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Violent Video Games, Externalizing Behavior, and Prosocial Behavior: A Five-Year Longitudinal Study During Adolescence

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Decades of research on the effects of media violence have examined associations between viewing aggressive material in the media and aggression and prosocial behavior. However, the existing longitudinal studies have tended to exclusively examine aggression and prosocial behavior as outcomes, with a limited range of potential mediators. The current study examines associations between playing violent video games and externalizing and prosocial behavior over a 5-year period across adolescence. Additionally, the study examines potential mediators of these associations, including empathic concern, benevolence, and self-regulation. Participants included 488 adolescents (M_{age} of child at Wave 1 = 13.83, $SD = 0.98$) and their parents, who completed self- and parental measures at three different time points, each 2 years apart. Results revealed that early exposure to video game violence was indirectly associated with lower levels of prosocial behavior as mediated by lower levels of benevolence. Additionally, early video game violence play was associated with higher levels of externalizing behavior at the cross-sectional level, but not 5 years later. Implications of results for adolescents and parents are discussed.

Keywords: video game, computer game, externalizing behavior, violence, prosocial

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Media has been used for many years to convey messages to its audiences. However, in just the past few decades, media use has increased dramatically. A recent United States poll showed that, on average, children aged 8–12 years were exposed to almost six hours per day of recreational media, including over four and a half hours of screen time. Teens aged 13–18 years were exposed to considerably more: almost nine hours of recreational media and more than six and a half hours of screen time (Rideout, 2015). In recent years, media and its potential effects on users have been investigated in many forms, and researchers have found that exposure to different media content has been linked with a range of

positive and negative outcomes. Media can be educational (Schmidt & Anderson, 2007), enhance aspects of cognitive development and fine motor skills (Green & Bavelier, 2006), be a focus point for social connections and personal identity (Roe, 1996; Warburton, 2012; Warburton & Highfield, 2016), and be a model for prosocial behavior (Greitemeyer & Mügge, 2014; Prot et al., 2014). However exposure to other types of media content has been associated with negative outcomes, including substance use (Padilla-Walker, Nelson, Carroll, & Jensen, 2010; Robinson, Chen, & Killen, 1998), violence (Anderson et al., 2003), aggression (Anderson, Bushman, Donnerstein, Hummer, & Warburton, 2015; Media Violence Commission, International Society for Research on Aggression, 2012; Warburton & Braunstein, 2012), risky behavior (Klein et al., 1993), and increased and accelerated sexual behaviors (Escobar-Chaves et al., 2005; Pardun, L'Engle, & Brown, 2005).

In addition to increased exposure to media, advancements in technology have brought about more sophisticated forms of media and different ways to interact with them. Video games are a newer form of interactive media that, year by year, have used more advanced technology for their delivery and more sophisticated and realistic graphics for their content (Konijn, Bijvank, & Bushman, 2007). Because video games are interactive, some researchers have suggested that video games may be more likely to influence outcomes such as aggression and decreased empathy than more passive media (Bryant & Oliver, 2009). It is important to note that

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some researchers have argued that exposure to violent video games are not a significant predictor of aggressive or violent behavior in the short, or long term (e.g., DeCamp & Ferguson, 2017; Ferguson, 2007; Markey & Ferguson, 2017), yet the majority of researchers studying media effects affirm the existence of a positive relationship between exposure to violent media and increased aggressive behavior (Greitemeyer & Mügge, 2014). This interactive exposure to media using video games, in turn, may have developmental implications where the content is unhelpful in terms of socialization and moral development. For example, many popular video games have been shown to have frequent depictions of violence (Dill, Gentile, Richter, & Dill, 2005) as well as sexual (Downs & Smith, 2010) and antisocial content (Walsh, Gentile, Gieske, Walsh, & Chasco, 2003). The current study will investigate longitudinal associations between playing high amounts of violent video games and various positive and negative outcomes, including externalizing behavior and prosocial behavior, over a 5-year period in adolescence.

Violent Video Games

Violent content appears in many genres of video games, including children's games and educational games. According to a Children Now (2001) content analysis, as much as 89% of video games have some form of violence, with almost half including potentially lethal violence against other characters (Dill et al., 2005; Gentile, Lynch, Linder, & Walsh, 2004). Many studies have investigated the effects of violent video games on several different outcomes. The majority of these studies have suggested that violent video game play is positively associated with aggression (e.g., Anderson & Warburton, 2012; Greitemeyer & Mügge, 2014; Warburton, 2014), violence (Bartholow, Bushman, & Sestir, 2006), hostility (Gentile et al., 2004), aggressive affect (Anderson & Bushman, 2001), and desensitization to violent depictions and messages (Bartholow et al., 2006; Carnagey, Anderson, & Bushman, 2007; Gentile, Swing, Anderson, Rinker, & Thomas, 2016). Similar findings have been reported across cultures (Anderson et al., 2010) in dozens of countries (Anderson et al., 2008, 2017; Möller & Krahé, 2009).

