier studies, prosocial content can decrease antisocial affect and aggressive behaviors. On the other hand, violent content in video games has sometimes been found to increase aggression. The current paper’s aim is twofold. It aims to examine the relationship between violent video games and prosocial video games played in a cooperative, prosocial context and subsequent measures of aggression and prosociality. It also aims to examine the relationship between violent video games and prosocial video games played in an isolated context in regard to measures of aggression and prosociality. In this experiment, it is hypothesized that playing games with prosocial content through a prosocial process will increase prosocial behavior. It is also
hypothesized that playing games with prosocial content via an isolated process will increase prosocial behavior. Additionally, playing games with violent content via an isolated process is hypothesized to increase aggression. Finally, without a precedent to this design, it is unknown how violent video games will correlate with aggression in a cooperative, prosocial context.
II. METHOD

Participants

To determine the appropriate number of participants to recruit for this study, the software program G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009) was utilized to calculate the power analysis. To achieve sufficient power to detect global effects in a MANOVA with 4 groups and 2 outcome variables, an \( \alpha \) of .05, a power (1-\( \beta \)) of .80, and an expected effect size of medium (\( f^2(V) = 0.25 \)), power analysis indicated the requisite number of participants should be 32. For the follow-up ANOVAs with 4 groups, an \( \alpha \) of .05, a power (1-\( \beta \)) of .80, and an expected effect size medium (\( f = 0.50 \)), a sample size of 48 would provide adequate power. For the purposes of overall sufficient power, the larger requirement of 48 participants was the target \( N \) for this experiment. This goal was successfully met, with a total of 55 subjects having participated in the study. Participants were recruited to the study from undergraduate-level courses in psychology in exchange for course credit.

Of the 55 participants, 71% were female (\( N = 39 \)) and 29% male (\( N = 16 \)) with ages ranging from 18 to 42 (\( M = 19.53 \)). Only two of the participants were married, leaving 96.4% of the sample unmarried. While the two married participants reported living with their spouse, the unmarried participants reported either living alone (9.1%), with children (5.5%), or with a friend or roommate (81.8%). The majority of the sample reported being unemployed (69.1%), one participant worked full time (1.8%), and the remaining participants reported having a part-time job (29.1%). When reporting total household income, 43.6% of the entire sample indicated that
they made less than $10,000, 5.5% made between $10,000 and $20,000, 12.7% made between $21,000 and $30,000, 18.2% made between $31,000 and $50,000, 18.2% made between $51,000 and $100,000, and 20% made more than $100,000. With regard to race, 72.7% of the sample self-identified as White, 18.2% identified as either Black or African American, and 7.3% identified as Asian. When asked about their religious affiliation, 43.6% of the participants indicated that they were Protestant Christian, 18.2% identified as Roman Catholic, 10.9% identified as Evangelical Christian, 1.8% identified as Hindu, 3.6% identified as Buddhist, 14.5% responded that they were not religious, 5.5% marked “Other,” and 1 participant did not circle any of the available answers but wrote “Christian” out to the side.

**Measures and Materials**

**Demographics.** Demographics were collected from the sample via a demographics questionnaire found in Appendix A. As outlined above, items address socio-economic scale, ethnicity, gender, age, and religious affiliation.

**Prosocial Tendency Measure.** The Prosocial Tendency Measure (PTM; Carlo & Randall, 2002), included in Appendix B, was developed to measure the level of prosociality that individuals typically exhibit. It is a self-report, 23-item questionnaire that is intended to assess overall prosocial tendency with 6 different subdomains of prosociality: public (4 items, $M = 2.03, SD = .65, \alpha = .78$), anonymous (5 items, $M = 2.70, SD = .95, \alpha = .85$), compliant (2 items, $M = 4.06, SD = .81, \alpha = .80$), altruism (5 items, $M = 4.26, SD = .54, \alpha = .74$), emotional (4 items, $M = 3.66, SD = .72, \alpha = .75$), and dire (3 items, $M = 3.53, SD = .70, \alpha = .63$) prosocial tendencies. Higher scores on the items indicate higher prosocial tendency with the items making up the altruism subscale being the only items that are reverse scored (e.g., “One of the best things
about doing charity work is that it looks good on my resume.”). Upon developing the measure, Carlo and Randall (2002) discovered these six subscales through a varimax rotated principal components exploratory factor analysis. These six factors accounted for 63.38% of the systematic variance in the college-age participants’ responses. Furthermore, a PTM composite score can be obtained by averaging the scores ($M = 3.33$, $SD = .53$, $\alpha = .73$).

