

## CHAPTER 5

### VIDEO GAME VIOLENCE AND OFFLINE AGGRESSION

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#### INTRODUCTION

Technological progress over the past several decades has revolutionized human life and interaction. Media are no longer consumed solely through the family-shared television or radio. Instead, tablets, smart phones, home computers, and video game consoles are each capable of providing an unprecedented access to television shows, movies, and video games. Indeed, the data support the notion that media use is quite high. According to Rideout et al. (2010), youth spend approximately seven and a half hours per day consuming some form of media. Such high consumption quickly inspires questions about what psychological effects will result from the access brought by the digital age.

Media use often allows viewers and players to engage with rich stories that contain characters, themes, lessons, and portrayals that make lasting impressions. It would be naïve to think that viewers merely observe media passively without relating to the content in meaningful ways. Viewers identify with characters and learn from their mistakes and successes. For this reason, research has often focused on major content themes within media and on their effects on subsequent behavior, beliefs, attitudes, and more. Unsurprisingly, one of the most prevalent themes in modern media is violence. No group is immune to this exposure. In a survey by Worth et al. (2008), 71% of 14-year olds in the United States and even 35% of 10-year olds reported viewing at least one extremely violent movie. For children living in homes without rules regarding violent content, this percentage rose to 87%.

Similarly, Gentile (2008) found that over 90% of video games rated as appropriate for children age 10 and older contained violence.

Since Albert Bandura's (1965) classic bobo doll study, the foundations of observation theory have provided a convincing theoretical framework through which the effects of violent media use are understood. In this study, children who observed a model aggressing toward a toy bobo doll were found to spontaneously replicate this aggressive behavior. However, numerous theoretical advances have revealed that the relationship between viewing violence and subsequent aggressive behavior is a complex one in which numerous psychological processes are at work, processes that can be well understood with the use of modern social-cognitive theories. This chapter will focus on the relationship between exposure to video game violence and aggressive behavior.

## **AGGRESSION AND VIOLENT MEDIA**

The study of violent media often focuses on aggressive behavior as an outcome. Before proceeding, it is important to consider how researchers define aggression. Aggression is commonly defined as "any behavior directed toward another individual that is carried out with the proximate (immediate) intent to cause harm. In addition, the perpetrator must believe that the behavior will harm the target, and that the target is motivated to avoid the behavior" (Anderson and Bushman, 2002, p. 28). Violence, on the other hand, is considered an extreme form of aggression (Anderson and Bushman, 2002). In research contexts, the presence of media violence is often characterized by the presence of aggressive content – that is, characters harming others who wish to avoid such harm. Interestingly, in one experimental study by Anderson et al. (2007), individuals playing video games with lower-level aggressive content (no gory violence) demonstrated increases in aggressive behavior that were at least as large as those shown by participants who played a more graphically violent game. Because

the findings of this study suggest that there is little or no difference between the effects of lower- and higher-level aggressive media content and because most published studies have not distinguished between such types of content, we will not make that distinction throughout this chapter and will use the terms aggression and violence interchangeably.

Several content analyses have concluded that a large proportion of the contemporary mass media contains violence (e.g., Yokata and Thompson, 2000; Thompson and Haninger, 2001; Thompson et al., 2006; Linder and Gentile, 2009). Furthermore, hundreds of studies have been conducted on the effects of violent television programs and video games (Wartella and Reeves, 1985; Paik and Comstock, 1994; Bushman and Huesmann, 2006; Anderson et al., 2010). The consistent finding, accepted by a wide array of scientific societies, is that violent media use can be a risk factor for increases in aggressive behavior and a host of aggression-related variables (American Psychological Association, 2005; American Academy of Pediatrics, 2009; International Society for Research on Aggression, 2012; Society for the Psychological Study of Social Issues, 2014). This link has been observed across gender, age groups, and cultures (e.g., Anderson et al., 2003, 2010).

