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## The mediating role of sympathy in the relationship between media violence and Dutch adolescents' social behaviors

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### ABSTRACT

Previous research suggests that empathy could serve as a mediator in the relation between media violence exposure and social behavior (i.e., aggressive and prosocial behavior). However, conceptualizations of empathy are diverse and empirical findings are mixed. Theory as well as previous research suggests that sympathy, more than empathy, may explain how media violence can affect youths' aggressive or prosocial behavior. The present study formally tests this assumption using a three-wave longitudinal design with 878 early adolescents. Although neither sympathy nor empathy provided a significant indirect pathway between media violence and social behavior, the findings do show that sympathy is more strongly related to media violence and social behavior than empathy. Methodological challenges and suggestions for future research are discussed.

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Media violence; empathy; sympathy; aggression; prosocial behavior

Questions about whether and how violent content in games and television programs affects youths' social behavior have been asked for decades. Meta-analyses indicate that violent media use is related to higher aggressive behavior and lower prosocial behavior (e.g., Anderson et al., 2010; Greitemeyer & Mügge, 2014), although others suggest that media violence is not related to such behavioral outcomes (e.g., Ferguson, 2015). At the same time, researchers have attempted to understand, if there truly is a relationship, *how* media violence exposure may be related to aggressive and prosocial behavior. Theoretical models propose that repeated exposure to violent media content may result in (among other things) a lower likelihood to emotionally respond to other people's suffering (Anderson & Bushman, 2002; Carnagey, Anderson, & Bushman, 2007). Emotional responsiveness to others is an umbrella term that includes concepts such as empathy and sympathy, which have been found to be key predictors of youths' moral development and social behavior (Eisenberg & Miller, 1987; Maibom, 2012; Miller & Eisenberg, 1988). As such, if media violence negatively affects adolescents' development of empathy and sympathy, this may provide one explanation for a relationship between violent media and aggressive and prosocial behavior.

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Several empirical studies have investigated whether empathy or sympathy indeed mediate between media violence exposure and youths' social behavior, generally finding small or sometimes nonsignificant relationships (e.g., Gentile, Li, Khoo, Prot, & Anderson, 2014; Padilla-Walker, Coyne, Collier, & Nielson, 2015). However, it is difficult to draw clear conclusions from this body of work due to the wide variety of conceptualizations and measures used for empathy and sympathy. Although alike, there are relevant conceptual differences between empathy and sympathy. For example, empathy relates to *understanding* or *experiencing* another person's emotions, whereas sympathy is defined as feelings of *concern* for the other person (Wispé, 1986). Recent research suggests that there are differences in how empathy and sympathy relate to media exposure and social behavior (MacEvoy & Leff, 2012; Vossen, Piotrowski, & Valkenburg, 2016). However, current theorizing (Anderson & Bushman, 2002; Carnagey et al., 2007) is unclear about which component of emotional responsiveness may be expected to drive media violence effects. And in empirical media violence research, the terms empathy and sympathy are often used interchangeably between and even within studies (Anderson et al., 2010; Fanti, Vanman, Henrich, & Avraamides, 2009). In other studies, measures used do not always correctly map onto the concept that a study purports to measure. For instance, Mößle, Kliem, and Rehbein (2014) purport to study the role of empathy in the media violence–aggression relationship, but their measure for “empathy” included items that actually reflect sympathy (e.g., “I often feel compassion for people who are worse off than me”).

These conceptual and methodological problems prohibit a clear understanding of whether empathy, sympathy, or both may explain potential media violence effects (if at all). Improved conceptualizations and corresponding measurement of empathy and sympathy should enable us to see more clearly whether emotional responsiveness plays a role in this relationship (cf. Elson & Ferguson, 2014). Subsequently, if we understand more clearly which component of responding emotionally to others is most important, this may guide efforts to prevent youths' aggression and promote their prosocial behavior. This study, therefore, provides and tests formal conceptualizations of both empathy and sympathy in the relationship between media violence exposure and youths' aggressive and prosocial behavior. To this end, we use data from a longitudinal three-wave panel design with a large sample of Dutch 10- to 14-year-olds. We focus on early adolescence because this is the time where interest in and the use of violent media increases (Valkenburg & Piotrowski, 2017). In addition, several cognitive, emotional, and physical changes take place during this time that impact the development of empathy (Hoffman, 2000).