**State Hostility Scale.** The State Hostility Scale (Anderson, 1997; Anderson, Deuser, & DeNeve, 1995), included in Appendix C, is a 35-item, self-report questionnaire intended to assess a participant’s current level of hostility. Respondents indicate on a 5-point Likert-type scale to what extent they agree or disagree with statements that contain either hostile content or non-hostile content. The 11 non-hostile statements are reverse scored so that a higher score on any item indicates higher hostility in that subdomain. Anderson, Deuser, & DeNeve (1995) found that the measure had excellent internal consistency ($\alpha = .94$), and that a principal components factor analysis with a Harris-Kaiser oblique rotation yielded four factors with eigenvalues greater than one. The subscales were named feeling unsociable (3 items, $\alpha = .59$), feeling mean (14 items, $\alpha = .95$), lack of positive feelings (10 reverse scored items, $\alpha = .90$), and aggravation (6 items, $\alpha = .85$).

**Resistance 3.** Resistance 3 was, at the time of this study, a relatively new first-person shooter video game for the Playstation 3. The player navigates through urban and rural terrain while killing enemies intended to stop him or her from achieving objectives. The Entertainment Software Rating Board (ESRB) rated Resistance 3 “M,” meaning the content is intended to be played by mature audiences. The ESRB describes video games in the M category as suitable for ages 17 and older due to the possibility of intense violence, blood and gore, and strong language.
Resistance 3 was chosen for its moderately high level of violence, its realistic graphics, and its inclusion of both a single-player and a cooperative play option.

**Portal 2.** Portal 2 is also a relatively new first-person video game for the Playstation 3 but without violent content. The player is required to use a gun that shoots entrances and exits to portals to continue to progress through subsequent levels of an underground facility. In mechanics, it is functionally identical to Resistance 3 except that the gun fires harmless portals rather than bullets. The ESRB rated Portal 2 as “E10+” indicating that it is intended for everyone aged 10 and older. Portal 2 was selected for inclusion in this study due to its identical first-person control scheme and its gun-based mechanics. Additionally, Portal 2 has a first-person, cooperative mode to parallel the cooperative mode of Resistance 3.

**Procedure**

Participants signed up for the study through experimental management software (Sona Systems). They were randomly assigned to play a video game in a format based on one of the following four conditions: 1) isolated prosocial game play; 2) cooperative prosocial game play, 3) isolated violent game play; or 4) cooperative violent game play. Prior to playing, each participant was told that the purpose of this study was to examine differences in how enjoyable video game play is among people who report different levels of emotions, motivations, and behaviors. They were then administered the questionnaire battery individually. Upon completing the measures, they were allowed five minutes of isolated play to ensure familiarity with the controls required to play the game. After the familiarity phase, the subjects played the game for 30 minutes consistent with their experimental condition, and then they were separated. They were then asked how enjoyable they found the game on a Likert-type scale with 0 meaning they...
did not enjoy it at all, 5 meaning they enjoyed it somewhat, and 10 meaning they enjoyed it immensely. Afterward, they were re-administered the SHS and the PTM.

An experimenter then collected the measures and informed the individual that the final requirement to award credit for successful completion of the experiment was to help choose which pictures to show participants for a different study. The participant was then told that the experimenter was too familiar with the pictures so help is needed for each set. The participant was asked to select 10 from a set of 30 photographs which were placed in random order. The 30 photographs were drawn from the International Affective Picture System (IAPS; Center for the Study of Emotion and Attention, 1995; Lang, Bradley, & Cuthbert, 2008), a set of photographs that have been widely researched and provide ratings for their emotional and cognitive effects (which are based on standardization studies with large samples). Each photo is rated according to subjective valence of the picture on a 1 (very negative) to 9 (very positive) Likert-type scale. Ten photos were chosen that were primed to bring about discomfort (ratings below 4; e.g., a rotting animal corpse), 10 photos rated as neutral (ratings from 4 to 6; e.g., a hairdryer), and 10 photos that typically bring about positive valence (ratings above 6; e.g., a puppy). Previous research (e.g., Mussweiler & Förster, 2000) has found that the selection of more uncomfortable photos for a subsequent viewer reflected aggression. The ratings associated with pictures chosen were employed as dependent variables in the analyses that follow.

Finally, the participants were thanked for their participation and released from the laboratory. Upon exiting the laboratory, a confederate approached the participant, informed them that they were recruiting volunteers for a charity, and requested that they take part in local volunteer activities for the needy (e.g., building projects, reading to the elderly, yard work). They were allowed to do nothing, sign a petition to increase the funding for local non-profit
organizations, sign up for email updates for volunteer opportunities, or register for 30 minute increments of volunteer work in the activity of their choosing. Immediately after designating the level of commitment they were willing to offer, they were fully debriefed and, should they have desired, were given materials for real volunteer work in the community for any follow-up that they may want.
III. RESULTS

Analysis

The means and standard deviations for each of the subscales collected for each condition appear in Table 1.

