

EGO DEPLETION AND ACTIVE VIOLENT MEDIA: VIDEO GAMES, SELF-CONTROL, AND
AGGRESSION

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ABSTRACT

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The present study aims to examine the relation between violent media exposure (via violent video games) on the one hand and ego depletion, and aggressive behavior, cognitions, and affect on the other. In particular, the goal is to determine if one of the reasons why violent video games stimulate aggression is because they deplete limited cognitive resources (i.e., “ego depletion”), and therefore inhibit self-control. Short-term effects of playing violent video games on aggression have primarily been attributed to priming and mimicry (Anderson, et al. 2010). However, it may be possible that playing video games also depletes limited cognitive resources, reducing self-control, and increasing the likelihood of aggression in response to provocation (Stuck & Baumeister, 2006). Research has been done to examine the relation between self-control and aggression, between self-control and ego depletion, and between ego depletion and aggression. However, little has been done to examine the role of this process in the relation between playing violent video games and aggression, and the current study aims to address this gap in the literature. In this study, data were collected from 96 undergraduate students who either played or watched images from a violent or non-violent video game and then engaged in separate tasks designed to assess ego depletion, aggressive behavior, aggressive thoughts, and aggressive cognitions. The results indicated that, although playing violent video games did not lead to higher levels of aggression or higher levels of ego depletion, individuals who exhibited higher levels of ego depletion exhibited higher levels of aggressive behaviors. Findings from the current study have implications for future research, including more accurately determining the

psychological and interpersonal effects of ego depletion, especially in the presence of violent media.

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INTRODUCTION

For the past four decades, video games have been a predominant force in contemporary media and mainstream society. Survey research shows that 58% of Americans play video games, and that the average household owns at least one game console, personal computer, or smartphone that family members use for playing video games (The Entertainment Software Association, 2014). Additionally, video games have become progressively more popular with a wider range of players. Currently, the average video game player is 30 years old and has been playing video games for about 13 years (The Entertainment Software Association, 2014). Following in the trend of other forms of popular media, video games have become increasingly more graphic and violent. The effects of violent video games have become a controversial issue in recent years as various studies have illustrated that playing violent video games can increase aggressive behavior not only in the short-term, but in the long run as well (Anderson et al., 2010). Several psychological processes have been implicated to explain why playing violent video games might lead to aggression. For example, playing such games might strengthen normative beliefs that aggression is justified, and might lead players to become emotionally and cognitively desensitized to violence (Funk, 2005; Funk, Bechtoldt-Baldacci, Pasold & Baumgartner, 2004; Huesmann & Kirwil, 2007).

Another possible mechanism in the link between playing violent video games and subsequent aggression is self-control. A link between aggression and self-control has been established, such that when self-control is weakened, aggressive behavior is more likely to exhibit itself (Stucke & Baumeister, 2006). Additionally, the theory that the brain has limited cognitive resources has been suggested as a possible factor contributing to the decline of self-control after the expenditure of cognitive effort. As a result, the depletion of cognitive resources

then contributes to subsequent decreases in self-control and increases in aggression (Baumeister, Heatherton, & Tice, 1994). Research has been conducted to examine the relation between self-control and aggression, between self-control and ego depletion, and between ego depletion and aggression. However, role of ego depletion in the relation between playing violent video games and aggression has not yet been examined. In the present study, I will examine if certain forms of media, specifically video games, are cognitively demanding and therefore produce the effects of ego depletion. In particular, I hypothesize that one of the reasons why violent video games stimulate aggression is because they deplete limited cognitive resources, and therefore lower self-control.

Cognitive Resources and Self-Control

The idea that self-control is an “effortful” mental task that requires cognitive resources was first proposed by Baumeister et al. (1998) when these authors reviewed multiple studies, illustrating diminished self-control on tasks following prior activities that seemed to deplete cognitive resources. Self-control is defined as the “adjustment” of behavior to fall in line with social norms, expectations, and standards. It often involves “inhibiting” impulsive tendencies motivated by emotions or desires, and it is a crucial factor in the lives of humans as they interact with one another daily (Baumeister & Heatherton, 1996; Gailliot & Baumeister, 2007). While self-regulation is considered a function of personal expectations, beliefs, attitudes, and intentions, self-control is viewed as a limited commodity that facilitates self-regulatory capability (Ajzen, 1985; Bagozzi, 1992; Baumeister & Heatherton, 1996; Fishbach, Friedman, & Kruglanski, 2003; Koestner, Bernieri, & Zuckerman, 1992; Matcalfe & Mischel, 1999; Sansone & Smith, 2000). Used interchangeably in the literature, the terms self-control and self-regulation are considered to be synonymous with *willpower* and *self-discipline* (Baumeister et al., 2007;

Duckworth & Seligman, 2005; Henden, 2008; Hofmann et al., 2007; Mischel, 1996). High levels of self-control have been closely linked to more constructive interpersonal relationships, reduced prejudice and stereotyping, greater mental health and emotional management skills, control over eating disorders, criminal behaviors, and substance abuse (Duckworth & Seligman, 2005; Finkel & Campbell, 2001; Gailliot, Peruche, Plant, & Baumeister, 2009; Gailliot, Schmeichel, & Baumeister, 2006; Gottfredson & Hirschi, 1990; Mischel, Shoda, & Peake, 1988; Muraven, Collins, & Nienhaus, 2002; Pratt & Cullen, 2000; Shoda, Mischel, & Peake, 1990; Tangney, Baumeister, & Boone, 2004).

The role of a limited cognitive resource in the brain has been examined closely in recent years along with its influence on self-regulation. The term *ego depletion* was coined to indicate the exhausted state, or depletion of the limited resource after exercising self-control (Baumeister et al., 2007). Evidence for ego depletion has even been shown to occur in canines, measured by persistence in engagement with a play toy after being instructed to perform extended self-control tasks (Miller et al., 2010). Baumeister et al. (1998) suggested the idea of a strength model, which states that the exertion of self-control depletes a common resource in the body, and can be likened to a muscle that becomes exhausted after strenuous use. This resource can be restored by rest or through the replenishment of fuel (Gailliot & Baumeister, 2007; Tyler & Burns, 2008).

The “dual-task paradigm” is often used in empirical studies measuring the effects of ego depletion (Baumeister et al., 1998; Finkel et al., 2006; Muraven, Tice, & Baumeister, 1998). This experimental procedure requires participants to engage in consecutive, unrelated tasks.

Participants assigned to the experimental ego depletion group complete two consecutive self-control tasks, while control subjects complete two tasks, with only the second requiring self-control. Using the strength model as a theoretical framework, the prediction is that participants in

the ego control condition will have impaired performance on the second self-control task relative to those in the control condition. This is due to the assumption that participants who engage in an initial self-control task will become depleted, and will therefore have fewer self-control resources to draw upon for the second task (Baumeister et al., 2007). Although no self-report measures of ego depletion exist currently, impaired performance on subsequent self-control tasks serves as an indicator of depleted cognitive resources, and therefore ego depletion. This paradigm has been replicated within the body of ego depletion literature, and has been found to be relatively consistent, suggesting that effects are not due solely to one set of tasks (Baumeister et al., 2007; Baumeister & Vohs, 2007; Tyler, 2008; Wright, Martin, & Bland, 2003). A meta-analysis of the effects of ego depletion by Hagger et al. (2010) illustrates its current importance in the area of self-regulation research, and the authors proposed several questions to guide experiments in the future. The proposition that an individual's beliefs about self-control and willpower can moderate how they are influenced by ego depletion has also been recently explored (Job, Dweck, & Walton, 2010)

As noted, the strength model states that utilizing self-control pulls from a limited cognitive resource, therefore depleting it for immediate future use. There has been much speculation about what this resource might be, and the dominant theory in the existing literature states that cognitive resources are determined by glucose level (Gailliot & Baumeister, 2007). Several studies have demonstrated parallel decreases in blood glucose and ego depletion after engaging in self-regulatory tasks, with the effect on ego depletion being mitigated by glucose consumption relative to a placebo (DeWall, Baumeister, Gailliot & Maner, 2008; Dvorak & Simons, 2009; Gailliot, Baumeister, et al., 2007; Gailliot, Peruche, Plant, & Baumeister, 2009; Masicampo & Baumeister, 2008). While these studies support this theory, other researchers

claim that the idea of a resource model is an incorrect one altogether as it is inconsistent with what is known about brain metabolism and glucose consumption (Kurzban, 2010). Kurzban (2010) highlights that in many studies examining the glucose resource model, effects were only found in those subjects who were instructed to fast before the study, and therefore results from these studies cannot explain data from those who were not required to fast. He states additionally that according to neuroscience literature, it is unlikely that the glucose consumption that occurs during a brief self-control task would be significant in size. Despite the debate around what specifically the factor in this process is, it seems as though there is a consensus in the research that participating in mentally effortful, self-regulatory tasks compromises the ability to engage subsequently in self-regulatory processes.

Empirically, it has been shown that cognitive resources can be depleted by certain cognitively demanding tasks, including those that require effortful attention, self-regulation, decision making, or that utilize executive functions, such as planning, goal oriented behavior, and attention (Baumeister, Vohs, & Tice, 2007; Schmeichel, 2007). This can have an effect on future tasks that may utilize these same cognitive resources (Schmeichel, 2007; Vohs et al., 2006). A study conducted by Schmeichel (2007) aimed to determine if initial executive control efforts undermined subsequent efforts at executive control. While there is no universally accepted definition of executive control, it is most commonly defined as an interconnected group of abilities that allow an individual to alter his or her thoughts and behaviors (Baddeley, 1986; Norman & Shallice, 1986). For example, executive control would aid in determining whether someone decided to act upon particular thoughts or inhibit the urge to do so. In Schmeichel's (2007) first experiment, participants were shown a video clip of a woman being interviewed. An individual off-screen was interviewing the woman in the video, and the video clip was played

without audio. As the video clip played, a series of one-syllable words flashed across the screen for a period of 15 seconds each. The words appeared at the bottom of the screen and did not dominate the picture. Participants in the control condition were assigned to watch the clip with no further instruction. The participants in the experimental condition were instructed to watch the video clip while also avoiding looking at the words at the bottom of the screen. Participants in the experimental condition were required to exert executive control by restricting their attention away from the novel stimuli. On a test of working memory span that followed the video clip, participants who were required to control their attention did worse than those who were instructed to simply watch the video.