Violent Video Games and Externalizing Behaviors

While both cross-sectional and longitudinal studies have correlated violent video game use with aggression and other negative outcomes, very little research has investigated the potential relationships between violent video games and externalizing behaviors. Externalizing behaviors are conceptualized as including a variety of behaviors and activities including social deviance, unmanageability, hyperactivity, disruptiveness, noncompliance, antisocial behaviors, and delinquency (Maughan, Christiansen, Jensen, Olympia, & Clark, 2005). Given the scope of externalizing behaviors and the developmental issues related to externalizing behaviors (e.g., Campbell, Shaw, & Gilliom, 2000), it is important to understand contributing social factors, including violent video game play. While some research combines aggression and externalizing behaviors as indicators of problem behavior, there is evidence to suggest that these are two distinctive constructs that are differentially associated with outcomes. For example, the definition of aggression includes an intent to harm others. Conversely,

externalizing behavior *can* harm others but is more focused on rule-breaking behavior, and can include behaviors such as theft, drug or other substance use, truancy, and so forth. A numbers of studies utilizing factor analyses have found that aggression and externalizing behavior load on two different dimensions (e.g., Rey & Morris-Yates, 1993; Tackett, Krueger, Sawyer, & Graetz, 2003), leading to a much more accurate representation of antisocial behavior than examining these in one dimension. However, though aggression and externalizing behavior often load as two distinct dimensions, they are often highly correlated. Violent video games depict a significant amount of aggression while often displaying high levels of externalizing behaviors, such as vandalism, theft, and general rule breaking. Accordingly, an early and heavy diet of violent video games—which are often replete with nonviolent externalizing behaviors—may increase the likelihood that individuals would learn that such externalizing behaviors are normative and even rewarded in some circumstances. Thus, we have decided to examine the long-term effect of violent video games on externalizing behavior in the current study.

To our knowledge, only a few studies have explicitly investigated the relationship between violent video games and externalizing behaviors. The first, conducted by Funk et al. (2002), did not find any significant relationship between violent video games and externalizing behaviors. Another study found a positive association between violent games and externalizing behaviors but only among females (Lohaus, Ball, Klein-Hessling, & Wild, 2005). Lastly, a study conducted by Holtz and Appel (2011) found that externalizing behavior problems like aggression and delinquency could be predicted based on online gaming and first-person-shooter game play.

Several researchers have examined the relationship between playing violent video games and delinquency in adolescents (a type of externalizing behavior). In a 2-year longitudinal study of adolescents by Hopf, Huber, and Weiß (2008), the researchers found a positive relationship between violent video game play and adolescent delinquent behavior. Similarly, cross sectional studies examining undergraduate college students (Anderson & Dill, 2000) and 12-to-18 old participants found a significant relationship between violent video game play and delinquent behavior (Exelmans, Custers, & Van den Bulck, 2015). Additionally, the study by Exelmans et al. (2015) found that statistical models including violent video game play were better predictors of delinquent behaviors in adolescents than statistical models only focusing on peer behavior, prior victimization, sensation seeking, and alienation alone. This relationship between violent video game play and delinquent behavior has also been found in clinical populations of institutionalized juvenile delinquents (DeLisi, Vaughn, Gentile, Anderson, & Shook, 2013). However, Ferguson, Olson, Kutner, and Warner (2014) found that violent video game play was not a significant predictor of delinquent behavior in seventh to eighth graders when parental, peer, and individual characteristics were included in a cross-sectional model. The research findings above are mixed and mostly all obtained through cross-sectional studies using a youth self-report measure of externalizing behavior. As Funk et al. (2002) noted, it is possible that child participants, including aggressive children, had differing perceptions of what constituted higher levels of aggressive and externalizing behavior, a self-report issue that has the potential to account for the disparate findings. Until now, very few longitudinal studies investigating

this relationship have been conducted, and the ones that exist are relatively short in length. This study will address these gaps by providing longitudinal data about the long-term impact of violent video games on externalizing behavior during adolescence (over 5 years), using data sources from multiple informants.

Video Games and Prosocial Behavior

Prosocial behavior refers to any voluntary behavior that is intended to help or benefit another individual or group (e.g., sharing, complimenting, helping). Prosocial behavior is associated with many positive outcomes, including life satisfaction, self-acceptance, personal growth, autonomy, positive relationships with others, social coherence, and psychological functioning (Keyes, 2005; Nelson, Layous, Cole, & Lyubomirsky, 2016). The many positive outcomes of prosocial behavior—both to individuals and to society—underpin the importance of developing and promoting such behavior from an early age.

Several studies have investigated both the short- and long-term effects of violent video games on prosocial behavior. Recent studies have found that in addition to increasing aggressive behavior (Bartholow & Anderson, 2002), violent video games decrease prosocial behavior in the short and long term (e.g., Anderson et al., 2010). In contrast, video games with prosocial content have been shown to facilitate helping behaviors (see Greitemeyer & Mügge, 2014 for a review), with increases in empathy acting as a mediator of this relationship (Prot et al., 2014). Specifically, experimental and longitudinal studies have found that prosocial video games increase prosocial thoughts (Greitemeyer & Osswald, 2010) and promote prosocial behaviors such as altruistic service, defending behaviors, and intervention in harassment situations (Gentile et al., 2009; Greitemeyer & Osswald, 2010). Given this disparity in outcomes, it is perhaps surprising that violent video game content seems to be much more common than prosocial content in mainstream gaming (Dill et al., 2005; Gentile et al., 2004) and that more-frequent video game users are likely exposed to significantly more violent video game content than prosocial content. For example, Krahe and Möller (2004) found that a higher frequency of game play was positively correlated with the degree to which adolescents recommended violent games. Although it is clearly important to continue to investigate the possible outcomes of playing violent video games, to date, very few studies have examined the long-term impact of violent video games on prosocial behavior. Accordingly, one key aim of the current study is to examine these relationships during adolescence.

Gender

In examining violent video game play and externalizing behaviors it is important to consider gender. Men have repeatedly been shown to have higher rates of externalizing behaviors starting in early childhood (Miner & Clarke-Stewart, 2008) and continuing into adulthood (Hicks et al., 2007). Importantly, the trajectories and risk factors of externalizing behaviors differ between men and women (Daigle, Cullen, & Wright, 2007). Adolescent boys report more serious delinquency than adolescent girls and this may be due to the fact that adolescent boys experience more risk factors and fewer protective factors to delinquency in adolescence than adolescent females (Fagan, Van Horn, Hawkins, & Arthur, 2007).