Participants’ answers on the video game survey revealed that 96.5% had played a video game at least once in the past year. Of those participants who had played video games in the past year, 88.6% had played games that qualify as violent according to the criteria set by the Causationists (e.g., Anderson & Bushman, 2001, p. 354). The categories meeting these criteria were first-person shooter, adventure, role-playing, massively-multiplayer online, and fighter games. Although nearly all participants played games on occasion, only 51.7% reported playing on a regular, weekly basis.

There were only two instances of missing data in this data set. One missing value was due to a confederate responsible for soliciting volunteer hours being unable to catch the participant after she exited the building. The other missing value was from a participant simply not answering an item on the Hostility Scale. Both of these missing values were addressed by utilizing mean imputation to replace the missing value with the average of the other 54 participants’ responses.

In order to investigate outliers in the data, Mahalanobis distance was calculated for each participant using his/her subscale score data from all instruments collected. Results from chi-squared analyses were that none of these values were designated as significant outliers ($p < $
.001), thus no data were removed from subsequent analyses. The data were then examined for non-normal distributions by identifying kurtosis scores that were greater than two deviations from the standard error of kurtosis ($SE = .634$). This analysis revealed that the Compliant subscale score from the PTM from the post-test measurement of the Compliant subscale was found to be kurtotic with a score of 1.48. The amounts of time participants offered to volunteer was also found to be kurtotic with a score of 5.11. In assessing the data for skew, the post-test Public subscale measurement from the PTM was found to be positively skewed with a score of 0.79 ($SE = .32$); the average valence scores from the volunteer task were also found to be negatively skewed with a score of 4.86 ($SE = .32$). Finally, the data from the photo selection task were found to be positively skewed with a score of 1.90 ($SE = .32$). All of these variables were logarithmically transformed to allow the assumptions of subsequent analyses to be met. 

Transformed data were used for the following analyses.

To assess for potential covariates in the data set, a series of ANOVAs were used to examine the data as a function of various demographic groups. Results indicated that gender was significantly associated with participants’ responses on pre- and post-test measurements on the Public ($p = .004$ and $p = .002$ respectively) and Altruism ($p = .02$ and $p = .04$ respectively) subscales of the PTM, as well as the pre-test measurement of the SHS ($p = .04$). Male participants indicated that they were more likely to help others when there was an audience present when compared to their female counterparts both before ($M_{males} = 10.00$, $M_{females} = 7.82$) and after ($M_{males} = 9.75$, $M_{females} = 7.05$) the video game task. Conversely, males were less likely to help simply for altruistic purposes, again, both before ($M_{males} = 17.69$, $M_{females} = 19.90$) and after ($M_{males} = 18.44$, $M_{females} = 20.55$) the video game task. Similarly, ethnicity was significantly associated with differences on the pre-test ($p = .005$) and post-test ($p = .049$) measurements of
the Compliance subscale of the PTM, indicating that African Americans were less likely to act prosocially after being asked to help. On the basis of these observed differences, race and gender were used as covariates for the following omnibus test.

Next, a MANCOVA was conducted to examine the effect of gaming condition on the dependent variables (namely prosociality, state hostility, average emotional valence rating of IAP pictures selected, and willingness to volunteer) while controlling for gender and race. The analysis indicated no differences on these measurements between groups (Wilks’ Lambda = 0.31, \( F(3, 52) = 1.09, p = .36 \)). Conducting the same analysis without including gender and race as covariates also yielded null results (Wilks’ Lambda = 0.25, \( F(3, 52) = 1.23, p = .19 \)).

Nonetheless, specific a priori hypotheses regarding the relationship between prosociality, prosocial games, violent video games, and aggression made univariate examinations of these variables appropriate. These analyses were run in a more isolated fashion via repeated measures ANOVAs. First, it was hypothesized that consuming violent video game content would have limited effect on an individual’s scores on aggression measures. The results of an analysis designed to test this assertion revealed no significant group (violent vs. non-violent) by time (pre- vs. post-game play) interactions on SHS scores \( [F(1, 52) = 0.27, p = .609] \) indicating that the type of game and context of such (i.e., cooperative vs. isolated) did not have a significant impact on participants’ self-reported aggression.