Importantly, the effects of violent media have been demonstrated across a variety of aggression measures. One commonly used measure of aggression is Taylor's Competitive Reaction Time Task (TCRTT). This task involves participants competing against an ostensible other participant in reaction time trials (the participant wins a trial by clicking a box faster than his or her opponent). Prior to each trial, the participants select an aversive noise volume (60-105 dB) and/or duration (0.5-5 seconds) to administer to their opponent if they beat the opponent on that trial. Several studies from different labs using different versions of the TCRTT have demonstrated that brief violent video game play leads participants to administer more punitive noise blasts than those who played an equally

exciting nonviolent game (e.g., Bushman and Gibson, 2011; Engelhardt et al., 2011; Anderson et al., 2004).

In another aggression measure, the “hot sauce paradigm,” researchers explain to participants that they are taking part in a two-part study. The first part involves media use; in the second part, participants select foods for another person to eat. They are informed that the person dislikes spicy food but are given the opportunity to administer an amount of hot sauce that this person must eat. In studies utilizing this paradigm, violent video game play consistently leads to increases in the amount of hot sauce administered to the other person (e.g., Barlett et al., 2009). Other studies have examined the effects of violent media on verbal aggression such as insulting another person (Parke et al., 1977; Kremer and Farrar, 2009); on children’s aggressiveness during a period of free play or at school (Silvern and Williamson, 1987; Anderson et al., 2007); and even on the frequency of committing seriously violent or delinquent behaviors as an adolescent or adult (e.g., Huesmann et al., 2003; Boxer et al., 2009; O’Brien and Moceris, 2009; DeLisi et al., 2012).

## **THEORETICAL PROCESSES**

As already mentioned, the effect of violent media content is very robust and has been demonstrated across many studies. Research has therefore begun to shift to studying the psychological processes that may give rise to this effect. Currently, the General Aggression Model (GAM; Anderson and Bushman, 2002; Anderson and Carnagey, in press) is the most comprehensive theoretical framework for understanding violent media effects. This model integrates a host of overlapping theories of human aggression, including social-cognitive, personality, and biological factors. It has been applied to understanding the observed increases in aggression resulting from a number of stimuli including temperature change,

provocation, and pain, and ranging from relatively minor forms of aggression to major psychopathologies involving violence (Gilbert and Daffern, 2011).

Figure 1 about here

The General Aggression Model describes both short- and long-term processes involved in the development and maintenance of aggressive behavior patterns. The single episode begins with two forms of input: the person and the situation. Contained within the person are all characteristics of the individual that carry across situations. These include biological dispositions (e.g., testosterone levels, genetic propensities toward aggressiveness) and personality characteristics (e.g., general hostility, perceiving others' ambiguous behavior as aggressive, trait aggression, and attitudes and beliefs that support or inhibit aggressive responses). The second form of input is the situation itself. This factor includes all elements within an immediate social encounter that can influence aggression – facilitative ones such as provocation, warm temperatures, or violent media use, and inhibitory ones such as being in a church or receiving a compliment. Importantly, both the person and situation variables can also include protective (or inhibiting) factors that affect aggression. For example, aggression is inhibited when individuals find themselves in a setting where aggressive responses are seen as especially inappropriate (e.g., a funeral). Similarly, person factors such as having low testosterone or being female are protective against aggression. In fact, aggression is often best understood within a risk and resilience approach in which risk and protective factors interact to produce aggressive (or non-aggressive) responses (Gentile and Bushman, 2012).

Within the GAM, the person and situation factors influence the internal states, which refer to the person's affect, cognitions, and arousal. For example, when provoked (e.g., bumped in a hallway), individuals often experience increases in aggressive affect (e.g., anger), aggressive cognitions (e.g., aggressive fantasizing), and arousal (e.g., increased heart

rate). These internal states are highly interactive and may reinforce or inhibit one another. For example, following provocation, individuals may interpret the provocation as unjustified, which can then lead to increases in anger and arousal.

These internal states feed into decision-making processes whereby the individual appraises the situation. The initial appraisal is usually very fast, effortless, and automatic, and may be made without conscious awareness. After an initial appraisal is made, the individual decides whether it is sufficient. If it is, an impulsive behavioral response occurs (e.g., a verbal insult). If the initial appraisal is deemed unsatisfying and if the individual possesses sufficient time and cognitive resources, reappraisal occurs, in which the individual considers alternative explanations of the initial harmful event and alternative behavioral options (Barlett and Anderson, 2011). When a behavioral option is considered appropriate, a thoughtful action (or inaction) occurs. It is important to note that reappraisal does not guarantee a non-aggressive response. For example, an initial appraisal may be relatively benign (e.g., harm was unintended), but reappraisal may lead to a decision that the initial harm was intended, which in turn leads to an aggressive response.