Furthermore, adolescent males spend approximately twice as much time playing video games as adolescent females (Greenberg, Sherry, Lachlan, Lucas, & Holmstrom, 2010) and this disparity in time spent playing video games continues into early adulthood (Ogletree & Drake, 2007). Particularly important for the current study, adolescent boys are much more likely to play physically-oriented (aka, violent) video games than adolescent girls (Greenberg et al., 2010). Given the gender differences in violent video game play and externalizing behaviors it is important to consider gender in the current study.

Theoretical Models

The current study uses the general aggression model (GAM; Anderson & Bushman, 2002) to explain associations between viewing media, externalizing, and prosocial behaviors. GAM is used primarily as a model to explain the underlying psychological processes during an instance of aggression and prosocial behavior. In short, an environmental trigger interacts with the characteristics (biological and personal) within a person that make them more or less prepared to aggress or behave prosocially. This results in the activation of relevant cognitions and emotions and may also be accompanied by physiological arousal. These cognitions and emotions, in turn, may impel the person toward an aggressive or prosocial action, and this action becomes more likely if the person is quite aroused or doesn't have the time and/or cognitive resources for "reappraisal" processes (i.e., thinking through the consequences of this and alternate responses). Given the similarities and overlap between aggression and the various antisocial behaviors conceptualized as "externalizing," GAM seems to be similarly applicable to externalizing behaviors.

Importantly for this study of effects over time, GAM also proposes mechanisms by which external influences such as violent video games may have a long-term impact on an individual's trait levels of aggression and prosocial behavior, and again, such processes may be relevant to a tendency toward externalizing behavior. Using GAM, viewing aggression in the media may have a long-term impact on these behaviors in a number of ways. First, viewing media aggression may contribute to the formulation, rehearsal, and reinforcement of beliefs and attitudes that normalize externalizing behavior and the construction and reinforcement of knowledge structures in which externalizing behaviors are a key action tendency. Indeed, given that many popular video games (e.g., *Grand Theft Auto V*) involve and reward a wide range of antisocial behaviors, such processes could be involved in the development, and generalization, of a number of behaviors that could be considered deviant, defiant, disruptive, antisocial, and delinquent (i.e., externalizing). Second, high levels of viewing may emotionally and cognitively desensitize viewers to the suffering of others, including those impacted by externalizing behaviors, thus decreasing barriers to externalizing behavior and the likelihood of prosocial responses such as decreased empathic concern and benevolence for others. This decrease in benevolence and empathic concern after repeated exposure to violent media also decrease the likelihood that a person will respond prosocially. Third, chronic exposure to aggressive or violent video games may lead to a hostile attributional bias that impacts the way others' behavior is perceived and increases the likelihood that innocent behaviors by others will be interpreted as hostile and responded to in a hostile

way. Fourth, people may imitate the behavior of key media characters who model externalizing behavior, especially if they are admired, high in status, powerful, and/or rewarded for that behavior (e.g., Bandura, 1977). Finally, it is implicit in GAM that external factors such as violent video games may impact a range of internal processes over time to increase an individual's readiness to aggress (Warburton & Anderson, 2015, 2018). These processes may be biological (e.g., changes to brain function, desensitization) or psychological (e.g., changes to attitudes and beliefs).

Based on predictions from GAM and from existing findings regarding the impact of violent video games on thoughts, feelings, and behavior (e.g., Anderson et al., 2003, 2010), it could be theorized that levels of adolescents' exposure to aggressive media—particularly interactive media such as violent video games—would predict higher levels of externalizing behavior and lower levels of prosocial behavior over time. The current study tests these hypotheses and also examines three key within-person factors described in GAM that have the potential to change over time and mediate such an effect. These are impaired self-regulation (biological), curtailed empathic concern (psychological), and reduced benevolence (psychological).

Mediators

Self-regulation. Self-regulation refers to one's ability to modulate thoughts, feelings, and emotions (Posner & Rothbart, 2000). Self-regulation has been associated with a host of positive outcomes, including improved self-discipline (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011), goal orientation and attainment (Bouffard, Boisvert, Vezeau, & Larouche, 1995), and lower levels of delinquent behavior (Tyler, 2009). Self-regulation has also been investigated in association with several media outlets, including TV and Internet usage. While this is a fairly new area of research in the media field, results link low levels of self-regulation to excessive—and, at times, compulsive—media consumption (LaRose, Lin, & Eastin, 2003). Indeed, Internet gaming disorder, a compulsive use of online games, was added as a mental disorder to the Appendix of the *DSM-5* in 2013 and to the body of the ICD-11 in 2017 (Petry et al., 2014). Relevant to this study, neuroimaging studies have linked violent video game play to reduced activity in parts of the brain used in self-regulatory processes such as the prefrontal cortex (Hummer et al., 2010) as well as to reduced cognitive control (Bailey, West, & Anderson, 2010) and decrements to inhibitory control over time (Hummer, Kronenberger, Wang, & Mathews, 2017). Self-regulation is also negatively correlated with externalizing behaviors in both children and adolescents (Eisenberg et al., 2001, 2005). In addition to dissuading negative behaviors, it appears that self-regulation facilitates positive social behaviors, including prosocial behavior toward family, friends, and strangers (Padilla-Walker & Christensen, 2011).