The second and third predictions for this experiment hypothesized that individuals who played the non-violent game in both the isolated and cooperative contexts would endorse higher levels of prosociality on prosocial measures. These hypotheses were only partially supported by the data. There was a significant effect found in the interaction between gaming conditions and the difference between the pre-test and post-test scores on both the Public \( [F(1, 52) = 3.11, p = \)
.04] and Altruistic subscales \[F(1, 52) = 4.02, p = .02\]. The means and standard deviations of responses on these subscales across each condition are presented in Table 2. Based on this interaction effect, pairwise comparisons using Tukey’s HSD were conducted. These results indicated significant differences between the independent non-violent gaming condition \((M = 6.42)\) and in the cooperative violent condition \((M = 9.77)\) on the Public subscale, \(t(55) = 2.87, p = .03\). Additionally, significant differences were found between the cooperative violent gaming condition \((M = 17.23)\) and the cooperative non-violent gaming condition \((M = 21.86)\) on the Altruism subscale, \(t(55) = 4.01, p = .002\).

Additionally, a stepwise multiple linear regression analysis was used to develop a model for predicting participants’ time volunteered in the behavioral task from their scores on the PTM self-report questionnaire subscales. The analysis indicated that only the pre-test measurement of the Compliant subscale was a significant predictor of time volunteered, which accounted for 9% of total variance in this behavioral task, \(F(1, 54) = 11.15, p = .03, R^2 = .09, 95\% CI (.04 - .57)\). A similar regression analysis was used to examine the prediction of participants’ scores on the photo selection behavioral task from their scores on the pre- and post-test measurements of the SHS aggression self-report questionnaire (again using a stepwise process). This analysis indicated that neither variable was a significant predictor of the behavioral task score.
IV. DISCUSSION

Findings

In this experiment, some aspects of prosociality, under specific conditions, were affected by manipulation of the independent variables. Specifically, participants who played a violent video game cooperatively scored higher on self-reported scales of public prosociality after gameplay than participants who played a non-violent video game alone. Additionally, participants who played a non-violent game cooperatively scored higher on self-reported scales of altruism after gameplay than participants who played a violent video game cooperatively. Alternatively, the main findings on multiple measurements of hostility indicated that there were no effects of manipulation of video game content (violent vs. non-violent) or gameplay context (individual vs. cooperative).

These results raise interesting questions when considered in the broader, often disparate or polarized, framework of extant research in this area. For example, previous studies utilizing violent video game exposure as an independent variable have found either no correlation with prosociality (e.g., Ferguson & Garza, 2011) or a small, negative effect (e.g., Anderson et al., 2010) Indeed, it is a topic of strong contention whether the relationship exists or not, with official governmental policies contending that conclusions on this matter cannot be strongly informed by published scientific findings (Australian Attorney General’s Department, 2010). The current study’s findings of some contextual, positive, significant effects on prosociality suggest that the relationship between these constructs may be more multi-faceted than previously considered. It
is possible that certain forms of prosociality, for example, are differentially impacted by cooperation (even on tasks with violent content).

The results in terms of simple effects were somewhat more difficult to interpret. No main effect of context on prosociality was observed in this experiment, so conclusions about the nature of playing alone or playing cooperatively, in general, cannot be drawn. Furthermore, there was also no main effect of content on prosociality observed which prohibited generalized conclusions regarding the direct impact of playing violent video games on prosocial behavior. Only very specific parameters produced significant effects when comparing two subtypes of prosociality across conditions. When and where these differences were observed, they were large, although the sample size and limitations in terms of forming conclusions on the basis of largely null results do not facilitate stronger interpretation of these results.

It is clear, however, that the hypotheses that prosocial content and a prosocial context would influence prosocial behavior were unsupported by these data. Participants did not report more prosocial tendencies on the PTM and also did not offer more volunteer time after being exposed to prosocial content or contexts. As previously mentioned, prosocial behaviors such as volunteering have historically been found to increase after being exposed to a prosocial video game, although this has been an inconsistent finding. The results from the current study offer no aid in cogently interpreting this sometimes-seen effect. These results were unexpected, since measuring prosociality using two separate methods was explicitly executed to enhance this element of study and facilitate greater interpretation of discrepant findings found in the literature.

Consistent with previous research, no correlation was found between self-report measures of aggression and behavioral tasks such as the IAPS photo selection task. Also, consistent with previous research, the PTM was (at least in part) able to predict behavior outside of the
laboratory. One possible reason for this disparity of association is due to the ethical concerns involved with measuring aggression behaviorally versus overt prosocial behaviors. Measurements of prosociality are not inhibited by ethical issues and, thus, the PTM’s external validation was a more straightforward process (Carlo & Randall, 2002; Carlo, Hausmann, Christiansen, Randall, & Jarvis, 2003). Alternatively, research promoting interpersonal aggression is likely fraught with ethical complications, and data concerning behavioral predictions are scarce. This difference in previous methods may help explain why the participants’ scores on the Compliant subscale of the PTM were found to correlate with time volunteered. Indeed, the solicitation of volunteer work was theoretically a direct measurement of prosocial compliance, as measured by this scale.