In another study, Baumeister, Bratslavsky, Muraven, and Tice (1998) conducted four experiments to examine the role of self-regulation in the depletion of cognitive resources. In the initial experiment, participants were more likely to give up quickly on an unsolvable puzzle task when they were required to resist eating more tempting foods (chocolate chip cookies) versus less tempting foods (red and white radishes). Additionally, participants who were instructed to exert self-control by resisting the desire to eat a tempting food reported a stronger drive to quit the unsolvable puzzle task than participants who were not required to exert self-control.

Self-Control and Aggression

Self-control also plays a significant role in the expression of aggression, and is often referred to as a metaphorical inner restraint preventing aggression from outwardly manifesting itself (Stucke & Baumeister, 2006). When these restraints are weakened or broken, an individual's ability to exert self-control is compromised and he or she is more likely to engage in aggressive behavior (Stucke & Baumeister, 2006). As stated previously, participating in cognitively demanding or self-regulating tasks can deplete the brain's limited resource, and

therefore inhibit self-control in future tasks. This in turn prevents aggression from being inhibited as well (Stucke & Baumeister, 2006). Aggression has been defined as the intent to harm another individual through behavior (Berkowitz, 1993). As a social race, all human beings are occasionally challenged by aggressive tendencies; however socialization teaches us to suppress acting upon these impulses. As aggression is often instigated by provocation, self-control is instrumental in ensuring a civilized population (Anderson & Bushman, 2002). Research by Stucke and Baumeister (2006) illustrates how the capacity to suppress aggression is a resource limited by previous actions of self-control and regulation. Drawing on previous research demonstrating the relation between ego depletion and self-regulatory failure, the authors designed three experiments to test the influence of self-regulation, specifically inhibiting the desire to eat tempting foods, and controlling body movements and facial expressions, on provoked aggression. The results revealed that participants who engaged in the self-regulatory tasks were more aggressive toward the experimenter following an insulting comment, as compared to a control group. Therefore, participating in cognitively demanding tasks can increase the chances of acting out aggressively, as a result of diminished cognitive resources in the brain, and therefore diminished self-control.

Video Games, Aggression, and Self-Control

The role of video games in the development of aggressive behavior has also been examined closely in recent years. While there are exceptions to this general finding (e.g., Ferguson & Rueda, 2010), most studies and meta-analyses have shown that violent video games cause not only short-term effects, such as priming violent thoughts and stimulating aggressive arousal, but also long-term effects, such as the development of violent attitudes and beliefs (Anderson et al., 2003; Huesmann & Kirwil, 2007). Drawing from Bandura's (1963; 1994)

observational and social learning theories, early research investigating video game violence proposed that individuals primarily learn behavior through the observations of others. Individuals who play violent video games observe a variety of violent behaviors, and these behaviors are often repeated, as they are frequently essential in earning rewards and to the progression of the game.

Berkowitz's (1993) cognitive neoassociationism model and Abelson's (1976) script theory have also been used to explain the effects of video game violence. These models propose that aggressive concepts are linked together in memory, forming a network of associations between related terms (e.g., the concept of "gun" being associated with related concepts such as shoot, hurt, harm). Those concepts that are frequently encountered together develop stronger associations. When concepts become primed, they are activated, and this activation spreads to related concepts, activating them as well (Anderson et al. 1998; Berkowitz, 1993).

Additionally, individuals develop "scripts" for interacting with their environment. These mental representations define situations and serve as guidelines for appropriate behavior in specific situations (Abelson, 1976; Anderson & Bushman, 2002; Eron, 1994). These scripts consist of networks of concepts so highly associated that they become a single concept within memory. For example, when going to a restaurant, many concepts may come to mind such as menu, waiter, ordering, food, etc. However, after participating in this experience, an individual learns a script outlining the expectations for this particular situation (e.g., wait to be seated, look at the menu, tell waiter what you would like to eat, wait for food). When children observe situations of violence and aggression in real life and in violent media, they begin to acquire aggressive scripts (Huesmann 1986, 1998). Violent video games frequently require the player to use violence; the player is rewarded for using violence to solve problems within the game. This

is problematic as frequently engaging in these virtual behaviors can teach children, who have not yet developed their own guidelines for solving problems, aggressive scripts where violence and intimidation are viable means of getting what they want (Huesmann, 1998). Moreover, observing media violence primes networks associated with aggressive concepts, which allows for easier accessibility of aggressive thoughts, behaviors, and feelings. Using these theories as a foundation, a number of information processing models have been described to explain how observing violence causes aggressive behavior (Anderson & Bushman, 2002; Dodge, 1980; Huesmann, 1988). All of these models explain how the effects of environmental factors, along with exposure to violent media and real-world violence, affect an individual's thoughts and beliefs about the world, known as schemas. The models also explain how these factors influence aggressive tendencies and aggressive arousal.

Of these integrated models, perhaps the most inclusive and widely used is the General Aggression Model (GAM) proposed by Anderson and Bushman (2002). Although it has undergone several revisions, this model serves to combine several theories of aggression into one cohesive model (Anderson & Bushman, 2002). The GAM examines the influence of person factors (e.g., sex, attitudes, traits, scripts) and situational factors (e.g., provocation, playing violent video games, aggressive cues) on three internal state variables, which interact with one another (i.e., thoughts, feelings, and physiological arousal). These three state variables lead to a decision process, which in turn leads to actions (Anderson & Bushman, 2002).

The effects of video games are of particular concern because of the rate at which violent video games are available and widely used, especially among adolescents. According to Lenhart et al. (2008), of young adults between 12-17 years of age, 97% play some kind of computer or video game, and the majority of these games are violent in nature. A study conducted by a large

Internet research group indicated that 70% of college students reported playing video games at least once and a while, and 65% of college students reported playing video games regularly or occasionally (Jones, 2003). Experimental research by Anderson and Dill (2000) illustrates how violent video games prime aggressive thoughts. Participants in their study were faster at identifying violent words as compared to control words after playing a violent video game. In an additional laboratory experiment, the authors investigated the effects of violent video games using blasts of noise directed at an opponent as a measure of aggression. In this study, participants who played the violent game administered longer blasts of noise to their opponent than those who played the non-violent game. Through both a correlational study using self-report data and an experimental design, Anderson and Dill (2000) also illustrated that violent video game play was related to increases in aggression. Using undergraduate students, the authors demonstrated a main effect of violent video game play on aggressive behavior, indicating that those with greater violent video game exposure demonstrated greater aggressive behavior. Participants who reported playing violent video games more often, and for a longer period of time reported engaging in greater levels of aggressive behavior in their daily lives. Additionally, the authors found that exposure to violent video games was positively correlated with aggressive and non-aggressive delinquent behavior, with a stronger relation existing between violent video game exposure and aggressive delinquent behavior.

A field study conducted by Gentile, Lynch, Linder, and Walsh (2004) using populations of students from 8th and 9th grade classes assisted in illustrating that these effects are not just short term. After controlling for trait hostility, students who reported playing more video games were also found to be more aggressive, disrespectful to their teachers, and were involved in more physical altercations with other students than those who did not. This specific study, along with a

multitude of other studies in this area of research, illuminate a clear connection between the effects of violent video games on aggression, and suggests that priming of aggressive cognitions plays a key role in the short-term effects of violent video games.

Moderators of Video Game Effects

Several studies have examined factors that may partially account for the link between playing violent video games and increases in aggression. Specifically, several variables including personality traits, gender, and self-control have been investigated to determine if they moderate the relation between violent media and aggressive responses.

Personality traits. Research has indicated that individuals with certain personality traits may be prone to exhibit greater short-term aggressive responses (Anderson & Carnagey, 2009; Giumetti & Markey, 2007). Specifically, those who reported more frequent violent video game use, lower trait empathy, and higher trait aggression displayed the highest levels of aggressive behavior (Anderson & Dill, 2000; Bartholow et al, 2005). A study by Engelhardt, Bartholow, and Sauls (2011) found that individuals with higher levels of trait aggression showed greater increases in aggressive behavior after playing a violent video game than those who reported lower levels of trait aggression.

Gender. Research has illustrated that males are not only more likely to play video games than females, but the games that they play are more likely to be violent in content and they prefer a higher level of violent content than females (Anderson & Dill, 2000; Arriga et al., 2006; Gentile et al., 2004; Krahe & Moller, 2004). Consistent research findings have also shown that males are more physically and verbally aggressive than females (Crick & Grotpeter, 1995, 1996; Musher-Eizenman et al., 2004). As males consume more and higher levels of violent media more frequently, and because males are generally more physically and verbally aggressive than

females, the argument has been made that violent media may have a greater effect on males than females (Anderson & Murphy, 2003). Therefore, only male participants were included in the present study.

Ego depletion. Additionally, few to no studies have examined the role of ego depletion as a potential trait variable. It may be that some individuals are more susceptible to the effects of effortful and sustained attentional tasks and will therefore become more ego depleted by such tasks. This could subsequently lead to these individuals exhibiting higher levels of aggressive behaviors due to inhibited self-regulatory processes. Furthermore, exposure to violent media may exacerbate the effects of inhibited self-regulation from greater ego depletion. The current study examined any effects of ego depletion as a moderator in this process.

The major hypothesis of the current study is that part of the effect on aggression of playing violent video games is due to the fact that playing such games depletes cognitive resources and makes self-control less likely in immediate future tasks. It is therefore crucial to investigate whether in fact playing violent video games inhibits self-regulatory processes by depleting cognitive resources. Because ego depletion is a short-term phenomenon, the current study focuses on the short-term effect of playing violent video games.

Hypotheses

It is expected that participants who are exposed to passive media viewing will persist longer on an unsolvable anagram task compared to those exposed to active media. In addition, it is expected that participants exposed to violent media will show much higher levels of aggression (cognitions, behaviors, and feelings) compared to those exposed to non-violent media. This is based on the assumption that violent, active media will be cognitively demanding and therefore reduce the ability to exert self-control, increasing the risk for aggressive behavior

when provoked. It is also based on the assumption that violent media primes more aggression than non-violent media. Finally, I hypothesize that the effects of violent video game play will be moderated by personality variables including trait aggressiveness and level of ego depletion.

This is based on prior research that has found links between greater aggressive responses after playing a violent video game for individuals with higher levels of trait aggression. Additionally, any effects of ego depletion as a trait moderator will also be examined.