When the behavioral response is selected and enacted, the ongoing situation is influenced and feeds back into the situational input during the next episode (see Figure 1). In other words, the GAM presents a type of behavioral feedback loop in which the situational and individual variables interact, affecting internal states and decision-making processes before a behavior is enacted, which then affects the situation. The newly changed situation feeds back into the situational input variable and initiates a new cycle. Furthermore, with repeated cycles, long-term learning processes are also affected. For example, if an aggressive response “works,” the person is rewarded for the whole decision-making process that led to the aggressive response, leading to changes in beliefs, expectations, and so on. This is in agreement with social learning and social-cognitive theories.

This cyclical process helps us better understand the violence escalation cycle (Figure 2). Within this cycle, two individuals or two groups (such as high school cliques, political parties, or even nations) engage in increasingly aggressive responses following provocation. An initial, triggering event is perceived by the acting party as unintentional, justified, and relatively mild. However, the second party perceives this action as intentional, unjustified, and harmful and retaliates in a way that it believes is justified. The first party perceives this as an unjustified over-retaliation and reacts in a way it believes is justified retaliation. Thus, the cycle begins anew, and each act of retaliation is more serious than the preceding bout of violence. These aggressive behaviors continue to escalate until one party is no longer able to retaliate or a successful intervention occurs (Anderson et al., 2008).

Figure 2 about here

Because the broad nature of the GAM allows its application across an entire range of human aggression phenomena, it serves as a solid theoretical foundation for understanding media violence effects. The text below describes some of the more specific theories within the GAM that can help explain aggressive outcomes following violent media use.

### **Priming effects**

A major influential theory that contributes to the explanatory power of the GAM is the cognitive neo-association theory proposed by Berkowitz (1990, 1993). This theory posits that aggression occurs when individuals experience aversive events, which leads to negative affect, which in turn primes a host of aggression-related knowledge structures. Perhaps one of the most valuable aspects of this theory is its knowledge structure approach to an understanding of how aggression-related cues increase aggression.

According to this approach, cognitive concepts, emotions, and behavioral scripts are interconnected in memory (Collins and Loftus, 1975), forming a web of associations that are used to process information and assist in making decisions about optimal behavioral outcomes in any given situation. The theory states that activation of a given concept will automatically activate related concepts in memory. For example, the word “murder” will strongly activate concepts such as “kill,” “attack,” or “gun” but will likely not activate unrelated concepts such as “banana.” When we are exposed to images of violence, violence-related concepts are subsequently activated, and this effectively primes the mind to utilize such concepts.

This theory has received empirical support from numerous psychological studies. A direct way to test it is to examine the accessibility of aggressive thoughts following violent video game play. One popular method is to offer an opportunity to complete fragmented words that produce aggression-related or aggression-unrelated words. For example, the word fragment “ki\_ \_” can be completed to produce the word “kill” or “kind,” and individuals with greater accessibility to aggressive thoughts are more likely to complete this fragment to produce the word “kill.” Several studies have demonstrated this increased accessibility following violent video game play (e.g., Carnagey and Anderson, 2005; Barlett and Rodeheffer, 2009).

In another study, participants were asked to play one of three versions of the same game. The games were identical except that one had a violent content. In one version, players shot at enemy soldiers; in another, they watered flowers; and in the final version, they clicked shapes. Following game play, participants completed an association task. The results showed that participants who had played the violent version were more likely to associate aggression-related terms with their self-concept (Bluemke et al., 2010). Other studies have measured

aggressive thought accessibility using dramatically different methods but produced similar results. These include increases in amount of violent content provided in a story completion task (Anderson et al., 2003), increased speed of aggressive word recognition (Bösche, 2010), increases in rating aggressive and ambiguous word pairs as similar (Bushman and Anderson, 2002), and even increases in negative attitudes toward Arab and Muslim populations after playing a game that included terrorist themes (Saleem and Anderson, 2013).