Additionally, it is possible that this experiment failed to find significant relationships between different types of video game exposure and subsequent behavior due to minimal impact of media consumption in shaping proximal behaviors. Put another way, null results were notable because this is representative of the true association between these constructs at a population level (i.e., very little. The Catalyst Model makes this very prediction, and in some respects a lack of significant results is not surprising. Given the accumulation of evidence from what are generally more carefully controlled, unbiased studies (in comparison to those from Causationist authors) some considerable weight may be afforded to this potential. In any case, worry over possible deleterious recreational activities dates back to Plutarch defending poetry against the Ancient Greek populous’ worry over its harmful effects (Euben, 1997). As previously mentioned, this bias may have been appended to new forms of entertainment such as video games. This notion has been directly cited as present in much of the literature associating video games with violence, thus tempering researchers’ ability to fully interpret extant publications. It
is thus plausible to theorize that video games are a kind of “moral panic” (Ferguson et al., 2012) for the current generation of concerned parents and policymakers (and, more alarmingly, some scientific researchers). Nonetheless, the difficulty of interpreting null results remains and forming conclusions on this basis would be overstepping the data collected.

**Methodological Implications**

Despite largely null results, the current study elucidated the need to think forward to methodological issues for future work in this area. For example, if the only relationship between video game play and prosociality turns out to be highly contextual, new approaches will be required to examine the nature of these relationships. In particular, previous work has been criticized for the simplicity of analyses and lack of scrutiny in ruling out confounding variables (i.e., “third variables;” Ferguson et al., 2006, p. 312). The current study implemented a more robust manipulation of video gameplay context and content to measure self-reported variables as well as real-world, tangible behavior in comparison to methods employed in previous studies. This allowed for an opportunity to examine the difference between two commonly-used self-report questionnaires and the behaviors that they are designed to predict. Replications in future study with additional measurement, longitudinal analyses, and creative methods of determining behavioral concordance may further address methodological criticisms and advance knowledge in this area. Additionally, the inclusion of a gameplay context factor in the current study allowed for scientific examination of two very common, real-world scenarios of playing different kinds of games (i.e., with and without friends.) This design has not previously been employed, and was chosen specifically to increase the external validity of the experiment. To the extent that this
factor is examined in future studies this, too, may yield methodological and programmatic advantages.

This study was also designed to address some of the methodological flaws found in the current literature. Critics of the Causationist literature have pointed out that there was a lack of external validity since most of the literature showing a correlation between violent video games and aggression relied on measurements that have not shown any correlation to aggression when measured behaviorally (Durkin, 1995; Ferguson & Garza, 2010; Adachi & Willoughby, 2011). These measurements were classified into two groups. First, pen-and-paper self-report questionnaires that have historically failed to provide any research to suggest that they predicted real-world aggression. Second, aggression analogues such as the TCRTT have been utilized, despite the fact that these have been demonstrated to have limited correspondence with neurological substrates known to predict aggressive behavior (Ferguson, Smith, Miller-Stratton, Fritz, & Heinrich, 2008). This study sought to mitigate these measurement errors by using time volunteered, which was treated as an exemplar of prosociality. Behavioral analogues such as these, particularly if applied without full disclosure (i.e., with the use of mild deception), may also facilitate future advances in study.

Additionally, it was notable that comparing the current sample to many others identified in the extant literature indicated that this group engaged in video game play at a much higher rate (Gentile & Walsh, 2002; Gentile, 2009; ESA, 2012). Previous studies were able to primarily include samples of non-video game players, of which there are now few among younger adults (ESA, 2012). Therefore, it is possible that these studies assess a slightly different construct (i.e., the initial, proximal effect of video game exposure), and that any novel effects seen could habituate over time. If this is true, the trend of higher consumption of video games over the years
is potentially problematic for integrating the findings of earlier research into prospective theories or specific hypothesis generation. Research from an era before the mass consumption of video games may have been recording novel effects which would call into question their validity for a modern population. Therefore, it may be warranted to more carefully scrutinize the strength or existence of relationships between media exposure and subsequent affect, cognition, and behavior when generalizing earlier findings to contemporary times. At the very least, capturing future participants’ familiarity and engagement with video games in terms of intensity, frequency, and duration appears to be a critical element for studies conducted in a changing cultural landscape of technological diffusion. This could allow inter-generational comparisons of consumption rates, as well as the potential for relevant covariation, moderation, or mediation analyses in future study.

**Strengths, Limitations, and Future Implications**

One strength of this study was its methodological rigor in selecting video games that were maximally identical to control for violence as the premiere difference between the two. Previous research has largely failed to apply such careful control between conditions. This experiment also offered a multi-modal assessment of prosociality and aggression with deception used as a method of increasing the external validity of these findings. This quality of research design may lend slightly higher credence to these results than early research in the field, much of which has received heavy criticism in contemporary articles.