METHOD

Participants and Procedures

Undergraduate students were recruited from Bowling Green State University, and received experimental credit required in their introductory psychology courses or a \$5.00 cash compensation for their participation. The students were recruited using the Psychology SONA Online Experimental system, as well as advertisements for the study on an campus wide email list and postings of paper flyers on the BGSU campus and in businesses in greater Bowling Green. A power analysis was conducted using G*Power 3, a statistical power analysis computer program (Faul, Erdfelder, Lang & Buchner, 2007), which determined that a sample size of 126 (35-30 participants per condition) would be sufficient to detect moderate effect size of .30 with a power of .80. After over a year of participant recruitment, a total of 96 participants completed both portions of the study ($M_{age} = 20.17$ years, age range: 18-31), therefore the study may be under powered. Only males took part in the study, as research has shown that males are much more likely to play video games than females (Arriga et al., 2006; Krahe & Moller, 2004). Participants were primarily Caucasian males (77%) in their first year of undergraduate study (52%). College GPA was distributed among participants as follows: 4% between 1.0-1.99, 39% between 2.0-2.99, and 57% between 3.0-4.0. Regarding employment status, 1% of participants indicated that they held a full time job, 44% indicated that they held a part time job, and 55% of participants indicated that they did not currently have a job. In terms of parental education, 40% of participants reported that their mother completed a bachelor's or associate degree, 19% reported that their mother completed some college, 19% reported that their mother graduated high school, 16% reported that their mother completed an advanced degree, and 7% reported that their mother did not complete high school, or they were not sure of the last grade completed.

Additionally, 25% of participants reported that their father graduated high school, 32% reported that their father completed a bachelor's or associate degree, 20% reported that their father completed some college, 18% reported that their father completed an advanced degree, and 3% reported that they were not sure of the last grade their father completed. See Table 1 for full participant demographics.

A summary of the experiment was posted on the Psychology SONA Online Experimental system. To prevent any demand characteristic biases, a cover story was be used, stating that the experiment would be examining the effects of viewing various forms of media on students' reaction time. Participants who met the study requirements (i.e., those who were male and 18 years of age and above) were required to complete background questions online (i.e., demographics, video game experiences, trait aggression, impulsiveness, and trait empathy) and at the end of the questionnaire were given a randomly generated ID number that they were instructed to bring to the lab. After completing the online questionnaires, participants were then able to sign up for the second part of the study, which took place at the Psychology Building during their specified date and time.

When the participants arrived at the lab, they completed an informed consent process that outlined all possible risks and benefits of participating in the experiment (see Appendix A). The experiment took each participant about an hour to complete. Upon arriving, participants were also be asked for the ID number they were given during the initial online survey so that their online data can be connected to their in-session data, while also protecting their confidentiality. Participants were then randomly assigned to one of four experimental conditions: to play a violent video game, a non-violent video game, or view a slideshow of the violent video game or non-violent video game for 15 minutes. Those in the video game conditions were given a brief

tutorial on the controls and gameplay. Those in the picture viewing conditions were shown a slideshow of pictures of the violent or the non-violent video game on a computer screen.

Next, participants were given a list of unsolvable anagrams, during which they were timed to determine their level of persistence. They were told, “You will now be completing some word puzzles. This page contains several anagrams for you to solve. This is not a test. Work on them for as long as you want, and if you want to stop, just ring the bell on the table.” Participants were given up to 20 minutes to attempt to solve the anagrams. This task has been used by Baumeister et al. (1998) specifically as a measure of ego depletion, but it has also been used by several other researchers to examine the effects of ego depletion on self-control resources (Muraven et al., 1998; Burkley, 2008; Ciarocco, Sommer, & Baumeister, 2001; Seferstrom & Nes, 2007; Tyler, 2008; Tyler & Burns, 2009). After the unsolvable anagram task, participants were randomly assigned to one of two orders of additional tasks to control for priming effects: questionnaires measuring their state aggression and aggressive cognitions followed by the Competitive Reaction Task (CRT), or vice versa. The CRT is a computer task that measures aggressive behaviors. During the CRT, participants were told they would be competing against a partner on a computer task measuring reaction time.

After completing the questionnaires and CRT, participants were given a final questionnaire assessing their subjective experiences of the experimental conditions, their subjective experience competing the unsolvable anagram task, and a manipulation check to determine if they were aware of the true purpose of the experiment. When this was complete, participants were debriefed, thanked for their participation, and given credit on the SONA Online Experimental system.

Measures

Demographics. A measure was given to collect basic demographic information including gender, age, race/ethnicity, and year in college (see Appendix D).

Video game experience. Because an individual's previous experience with playing video games may influence his or her performance in the current study, a questionnaire was administered to determine and control for level of experience with playing video games. This measure is adapted from Anderson and Dill's (2000) violent video game exposure questionnaire, and asked participants to report how often they play video games, what types of games they play, how violent they perceive the games to be, how they believe their skills compare to others, and what gaming platform(s) they use (see Appendix E). Specifically, participants listed their top three favorite video games, and then rated on a 7-point scale how often they play the game (1=rarely, 7=often), the level of violence in the game (1= little or no violent content, 7=extremely violent content), and how violent they believe the graphics of the game to be (1=little or no violent graphics, 7=extremely violent graphics). For each game, violent graphic and content scores were averaged and multiplied by game playing frequency to determine a violence exposure score. These three scores were then be averaged to produce an overall index of exposure to video game violence. This measure was found to have good internal consistency reliability with a current study alpha of .91.

Trait aggression. The Buss-Perry Trait Aggression Questionnaire measures trait aggressiveness with four primary subscales of aggression (physical aggression, verbal aggression, anger, and hostility). This measure requires participants to rate 29 items on a 7-point scale (1 = extremely uncharacteristic of me and 7 = extremely characteristic of me). The physical aggression subscale consists of nine items such as "Given enough provocation, I may hit another

person”; the verbal aggression subscale consists of five items such as “I often find myself disagreeing with people”; the anger subscale consists of seven items such as “I have trouble controlling my temper”; and the hostility subscale consists of eight items such as “At times I feel I have gotten a raw deal out of life” (See Appendix F). Two items on this measure were reverse coded, and scores were averaged such that higher scores represent more aggressive responses and therefore greater trait aggression. This measure was used to determine if trait aggression serves as a moderator between playing violent video games and aggression, specifically aggressive affect, behavior, and cognitions (i.e., if the effect of playing violent games on subsequent aggression is evident only for those higher in trait aggression). This measure was found to have good past reliability with an alpha of .89 (Buss & Perry, 1992). The alpha for the current study was .90.

Trait empathy. Trait empathy was measured using the Interpersonal Reactivity Index (IRI) (Davis, 1983). The four subscales that compose the IRI assess the four main components of empathy, Perspective Taking, Empathetic Concern, Fantasy, and Personal Distress. This measure requires participants to answer 28 items about their empathetic concern in particular situations, for example, “When I see someone being taken advantage of, I feel kind of protective towards them.” Participants were asked to rate each item on a 1 to 5 scale (1 = does not describe me well and 5 = describes me well). Nine items on this measure were reverse coded, and scores were obtained by calculating a mean score for each of the four subscales with higher scores indicating greater adherence with the subscale. The subscale internal consistencies for the current study are as follows: Perspective Taking ($\alpha = .74$), Empathetic Concern ($\alpha = .73$), Fantasy ($\alpha = .73$), Personal Distress ($\alpha = .58$). This index was primarily used to help prevent participants from learning the true purpose of the study. See Appendix G for the full measure.

Impulsivity. The Barratt Impulsiveness Scale (BIS-11) (Patton et al., 1995) is a 30-item measure assessing impulsive behaviors and preferences. This scale is currently the most widely cited instrument for the assessment of impulsiveness in the scientific literature (Stanford et al., 2009). The BIS-11 assesses three factors of impulsiveness: attentional, motor, and nonplanning. These three factors are each summed to calculate the subscale scores, and then further summed together to create a total impulsiveness score. See Appendix L for the full measure.

Unsolvable anagram task. Length of persistence on an unsolvable anagram task was used as the dependent measure of ego depletion. This specific measure was adapted from Burkley's (2008) unsolvable anagram task. For this measure, participants were given a list of 8 anagrams, 6 of which were unsolvable, and allowed up to 20 minutes to attempt to solve them. They were told to work on them for as long as they want, and to ring a bell at their table when they would like to end the task. Anagram solving is a widely used measure of self-control resources that requires both effort and skill. An unsolvable anagram task was utilized by Baumeister et al. (1998) due to the suspected self-regulation it would require from participants. Specifically, the authors discussed the process of assembling and disassembling tentative letter combinations, entailing participants to exert self-control and persist despite multiple failures. Length of persistence on this task following ego-depleting tasks assessed ego depletion from the initial task, with more ego depleted participants persisting less. Self-regulation was required in this measure as persistence on the task required participants to resist the more appealing easy solution of simply giving up; therefore those with depleted regulatory resources should quit the task sooner. Persistence on unsolvable anagram tasks has subsequently been used as a dependent measure in many other ego depletion studies as well as those measuring self-control resources

(Muraven et al., 1998; Burkley, 2008; Ciarocco, Sommer, & Baumeister, 2001; Seferstrom & Nes, 2007; Tyler, 2008; Tyler & Burns, 2009). See Appendix I for the full measure.

Aggressive behavior. The Competitive Reaction Task (CRT) consists of a reaction time task completed on a computer that uses aversive stimuli to measure aggression. This task has been established as a valid and reliable measure of aggression through its use in numerous studies (Anderson & Carnagey, 2009; Anderson & Dill, 2000; Bartholow et al., 2006; Carnagey & Anderson, 2005). Participants were led to believe that they were competing against a partner of the same sex, and were trying to click a button before their partner does. The task consisted of 25 trials and participants were told that whoever hits the button the slowest for each trial would be blasted with aversive noise by the opponent. Participants were then able to set the volume and duration of the noise for their partner for each of the 25 trials and could view the levels that their partner had set for them. Aggression was measured by the level and duration of the blasts of noise the participants assigned to their partners. The blasts of noise were set to levels in increments of 1 (5 decibels), from level 1 (60 decibels) through level 10 (105 decibels). An option of 0 decibels, or no noise, was available as well, and represented a non-aggressive response. In the first trial the participant was programmed to lose and receive a level 10 (105 decibels) blast of noise for a duration of 10 seconds, which served as provocation for the participant as it is the loudest and longest assignment possible. The participant was programmed to lose half of the remaining trials, which remained constant across all participants. On each trial the intensity level for the noise blast that the participant chose was multiplied by the duration he chose to represent one measure of aggression. The participant's score on this variable on the first trial was taken as a measure of unprovoked aggression and the participant's average score on trials 2 to 25 was taken as a measure of provoked aggression. Participant's average scores of

provoked intensity and duration were then multiplied to calculate a total measure of aggressive behavior. Prior studies have found this to be the most effective way of combining these two scores (Bartholow et al., 2006).