Empathic concern. Empathic concern is a complex human experience involving both top-down and bottom-up cognitive processes and neural networks. It involves perceiving the affective experience of others and responding to that perception using an individual's internal motivations, desires, regulatory abilities, and cognitions. Related emotional responses include sympathy, compassion, and tenderness. It appears that while some forms of media, such as violent video games, decrease empathic concern

(Anderson et al., 2010; Fraser, Padilla-Walker, Coyne, Nelson, & Stockdale, 2012), prosocial video games (Prot et al., 2014) can increase it. Lower levels of empathic concern have also been linked to antisocial behaviors, including bullying (Gini, Albiero, Benelli, & Altoè, 2007). Empathic concern has been associated with various aspects of prosocial behavior in children and adolescents as well. It has been found to diminish behavioral problems in children (Hastings, Zahn-Waxler, Robinson, Usher, & Bridges, 2000) and to motivate altruistic helping intended to minimize suffering in others (Batson, 2010; Coke, Batson, & McDavis, 1978; Dovidio, Allen, & Schroeder, 1990), including helping bullied classmates (Gini et al., 2007).

Benevolence. Beliefs and values include internalized principles or standards that govern attitudes and guide behaviors. According to the basic human values theory, benevolence—a value that emphasizes the intrinsic desire to preserve and enhance the welfare of others (Schwartz & Boehnke, 2004)—is one of many values recognized across cultures. Though benevolence has been studied in many areas, no research to our knowledge exists to investigate the potential relationships between benevolence and different forms of media consumption. There are sound reasons to believe that benevolence may be an important mediating factor in this study. For example, high levels of benevolence have been linked with prosocial behavior (Schwartz, 2010), and lower levels have been associated with higher levels of externalizing behaviors in children (Prinzie et al., 2003; Williams et al., 2009).

Current Study

The purpose of the current study is to further investigate the relationship between violent video game play and externalizing and prosocial behaviors across a 5-year period in adolescence. In addition to investigating the direct relationship between violent video games and externalizing behaviors, this study will also consider mediators such as self-regulation, empathic concern, and benevolent values, both as outcomes and mediators. We hypothesize that violent video game play during early adolescence will be associated with higher levels of externalizing behavior and lower levels of prosocial behavior in late adolescence. Additionally, we hypothesize that these relationships will be mediated through self-regulation, empathic concern, and a benevolent value system.

Method

Participants

The participants for this study were taken from three different years (Waves 3, 5, and 7—referred to as Waves 1, 2, and 3 for reader ease from this point onward) of the Flourishing Families Project (FFP), a longitudinal study of intrafamily life involving 488 families with a child between the ages of 11 and 16 (51% male, M_{age} of child at Wave 1 = 13.83, $SD = 0.98$). There was approximately a 2-year gap between measurement periods for each year. Participants were treated in accordance with the American Psychological Association's Code of Conduct, Ethical Principles and Guidelines (American Psychological Association, 2002) and approval for the study was obtained from the Institutional Review Board (IRB) at Brigham Young University for the project entitled "Flourishing Families" (IRB F060311). Just over 67% of children

came from two-parent families, while nearly 33% were in single-parent families (91% percent of single parents were mothers and 9% were fathers). Of the families, 338 were of European American ethnicity, 61 were African American, with smaller numbers for Hispanics (5) and Asian Americans (14). Thirty-eight families are considered multiethnic in nature, based on a combination of two or more ethnic cultures among family members. In terms of parental education, 69.9% of mothers and approximately 68% of fathers had a bachelor's degree or higher. For family income, 31.5% of families reported a yearly income of less than \$59,000, with 28.3% reporting income in the \$60,000–99,000 range, 22.1% in the \$100,000–139,000 range, and another 18.1% making \$140,000 or more per year.

Procedure

Participant families for the FFP were primarily recruited using a purchased national telephone survey database (Polk Directories/InfoUSA). At the time of data collection, this database contained approximately 82 million households across the United States and had detailed information about each household, including presence and age of children. Families identified using the Polk Directory were randomly selected from targeted census tracts that mirrored the socioeconomic and racial stratification reported for local school districts. All families with a child between the ages of 10 and 14 living within target census tracts were deemed eligible to participate in the FFP. Of the 692 eligible families contacted, 423 agreed to participate, resulting in a 61% response rate. Because the Polk Directory national database was generated using telephone, magazine, and Internet subscription reports, families of lower socioeconomic status were underrepresented in the final sample. In an attempt to more closely mirror the demographics of the local area, a limited number of lower socioeconomic and ethnically diverse families were recruited into the study by other means (e.g., by referrals and fliers). These totaled $n = 77$ (15% of the final sample) and increased the socioeconomic and ethnic diversity of the final sample ($N = 500$). We were able to recontact 488 families for the current study (98% retention). Finally, there was an 88% retention rate between the first and last waves measured in the current study. It is important to note that there were very little missing data. As interviewers collected each segment of the in-home interview, questionnaires were screened for missing answers and double marking. Dropout analyses revealed that the data were missing at random. Missing data was handled using the maximum likelihood method in Mplus which allowed us to include participants who had data for at least one wave.

Measures

All video game and behavioral outcomes were measured at Waves 1 and 3. Mediators were measured at Wave 1 and 2. Multiple reporters of behavior (child, mother, and father) were utilized where data existed and are outlined below.