### ***The conceptual role of empathy and sympathy in media violence research***

Research into the effects of violent media exposure on emotional and behavioral outcomes is often guided by the General Aggression Model (GAM, Anderson & Bushman, 2002), an integrative framework combining several domain-specific theories of aggression. The GAM offers both short-term and long-term explanations for a relationship between media violence exposure and social behaviors. In the short term, watching violent television shows or playing violent games is proposed to increase the accessibility of aggressive thoughts, aggressive affect, and physiological arousal, which together may increase the likelihood of aggressive behavior in the immediate situation. When such

experiences during violent media use repeat over time, this is argued to result in the learning, rehearsal, and reinforcement of aggressive knowledge structures, thus creating a more aggressive (and less prosocial) personality.

Although the original GAM does not elaborate on the role of emotional responding, an extension of the GAM by Carnagey et al. (2007) does include emotional outcomes through desensitization processes. Desensitization is defined by Carnagey et al. (2007, p. 491) as a short-term “process by which initial arousal responses to violent stimuli are reduced, thereby changing the individual’s ‘present internal state.’” Desensitization is argued to take place because violence on television and in games is often presented in a positive way, which may reduce distressing reactions to such content (Carnagey et al., 2007). In the long term, desensitization may result in more long-lasting cognitive and affective changes in personality. One of these potential changes in personality is to “feel less sympathy for violence victims” (p. 491). In other words, this extended GAM conceptualizes decreased sympathy as a (long-term) outcome of media violence exposure through desensitized arousal responses. Of note, because Carnagey and colleagues provide no formal description or definition of sympathy, it is unclear whether they indeed specifically conceptualize *sympathy* as a mediator of media violence effects or whether they use the term as a synonym for *empathy*. In any case, while the theory pinpoints sympathy as an outcome of desensitization, it is most often used by researchers to explain effects of media violence on empathy (e.g., Funk, Baldacci, Pasold, & Baumgardner, 2004; Krahe & Möller, 2010).

Results from cross-sectional (Fraser, Padilla-Walker, Coyne, Nelson, & Stockdale, 2012; Funk et al., 2004), experimental (Greitemeyer, Osswald, & Brauer, 2010, study 2), and longitudinal work (Krahe & Möller, 2010; Vossen et al., 2016) suggest that exposure to media violence may have a small negative effect on adolescents’ reactivity to the emotions of others. In addition, four longitudinal studies have investigated whether empathy or sympathy *mediate* between violent media exposure and aggressive or prosocial behavior (Gentile et al., 2014; Mößle et al., 2014; Padilla-Walker et al., 2015; Prot et al., 2014, study, p. 2). These studies provide inconsistent evidence for such a mediating effect over time. Although Prot et al. (2014, study 2) found that children’s “empathic attitudes” (example item: “I would feel bad if my mother’s friend got sick”) mediated between violent media use and prosocial behavior, a study based on the same data but using aggression as outcome variable found no mediating effect (Gentile et al., 2014). Padilla-Walker et al. (2015) did not find “empathic concern” (e.g., “When I see someone being taken advantage of, I feel kind of protective towards them”) to be a significant mediating variable between violent media exposure and adolescents’ aggressive and prosocial behavior. Lastly, Mößle et al. (2014) do report a significant mediation path between violent media, empathy (but measuring sympathy), and aggression – but only for boys and not for girls.

Apart from showing inconsistent results, the description of these four longitudinal studies illustrates that different researchers use different terms and measures for empathy and sympathy – sometimes while referring to the same underlying concept. These problems hinder a clear understanding of what it is exactly, when we respond emotionally to others, that may explain the potential effects of media content on social behavior. Is it merely *recognizing* other people’s pain? Is it *feeling* other people’s pain? Or is it feeling *concerned* for others that drives social behavior? More theoretical and empirical precision

would be a first step towards better understanding this. To that end, it is necessary to further explicate the differences between empathy and sympathy.