Aggressive affect. State hostility was measured using the State Hostility Scale (Anderson, Deuser, & Deneve, 1995). This scale was given to participants after playing the video game and completing the unsolvable anagram tasks and required participants to rate 35 questions on a 5-point scale (1 = Strongly Disagree; 5 = Strongly Agree). The questions asked participants to rate how they feel currently about various negative or positive emotional states, for example “I feel furious”, “I feel friendly” and “I feel frustrated”. Of the 35 items, 11 items were reverse coded to control for participant response bias. Scores were added to obtain an overall score of hostility, and participants with greater levels of state hostility received higher scores. This scale has been used in numerous studies examining the effects of playing violent video games on aggressive affect, (Anderson & Carnagey, 2009; Barlett, Harris & Bruey, 2008; Carnagey & Anderson, 2005) with acceptable internal consistency ($\alpha = .84$ to $.95$). The alpha for the current study was $.94$. See Appendix I for the full measure.

Aggressive cognitions. The Word Completion Task was used as a measure of aggressive cognitions (Anderson, Carnagey, & Eubanks, 2000). This task consisted of a list of 98 words with missing letters (see Appendix J). Participants were required to complete as many words as they could in 3 minutes, by filling in the missing letters. Most of the words can be completed to create either a neutral or aggression-related word (e.g., *ki_ _* can become *kiss* or *kill*). Participant answers were coded using a system created by the authors that determines if the word is “aggressive,” “ambiguous,” “neutral,” or a “non-word.” A measure of aggressive cognitions was calculated by dividing the number of aggressive words by the total number of words completed.

Subjective task experience. Participants completed a questionnaire evaluating their subjective experience of the experimental condition to which they were assigned (i.e., violent video game, non-violent video game, or picture viewing) as well as their subjective experience of the unsolvable anagram task. This measure was used to assess the frustration with and perceived difficulty of playing or watching the video game and completing the unsolvable anagram task. This measure was also used to determine if individuals who subjectively reported greater difficulty with the playing or watching the video game, or completing the unsolvable anagram task, became more ego depleted. The questionnaire asked participants to rate 6 items on a spectrum of 1 to 7 (1 = least demanding and 7 = most demanding) with questions such as, “I found this task was:” with “1 = Mentally Easy” and “7 = Mentally Challenging.” Scores were obtained by summing the scores from both sections (i.e. video game vs. anagram), with greater scores indicating more perceived difficulty. Items addressing how mentally challenging participants perceive the tasks to be were used to assess the ego depletion hypothesis and determine if those who found the tasks difficult also became more ego depleted, and additionally more aggressive, than those who found the tasks less challenging. The item assessing how frustrating participants find the task should help in addressing the alternate explanation that more aggressive responses are due to the participant’s elevated levels of frustration with the task. This measure also included a manipulation check by asking participants to describe in their own words what they believed the study to be measuring, to determine if any participants discovered the true purpose of the experiment. The willpower items from this measure were adapted from Job, Dweck and Walton’s (2010) Implicit Theories about Willpower Questionnaire. See Appendix K for the full measure.

Materials

For the video game conditions, a Microsoft Xbox 360 video game system was used along with two video games. Games were considered violent if they received an Entertainment Software Review Board (ESRB) rating of “Mature” for scenes of violence. Games were considered non-violent if they received an ESRB rating of “Everyone” or “Teen”, and indicated that the game does not contain violence. The violent video game used was Gears of War 4. This game required players to navigate through a three dimensional environment, interact with other characters with the goal of eliminating opponents by shooting, punching, or killing them with a chainsaw. This game was also chosen because of its ESRB rating of “Mature” due to blood and gore, intense violence, and strong language. The non-violent video game used was Dirt 3. This formula one racing game required participants to assess speed and distance while moving through a three dimensional environment. This game was additionally chosen due to its ESRB rating of “Everyone” as it contains no violence between characters. For the slideshow condition, a computer was used to display a slideshow of images from Gears of War 4 or Dirt 3. Gears of War 4 and Dirt 3 were chosen, as a game analysis revealed they were similar in pace, excitement, and accessibility (Drummond, 2014). The game analysis required participants (N=10; 2 female) to rate the games on a 5-point scale for pace of play (Dirt 3 M=4.2; GoW4 M=4.1), ease of play (Dirt 3 M=4.1; GoW4 M=4.5), frustration (reverse scored; Dirt 3 M=4.1; GoW4 M=4.5), and entertainment (Dirt 3 M=4.2; GoW4 M=4.2).

RESULTS

Overview of Statistical Analyses

Preliminary analyses. Analyses were computed to determine if the four experimental groups differed in age, race, year in college, parental education, video game play frequency, violent video game preference, employment status, trait empathy, impulsiveness, and trait aggression. This was done using a series of one-way ANOVAs. Recall that two orders of measures were presented to participants. As the measures of aggression were counterbalanced to control for the effects of priming, participants were randomly assigned to initially complete the CRT, measuring aggressive behavior, or a questionnaire containing the Word Completion Task, measuring aggressive cognitions, and the State Hostility Scale, measuring aggressive affect. The order of these tasks was controlled in the major analyses.

Next, correlations were computed among the study variables (i.e., aggressive behavior, aggressive affect, aggressive cognitions, anagram task persistence, trait aggression, trait empathy). The aggression outcome measures (aggressive behavior, aggressive affect, aggressive cognitions) were expected to be correlated with one another, but only modestly to moderately, based upon previous studies examining the relation between video games and aggression (Anderson & Carnagey, 2009; Anderson & Dill, 2000; Bartholow, Bushman, & Sestir, 2006).

Major analyses: Hypotheses 1-4: Main and interaction effects. I predicted that the context and content of the video game would predict anagram task persistence, aggressive behavior, aggressive affect, and aggressive cognitions. To examine whether video game violence and level of engagement in media influenced the outcome measures, a series of 2 (condition) by 2 (content) ANOVAs were computed. I expected to find a main effect of media condition (i.e., violent video game or non-violent video game and active or passive media viewing) on the

outcome variables, with those participants in the active violent video game condition persisting less during the anagram task (suggesting self-control depletion), exhibiting higher levels of aggression on the CRT, endorsing greater state hostility, and showing higher levels of aggressive cognitions compared to the participants in the other conditions. It was expected that those in the passive media viewing conditions would persist longer on the anagram task, and exhibit lower levels of aggression on the CRT than those in the active game condition. It was also expected that those in the non-violent, passive viewing task would persist the longest on the anagrams and show lower levels of aggression than those in the passive, violent video game task as participants in the picture viewing condition would not be subject to ego depleting tasks, nor the priming effects of viewing violent images.

Major analyses: Hypotheses 5 & 6: Moderator analysis. I predicted that trait aggression and ego depletion would moderate the relation between video game context and content and aggressive outcome variables (i.e., aggressive behavior, state hostility, and aggressive cognitions). I computed a series of hierarchical regression analyses in which the effects of trait aggression and ego depletion on the relation between the context and content of the video games and the aggression outcome variables (i.e., aggressive behavior, state hostility, and aggressive cognitions) were examined. These analyses also examined all potential two-way and three-ways interactions between each moderator variable and the content (violent vs. non-violent) and context (playing vs. viewing pictures) of the video game condition. Interaction terms were calculated by mean-centering the anagram task persistence and trait aggression scores.

Results of the Preliminary Analyses

Separate ANOVAs were computed to examine differences among the four experimental groups in demographic and background variables. These analyses indicated that the experimental

conditions did not significantly differ based on demographic variables (i.e., age, race, year in college, parental education), video game play frequency, violent video game preference, employment status, impulsiveness, and trait aggression, but they did differ on participants' ratings on the Perspective Taking, $F(3, 92) = 2.83, p=.04$, and Personal Distress, $F(3, 92) = 5.16, p=.00$, subscales of the IRI. Because these variables were found to differ by condition, they were included as control variables in later analyses. Recall that the order of the aggression measures was counterbalanced to reduce priming effects; cross-tabulations indicated that the order of the measures was successfully counterbalanced across conditions (no significant chi-square tests for order x condition). ANOVAs were computed to determine if the order of these measures had any effect on the outcome measures and the results indicated that the order was significantly related to aggressive behavior, $F(9, 84) = 5.85, p=.02$, and aggressive affect, $F(9, 86) = 6.43, p=.01$. The order of the measures was not significantly related to aggressive cognitions, $F(9, 86) = .00, ns$. Thus, order was entered as a covariate in the major analyses reported below.

Table 3 shows that the correlations among the study variables indicated that aggressive cognitions, aggressive affect, and the average intensity of the noise blasts participants assigned to their partners during the CRT were all significantly positively correlated (r s ranged from .24 to .32). The amount of time participants persisted on the unsolvable anagram task was significantly negatively correlated with the average intensity ($r = -.25$) and average duration ($r = -.34$) of noise blasts participants assigned to their partners during the CRT. This indicates that participants who persisted longer on the unsolvable anagram task exhibited less aggressive behavior. This supports the hypothesis that ego depletion, as measured by anagram task persistence, is associated with more aggressive behavior. The average duration of the noise blasts participants assigned to their partners during the CRT was also significantly positively correlated with

aggressive affect ($r = .24$) and the intensity of the noise blasts that participants assigned to their partners ($r = .77$).

Results of the Major Analyses

To examine whether viewing pictures of or playing a violent or non-violent video game had any influence on ego depletion (persistence on the anagram task) and aggressive responses (behavior, affect, and cognitions), a series of 2 (condition: video play vs. viewing pictures) by 2 (content: violent vs. non-violent) ANOVAs were computed and are shown in Table 4. In these ANOVAs, covariates (the Personal Distress and Perspective Taking Scales of the IRI, and order) were included based on the preliminary analyses, but the results for the covariates are not included in the table. Partial eta squared scores were also calculated as an index of effect size for each analysis and interpreted based on established guidelines (Cohen, 1988; Murphy & Myers, 2004). Specifically, these authors suggested that scores should be interpreted as such: small = .01, medium = .06, and large = .13.

Hypothesis 1: The context and content of the video game will predict ego depletion.

To examine whether viewing pictures of or playing a violent or non-violent video game had any influence on the amount of time participants persisted on the unsolvable anagram task, an ANOVA was computed comparing the length of time in seconds that participants engaged in the anagram task among the four experimental conditions. Table 4 shows that no significant main effects for content, $F(1, 89) = 2.61, ns$, context, $F(1, 89) = 2.24, ns$, or interaction effects, $F(1, 89) = .44, ns$, on anagram task persistence were observed. Partial eta squared scores were small for content ($\eta_p^2 = .03$), context ($\eta_p^2 = .03$), and content by context ($\eta_p^2 = .01$). Thus, playing violent video games was not related to subsequent ego depletion. Given this result, a mediational model in which playing video games (especially violent games) leads to ego

depletion, which in turn leads to aggressive behavior, affect, and cognitions, was not supported because the first proposed link in the mediational model was not significant.