Video game violence and time (Wave 1 and Wave 3). Participants listed their three favorite video games and rated how frequently they played each game on a scale of 1 (*not frequently*) to 5 (*extremely frequently*). All the games identified by participants were then distributed to 320 independent raters (58% male, $M_{age} = 22.50$, $SD = 4.40$), who were asked to rate

how much physical aggression was in each game they were familiar with (viewed regularly). Raters were provided with definitions and examples of physical aggression. Ratings were based on a 1 (*not physically aggressive*) to 5 (*extremely physically aggressive*) Likert scale. The raters evaluated a total of 97 different games. The mean ratings of all raters for a particular game (at least two raters per game) were determined. Expert ratings are commonly used in media violence research (e.g., Huesmann, Moise-Titus, Podolski, & Eron, 2003; Krahé, Busching, & Möller, 2012) and show high reliability, convergent validity, predictive validity, and discriminant validity across multiple cultures and ages (Busching et al., 2015). Interrater reliability was then assessed with two different methods, consistent with the method set by Huesmann et al. (2003). In particular, we determined the means of the interrater correlations and averaged absolute discrepancies from the mean. Raters with a high number of consistent negative correlations (suggesting lack of care or quality in rating) were omitted. The resulting means and interrater correlations were $z = 1.50$, $r = .90$, $SD = 1.59$. Examples of video games rated as highly aggressive included *Grand Theft Auto*, *Assassin's Creed*, and *Halo*.

A video game violence exposure score was obtained by multiplying content ratings for each game by frequency of game playing, thus giving more weight to games that were played more frequently.

Externalizing behavior (Wave 1 and Wave 3). Externalizing problem behavior was measured using nine delinquency-related items (Barber, Stolz, & Olsen, 2005) using child, mother, and father reports. Sample items include "I lie or cheat" (or "My child lies or cheats") and "I steal things from places other than home" (or "My child steals things from places other than home"). None of the items measured aggressive behavior. Responses ranged from 0 (*not true*) to 2 (*often true*), with higher scores representing higher levels of delinquent/externalizing behavior. There is extensive evidence of both reliability and validity of this measure, and there is evidence that this scale has cross-ethnic equivalence (Krishnakumar, Buehler, & Barber, 2003). The Cronbach's alpha reliability coefficient for this research sample was found to be acceptable at Wave 1 (child $\alpha = .76$; mother $\alpha = .76$; father $\alpha = .58$) and Wave 3 (child $\alpha = .75$; mother $\alpha = .83$; father $\alpha = .80$). Child, mother, and father reports of externalizing behavior were used as latent factors at both time points in the analyses below.

Prosocial behavior (Wave 1 and Wave 3). Children's prosocial behavior was measured using nine items based on the Inventory of Strengths (modified from Peterson & Seligman, 2004). Respondents answered on a 5-point Likert-type scale, ranging from 1 (*not like me at all*) to 5 (*very much like me*) in terms of how much they disagreed or agreed with statements about themselves. Sample statements included "I help people I don't know, even if it is not easy for me" and "I go out of my way to cheer up people who seem sad, even if I do not know them." Higher scores indicate greater levels of prosocial behavior. A Cronbach's alpha coefficient of $\alpha = .70$ was found for the original measure (Peterson & Seligman, 2004), while the Cronbach's alpha reliability coefficients were found to be $\alpha = .83$ for Wave 1 and $\alpha = .85$ at Wave 3.

Self-regulation (Waves 1 and 2). Parents and children reported on the child's ability to regulate emotions, cognitions, and

behaviors using a 12-item self-regulation measure (revised from Novak & Clayton, 2001). Parents responded based on how much they agreed or disagreed with statements about their child, such as “My child has difficulty controlling his/her temper,” (“I have difficulty controlling my temper”) and “My child gets distracted by little things,” (“I get distracted by little things”; all examples here were reverse coded). Responses ranged from 1 (*never true*) to 4 (*always true*), with higher scores representing the child’s ability to regulate his or her emotions, behavior, and cognitions. The Cronbach’s alpha reliability coefficient was acceptable at Wave 1 (child $\alpha = .80$; mother $\alpha = .88$; father $\alpha = .87$) and Wave 2 (child $\alpha = .81$; mother $\alpha = .88$; father $\alpha = .88$). The three reports of self-regulation were used as a latent factor in the analyses reported below.

Empathic concern (Waves 1 and 2). Child’s empathic concern was assessed using a 7-item self-report measure from Barber (2002) and based on the measure of Davis (1996). The Likert-type response scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*), and higher scores indicate greater empathic concern for others. Sample items included “I often have tender, concerned feelings for people less fortunate than I” and “When I see someone being taken advantage of, I feel kind of protective towards them.” Reliability as reported by Barber (2002) was $\alpha = .72$. The current study also showed acceptable reliability at both Wave 1 ($\alpha = .76$) and Wave 2 ($\alpha = .75$).

Benevolence (Waves 1 and 2). Children’s internalized benevolence values were assessed using four items taken from the Portrait Values Questionnaire (Schwartz et al., 2001). Participants rated how much they thought a description of a fictional person was similar to themselves with statements designed to assess respondent benevolence. A 6-point Likert scale was used with response categories ranging from 1 (*not like me at all*) to 6 (*very much like me*). Sample items included “Forgiving people who have hurt this person is important to him/her. This person tries to see what is good in them and not to hold a grudge” and “It is important to this person to be loyal to their friends. This person wants to devote himself to people close to him/her.” Cronbach’s alpha coefficient was found acceptable for Wave 1 ($\alpha = .80$) and Wave 2 ($\alpha = .79$).

Results

Preliminary Analyses

Bivariate correlations between major variables of interest are reported in Table 1. Only child report variables are reported in the table, though bivariate correlations for parents can be viewed in the [online supplemental material](#). At the cross-sectional level, video game violence was negatively correlated with prosocial behavior and positively correlated with externalizing behavior (all at Wave 1). Longitudinally, video game violence (Wave 1) was associated with lower levels of self-regulation (Wave 2), benevolence (Wave 2), empathic concern (Wave 2), and prosocial behavior (Wave 3), and positively associated with externalizing behavior (Wave 3). Additionally, externalizing behavior (Wave 1) was positively and prosocial behavior (Wave 1) was negatively associated with video game violence (Wave 3).