As mentioned, these effects are thought to invoke fundamental learning processes. Therefore, the same processes that account for the harmful effects of violent games should be at play when playing video games increases positive behaviors. For example, playing video games with prosocial content seems to reduce the accessibility of aggressive thoughts (Greitemeyer and Osswald, 2009) and studies have demonstrated that playing prosocial video games increases prosocial behavior (Gentile et al., 2009; Prot et al., 2014).

The cognitive processes described above are at least partially responsible for the behavioral outcomes that have been observed (Anderson and Dill, 2000; Carnagey and Anderson, 2005; Barlett and Anderson, 2013). Indeed, a recent longitudinal study found that the aggression-enhancing effect of violent video game play was wholly mediated by changes in aggressive thinking patterns (Gentile et al., 2014). Findings such as these indicate that the positive and negative effects of video game play are two sides of the same coin, i.e., that aggressive and helping behaviors that result from related content exposure seem to be mediated by the same underlying learning processes.

### **Script theory**

Related to the concept of knowledge structure development and priming, “script theory” (Huesmann, 1988) states that individuals organize much information in a way that helps guide behavior within specific social contexts, much as a theatrical script guides actors’ behaviors. When in a restaurant, for example, individuals are fully aware of the socially appropriate behaviors associated with the place. Patrons enter the establishment and wait to be seated, they order drinks, then food, pay, leave a tip, and leave. Script theory elucidates the ways in which seemingly disconnected knowledge structures (e.g., those related to aggressive thoughts) are organized to guide behavior.

For example, violent media often portray violent actions in ways that consistently reward aggression. Normal real-world negative consequences in such television shows and movies are underrepresented. According to such scripts, action movie heroes rarely experience, first hand, the collateral damage associated with their actions. In video games, this is extended further by rewarding players with points, in-game currency, or virtual items for killing enemies. Such portrayals make aggressive actions appear more rewarding and less damaging than in reality. A parallel that one can draw is with aggressive fantasizing, which often involves rehearsing mental imagery in which violent actions are rewarded. Indeed, television violence has been associated with aggressive fantasizing in males (Viemerö and Paaajanen, 1992). In addition, individuals who imagine themselves acting as the violent characters they view are more likely to exhibit aggressive behavior (Leyens and Picus, 1973; Konijn et al., 2007). Other research indicates that for those exposed to high levels of violence, aggressive fantasizing is associated with increases in aggressive behavior (Smith et al., 2009). In line with this research, people exposed to high levels of media violence are more likely to interpret ambiguous situations in a hostile manner (Anderson et al., 2007; Möller and Krahe, 2009). For example, individuals exposed to media with a highly violent content were more likely to believe that a person in a fictional scenario who bumped

someone while taking a drink was doing so intentionally (Möller and Krahé, 2009). In this case, individuals are, in a sense, filling out the missing details of a situation by utilizing the aggressive scripts developed as a result of violent media use.

### **Excitation transfer**

Violent media are naturally exciting (Zillmann, 1971; Anderson et al., 2004) – this is one reason why many of us enjoy such content in the first place. Unsurprisingly, increases in the severity of media violence are associated with increases in arousal. For example, research has found that seeing blood in video games is associated with increases in heart rate (Barlett et al., 2008). Similarly, auditory cues such as screaming victims, also produce arousal, as measured by increases in the galvanic skin response (Jeong et al., 2012). Further, more visually realistic games also produce increases in arousal, as measured by blood pressure, body temperature, and skin conductance (Ivory and Kalyanaraman, 2007; Barlett and Rodeheffer, 2009).

Individuals who become aroused do not experience an immediate return to baseline when the arousing stimulus is removed. Instead, such arousal is carried into future situations and can affect the subsequent behavior. When individuals encounter a provoking situation following an arousing event, their residual arousal may be attributed to the provoking situation, instead of the previously arousing event. This effectively enhances aggressive reactions in a process known as “excitation transfer” (Zillman, 1971, 1972). Therefore, when individuals consume violent media, whether passively (as in television and movies) or actively (as in video games), they may become more aggressive in situations that occur immediately afterwards, because the arousal produced by such media may be transferred to these situations. For this reason, the best studies of media violence and aggressive behavior

control for arousal either by including equally arousing violent and nonviolent games or by assessing and statistically controlling for arousal (e.g., Anderson et al., 2004).