Hypothesis 2: The context and content of the video game will predict aggressive behavior. To examine whether viewing pictures of or playing a violent or non-violent video game had any influence on aggressive behavior, an ANOVA was computed comparing the average noise intensity participants administered to their partner on the CRT, after initially being provoked, among the four experimental conditions. Table 4 indicates that no significant main effects for content, $F(1, 87) = .26, ns$, context, $F(1, 87) = .56, ns$, or interaction effects, $F(1, 87) = .07, ns$, on aggressive behavior were observed. Partial eta squared scores were small for content ($\eta_p^2 = .00$), context ($\eta_p^2 = .01$), and content by context ($\eta_p^2 = .00$). These results indicate that playing violent video games was unrelated to subsequent aggressive behavior.

Hypothesis 3: The context and content of the video game will predict aggressive affect. To examine whether viewing pictures of or playing a violent or non-violent video game had any influence on aggressive affect, an ANOVA was computed comparing aggressive affect, as measured by the sum of scores on the State Hostility Scale, among the four experimental conditions. Table 4 shows that there was a significant main effect for content, $F(1,89) = 5.61, p < .05$, showing that participants in the non-violent condition scored higher in aggressive affect than participants in the violent condition (non-violent, $M = 76.40, SD = 18.41$; violent, $M = 65.51, SD = 18.25$), which is counter to the hypothesis. There was no significant main effect for context, $F(1,89) = .39, ns$. The interaction between content and context showed a trend toward significance, $F(1,89) = 3.79, p < .06$. Table 4 shows that in between-groups least squares differences contrasts, participants in the non-violent-watch condition scored significantly higher than those in the non-violent-play, violent-play, and violent-watch conditions respectively.

Partial eta squared scores were small for context ($\eta_p^2 = .00$), and content by context ($\eta_p^2 = .04$), and medium for content ($\eta_p^2 = .06$). These results do not support the hypothesis that participants who played or watched a violent video game would exhibit more aggressive affect.

Hypothesis 4: The context and content of the video game will predict aggressive cognition. To examine whether viewing pictures of or playing a violent or non-violent video game had any influence on aggressive cognitions, an ANOVA was computed comparing aggressive cognitions, as measured by the ratio of aggressive words to overall words completed on the Word Completion Task, among the four experimental conditions. Table 4 indicates that there were no significant main effects for content, $F(1,89) = .19$, *ns*, context, $F(1,89) = .83$, *ns*, or interaction effects, $F(1, 89) = .12$, *ns*, on aggressive cognition were observed. Partial eta squared scores were small for content ($\eta_p^2 = .00$), context ($\eta_p^2 = .01$), and content by context ($\eta_p^2 = .00$). These results do not support the hypothesis that playing violent video games would lead to subsequent increases in aggressive thoughts.

Moderator analyses. To examine whether aggressive responses after playing a violent or non-violent video game were moderated by level of ego depletion (persistence on the anagram task) or trait aggression, a series of hierarchical regression analyses were computed, one for each outcome variable.

Hypothesis 5: Trait aggression. It was expected that trait aggression would moderate the relation between video game context and content and aggressive outcome variables (i.e., aggressive behavior, state hostility, and aggressive cognitions). Specifically, it was predicted that participants with higher levels of trait aggression would exhibit higher levels of short-term aggressive behavior, state hostility, and aggressive cognitions after being exposed to media with violent content. A 4-step hierarchical regression analysis was conducted to examine

potential moderator effects of trait aggression on aggressive behavior, state hostility, and aggressive cognitions. In the first step, background/demographic variables were controlled (the counterbalanced order of the aggression measures, the Personal Distress Scale of the IRI, and the Perspective Taking Scale of the IRI). In the second step, the effects of video game context (playing versus watching the video game) and content (violent versus non-violent) were entered. In the third and fourth steps, 2-way interaction terms for content and context by ego depletion (Step 3), as well as the 3-way interaction term of content by context by ego depletion (Step 4) were entered. In no cases were the interactions significant, which suggests that trait aggression did not moderate the relation between video game content and context on aggressive behavior, state hostility, or aggressive cognitions. There was a main effect for trait aggression on state hostility ($\beta = .28, p = .005$) in which those participants with higher levels of trait aggression reported higher state aggression.

Hypothesis 6: Ego depletion. It was expected that ego depletion would moderate the relation between video game context and content and aggressive outcome variables (i.e., aggressive behavior, state hostility, and aggressive cognitions). Specifically, it was predicted that participants with presumably higher levels of ego depletion, as indicated by less persistence on the unsolvable anagram task, would exhibit higher levels of short-term aggressive behavior, state hostility, and aggressive cognitions after being exposed to potentially ego depleting tasks. The same 4-step hierarchical regression analysis was computed as just described in Hypothesis 5. Again, in no cases were the interactions significant, which suggests that anagram task persistence did not moderate the relation between video game content and context on aggressive behavior, state hostility, or aggressive cognitions. There was, however, a main effect for anagram task persistence on aggressive behavior ($\beta = -.27, p = .005$), in which those

who persisted less on the anagram task exhibited higher levels of aggressive behavior on the CRT. This suggests that those who persisted less on this task were presumably been more ego depleted, and therefore more prone to aggressive responses on the CRT.

Results of Exploratory Analyses

Participants' ratings on the Subjective Task Experience Questionnaire were examined to determine if perceived task demandingness or level of frustration with the anagram task or media condition differed across conditions or had any effect on anagram task persistence. Specifically, it was expected that participants who persisted less on the anagram task would report the task to be more demanding and more frustrating. Additionally, it was hypothesized that participants who were assigned to play a video game would report higher levels of demandingness than those assigned to watch a picture slideshow.

A series of 2 (condition: video play vs. viewing pictures) by 2 (content: violent vs. non-violent) ANOVAs were computed. In these ANOVAs, covariates (the Personal Distress and Perspective Taking Scales of the IRI, and order) were included based on the preliminary analyses. The results indicated that there was a significant main effect for context on ratings of the demandingness of the media condition, such that participants assigned to play the video game reported higher levels of task demandingness than those who were assigned to watch the picture slideshow, $F(1,89) = 31.44, p < .00$. A significant main effect was found for context on ratings of frustration while playing the video game, such that participants assigned to play the video game reported higher levels of frustration with the media condition than those assigned to watch the picture slideshow, $F(1,89) = 8.48, p < .01$.

Next, correlations were computed among anagram task persistence, demandingness of the media condition, demandingness of the anagram task, frustration with the media condition, and

frustration with the anagram task. Ratings of frustration for the media condition were significantly positively correlated with ratings of frustration for the anagram task, $r(96) = .25, p < .05$, and ratings of demandingness of the media condition, $r(96) = .73, p < .01$. This indicates that participants who found a task more challenging may have also found this task, as well as subsequent tasks, to be more frustrating. Additionally, ratings of frustration on the anagram task were significantly positively correlated with ratings of demandingness on the anagram task $r(96) = .74, p < .01$. Results also showed that participants' ratings of task demandingness or frustration were not significantly correlated with anagram task persistence.

DISCUSSION

The present study examined the influence of ego depletion on the previously established link between engaging with violent media and aggression. Specifically, I sought to further investigate the associations between exposure to violent video games and aggressive behavior, affect, and cognitions, and assess the effects of ego depletion on these associations. Prior research has found that individuals who exhibit higher levels of ego depletion exhibit weaker self-control, and individuals who exhibit reduced self-control exhibit higher levels of aggression (Stucke & Baumeister, 2006). Additionally, years of research have illustrated relations between violent media, including video games, and more aggressive behaviors, affect, and cognitions (Anderson & Bushman, 2002; Dodge, 1980; Huesmann, 1988). This study sought to determine if playing a video game resulted in individuals becoming more ego depleted, therefore exhibiting inhibited self-regulatory processes, and in turn, higher levels of aggression. This study also sought to determine if this relation was moderated by personality traits. Specifically, trait aggression was examined as a moderator based on previous research identifying it as a variable that enhances the effect of engaging in violent media and aggression. Additionally, ego depletion was examined as a moderator variable, with the hypothesis being that the relation between playing violent video games and subsequent aggression would be stronger for those individuals who exhibit higher levels of anagram task persistence. In the following sections, I will discuss the results and implications of each of my hypotheses. Finally, the limitations of this study will be discussed, as well as directions for future research.

Hypotheses 1-4: Main and Interaction Effects

Based on previous research, I predicted that the four experimental conditions to which participants were assigned would predict levels of anagram task persistence, as well as scores on

the aggression outcome measures. Counter to my hypotheses, no significant relations were found among the experimental groups and the participant's anagram task persistence, aggressive behavior, or aggressive cognitions. Experimental conditions did predict aggressive affect, but in a counter-intuitive direction: participants who watched the non-violent video game had the highest levels of aggressive affect. Though past research using the same measures has shown significant increases in levels of aggressive cognitions (Anderson et al., 2004), affect (Anderson & Carnagey, 2009; Barlett et al., 2008; Carnagey & Anderson, 2005), and behavior (Anderson & Carnagey, 2009; Anderson & Dill, 2000; Bartholow et al., 2006; Carnagey & Anderson, 2005) from exposure to violent video games, the present study did not find the same effects. The reasons for the discrepancy between the past findings and my findings are unclear. It may be that because the effects of violent media on aggression are primarily a short term phenomena, the exposure to a potentially affect-eliciting task (the anagram task) directly following the media condition and preceding measures of state aggression may have influenced participants' aggressive behavior, thoughts, and feelings. Additionally, although the majority of research has found increases in aggression following the exposure to violent media, there have been some exceptions. One specific exception is a study conducted by Ferguson and Rueda (2010) who failed to find any differences in aggression between individuals assigned to play violent verses non-violent video games.

It is also possible that the design of the study may have interfered with the ability to detect violent video game effects on aggression. After playing or watching the video games, all participants were administered the unsolvable anagram task. Although the unsolvable anagram task used to measure participants' levels of ego depletion, the task may have been ego depleting itself. Because this task was given to all participants after playing or watching a video game and

before the measures of aggression, the unsolvable anagram task may have negated any effects of condition on aggression.