The current study is not without its faults, however. First and foremost, drawing causal statements is impossible from null results. However, these results do add to the growing body of literature producing similar findings when examining a relationship between violent games and
negative outcomes (Van Schie & Weigman, 1997; Sherry, 2001; Durkin & Barber, 2002; Ferguson, 2007; Sherry, 2007; Ferguson, Rueda, Cruz, Ferguson, Fritz, & Smith, 2008; Ferguson & Kilburn, 2009; Ferguson, San Miguel, & Hartley, 2009; Ferguson, 2010; Ferguson, Olson, Kutner, & Warner, 2010; Ferguson & Garza, 2010; Ferguson & Rueda, 2010; Adachi & Willoughby, 2011; Ferguson, San Miguel, Garza, & Jerabeck, 2012; Ferguson, Garza, Jerabeck, Ramos, & Galindo, 2013; Ramos, Ferguson, Frailing, Romero-Ramirez, 2013). Despite the logical fallacy involved in any attempt to conclusively, statistically establish a non-relationship between two variables, a large enough base of articles with similar results (i.e., a lack of a relationship) confers skepticism that any such relationship exists.

Additionally, more research is necessary to determine if prosociality follows a similar trajectory as aggression. That is, whether or not prosocial behavior is also predominantly affected by genetic and familial influences is an empirical question that has not yet been addressed. Socio-cognitive models exist, of course, but a model that takes into account cross-disciplinary empirical findings that evidences incremental strength in its predictive power may help bridge the gap between these two, often co-researched, related constructs. If contextualized in terms of cooperation vs. isolation as a facet of study in future video game research, these theoretical mechanisms of trait development become very relevant.

Another avenue for future research is the level to which individuals can interpret video game aggression as qualitatively different than real-world aggression via context. For example, in football, an athlete may be physically aggressive with his teammates in a scrimmage but, at the end of the match, behave perfectly affably toward those same teammates. Some researchers have indicated that this understanding of context also occurs in video games (Ferguson & Dyck, 2012), thus mitigating the impact of game play on subsequent aggression. The phenomenon of
being able to compartmentalize fantasy is well-established in developmental literature, and has been noted to be present before the age of 5 (Woolley & Van Reet, 2006; Corriveau, Kim, Schwalen, & Harris, 2009; Boerger, Tullos, & Woodley, 2009). Thus, it is within reason to aim to investigate these constructs in future research, particularly through the application of longitudinal methods.
V. LIST OF REFERENCES
References


Loftus, G. (1996). Psychology will be a much better science when we change the way we analyze data. *Current Directions in Psychological Science, 5*, 161-171.


VI. LIST OF APPENDICES
APPENDIX A: DEMOGRAPHICS QUESTIONNAIRE
DEMOGRAPHICS-Self-Report

D1. What is your biological sex?
   0 = Male
   1 = Female

D2. How old are you? __________
   (Ranges from 18 to 64)

D3. What is your marital status?
   0 = Never married
   1 = Married
   2 = Divorced/Annulled
   3 = Separated
   4 = Widowed
   5 = Not married, but living with partner

D4. Who do you currently live with? Check all that apply.
   □ = Alone
   □ = Other relative
   □ = Spouse or romantic partner
   □ = Friend or roommate
   □ = Children (under age 18)

D5. What is your highest education level completed?
   0 = Elementary (8th grade or less)
   1 = Some High School
   2 = High School Diploma
   3 = Some College
   4 = Bachelor’s Degree
   5 = Master’s Degree
   6 = Doctoral or professional degree (PhD, MD, etc.)

D6. What best describes your current employment status?
   0 = Unemployed
   1 = Home Maker
   2 = Part-Time
   3 = Full-time (40 hours per week or more)

D7. What best describes your total household income (before taxes)?
   0 = Less than $10,000
   1 = $10,000 to $20,000
   2 = $21,000 to $30,000
   3 = $31,000 to $50,000
   4 = $51,000 to $100,000
   5 = Greater than $100,000

D8. Do you describe yourself as a Hispanic or Latino?
   0 = No
   1 = Yes

D9. What is your race?
   0 = White
   1 = Black/African American
   2 = Asian
   3 = Native American, Alaskan Native
   4 = Asian or Pacific Islander
   5 = Native Hawaiian or Other Pacific Islander
   6 = Multiracial (list numbers _____ & _____ & _____)

D10. What is your religious affiliation?
    1. Protestant Christian
    2. Roman Catholic
    3. Evangelical Christian
    4. Jewish
    5. Muslim
    6. Hindu
    7. Buddhist
    8. Other: ____________________
    9. I am not religious
APPENDIX B: VIDEO GAME CONSUMPTION SURVEY
Video Game Survey

The purpose of this survey is to assess different aspects of your video game play. Please answer the following questions to the best of your ability. If you have any questions, please ask the experimenter. Thank you for your participation.