### **Desensitization to violence**

When individuals are repeatedly exposed to an aversive stimulus, they may habituate to that stimulus, that is, it fails to influence them to the same degree as when first presented. This habituation process occurs when individuals are repeatedly exposed to violent imagery and affects emotional reactions and empathy for the victims (Funk et al., 2004). The typical anxiety-related responses to violent imagery are important in inhibiting aggression. However, when the normally aversive reactions that individuals have to images or thoughts of violence are diminished, inhibitory effects are no longer present, aggressive thoughts and behaviors increase (Bartholow et al., 2005, 2006; Engelhardt et al., 2011; Krahé et al., 2011), and helping behavior decreases (Bushman and Anderson, 2009).

Critically, this desensitization effect may lead individuals to perceive real life violence as more acceptable following violent media use (Mullin and Linz, 1995). In other words, the desensitization toward violence is not limited to other forms of fictional violence. In a study by Carnagey et al. (2007), individuals randomly assigned to play a violent video game were less physiologically aroused by subsequent viewing of real-life violence than nonviolent game control players. Other studies found that viewing sexually violent films led individuals to experience less empathy for the victims of such violence and attribute more blame to them (Mullin and Linz, 1995; Dexter et al., 1997). Further, it was reported that high exposure to media violence produced brain activity normally associated with the processing of emotional information and preparation for aggressive behavior (Kronenberger et al., 2005; Mathews et al., 2005; Weber et al., 2006; Hummer et al., 2010; Strenziok et al., 2010; Bailey et al., 2011).

The desensitization process has been found both in brief, short-term contexts, as well as in studies of long-term effects. For example, habitual violent video game players demonstrated reduced brain activity normally associated with exposure to aversive stimuli and violent imagery (Bartholow et al., 2006). Similarly, long-term violent media use has been positively associated with favorable attitudes toward violence and negatively associated with empathy with victims (e.g., Funk et al., 2004; Anderson et al., 2010; Prot et al., 2014). Both effects can be seen as resulting from the reduced emotional and physiological responses to violence.

### **Aggressive beliefs and attitudes**

Media violence may also influence propensities toward aggression through changes in the way individuals perceive behaviors of others and interpret social information (Crick and Dodge, 1994; Dodge, 2011). For example, a major determinant of whether one is to respond aggressively is his or her interpretation of ambiguous behaviors and stimuli. Thus, individuals who tend to interpret an ambiguous situation (e.g., a bump in the hallway) in hostile terms (e.g., believing that a bump in the hallway was intentional) are more likely to respond aggressively (Orobido de Castro et al., 2002). This tendency, known as the *hostile attribution bias*, is greater among frequent violent media users (Möller and Krahé, 2009) and has been demonstrated in the short-term experiments (Kirsh, 1998; Bushman and Anderson, 2002) as well as longitudinal studies (Anderson et al., 2007; Möller and Krahé, 2009). The longitudinal studies have found that violent media use increased hostile attribution biases which, in turn, increased aggression.

Media violence can also influence other beliefs that individuals have about people and the world around them, including beliefs about appropriate ways of reacting to others (Funk et al., 2004; Bushman and Huesmann, 2006). For example, in a longitudinal study by Möller

and Krahe (2009), participants read a brief vignette in which a confrontation was described between them and another same-sex peer. Participants were provided with a list of possible reactions to this scenario and rated how appropriate each response was. Individuals who engaged with violent video games at baseline were more likely to endorse more aggressive responses subsequently, and this in turn predicted increases in aggression. This finding suggests that violent video games can produce changes in individuals' beliefs about what constitutes normal reactions to confrontation, i.e., that aggressive responses are appropriate and normal.