### *The relevant distinction between empathy and sympathy*

Although there is no universally accepted definition of empathy, there is a general understanding from conceptual work that empathy refers to the sharing of another person's emotional state (Preston & de Waal, 2002). An important aspect in empathy is that the emotion is equal to another person's emotional state (de Vignemont & Singer, 2006). Empathy is, however, not the same as emotional contagion or mimicry, because it involves knowing that the other person is the source of one's own affective state (Singer & Lamm, 2009). Moreover, researchers differentiate between an affective and a cognitive component of empathy. The affective component reflects the vicarious *sharing* of another person's emotion, while the cognitive component refers to *understanding* where the emotion comes from in the other person by taking the perspective of that person and using one's own mental representations (Preston & Hofelich, 2012; Singer & Lamm, 2009).

Like affective empathy, sympathy is an emotional reaction to the affective state of another person. Sympathy is generally understood as feelings of *sorrow or concern* in response to the negative emotional state of another person (Clark, 2010; Eisenberg, 2000). An important difference between affective empathy and sympathy is that for affective empathy the experienced emotion is equal to the emotion of the other person, while this is not the case for sympathy (Singer & Lamm, 2009; Wispé, 1986). To illustrate, when *empathizing* affectively with someone who is sad, a person would feel sad him/herself as a result. In contrast, *sympathizing* with someone who is sad would result in feelings of compassion and concern, not of sadness (Eisenberg, 2000). Another distinction between sympathy and affective empathy is that sympathy is a response to misfortune and suffering whereas empathy can occur in response to a whole range of emotions, including positive emotions (Wispé, 1986). Lastly, researchers believe that while empathy is a conscious ability of using *ourselves* to better understand the people around us (self-oriented), sympathy is a more automatic response to the suffering of another person with an urge to alleviate this suffering (other-oriented, Wispé, 1986). Because of this, sympathy is considered a moral emotion and therefore a stronger motive for socio-moral behaviors such as prosocial behavior and aggression than empathy (Carlo, Vicenta Mestre, Samper, Tur, & Armenta, 2010).

### *How empathy and sympathy relate to social behavior and media violence*

Although affective empathy, cognitive empathy, and sympathy are related to each other, the subtle conceptual differences between them may result in different relationships of these concepts with relevant predictors and outcome variables (in our study: media violence, aggression, and prosocial behavior). Although no longitudinal work exists that tested this, a small number of studies suggests that this may indeed be the case. For example, research has shown that while empathy is generally found to be negatively related to aggression (Lovett & Sheffield, 2007), this relationship depends on the type of empathy and aggression. Affective empathy is found to be negatively related to physical aggression, while cognitive empathy has been found to be positively related to indirect

aggression (Kaukiainen et al., 1999; Yeo, Ang, Loh, Fu, & Karre, 2011). In one of the few studies comparing affective empathy, cognitive empathy, and sympathy, Vossen, Piotrowski, and Valkenburg (2015) showed that, cross-sectionally, physical aggressive behavior was most strongly related to sympathy, followed by a weak negative correlation with affective empathy, and no significant correlation with cognitive empathy. This attests to the importance of distinguishing between affective empathy, cognitive empathy, and sympathy when investigating aggressive behavior.

Prosocial behavior is generally defined as behavior that benefits another person (Eisenberg & Miller, 1987) and is considered to be motivated by other-oriented moral emotions (Carlo et al., 2010). As stated before, sympathy is considered such a other-oriented moral emotion (Haidt, 2003; Hoffman, 2000; Malti, Gummerum, Keller, & Buchmann, 2009), which suggests that sympathy, more than empathy (being a self-oriented emotion) may predict prosocial behavior. Again, there is only little empirical research distinguishing between affective/cognitive empathy and sympathy, but this research does indeed suggest that sympathy is more strongly related to prosocial behavior than empathy (Maibom, 2012; Vossen et al., 2015).