A multivariate analysis of variance was conducted to examine sex differences across the major variables. A multivariate effect of sex of participant was revealed, $F(7, 160) = 8.62, p < .001$, partial $\eta^2 = .27$. Means, standard deviations, and univariate effects are reported in Table 2. Boys had significantly higher levels of video game violence exposure (W1 only) than girls, while girls had significantly higher levels of prosocial behavior, empathic concern, and benevolence than boys.

Measurement Model

A two-group measurement model of externalizing behavior and self-regulation was examined with Mplus (Version 8; Muthén & Muthén, 1998-2017). Each variable consisted of child, mother, and father reports. The model fit the data acceptably with $\chi^2(90) = 180.63, p < .001$, comparative fit index (CFI) = .96, Tucker-Lewis index (TLI) = .95, root-mean-square error of approximation (RMSEA) = .06. All factors loadings were above .40 (Table 3). When factor loadings were constrained to be equal across sex and time, the fit did not significantly decrease ($\chi^2(9) = 12.52, p > .05$), suggesting weak full metric invariance.

Table 1
Bivariate Correlations for Main Variables

Variable name	1	2	3	4	5	6	7	8
1. Video game violence (W1)								
2. Prosocial behavior (W1)	-.18**							
3. Externalizing behavior (W1)	.24***	-.29***						
4. Self-regulation (W2)	-.12*	.21***	-.25***					
5. Benevolence (W2)	-.19**	.46***	-.22***	.29***				
6. Empathic concern (W2)	-.26***	.43***	-.20***	.09*	.59***			
7. Video game violence (W3)	.34***	-.13*	.14*	-.08	-.16*	-.11		
8. Prosocial behavior (W3)	-.18**	.48***	-.19***	.21***	.45***	.43**	-.09	
9. Externalizing behavior (W3)	.19**	-.16**	.42***	-.31***	-.16**	-.09	.01	-.19***

Note. Wave of data collection is specified in parentheses; all variables in this table represent child report of behaviors. These reporters are used for the purposes of creating the table; however, multiple reporters were used for some variables in the structural equation model, as indicated. See the [online supplemental material](#) for additional bivariate correlations. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2
Sex Difference for Main Variables

Variable	Sex of participant				MANOVA results	
	Male		Female		F	Partial η^2
	M	SD	M	SD		
Video game violence exposure (W1)	8.46	4.80	4.98	3.51	23.98***	.13
Empathic concern (W2)	3.61	.55	4.11	.53	32.38***	.16
Self-regulation (W2)	2.82	.41	2.70	.45	2.94	.02
Benevolence (W2)	4.50	.81	4.79	.75	5.07*	.03
Externalizing behavior (W3)	.35	.27	.30	.26	1.33	.01
Prosocial behavior (W3)	3.39	.66	3.74	.65	11.20***	.06
Video game violence exposure (W3)	8.20	4.59	7.24	5.07	1.57	.01

Note. Child report variables were used for the purpose of the multivariate analysis of variance (MANOVA) for ease of interpretation. Video game violence was examined at Wave 1 (W1), the mediators at Wave 2 (W2), and the outcomes and Wave 3 (W3). Means and SDs for other waves can be obtained by contacting the first author.
* $p < .05$. *** $p < .01$.

Structural Model

A structural equation model was conducted with video game violence at Wave 1 predicting externalizing behavior and prosocial behavior at Wave 3 (controlling for these behaviors at Wave 1). Additionally, video game violence was included at Wave 3 to examine bidirectional associations. Mediators, including empathic concern, self-regulation, and benevolence were modeled at Wave 2. These same mediators were also controlled for at Wave 1 in order to examine whether video game violence resulted in any change in these variables over time. Age was used as a covariate. A multigroup model was conducted to test for structural invariance as a function of sex of participant. The unconstrained model resulted in significantly worse model fit when compared with a fully constrained model. Additionally, each path was examined as a function of gender, with a gender difference emerging only for the path from age to empathy, such that this association was stronger for girls than boys. Accordingly, the model was run as a single group, though gender was included as a covariate.

The final model had an acceptable fit; $\chi^2(153) = 397.78$, $p < .001$, CFI = .93, TLI = .90, RMSEA = .06 (Figure 1). There were no significant direct effects between video game violence (Wave 1) and externalizing (Wave 3; $\beta = .07$, $p = .242$) or prosocial

behavior (Wave 3; $\beta = -.06$, $p = .290$) 5 years later. Video game violence (Wave 1) predicted lower levels of empathic concern (Wave 2; $\beta = -.22$, $p = .001$) and benevolence (Wave 2; $\beta = -.14$, $p = .004$), though there was no significant effect on self-regulation 2 years later (Wave 2; $\beta = -.03$, $p = .459$). Finally, empathic concern (Wave 2; $\beta = .16$, $p = .01$) and benevolence (Wave 2; $\beta = .18$, $p = .001$) predicted higher levels of prosocial behavior, while lower levels of self-regulation (Wave 2; $\beta = -.35$, $p < .001$) predicted higher levels of externalizing behavior (Wave 3). No major variable predicted video game violence exposure at Wave 3, apart from video game violence exposure at Wave 1 ($\beta = .30$, $p < .001$). All other stability paths were highly significant for all variables ($p < .001$ for all paths).