### **Attention effects**

Recent research has suggested that screen media exposure might also increase violence through its effects on attention, executive control, and impulsivity. For example, in one longitudinal study, the amount of exposure to television at ages 1 and 3 predicted attention problems at age 7 (Christakis et al., 2004). Indeed, research linking hours of watching television by young children to later attention disorders led the American Academy of Pediatrics to recommend that children under 3 years of age not view any screen media at all.

In recent years, some reports have claimed that playing fast-paced violent games can improve attention (e.g., Green and Bavelier, 2006). But what the research actually shows is that playing such games, which requires players to quickly notice and respond to visual changes throughout the screen, is associated with better visuospatial skills. That is, players of violent games practice attending and responding to rapid changes on a computer screen and get better at such visuospatial tasks. Indeed, several experimental studies suggest that as few as 10 hours of training in such games can significantly improve visuospatial skills (Subrahmanyam and Greenfield, 1994; Green and Bavelier, 2006; Achtman et al., 2008;

Basak et al., 2008; Boot et al., 2008; Green et al., 2010), though some studies have failed to replicate this finding.

There is a distinction to be made between attention paid to visual stimuli that are inherently attracting attention and attention necessary to perform basic cognitive tasks. The latter is impaired in individuals with attention deficit hyperactivity disorder (ADHD), impulsivity, or executive control problems. It is possible, but remains to be proven, that the attentional sensitivity to peripheral stimuli that violent games seem to improve may be distracting and interfere with successful maintenance of focused attention on stimuli or thought processes that are not inherently attention-grabbing. For example, video game players are often required to attend to multiple peripheral stimuli, and the fidgeting child nearby may automatically draw their attention and distract them from a reading task. Indeed, several studies have reported a correlation between video game play and attention problems (e.g., Mistry et al., 2007; Bioulac et al., 2008; Gentile, 2009; Bailey et al., 2010, 2011), with some longitudinal studies providing stronger causal evidence (Swing et al., 2010; Gentile et al., 2012).

Of critical relevance to this chapter, the amount of screen media exposure – especially exposure to violent media (television and video games) – is associated with high levels of impulsive aggression through its effects on attention (Swing and Anderson, in press). Importantly, this effect was found even after statistically controlling for increases in aggression as a result of screen media's effects on aggressive cognition and affect (Swing and Anderson, in press). In other words, the effects of screen media on attention and the subsequent effects on aggression seem unique and independent of the other processes described above (Swing and Anderson, in press).

## DEBATE ON VIOLENT MEDIA EFFECTS

Despite the wealth of evidence in support of an effect of violent media on aggression-related outcomes, such evidence often goes underreported in news media (Bushman and Anderson, 2001). Consequently, many in the public believe that the “jury is still out” on the influence of violent media. Furthermore, a small group of researchers have been claiming that there is no effect of violent media on aggression-related outcomes (Ferguson et al., 2008; Ferguson and Kilburn, 2009, 2010; Ferguson and Savage, 2012; Elson and Ferguson, 2013; Ferguson, 2013; Ferguson and Dyck, 2013). Most of the concerns cited by these critics are methodological in nature, and we will highlight some of the more prominent criticisms mentioned in the literature and how they have been addressed.

### **Demand characteristics**

One criticism is that violent media research induces participants to respond desirably in order to please researchers. Thus, research participants presumably understand the purpose of a given study and behave aggressively following violent video game play (or violent television viewing) in order to provide support to the researchers’ hypotheses (Ferguson, 2013; Ferguson and Dyck, 2013). While this criticism has potential to invalidate findings, it is common practice to assess participants’ understanding of the research and exclude individuals who are aware of the study hypothesis from data analyses (e.g., Bartholow and Anderson, 2002; Anderson et al., 2004; Konjin et al., 2007; Anderson and Carnagey, 2009; Gentile et al., 2009). Further, there is good reason to believe that even if they know the study hypothesis, participants may be more likely to change their behavior to *disprove* the hypothesis given that aggression is a socially undesirable behavior. Indeed, empirical research dedicated to addressing this possibility seems to confirm this notion, as demonstrated by a study in which aggressive behavior in video game players was reduced

when the measure of aggression was *too transparent* (Bender et al., 2013). In other words, these individuals seemed motivated to disconfirm, not prove, the hypotheses of the researchers.