Most relevant to media violence researchers is the question whether sympathy, cognitive empathy, and affective empathy are also differently related to media violence exposure. Again, few of the empirical studies mentioned previously have included these three concepts. Often, studies use a composite measure, combining different concepts into one measure (Funk et al., 2004; Gentile et al., 2014; Prot et al., 2014), or they focus on *one* of the three concepts – most often sympathy (but called empathy by Mößle et al., 2014; and empathic concern by; Padilla-Walker et al., 2015). Vossen et al. (2016) did study the longitudinal relationship between media violence and affective empathy, cognitive empathy, and sympathy separately, and found that “teens who consume media violence subsequently feel *less concern* for other people in distress, but do not necessarily *share or understand* the emotions of other people to a lesser degree.” (p. 187, emphasis added). In other words, media violence seems to decrease sympathy, but not affective or cognitive empathy over time. Vossen et al. (2016) explain these findings by arguing that while sympathy specifically refers to emotional responsiveness in relation to *suffering*, empathy is a broader construct that does not necessarily reflect suffering or negative emotions per se. Because at its core, desensitization is expected to reduce one’s responsiveness to *suffering*, it seems logical that media violence, via desensitization, would reduce sympathy and not empathy over time. However, no study has specifically tested the longitudinal mediating role of sympathy in the relationship between media violence exposure and teens’ social behaviors. Therefore, in this study we use a longitudinal design to test the following hypothesis:

**Hypothesis 1 (H1):** Media violence exposure indirectly predicts higher levels of aggressive behavior through lower levels of sympathy.

**Hypothesis 2 (H2):** Media violence exposure indirectly predicts lower levels of prosocial behavior through lower levels of sympathy.

Weighing the available theory and empirical evidence, there is less reason to expect that affective and cognitive empathy are affected by media violence exposure or that

these two concepts mediate between media violence and aggressive and prosocial behavior. However, to further support our argument that it is sympathy and not affective/cognitive empathy that is the meaningful mediator here, we also formally test the following research questions:

**Research Question 1 (RQ1):** Does media violence indirectly predict (a) higher levels of aggressive behavior and (b) lower levels of prosocial behavior through lower levels of affective empathy?

**Research Question 2 (RQ2):** Does media violence indirectly predict (a) higher levels of aggressive behavior and (b) lower levels of prosocial behavior through lower levels of cognitive empathy?

## Method

### *Participants and procedure*

Ethical approval from the sponsoring institution's Review Board was obtained after which a large private survey research institute in The Netherlands collected the data. Families were recruited from an online panel of approximately 60,000 households that were randomly selected from the population and therefore representative of the Dutch population based on e.g., gender, age, geographical location, and socio-economic status. In total, this panel included 1,565 families with two children between 10 and 14 years old, of which 516 families participated in this study. We used three waves of data which were collected in one-year intervals in the adolescents' home, where they filled out a questionnaire on a laptop. Written informed consent was obtained from the participating adolescent and one of their parents before administration of the questionnaire. The first, second, and third waves of data collection were conducted between September and December 2012, 2013, and 2014, respectively. This one-year time interval is consistent with previously published longitudinal studies on the relation between media violence, empathy, and aggression (e.g., Mößle et al., 2014; Padilla-Walker et al., 2015). Data collection procedures were held constant over all three waves. Participating families received compensation by means of points, which can be redeemed for a variety of prizes provided by the survey company.

This study was part of a larger project for which a sibling design was necessary. Therefore, two children from each recruited family participated in the study. A total of 1,029 adolescents (49.8% female; mean age = 11.76 years,  $SD = 1.41$ ) completed the questionnaire at wave 1, of which 942 adolescents also participated again in wave 2 (50.2% female; mean age = 12.86 years,  $SD = 1.41$ ; 8.4% drop-out). In the third wave, 878 adolescents completed the questionnaire (50.7% female; mean age = 13.86 years,  $SD = 1.41$ ; 6.8% dropout). Missing data were largely at random. We did not find any differences in age, sex, empathy, or sympathy, and prosocial behavior between adolescents dropping out of the study or remaining included. We did, however, find that adolescents dropping out at wave 2 or 3 scored higher on aggression at wave 1 compared



to adolescents who remained included. This difference was not present for aggression at wave 2.

## *Measures*

### *Media violence exposure*

Media violence exposure was measured using direct estimates. Direct estimates are frequently used in survey research to measure media violence exposure (e.g., Fraser et al., 2012; Nikkelen et al., 2014; Slater, Henry, Swaim, & Anderson, 2003) and have been found reliable and valid for use in adolescents samples (Fikkers, Piotrowski, & Valkenburg, 2017). Direct estimates measure exposure to violent content on television and in digital games with two items each (four items in total): (1) How often do you watch television programs [play games] that contain violence? and (2) On the days that you watch television programs [play games] that contain violence, how much time do you spend on this per day? Participants were given the following definition of violence: "All violence (for example, fighting and shooting) that living beings (for example, humans and monsters) do to each other." Games referred to all types of games (video games, but also casual games played on mobile phones, tablets, or websites). Response categories for the first item ranged from 0 (never) to 7 (7 days per week). The second item was an open-ended question, answered by filling in hours and minutes. The two items for each medium were multiplied to calculate the number of hours per week of violent television and violent game exposure. These two variables were then summed to create one variable representing violent media exposure in hours per week. See Table 1 for descriptive statistics.