Hypotheses 5 & 6: Moderator Analyses

Consistent with prior research, I predicted that trait aggression would moderate the relation between violent media exposure and aggressive behavior, affect, and cognitions. Specifically, I expected that those with higher levels of initial trait aggression would show higher levels of aggression when exposed to violent media. A main effect was found for trait aggression on state aggression, with participants who endorsed higher levels of trait aggression scoring higher on state aggression. Contrary to my hypothesis, however, trait aggression did not moderate the relation between the video game content and context and scores on the aggression outcome measures. It is unclear as to why aggression failed to act as a moderator in this model. One possibility is that because participants in the current sample obtained relatively low scores of trait aggression, this measure was therefore skewed toward the one end of normal distribution. Put another way, this sample simply did not show moderate to high levels of trait aggression. It may be the case that those with higher ratings of trait aggression exhibit more aggressive behaviors, cognition, and affect after being exposed to violent media, as compared to those with low ratings of trait aggression, but more at-risk samples would need to be included for a more valid test of this hypothesis.

Additionally, my initial hypothesis was that those participants assigned to play a video game would become more ego depleted, as indicated by shorter anagram task persistence, (because it is more cognitively demanding than simply watching slides of the game), therefore inhibiting self-regulatory resources, and increasing likelihood of aggression. Furthermore, I expected that those assigned to play a violent video game would endorse the highest aggression

scores, as they would be subject to the effects of ego depletion in addition to priming effects from violent stimuli. This hypothesis, however, was not supported by the data, indicating that there was no effect of condition (context or content) on ego depletion. Thus, a meditational model could not be supported.

Instead, I examined ego depletion as a moderating variable. In doing so, I assessed ego depletion as a potential trait variable and hypothesized that individuals with shorter task persistence would be more influenced by violent video game play to become more aggressive. More specifically, I hypothesized that some individuals may be more susceptible to the effects of effortful and sustained attentional tasks and would therefore become more ego depleted by such tasks, subsequently leading to higher levels of aggressive behaviors due to inhibited self-regulatory processes. Contrary to my hypothesis, anagram task persistence did not moderate the relation between the video game content and context and scores on the aggression outcome measures.

Limitations and Future Directions

There are several limitations of the current study that should be addressed. First, the current sample was underpowered due to the limited number of participants that could be recruited relative to their distribution across the four main experimental conditions. It is possible that any relations between the study variables would be more clearly defined with a larger sample size. But the consistent lack of findings across outcome variables was still striking. However, as noted, the failure to replicate violent video game effects on immediate aggression could have been due to the study design in which an ego depleting task separated video game play from assessment of aggressive outcomes; thus, it is possible that the effects of the ego

depletion task, which was administered immediately after all experimental conditions, over-rode potential direct effects of condition on aggressive outcomes.

A second limitation of the current study is the overall low levels of trait aggression obtained by the study sample. The mean scores on the Buss-Perry Aggression Questionnaire indicated that on average, participants scored at the lower end of the scale ($M = 2.88$, $SD = .91$, Possible Range = 1-7; Obtained Range = 1.26-5.55). If participants were to score in the middle of the range of responses they would have an average mean score of 4.5. Though this limitation is not an uncommon one when working with college student samples, it may have contributed to the limited findings in this study. It is possible that in a sample with a normal distribution of aggressive ratings, trait aggression may have acted as a moderating variable.

A third limitation of the current study is the limited generalizability of the sample. This study included only male participants from a Midwestern university, primarily between the ages of 18-21. Therefore, I am unable to generalize the results from the current study to other populations, especially children. Researchers have argued from a theoretical perspective that media effects are stronger for children because their social cognitions are more malleable before middle childhood, so observation of violence could more likely shape their beliefs about aggression (Anderson & Bushman, 2002; Dodge, 1980; Huesmann, 1988). However, meta-analyses have shown that the link between violent media exposure and aggression is significant across ages (Anderson & Bushman, 2001).

A final limitation of the current study involves the unique challenges current measures of ego depletion pose to research. For example, though the unsolvable anagram task has been widely used as a measure of ego depletion, it in itself may be considered an ego depleting task which may interfere with subsequent performance on other tasks. In the current study, all

participants were administered the unsolvable anagram task after playing or watching the video games. Again, because this task was given to all participants after playing or watching a video game and before the measures of aggression, the unsolvable anagram task may have negated any effects of condition on aggression. In order to address this limitation in future studies, if the current study was replicated, half of the participants should be randomly assigned to complete the measure of ego depletion while the other half should complete the study without being given this task.

Despite these limitations, the current study has made a contribution to the bodies of video game and ego depletion research by investigating the depletion of cognitive resources as a potential link between violent media and aggression. Although evidence was not found to support the main hypotheses, negative correlations between persistence on the measure of ego depletion and aggressive behavior do suggest that higher levels of ego depletion may be contributing to higher levels of aggression. This confirms the findings of previous studies illustrating a link between the ego depletion, inhibited self-regulation, and aggressive behavior. Future research could improve on the current methodology to further examine ego depletion as a potential trait variable that may act as a moderator in the relation between cognitively demanding tasks and aggressive behavior. Additionally, further research may also be able to gain a more comprehensive understanding of the relation between ego depletion, video games, and aggression by obtaining a larger and more diverse participant sample. A final area of future development would involve improving the measurement tools available to assess ego depletion.

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APPENDIX A: RECRUITMENT SCRIPT

My name is Cassandra Pentzien and I am a graduate student in the Psychology Department here at BGSU. I am currently recruiting participants for a study examining the relation between viewing different types of media and reaction time. Participants are required to be males over the age of 18-years-old. This study has two parts. First you will complete an online questionnaire asking about your personality and specific media habits. You can complete the first part of the study on a computer, so you can do this at your residence. You will then schedule a time to come to the Psychology Department where you will view different types of media and complete a few measures of reaction time. Completion of the surveys should take about 30 minutes, and your participation in the lab should take approximately 1 hour. Those who participate will be given 1 ½ credits of research or extra credit for a psychology class.

Once you complete the online questionnaire and I assign you credit, you will be able to sign up for the second part of the study. If you have any questions please contact me at cpentzi@bgsu.edu. Thank you for your time.

APPENDIX B: CONSENT FORM

Informed Consent

- You are invited to participate in a research study examining how experience with different types of media affects your reaction time.
- To be eligible to participate in this study, you must be a male who is a BGSU student and over the age of 18-years-old.
- If you choose to participate, you will first be answering a series of questions about how often you play video games and what games you play and questions about your personality. You will then play 15 minutes of a video game or view a picture slideshow. You will then complete some word puzzles and a reaction time task. The reaction time task will involve you playing against another participant. We anticipate that your participation will take approximately 60 minutes.
- The benefits of participating include helping us understand more about how experience with media among university students relates to other variables like reaction time and personality. Additionally, you will have the opportunity to receive research credit or extra credit in a Psychology class if your instructor allows this.
- Please note that you are free to change your mind and stop participating at any time, even after you begin to participate in the experiment. If you choose to stop participating just notify the research investigator. None of your information will be used if you choose to terminate the experiment before it is completed.
- The anticipated risks to you are no greater than those normally encountered in daily life. Deciding to participate or not will not impact your grades, class standing, or relationship to BGSU.
- Please note that your participation is completely voluntary and you are free to skip any questions you do not want to answer.
- It is important for you to know that all responses provided on the measures you will be asked to complete will be kept completely confidential. Any contact information you provide to the researchers will NOT be linked to your survey answers or results on any experimental task. The information you provide if you are able to earn extra credit or research credit will be stored in the SONA database on a secure server separate from your survey responses, and will be used only to inform your instructor that you participated and should receive credit. Any information you provide will be accessed only by the research investigators.
- It is the researchers' hope that the data of this study will be reported in an article summarizing the overall results of this study. No one person's answers will be reported, only summary data.
- If you have any questions about the study, you may contact the principal investigator: Cassandra Pentzien, Graduate Student, Psychology Department, BGSU, by phone (419) 372-4597, or by email cpentzi@bgsu.edu or the investigator's advisor, Dr. Eric Dubow, by phone at 419-372-2556 or by email at edubow@bgsu.edu
- You may also contact the Chair of the Human Subjects Review Board, Bowling Green State University, (419) 372-7716, hsrb@bgsu.edu, if any problems or concerns arise during the course of the study.

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 EXPIRES __03/04/2016

APPENDIX C: SIGNATURE PAGE

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

Signature _____

APPENDIX D: DEBRIEFING SCRIPT

Thank you for participating in the study conducted by Cassandra Pentzien and faculty advisor, Dr. Eric Dubow. As we told you at the beginning, this study is about the relation between playing video games and reaction time. However, what we told you at the beginning of the experiment was not the whole story. Sometimes if we told people what the whole point of the experiment was ahead of time, then some people might do whatever it is they think we want them to do, just to be helpful. Other people might do the exact opposite of what they think we want them to do, to show us that we can't figure them out. When people are trying to second-guess what the experiment really is about, and they behave a certain way because of it, our results gets messed up. That's because people aren't behaving like they naturally would in the real world. The whole point of this experiment is to find out how people would naturally behave.

Now we'd like to explain what we were trying to learn about with this study. We were really interested in looking at how mentally demanding different forms of media are, and if the effects of this demandingness influence aggressive feelings and behavior. In this study, people were assigned to one of three conditions where they played a violent video game, a non-violent game, or viewed a series of pictures. After that, you then completed a list of anagrams. Although we told you the anagrams were of common English words, they were in fact unsolvable. We used this task to see if the condition you were assigned to before had any influence over your cognitive resources. The reaction time task, which in fact is called a Competitive Reaction Task (CRT), was used to measure your levels of aggression toward your partner after your partner provokes you by giving you a loud noise blast. In this task you were actually playing against the computer rather than another participant. This allowed us to control the number of trials you won and lost. Instead of measuring reaction time as you were told, this task measures aggressive behavior by examining the levels of the noise blasts you set. It was necessary that we originally misled you about the purpose of this test and whether you were playing against another person or the computer. Had you been aware of the purpose of this study or what was being measured during this task, it would have been impossible for you to act naturally. If we had asked you to pretend to play against another person on the reaction time task, it is likely this would have affected your performance and the noise blasts you set. It was our goal to make this task as realistic as possible so that you believed you were truly playing against another person. This was necessary to ensure that we receive accurate results so that we know whether what we find is true. But we couldn't tell you about this beforehand because we didn't want you to second-guess what we expected you to do, and then behave differently from how you might naturally react. There was no other way to do the study and get valid results.

We would like to emphasize that there are no correct responses in this study. We were looking at people's natural responses. Also, your response will be kept completely confidential because your data will be analyzed as part of a group of responses (e.g., all the people who played the violent, cognitively demanding game will be grouped together). If you no longer want your responses recorded because of deception, please notify the researcher. Finally, I would like to ask you not to mention anything about the study to any other students. If a student found out what the study was about and then participated in the study, we would not get invalid results. Your efforts and our efforts would be wasted. Therefore, we would appreciate it if you did not tell others about the study. Thanks a lot for your help.