Age: ______________________
Gender: ______________________

1. Which of the following gaming systems do you own? (Circle all that apply)

Xbox 360   PC   Wii   Nintendo DS   Nintendo 3DS
Xbox   Playstation 3   Playstation 2   PSP
Other: ____________________________

2. How many people play video games in your house or dorm room? (Please circle one)

1   2   3 or more

3. Please indicate how often in the past year have you done the following:

Played a PC based video game?
Never   Seldom   Sometimes   Frequently   Often

Played a console based video game?
Never   Seldom   Sometimes   Frequently   Often

Played an online video game that you play in a browser (e.g., Farmville, Flash Games, etc.)
Never   Seldom   Sometimes   Frequently   Often

Played a cell-phone or tablet based video game (e.g., Angry Birds, Draw Something, etc.)
Never   Seldom   Sometimes   Frequently   Often

During an average week, how many hours will you spend playing video games?
< 1 hour   1-3 hours   3-5 hours   5-7 hours   7-9 hours   > 9 hours
4. If you play video games, at what age did you first begin playing? __________

5. Please indicate how often in the past year you have played the following:

<table>
<thead>
<tr>
<th>Category</th>
<th>Never</th>
<th>Seldom</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Played Call of Duty, Team Fortress, Borderlands, Bioshock, or other first-person shooters?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Played Uncharted, Tomb Raider, Grand Theft Auto, or other adventure-shooter games?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Played Starcraft, Warcraft, Command and Conquer, Civilization, or other strategy games?</td>
<td></td>
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<tr>
<td>Played Final Fantasy, Fable, Witcher, Mass Effect, Dragon’s Dogma, or other role-playing games that are NOT MMORPGs?</td>
<td></td>
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</tr>
<tr>
<td>Played World of Warcraft, Guild Wars, Star Wars: The Old Republic, or other MMORPGs?</td>
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<td></td>
</tr>
<tr>
<td>Played Injustice, UFC, Soulcalibur, Marvel vs. Capcom, Virtua Fighter, or other fighter games?</td>
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<tr>
<td>Played Need for Speed, Burnout, Gran Turismo, Mario Kart, Dirt, or other racing games?</td>
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<tr>
<td>Played NBA 2K--, Tiger Woods PGA Tour, FIFA, Madden, MLB, or other sports games?</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Played Rock Band, Guitar Hero, Karaoke, Dance Dance Revolution, or other music games?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C: PROSOCIAL TENDENCIES MEASURE
Prosocial Tendencies Measure

Below are a number of statements which may or may not describe you. Please indicate HOW MUCH EACH STATEMENT DESCRIBES YOU by using the scale below.

<table>
<thead>
<tr>
<th>DOES NOT DESCRIBE ME AT ALL</th>
<th>DESCRIBES ME A LITTLE</th>
<th>SOMEWHAT DESCRIBES ME</th>
<th>DESCRIBES ME WELL</th>
<th>DESCRIBES ME GREATLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1. I can help others best when people are watching me.
2. It is most fulfilling to me when I can comfort someone who is very distressed.
3. When other people are around, it is easier for me to help needy others.
4. I think that one of the best things about helping others is that it makes me look good.
5. I get the most out of helping others when it is done in front of others.
6. I tend to help people who are in a real crisis or need.
7. When people ask me to help them, I don't hesitate.
8. I prefer to donate money anonymously.
9. I tend to help people who hurt themselves badly.
10. I believe that donating goods or money works best when it is tax-deductible.
11. I tend to help needy others most when they do not know who helped them.
12. I tend to help others particularly when they are emotionally distressed.
13. Helping others when I am in the spotlight is when I work best.
14. It is easy for me to help others when they are in a dire situation.
15. Most of the time, I help others when they do not know who helped them.
16. I think there should be more recognition for the time and energy people spend on charity work.
17. I respond to helping others best when the situation is highly emotional.
18. I never hesitate to help others when they ask for it.
19. I think that helping others without them knowing is the best type of situation.
20. One of the best things about doing charity work is that it looks good on my resume.
21. Emotional situations make me want to help needy others.
22. I often make anonymous donations because they make me feel good.
23. I feel that if I help someone, they should help me in the future.
APPENDIX D: STATE HOSTILITY SCALE
State Hostility Scale
Current Mood