### *Empathy and sympathy*

The Adolescent Measure of Empathy and Sympathy (AMES, Vossen et al., 2015) was used to measure affective empathy, cognitive empathy, and sympathy. This measure consists of 12 statements that measure these three concepts with four items each. Adolescents indicated how often each statement occurred on a five-point scale: (1) never, (2) almost never, (3) sometimes, (4) often, and (5) always. Example items are "When a friend is scared, I feel afraid" (affective empathy); "I can tell when someone acts happy, when they actually are not" (cognitive empathy); and "I feel sorry for someone who is treated unfairly" (sympathy). Confirmatory Factor Analyses confirmed the previously found 3-factor structure of the AMES (Vossen et al., 2015). In the current study, the 12-item scale with 3-factor structure resulted in an acceptable to good model fit at all relevant waves (Wave 1: RMSEA = .07 (90% [CI]: .06/.07), CFI = .93, TLI = .91, Wave 2: RMSEA = .06 (90% [CI]: .05/.06), CFI = .95, TLI = .94). Internal reliability was sufficient to good in each wave for the affective empathy subscale ( $\alpha$  ranging from .75 to .77), the cognitive empathy subscale ( $\alpha$  ranging from .80 to .83), and the sympathy subscale ( $\alpha$  ranging from .69 to .74). See Table 1 for means and standard deviations.

### *Direct aggression*

In this study, we specifically focused on direct aggression for two reasons. Firstly, our measure of media violence exposure focuses on directly observable aggression, so this conceptually matches better with a direct-aggression outcome. Secondly, previous





**Table 1.** Mean, standard deviations and pearson's correlations for model variables at three time waves.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
	M (SD)											
1. Media violence T1 <sup>a</sup>	5.06 (8.01)	1										
2. Direct aggression T1	1.64 (0.72)	.28**	1									
3. Prosocial behavior T1	2.58 (0.39)	-.14**	-.28**	1								
4. Affective empathy T1	2.29 (0.78)	-.12**	.20**	.28**	1							
5. Cognitive empathy T1	3.28 (0.77)	.01	.28**	.41**	.41**	1						
6. Sympathy T1	3.23 (0.75)	-.10**	.30**	.55**	.41**	.41**	1					
7. Affective empathy T2	2.47 (0.77)	-.08*	.20**	.53**	.32**	.34**	.32**	1				
8. Cognitive empathy T2	3.25 (0.80)	-.06	.32**	.35**	.58**	.35**	.47**	.53**	1			
9. Sympathy T2	3.57 (0.75)	-.17**	.33**	.39**	.31**	.55**	.48**	.53**	.53**	1		
10. Direct aggression T3	1.60 (0.72)	.20**	-.19**	-.15**	-.07	-.15**	-.04	-.08*	-.18**	1		
11. Prosocial Behavior T3	2.57 (0.41)	-.14**	.36**	.18**	.15**	.21**	.12**	.25**	.28**	-.29**	1	
12. Sex: Female <sup>b</sup>		-.36**	.21**	.37**	.11**	.26**	.25**	.19**	.27**	-.40**	.23**	1
13. Non-violent media T1	16.17 (14.10)	.04	-.10**	-.07*	-.10**	-.07*	-.05	-.11**	-.06	.05	-.04	-.04

Note. \*  $p < .05$ , \*\*  $p < .01$ . <sup>a</sup> Mean and SD are based on variable with recoded outliers. <sup>b</sup> Male = 1 and Female = 2.