If you have any questions about the study, you may contact the principal investigator:

Cassandra Pentzien, Graduate Student, Psychology Department, BGSU, by phone (419) 372-4597, or by email pentzien@umich.edu, or you may contact the investigator's advisor, Eric Dubow, by phone at 419-372-2556 or by email at edubow@bgsu.edu. You may also contact the Chair of the Human Subjects Review Board, Bowling Green State University, (419) 372-7716, hsrb@bgsu.edu, if any problems or concerns arise during the course of the study.

APPENDIX E: DEMOGRAPHIC QUESTIONNAIRE

Age: _____

Gender: _____

Race/Ethnicity: _____

Year in school: _____

APPENDIX F: VIOLENT VIDEO GAME EXPOSURE

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

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of Hours							

2. What types of games do you typically play? _____

3. On which video game console(s) do you typically play?

1. PC
2. Handheld (Nintendo DS/3DS, PSP/PlayStation Vita)
3. PlayStation (PS one, PlayStation 2, PlayStation 3)
4. Xbox/Xbox360
5. Nintendo (Super Nintendo, Nintendo 64, GameCube, Wii, Wii U)
6. Other _____

You will now be asked to think about and rate some of your favorite video games.

1. What is one of your favorite games? _____

How often do you play this game?

1	2	3	4	5	6	7
Rarely			Occasionally			Often

How violent is the content of this game?

1	2	3	4	5	6	7
Little or no violent content						Extremely violent content

How violent are the graphics of this game?

1	2	3	4	5	6	7
Little or no violent graphics						Extremely violent graphics

Compared to others who play this game, how would you rate your skills at this game?

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

How much problem solving does this game require?

1	2	3	4	5	6	7
Little or no Problem solving						Very much problem solving

How much strategy does this game involve?

1	2	3	4	5	6	7
Little or no strategy						Very much strategy

2. What is another one of your favorite games? _____

How often do you play this game?

1	2	3	4	5	6	7
Rarely			Occasionally			Often

How violent is the content of this game?

1	2	3	4	5	6	7
Little or no violent content						Extremely violent content

How violent are the graphics of this game?

1	2	3	4	5	6	7
Little or no violent graphics						Extremely violent graphics

Compared to others who play this game, how would you rate your skills at this game?

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

How much problem solving does this game require?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Little or no
Problem solving

Very much
problem solving

How much strategy does this game involve?

1	2	3	4	5	6	7
Little or no strategy						Very much strategy

3. What is another one of your favorite games? _____

How often do you play this game?

1	2	3	4	5	6	7
Rarely			Occasionally			Often

How violent is the content of this game?

1	2	3	4	5	6	7
Little or no violent content						Extremely violent content

How violent are the graphics of this game?

1	2	3	4	5	6	7
Little or no violent graphics						Extremely violent graphics

Compared to others who play this game, how would you rate your skills at this game?

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

How much problem solving does this game require?

1	2	3	4	5	6	7
Little or no Problem solving						Very much problem solving

How much strategy does this game involve?

1	2	3	4	5	6	7
Little or no strategy						Very much strategy

4. What is another one of your favorite games? _____

How often do you play this game?

1	2	3	4	5	6	7
Rarely			Occasionally			Often

How violent is the content of this game?

1	2	3	4	5	6	7
Little or no violent content						Extremely violent content

How violent are the graphics of this game?

1	2	3	4	5	6	7
Little or no violent graphics						Extremely violent graphics

Compared to others who play this game, how would you rate your skills at this game?

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

How much problem solving does this game require?

1	2	3	4	5	6	7
Little or no Problem solving						Very much problem solving

How much strategy does this game involve?

1	2	3	4	5	6	7
Little or no strategy						Very much strategy

5. What is another one of your favorite games? _____

How often do you play this game?

1	2	3	4	5	6	7
Rarely			Occasionally			Often

How violent is the content of this game?

1	2	3	4	5	6	7
Little or no violent content						Extremely violent content

How violent are the graphics of this game?

1	2	3	4	5	6	7
Little or no violent graphics						Extremely violent graphics

Compared to others who play this game, how would you rate your skills at this game?

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

How much problem solving does this game require?

1	2	3	4	5	6	7
Little or no Problem solving						Very much problem solving

How much strategy does this game involve?

1	2	3	4	5	6	7
Little or no strategy						Very much strategy

APPENDIX G: AGGRESSION QUESTIONNAIRE

Please rate each of the following items in terms of how characteristic they are of you.

1) Once in a while I can't control the urge to strike another person.

1	2	3	4	5	6	7
extremely uncharacteristic of me						extremely characteristic of me

2) Given enough provocation, I may hit another person.

1	2	3	4	5	6	7
extremely uncharacteristic of me						extremely characteristic of me

3) If somebody hits me, I hit back.

1	2	3	4	5	6	7
extremely uncharacteristic of me						extremely characteristic of me

4) I get into fights a little more than the average person.

1	2	3	4	5	6	7
extremely uncharacteristic of me						extremely characteristic of me

5) If I have to resort to violence to protect my rights, I will.

1	2	3	4	5	6	7
extremely uncharacteristic of me						extremely characteristic of me

6) There are people who pushed me so far that we came to blows.

1	2	3	4	5	6	7
extremely uncharacteristic of me						extremely characteristic of me

7) I can think of no good reason for ever hitting a person.

1	2	3	4	5	6	7
extremely uncharacteristic of me						extremely characteristic of me

8) I have threatened people I know.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

9) I have become so mad that I have broken things.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

10) I tell my friends openly when I disagree with them.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

11) I often find myself disagreeing with people.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

12) When people annoy me, I may tell them what I think of them.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

13) I can't help getting into arguments when people disagree with me.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

14) My friends say that I'm somewhat argumentative.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

15) I flare up quickly but get over it quickly.

1	2	3	4	5	6	7
extremely					extremely	

uncharacteristic
of me

characteristic
of me

16) When frustrated, I let my irritation show.

1
extremely
uncharacteristic
of me

2

3

4

5

6

7

extremely
characteristic
of me

17) I sometimes feel like a powder keg ready to explode.

1
extremely
uncharacteristic
of me

2

3

4

5

6

7

extremely
characteristic
of me

18) I am an even tempered person.

1
extremely
uncharacteristic
of me

2

3

4

5

6

7

extremely
characteristic
of me

19) Some of my friends think I am a hothead.

1
extremely
uncharacteristic
of me

2

3

4

5

6

7

extremely
characteristic
of me

20) Sometimes I fly off the handle for no good reason.

1
extremely
uncharacteristic
of me

2

3

4

5

6

7

extremely
characteristic
of me

21) I have trouble controlling my temper.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

22) I am sometimes eaten up with jealousy.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

23) At times I feel I have gotten a raw deal out of life.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

24) Other people always seem to get the breaks.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

25) I wonder why sometimes I feel so bitter about things.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

26) I know that "friends" talk about me behind my back.

1	2	3	4	5	6	7
extremely uncharacteristic of me					extremely characteristic of me	

27) I am suspicious of overly friendly strangers.

1	2	3	4	5	6	7
extremely						extremely
uncharacteristic						characteristic
of me						of me

28) I sometimes feel that people are laughing at me behind my back.

1	2	3	4	5	6	7
extremely						extremely
uncharacteristic						characteristic
of me						of me

29) When people are especially nice, I wonder what they want.

1	2	3	4	5	6	7
extremely						extremely
uncharacteristic						characteristic
of me						of me

APPENDIX H: INTERPERSONAL REACTIVITY INDEX

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate number on the scale at the top of the screen: 1, 2, 3, 4, or 5. When you have decided on your answer, please select the answer bubble next to the question. **READ EACH ITEM CAREFULLY BEFORE RESPONDING.** Answer as honestly as you can. Thank you.

ANSWER SCALE:

1	2	3	4	5
DOES NOT DESCRIBE ME WELL				DESCRIBES ME VERY WELL

1. I daydream and fantasize, with some regularity, about things that might happen to me. (FS)
2. I often have tender, concerned feelings for people less fortunate than me. (EC)
3. I sometimes find it difficult to see things from the "other guy's" point of view. (PT) (-)
4. Sometimes I don't feel very sorry for other people when they are having problems. (EC) (-)
5. I really get involved with the feelings of the characters in a novel. (FS)
6. In emergency situations, I feel apprehensive and ill-at-ease. (PD)
7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it. (FS) (-)
8. I try to look at everybody's side of a disagreement before I make a decision. (PT)
9. When I see someone being taken advantage of, I feel kind of protective towards them. (EC)
10. I sometimes feel helpless when I am in the middle of a very emotional situation. (PD)
11. I sometimes try to understand my friends better by imagining how things look from their perspective. (PT)
12. Becoming extremely involved in a good book or movie is somewhat rare for me. (FS) (-)
13. When I see someone get hurt, I tend to remain calm. (PD) (-)
14. Other people's misfortunes do not usually disturb me a great deal. (EC) (-)

15. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. (PT) (-)
16. After seeing a play or movie, I have felt as though I were one of the characters. (FS)
17. Being in a tense emotional situation scares me. (PD)
18. When I see someone being treated unfairly, I sometimes don't feel very much pity for them. (EC) (-)
19. I am usually pretty effective in dealing with emergencies. (PD) (-)
20. I am often quite touched by things that I see happen. (EC)
21. I believe that there are two sides to every question and try to look at them both. (PT)
22. I would describe myself as a pretty soft-hearted person. (EC)
23. When I watch a good movie, I can very easily put myself in the place of a leading character. (FS)
24. I tend to lose control during emergencies. (PD)
25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while. (PT)
26. When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me. (FS)
27. When I see someone who badly needs help in an emergency, I go to pieces. (PD)
28. Before criticizing somebody, I try to imagine how I would feel if I were in their place. (PT)

NOTE:(-) denotes item to be scored in reverse fashion

PT = perspective-taking scale
 FS = fantasy scale
 EC = empathic concern scale
 PD = personal distress scale

APPENDIX I: UNSOLVABLE ANAGRAM TASK

Unscramble each set of letters to form a common English word.