Indirect effects were estimated using 5,000 bootstrapping samples (using 95% confidence intervals [CIs]) through the INDIRECT command in Mplus. There were no indirect effects between video game variables and externalizing behavior. However, there was a significant indirect effect between video game violence and later prosocial behavior and benevolence ($\beta = -.03$, 95% CI [-.05, -.01], $p = .048$) with the indirect effect of empathic concern approaching significance ($\beta = -.04$, 95% CI [-.08, -.01], $p = .058$). Notably, these

Table 3
Factor Loadings for Measurement Model

Variable	Reporter	Factor loadings for boys	Factor loadings for girls
Externalizing behavior (W1)	Mother report	.90	.92
	Father report	.88	.88
	Child report	.57	.67
Externalizing behavior (W3)	Mother report	.91	.88
	Father report	.86	.96
	Child report	.56	.61
Self-regulation (W1)	Mother report	.87	.80
	Father report	.81	.79
	Child report	.47	.62
Self-regulation (W2)	Mother report	.85	.83
	Father report	.77	.79
	Child report	.44	.59

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3.

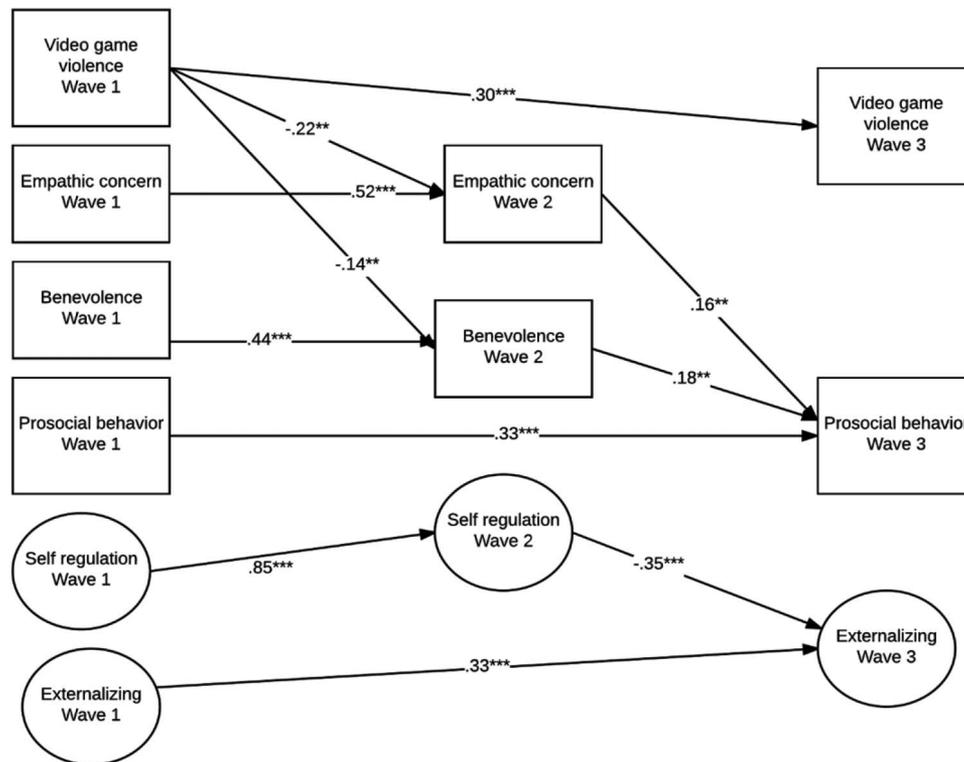


Figure 1. Structural model. Standardized values are shown. For model simplicity, all path weights, factor loadings, and covariances are not shown for exogenous variables (though much of this can be found in the [online supplemental material](#)). Control variables are also not shown. Additionally, factor loading, covariances, and error terms for endogenous variables are not shown. Only significant paths are shown in the figure for parsimony, though nonsignificant paths can be viewed in the [online supplemental material](#). ** $p < .01$. *** $p < .001$.

effects are small in nature, though this should not be surprising given the length of time examined in the current study and the fact that both mediating and outcome variables were all controlled for at the initial time point.

Discussion

Higher amounts of playing violent video games was related to lower levels of empathic concern and benevolence 2 years later. While there was not a significant direct link between violent video game and prosocial behavior 5 years later, there was a significant indirect association through benevolence.

To our knowledge, this is the first study to show that violent video game play negatively impacts benevolence, ultimately leading to a reduction in prosocial behavior. This finding suggests a higher level change to thinking whereby one's moral orientation toward helping others in need becomes eroded. In a sense, such a finding is not entirely unexpected. While beliefs and attitudes are often somewhat stable, Rokeach (2008) notes that even in adults, human beliefs are still subject to subtle and continual change. For children and, to a lesser extent, adolescents, the development of beliefs and attitudes is more plastic and open to external influence than for adults (White, Hayes, & Livesy, 2016). Thus, beliefs and attitudes such as benevolence may be somewhat open to downward change when exposed to a steady diet of violent games in a

cohort of early to middle adolescents such as the sample tested in this study.

That playing violent games should elicit subtle changes in a belief and attitude such as benevolence would be predicted by several important and well-understood theories. Social-cognitive theory (Bandura, 1986) would predict that substantial and ongoing exposure (real or virtual) to situations where others are hurt rather than helped may lead to attitudes and beliefs that align to those experiences. GAM (Anderson & Bushman, 2002), which incorporates social-cognitive principles as well as other key learning and schema development theories, would also predict that violent video game exposure has the potential to cause stable changes to attitudes and beliefs, which would then be incorporated into stable knowledge structures and scripts for behavior. Finally, cognitive dissonance theory (e.g., Festinger, 1957) would posit that those who are continually hurting others in one sphere of life (presumably including virtual spheres) would need to align their cognitions, including beliefs and attitudes related to benevolence, to avoid the mental discomfort of cognitive dissonance.