research has also employed measures of direct or physical aggression (e.g., Gentile et al., 2014; Padilla-Walker et al., 2015). To better compare our study with the previous literature, we, therefore, focus on direct aggression too. We measured direct aggression by using the direct aggression subscale from the Direct and Indirect Aggression Scale (DIAS, Björkqvist, Lagerspetz, & Kaukiainen, 1992), which has moderate to good psychometric properties based on internal consistency and correlations between self-report and peer-report (Collett, Ohan, & Myers, 2003). Adolescents indicated how often they perform the following acts when they are angry with a peer: (1) hit; (2) yell at or argue with; (3) kick; (4) swear at; (5) trip; (6) threaten to hurt; (7) push; or (8) fight with another adolescent. Response options were (1) never; (2) almost never; (3) sometimes; (4) often; and (5) very often. In the current study, this measure had an acceptable model fit at all relevant waves (Wave 1: RMSEA = .08 (90% [CI]: .07/.09), CFI = .89, TLI = .87; Wave 3: RMSEA = .09 (90% [CI]: .08/.09), CFI = .87, TLI = .85), and internal reliability was good ( $\alpha$  ranging from .91 to .92). Descriptive statistics of this measure are presented in [Table 1](#).

### *Prosocial behavior*

The prosocial behavior subscale of the Dutch self-report version of the Strengths and Difficulties Questionnaire (SDQ, van Widenfelt, Goedhart, Treffers, & Goodman, 2003) was used to measure prosocial behavior. The SDQ is a validated measure of behavior among youth, and the prosocial behavior subscale shows moderate agreement with parent-report measures (Vugteveen, de Bildt, Serra, de Wolf, & Timmerman, 2018). This subscale consists of five statements. Adolescents were asked to indicate how true each of the statements were for them on a three-point answering scale: (1) not true, (2) somewhat true, and (3) very true. Example items from this scale are: "I usually share with others, for example CD's, games, food" and "I am helpful if someone is hurt, upset or feeling ill." In the current study, this measure had a good model fit at all relevant waves (Wave 1: RMSEA = .05 (90% [CI]: .02/.08), CFI = .99, TLI = .97, Wave 3: RMSEA = .05 (90% [CI]: .02/.07), CFI = .99, TLI = .98), and reliability was acceptable ( $\alpha$  ranging from .76 to .79). Descriptive statistics of this measure are presented in [Table 1](#).

### *Control variables*

To ensure that an effect of media violence was not explained by other (nonviolent) media use (cf. Busching et al., 2015), we also calculated adolescents' nonviolent media exposure. This was done by first measuring general media exposure and then subtracting the number of hours of violent media exposure reported. Similar to the media violence exposure measure, we measured general media exposure with direct estimates, which consisted of two items for television exposure and electronic games (four items in total): (1) How often do you watch television programs [play games]? and (2) On the days that you watch television programs [play games], how much time do you spend on this per day? The response categories for the first items reached from 0 (never) to 7 (7 days a week). The second items comprised of an open-ended question, answered by filling in hours and minutes. The two items for each medium were multiplied to calculate the number of hours per week of television and game exposure. The two variables were then summed to create one variable representing

overall media exposure in hours per week. We then subtracted the hours per week of *violent* media exposure from the number of hours of *overall* media exposure to calculate adolescents' nonviolent media exposure. Descriptive statistics are presented in [Table 1](#).