LTEUBLA _____

TRAOTCR _____

LENPTAE _____

UOLDIBE _____

FSNAITE _____

OECARDE _____

TRYP A _____

MRBTHUE _____

APPENDIX J: STATE HOSTILITY SCALE

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

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1	2	3	4	5
_____ I feel furious.		_____ I feel like I'm about to explode.		
_____ I feel willful.		_____ I feel friendly.*		
_____ I feel aggravated.		_____ I feel understanding.*		
_____ I feel tender.*		_____ I feel likeable.*		
_____ I feel stormy.		_____ I feel mad.		
_____ I feel polite.*		_____ I feel mean.		
_____ I feel discontented.		_____ I feel bitter.		
_____ I feel like banging on a table.		_____ I feel burned up.		
_____ I feel irritated.		_____ I feel like yelling at somebody.		
_____ I feel frustrated.		_____ I feel cooperative.*		
_____ I feel kind.*		_____ I feel like swearing.		
_____ I feel unsociable.		_____ I feel cruel.		
_____ I feel outraged.		_____ I feel good-natured.*		
_____ I feel agreeable.*		_____ I feel disagreeable.		
_____ I feel angry.		_____ I feel enraged.		
_____ I feel offended.		_____ I feel sympathetic.*		
_____ I feel disgusted.		_____ I feel upset.		
_____ I feel tame.*				

*Item is reverse-scored

APPENDIX K: WORD COMPLETION TASK

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

Code# _____

1 b _ h _ _ _

2 i n _ _ r e

3 e x _ e _ _

4 m u _ _ e r

5 p r _ _ e

6 s p e a _

7 f l i _ _ e r

8 e x p l _ _ e

9 w _ _ m

10 k i _ _

11 t _ p _

12 h _ r _

13 a _ t _ r

14 c h o _ e

15 s _ m p _ _

16 a t t _ c _

17 c _ m p _ _ t

18 d e s _ _ _ _

19 s h _ l _

20 s h o _ t

21 r _ p _ _ t

22 s t r _ _ e

23 l _ _ e

24 b _ r n

25 s t _ r _ o

26 p _ _ s o n

27 p _ s t _ r

28 m _ _ g l e

29 b l _ n d

30 s n _ r e

31 b _ e

32 h _ t

33 g _ _ p e

34 s m _ c k

35 s m _ _ e

36 k n _ _ _

37 t _ n e

38 s _ _ b

39 s h _ r _

40 d r _ _ n

41 p _ _ n e

42 a n g _ _

43 f l _ _ t

44 f i _ _ t

45 p _ c k

46 h a _ e

47 a _ t

48 c _ t

49 w _ n

50 a _ e

51 _ r y

52 w a _

53 f _ m _

54 s l _ p

55 b _ _ k

56 r _ p e

57 f o _ e _ t

58 o f f _ _ _

59 l _ _ o n

60 c r _ _ l

61 c _ e _ t e

62 s t _ r _ y

63 m _ t c _

64 f _ r _ _

65 t _ _ t e

66 n _ _ t _

67 w _ _ d _ w

68 w _ _ k e d

69 v i s _ _ n

70 e n _ a g e

71 s c r _ _ n

72 h _ t r _ d

73 t _ l _ p h _ _ _

74 d i s _ _ s _ e d

75 c _ n t _ _ l

76 p r o v _ _ e

77 p _ n b _ l l

78 o u t _ _ _ e

79 c _ l l

80 r _ d e

81 m _ n _ g e

82 i n s _ _ _

83 s _ d _

84 b _ _ t

85 b r _ _ z e

86 r e v _ _ t

87 c o o _ 87

88 s _ _ y 88

89 d _ _ r

90 s m _ c k

91 f r _ _ t

92 _ u n c h

93 s h _ r e

94 a _ u s e

95 c l _ _ r

96 h _ n t

97 w _ t _ r

98 s _ a s h

APPENDIX L: SUBJECTIVE TASK EXPERIENCE

Please think back to the video game/picture viewing task. Rate below your experience with this task for each item below on a scale of 1 to 7.

1. I found this task was:

1	2	3	4	5	6	7
Mentally Easy						Mentally Challenging

2. I found this task to be:

1	2	3	4	5	6	7
Very Easy						Very Difficult

3. I found this task required:

1	2	3	4	5	6	7
Very Little Attention						Very Much Attention

4. I found this task:

1	2	3	4	5	6	7
Mentally Undemanding						Mentally Demanding

5. I thought this task was:

1	2	3	4	5	6	7
Mentally Refreshing						Mentally Exhausting

6. I found this task:

1	2	3	4	5	6	7
Not at all Frustrating						Very Frustrating

7. In your own words, please describe what you thought this experiment was trying to measure:

Please think back to the **word scramble** task. Rate below your experience with this task for each item below on a scale of 1 to 7.

1. I found this task was:

1	2	3	4	5	6	7
Mentally Easy						Mentally Challenging

2. I found this task to be:

1	2	3	4	5	6	7
Very Easy						Very Difficult

3. I found this task required:

1	2	3	4	5	6	7
Very Little Attention						Very Much Attention

4. I found this task:

1	2	3	4	5	6	7
Mentally Undemanding						Mentally Demanding

5. I thought this task was:

1	2	3	4	5	6	7
Mentally Refreshing						Mentally Exhausting

6. I found this task:

1	2	3	4	5	6	7
Not at all Frustrating						Very Frustrating

APPENDIX M: BARRATT IMPULSIVENESS SCALE

DIRECTIONS: People differ in the ways they act and think in different situations this is a test to measure some of the ways in which you act and think. Read each statement and select the appropriate response. Do not spend too much time on any statement. Answer quickly and honestly.

ANSWER SCALE:

1	2	3	4
Rarely/Never	Occasionally	Often	Almost Always/Always

1. I plan tasks carefully.
2. I do things without thinking.
3. I make-up my mind quickly.
4. I am happy-go-lucky.
5. I don't "pay attention."
6. I have "racing" thoughts.
7. I plan trips well ahead of time.
8. I am self controlled.
9. I concentrate easily.
10. I save regularly.
11. I "squirm" at plays or lectures.
12. I am a careful thinker.
13. I plan for job security.
14. I say things without thinking.
15. I like to think about complex problems.
16. I change jobs.
17. I act "on impulse."
18. I get easily bored when solving thought problems.
19. I act on the spur of the moment.
20. I am a steady thinker.
21. I change residences.
22. I buy things on impulse.
23. I can only think about one thing at a time.
24. I change hobbies.
25. I spend or charge more than I earn.
26. I often have extraneous thoughts when thinking.
27. I am more interested in the present than future.
28. I am restless at the theater or lectures.
29. I like puzzles.
30. I am future oriented.

TABLES

Table 1

Demographic Characteristics of the Sample

<i>N</i> =96	Frequency	Percentage
Age		
18	25	26.0%
19	28	29.2%
20	16	16.7%
21	12	12.5%
22	4	4.2%
23	3	3.1%
25	1	1.0%
26	1	1.0%
27	1	1.0%
28	2	2.1%
29	1	1.0%
31	2	2.1%
Participant Ethnicity		
Caucasian/White	80	83.3%
African American/Black	8	8.3%
Asian	5	5.2%
American Indian/Alaska Native	1	1.0%
Hispanic/Latino	1	1.0%
Other	1	1.0%
Year in School		
1 st	50	52.1%
2 nd	22	22.9%
3 rd	12	12.5%
4 th	5	5.2%
5 th or above	7	7.3%
GPA		
1.0-1.49	1	1.0%
1.5-1.99	3	3.1%
2.0-2.49	13	13.5%
2.5-2.99	24	25.0%
3.0-3.49	26	27.1%
3.5-4.0	29	30.2%
Employment		
Unemployed	53	55.2%
Part Time	42	43.8%
Full Time	1	1.0%
Mother Education		
<12 th Grade	2	2.1%
Graduated High School	18	18.8%
Some College	18	18.8%
Associates Degree	9	9.4%
Bachelors Degree	29	30.2%
Masters Degree	12	12.5%
Advanced Degree (e.g., M.D., Ph.D.)	3	3.1%
Unsure of Last Grade Completed	5	5.2%
Father Education		
<12 th Grade	0	0.0%

Graduated High School	24	25.0%
Some College	19	19.8%
Associates Degree	8	8.3%
Bachelors Degree	23	24.0%
Masters Degree	10	10.4%
Advanced Degree (e.g., M.D., Ph.D.)	7	7.3%
Unsure of Last Grade Completed	3	3.1%
Missing	2	2.1%

Table 2

Video Game Play Statistics

<i>N</i> =96		Frequency
Daily Video Game Play		
	Range (hours per day)	0.00-5.14
	Mean (hours per day)	1.24
Game Console(s) Used		
	Personal Computer	32
	Handheld (e.g., Nintendo DS, PSP, Cell Phone, etc.)	28
	PlayStation	34
	Xbox	60
	Nintendo	19
	Other	6

Table 3

Correlations Among Persistence on the Unsolvable Anagram Task, and Aggressive Cognitions, Affect, and Behavior

	Anagram Time	Aggressive Cognition	Aggressive Affect	Intensity of Noise	Duration of Noise
Anagram Time	1				
Aggressive Cognition	.057	1			
Aggressive Affect	-.050	.290**	1		
Intensity of Noise	-.254*	.236*	.321**	1	
Duration of Noise	-.349**	-.064	.239*	.769**	1

* $p < .05$ ** $p < .01$

Table 4

ANOVA Results and Means and Standard Deviations for the Main Effects of the Conditions (Content: Violent vs. Non-Violent; Context: Play vs. Watch) and their Interaction in Predicting the Outcome Variables

	Ego Depletion	Aggressive Behavior (CRT)	Aggressive Affect	Aggressive Cognitions
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Context <i>F (df)</i>	2.240 (1)	.563 (1)	.388 (1)	.833 (1)
Play Game	773.59 (53.37)	26.32 (2.49)	69.61 (2.61)	.20 (.01)
Watch Game	659.46 (52.11)	28.99 (2.42)	71.93 (2.55)	.19 (.01)
Content <i>F (df)</i>	2.610 (1)	.260 (1)	5.610 (1)	.185 (1)
Violent	779.92 (52.99)	28.58 (2.50)	66.22 (2.59)	.19 (.01)
Non-Violent	653.12 (54.12)	26.73 (2.44)	75.31 (2.65)	.19 (.01)
Context x Content <i>F (df)</i>	.438 (1)	.065 (1)	3.790 (1)	.120 (1)
Play/Violent	812.58 (73.68)	22.79 (16.28)	68.57 (3.60)	.20 (.01)
Play/Non-Violent	734.59 (77.31)	27.83 (15.71)	70.64 (3.78)	.20 (.10)
Watch/Violent	747.26 (73.83)	26.65 (16.43)	63.87 (3.61)	.19 (.01)
Watch/Non-Violent	571.66 (76.63)	33.21 (21.49)	79.99 (3.75)	.18 (.01)

Note. CRT = Competitive Reaction Time Task. The order of the aggression measures, the Personal Distress Scale of the IRI, and the Perspective Taking Scale of the IRI were included in the analysis as covariates, however, the results are not shown in the above table.