Though exposure to violent video games was concurrently associated with adolescent externalizing behavior, these relationships were not apparent over a 5-year time period. This confirms a number of short-term studies that examine externalizing behavior (e.g., Lohaus et al., 2005), but is not consistent with some of the

longitudinal research whereby greater violent video game play predicted later measures of aggressive behavior (e.g., Anderson, Gentile, & Buckley, 2007; Anderson et al., 2008; Gentile, Li, Khoo, Prot, & Anderson, 2014; Hopf et al., 2008; Krahé et al., 2012; Willoughby, Adachi, & Good, 2012) and trait aggression (Lemmens, Valkenburg, & Peter, 2011; Möller & Krahé, 2009). However, other researchers have failed to find an association between violent video game play and increased aggressive behavior. Ferguson et al. (2008) found family violence exposure and trait aggression to be significant predictors of violent criminality, but not violent video game play. Indeed, a meta-analytic study, adjusting for a theoretical publication bias in media violence research, suggested that playing violent video games was not associated with increased aggression in the lab or in real life (Ferguson, 2007). While the majority of research suggests an association between engaging with violent media and increased aggressive behavior, more work is needed to understand for who, when, and under what circumstances exposure to violent media is related to increased aggressive behavior. It may be that violent video games have a larger impact on externalizing behavior in the short term, and have little impact over the long term, at least with this sample.

Exposure to violent video games was also related to lower levels of empathic concern 2 years later, which was then associated with lower prosocial behavior. Empathic concern did not mediate the relationship between violence video game play and prosocial behavior, though it was in the hypothesized prediction and nearing significance ($p = .058$). Chronic exposure to violent video games may be related to changes in emotional processing, and this seems to be particularly true for people with higher or lower levels of empathic concern (Stockdale, Morrison, Palumbo, Garbarino, & Siltan, 2017). The current study adds to a growing literature showing an association between playing violent video games and lower levels of future empathic concern, however, more work is needed to disentangle the direction of effects and the variability in the relationships between violent video game play and empathic concern (Prot et al., 2014).

Additionally, playing violent video games was not related to changes in self-regulation across time. This finding is at odds with other research suggesting that playing video games may be related to constructs linked to self-regulation, including self-control deficits (Gabbadini, Riva, Andrighetto, Volpato, & Bushman, 2014), impulsivity (Lin & Lepper, 1987), and attention deficits (Swing, Gentile, Anderson, & Walsh, 2010). It is also inconsistent with research showing that adolescents with poor self-regulatory abilities are more likely to spend excessive time using media (LaRose et al., 2003). This may be a result of the high stability of self-regulation over time in our model. Indeed, exposure to violent video games was associated with poor self-regulation at the cross-sectional level, however, such exposure doesn't appear to decrease self-regulation over time when previous levels of self-regulation are taken into account. Such research is scarce, particularly within longitudinal designs, and research that uses a wider array of self-regulation measures is needed.

Likewise, self-regulation is a broad cognitive construct including components of executive functions, behavioral and motor control, and emotional regulation. Perhaps an omnibus measure of self-regulation, such as the measure used in the present study, cannot adequately capture the nuanced changes in cognitive constructs underlying self-regulation that may be modulated by expo-

sure to violent video games. For example, in a series of studies playing violent video games was related to changes in orienting and processing of emotional information, but differences emerged when the emotional information was relevant or irrelevant to the task at hand, suggesting that the effect of violent video game play on executive functioning and cognitive control may be dependent on if the executive functioning and control is in the presence of emotionally salient information (Bailey, West, & Anderson, 2011). Also, frequent and infrequent players of video games were asked to complete a Stroop task. Differences emerged between the two groups regarding proactive versus reactive control, with frequent players displaying poorer reactive control, but no difference in proactive control (Bailey et al., 2010), again suggesting the importance of taking a more nuanced approach to investigating the effects of violent video game play on executive functioning, self-regulation, and cognitive control. Finally, Swing and Anderson (2014) found that impulsivity and attention problems mediated the relationship between media violence exposure and aggressive behavior, but this mediation differed when examining reactive versus proactive aggressive behavior, suggesting that it is also important to take a more nuanced approach to externalizing behaviors when examining the mediating roles of regulatory behaviors in media violence exposure and externalizing behaviors.

The present study adds to emerging knowledge about the longitudinal associations of violent video game play on externalizing behaviors and prosocial behaviors; however, it is not without limitations. Although the current study obtained multiple reports for externalizing behavior, self-regulation, and game ratings, self-report measures were used for some other study outcomes. While adolescents are fairly accurate reporters of their own behaviors and are typically good reporters of their own media use and the content of the media they use (Gentile et al., 2009), the shortcomings of self-report data are well documented. Future researchers could expand the current study by employing observational measures and multiple-informant measures of all key factors. Additionally, the design of the current study cannot speak to the causality of early exposure to video game violence and later beliefs and outcomes.

Within the noted limitations, the current study points to a longitudinal association of playing violent video games on prosocial behavior in adolescents, specifically by subscribing to a less benevolent value system over time. Importantly, these associations were found even while controlling for these variables at the initial time point. Notably, though playing violent videos games was associated with concurrent levels of externalizing behavior, there was little evidence of a long-term effect in the current sample. Parents, educators, policymakers, and consumers are thus encouraged to take into account the potential outcomes of consuming video games with violent content.

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