### **Frustration and arousal**

Another criticism is that variables such as frustration and arousal confound effects of the violent media. According to Ferguson and Savage (2012), “Studies where experimental subjects are exposed to violence, and control subjects are exposed to something calm or boring, may report statistically significant differences between groups due to the differences in excitement or arousal elicited by the material rather than the violent content itself” (p. 131). This criticism can only apply to the short-term effects of violent media. As already noted, several longitudinal studies demonstrate a long-term effect of violent media on aggressive tendencies. Direct tests also demonstrate that the effect of violent content occurs independently of frustration. For example, in one study (Williams, 2009) individuals were randomly assigned to play one of several games in which frustration and violent content were manipulated. While frustration was found to increase aggression, so too was violent content, and thus frustration cannot solely account for aggression-related outcomes seen in other research. In still other studies, arousal is one of the most commonly controlled variables, either statistically, or through the pilot testing of video games in which equally arousing games are selected and compared (e.g., Anderson et al., 2004; Arriaga et al., 2008; Anderson and Carnagey, 2009). Indeed, starting with Anderson and Dill (2000), many experimental studies of violent video game effects have controlled for a host of potential confounds (e.g., frustration, difficulty, enjoyment, competitiveness) and still found the hypothesized effects (e.g., Arriaga et al., 2008, Barlett et al., 2008; Anderson and Carnagey, 2009; Williams, 2009).

### **Attraction hypothesis**

It has also been suggested that effects of exposure to violent media may be “better explained as a byproduct of ‘third’ variables, such as exposure to family violence and innate violence motivation” (Ferguson et al., 2008, p. 2). In other words, violent media do not increase aggression; instead, aggressive children and adults are attracted to violent media. This “attraction hypothesis” has received considerable empirical attention, but two main types of research have refuted it. First, experimental studies in which participants are randomly assigned to play a violent or a nonviolent video game control for individual differences in levels of aggressiveness. As shown in several such studies, violent game play causes significant increases in aggressive behavior, aggressive cognition, aggressive affect, and desensitization/lack of empathy (Anderson et al., 2010). Second, longitudinal studies have controlled for initial levels of aggressiveness in order to rule out attraction effects (e.g., Ostrov et al., 2006; Anderson et al., 2007, 2008; Möller and Krahe, 2009; Gentile et al., 2011, 2014), yet their results are consistent with the hypothesis that exposure to violent media is a risk factor for aggression.

### **Measures of aggression are invalid and not standardized**

This criticism is targeted primarily (but not solely) at the use of Taylor’s Competitive Reaction Time Task (TCRTT) as a measure of aggressive behavior. The measure has been described above, in the section on aggression and violent media. According to Ferguson (2013), measures such as the TCRTT “do *not* measure aggression, but vaguely approximate it in some way” and “children (and adults) wishing to be aggressive do not chase after their targets with . . . headphones with which to administer bursts of white noise” (p. 6). However, measures similar to the TCRTT have been found to demonstrate high levels of validity and to

be closely associated with relevant variables, including alcohol consumption, self-reported physical aggression, and even the genetic markers linked with aggression (Giancola and Parrott, 2008).

Measures such as the TCRTT have also been criticized on the grounds that aggression can be coded in multiple ways (e.g., through the number of high blasts, consideration of intensity or duration indices only, or an average intensity and duration). Such variability and lack of standardization may allow researchers to choose the coding method that suits their particular hypothesis (Ferguson, 2013). This criticism suggests that studies using the TCRTT should produce larger effect sizes than those that do not use it; contrary to this, the largest meta-analysis (Anderson et al., 2010) found that use of the TCRTT actually produced slightly smaller effect sizes. Second, in many studies multiple coding methods derived from the TCRTT have been used, and all had a tendency to show the same effects.