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

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Neither Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I feel furious.</th>
<th>I feel like I’m about to explode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel willful.</td>
<td>I feel friendly.</td>
</tr>
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<td>I feel aggravated.</td>
<td>I feel understanding.</td>
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<td>I feel tender.</td>
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<td>I feel polite.</td>
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<td>I feel discontented.</td>
<td>I feel bitter.</td>
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<td>I feel like banging on a table.</td>
<td>I feel burned up.</td>
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<td>I feel like yelling at somebody.</td>
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<td>I feel frustrated.</td>
<td>I feel cooperative.</td>
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<td>I feel like swearing.</td>
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<td>I feel unsociable.</td>
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<td>I feel disgusted.</td>
<td>I feel vexed.</td>
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<td>I feel tame.</td>
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VII: LIST OF TABLES
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<th>Measure</th>
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<th>Post-Test Measurement</th>
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<td>$SD$</td>
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*Note.* PTM = Prosocial Tendency Measure; SHS = State Hostility Scale; Photo = International Affective Picture System (IAPS) Photo Selection Task; Volunteer = Hours volunteered

* Behavioral Task
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</table>
VII. CURRICULUM VITAE
VITA

Jeremiah Nathaniel Beene

EDUCATIONAL BACKGROUND

Present
Clinical Psychology Ph.D. Program
Graduate Student
University of Mississippi, Oxford, Mississippi

May 2011
Bachelor of Arts in Psychology
University of Arkansas, Fayetteville, Arkansas

February 2008
United States Army UAV Flight School
Fort Huachuca, Arizona
Honors: 1st in Class

August 2005
United States Army Counterintelligence School
Fort Huachuca, Arizona
Honors: 2nd in Class

May 2002
Missouri State University
Springfield, Missouri
No degree completed

AWARDS & HONORS

November 2008
Bronze Star Medal
United States Army
Awarded for Extraordinary Valor in Combat

November 2008
Army Commendation Medal
United States Army
Awarded for Exemplary Leadership Initiative and Innovation

February 2008
Military Outstanding Volunteer Service Medal
United States Army
Awarded for Over 500 Hours Community Service
08/2000 – 05/2001  Presidential Scholarship  
Missouri State University

08/2000 – 05/2001  Academic Excellence Scholarship  
Missouri State University

RELEVANT EXPERIENCE

05/2012 – present  Graduate Therapist  
Psychological Services Center  
University of Mississippi  
207 Rebel Drive  
University, MS 38677

07/2015 – present  Teaching Assistant  
Graduate Statistics  
University of Mississippi  
Department of Psychology  
University, MS 38677

07/2014 – 07/2015  Clinic Coordinator  
Psychological Assessment Clinic  
University of Mississippi  
207 Rebel Drive  
University, MS 38677

07/2013 – 07/2014  Teaching Assistant  
Introduction to Statistics  
University of Mississippi  
Department of Psychology  
University, MS 38677

07/2012 – 07/2014  Behavioral Analyst, Graduate Therapist  
Education and Research Department  
The Baddour Center  
3297 Highway 51 South  
Senatobia, MS 38668  
Supervisor: Shannon Hill, Ph.D.

08/2011 – 08/2012  Graduate Research Assistant  
Scientific Infusion That Helps Laboratory  
University of Mississippi  
Department of Psychology  
University, MS 38677  
Supervisor: John Young, Ph.D.

08/2009 – 07/2011  Research Assistant  
Laboratory for Anxiety and Substance Abuse Research  
University of Arkansas  
Department of Psychology
Fayetteville, AR  72701
Supervisor: Lindsay S. Ham, Ph.D.

03/2010 – 10/2010  Principal Investigator: Laboratory for Anxiety and Substance Abuse Research
Independent Research Project
University of Arkansas
Department of Psychology
Fayetteville, AR
Supervisor: Lindsay S. Ham, Ph.D.

PROFESSIONAL PRESENTATIONS AND PUBLICATIONS


Beene, J. N. (2010, October). Perceived control of undesirable affect and overall sleep efficiency. Invited presentation at the Laboratory for Anxiety and Substance Abuse Research meeting at the University of Arkansas, Fayetteville, Arkansas.


PROFESSIONAL MEMBERSHIPS

Present  Assoc. for Contextual Behavioral Science  Student Member
Present  American Psychological Association  Student Affiliate
08/2009 – 07/2011  Arkansas Psychological Association  Student Associate
08/2009 – 07/2011  Psychology Club  Member

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04/2009 – 07/2011  Northwest Arkansas Philosophy Club  President

**RELEVANT EMPLOYMENT**

| Present | Project Leader | Teen Action and Support Center  
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<tr>
<td></td>
<td></td>
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<td></td>
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<td>Supervisor: Dawn Spragg, M.S., L.A.C.</td>
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| 08/2005 – 06/2009 | Counterintelligence Agent – Special Agent | United States Army  
|-------------------|-------------------------------------------|-------------------|
|                   |                                            | United States of America  
|                   |                                            | Supervisor: CW03 Joseph Kopecky |