### **Discrepant findings**

There are hundreds of empirical studies dedicated to testing the effect of violent video game play on aggression (Anderson et al., 2010). While, as a whole, this literature reveals largely consistent effects, there are studies in which no differences in downstream effects are found between violent and nonviolent games. Some find such contrasting findings as evidence that the issue is still not settled as to whether violent video game play affects aggression. It is important, however, to note that these contrary findings are largely derived from a very small number of studies (e.g., Ferguson et al., 2008). A recent meta-analysis (Greitemeyer and Mügge, 2014) compared the effect sizes observed in studies published by major proponents of violent video game effects on aggression (Craig Anderson and Brad Bushman) with effect sizes reported in studies by the opponents of these effects (Christopher Ferguson) and effects sizes from all other relevant studies. It was found that the Anderson and Bushman studies

produced average effect sizes of 0.19, while effect sizes of the Ferguson studies averaged at 0.02. Critically, the effect sizes produced by the Anderson and Bushman studies were comparable to those of the studies by other “neutral” researchers (0.20).

There are many possible reasons why smaller effects are observed in some studies. For example, studies in all fields produce varying effect sizes simply based on the usual random variation in samples. Another reason involves variations in methods and measures. One particularly serious possibility in the video game domain is that some researchers may fail to identify and exclude inappropriate study participants and may use methods (e.g., transparent aggression measures) that produce null effects. As already noted, there is also a related issue that some video game players may be strongly motivated to disconfirm the hypothesis that violent video game play increases aggression (Bender et al., 2013).

## **CONCLUSION**

The ways in which media, particularly violent media, influence viewers (and now players) is an old question, with a literature nearly as old as television. The theoretical accounts of how and why aggressive outcomes arise following violent media consumption are relatively solid, as they are built upon decades of research. Nevertheless, criticisms are frequently leveled at this literature, demanding evidence criteria beyond what is expected in other areas of psychological study. Those criticisms have been addressed, often with sound research (e.g., Bushman et al., 2010; Huesmann, 2010; Sacks et al., 2011). Although disagreement in research can fuel scientific progress, undue critical discourse has the potential to undermine the public’s ability to understand the effects of violent media. Of course, dissent should not be stifled, and the only way forward is to conduct more research to further refine our understanding of the issues at hand and help foster more informed consumer choices.

## **DISCLOSURE STATEMENT**

The authors disclose no relationships with commercial entities and professional activities that may bias their views.

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**Figure 1.** Short-term processes within the General Aggression Model

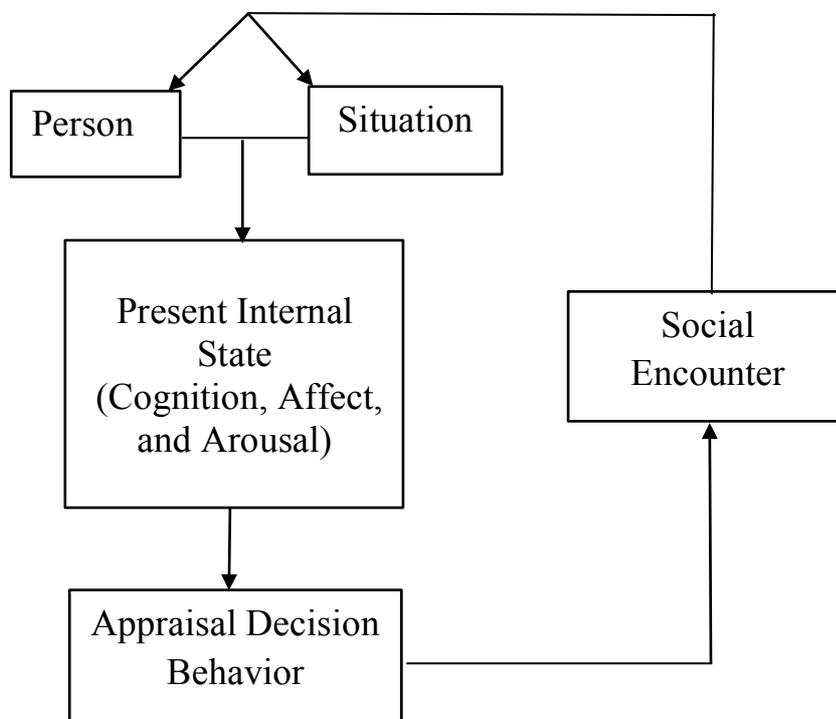


Figure 2. Violence escalation cycle