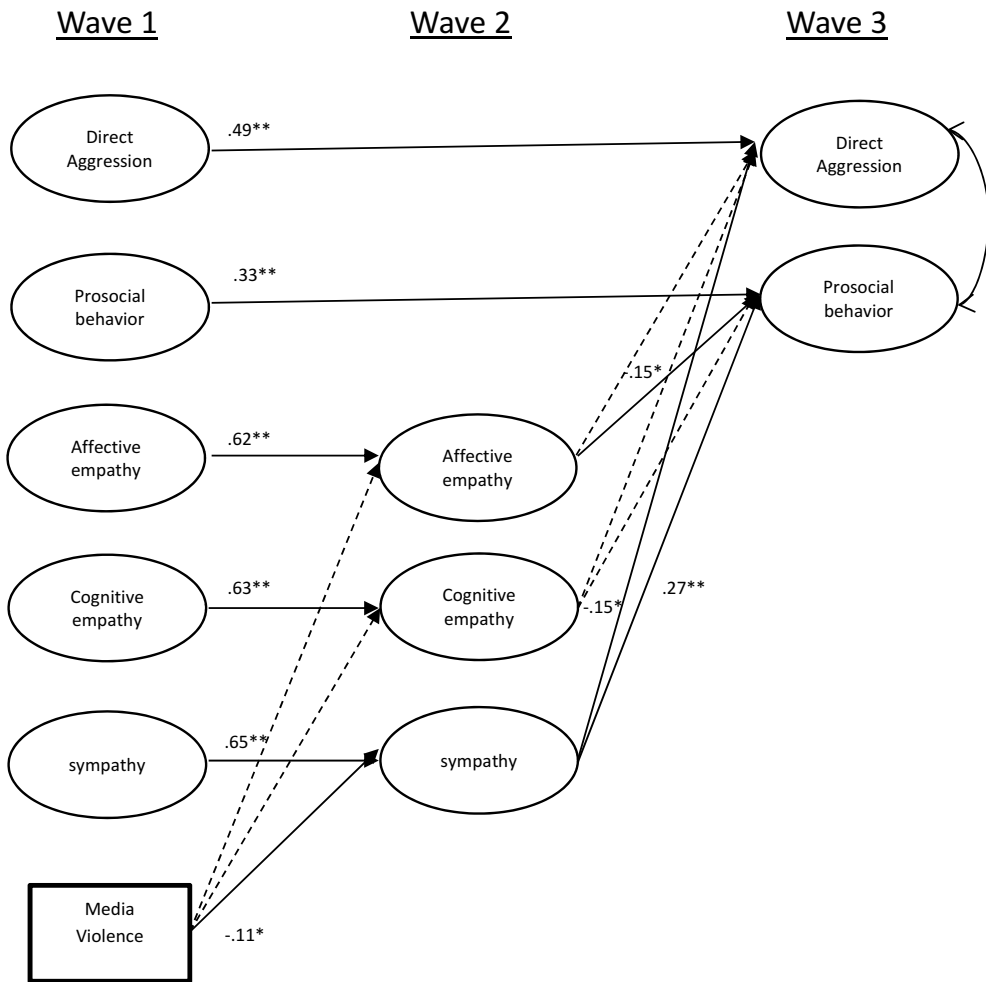
Furthermore, because of well-known sex differences in media violence exposure (Olson et al., 2007), empathy and sympathy (Lennon, Eisenberg, & Strayer, 1987; Mestre Escriva, Samper Garcia, Frias Navarro, & Tur Porcar, 2009), direct aggression (Card, Stucky, Sawalani, & Little, 2008), and prosocial behavior (Fabes, Carlo, Kupanoff, & Laible, 1999), sex was included as a control variable. Sex was coded as 1 = male and 2 = female.

### *Analytic approach*

Inspection of variable distributions revealed that violent and nonviolent media exposure included some extreme (i.e., very high) values due to the open-ended answers given to these time questions. The original range was 0 to 142 hours for violent media exposure and 0 to 138 hours for nonviolent media exposure. Because such outliers may distort the parameters and compromise generalizability (Mowbray, Fox-Wasylyshyn, & El-Masri, 2019), we recoded these outliers (i.e., those cases with values exceeding the mean plus three standard deviations) to the value of the observation closest to the threshold of the mean plus three standard deviations. A total of 16 cases were identified as outlying cases on violent media exposure. After recoding outliers, violent media exposure ranged from 0 to 38 hours (first quartile score = 0.17; Q2 = 1.83; Q3 = 6.00).<sup>1</sup> A total of 12 cases were identified as outlying cases in the nonviolent media exposure. After recoding, non-violent media exposure ranged from 0 to 75 hours (Q1 = 8.00, Q2 = 14.60, and Q3 = 25.00).

Structural equation modeling in Mplus 7.11 (Muthén & Muthén, 2014) was employed to examine whether media violence (at Time 1) lowered sympathy and affective/cognitive empathy (at Time 2) and subsequently affected aggressive/prosocial behavior (at Time 3). The mediators and dependent variables were corrected for their scores at Time 1 (see [Figure 1](#) for the variables included in the statistical models). First, we tested separate longitudinal mediation models for each of the three mediators individually. Second, we tested a longitudinal model that included all three mediators simultaneously to investigate their unique influence. In all models, To adjust for the clustered nature of our data (i.e., two adolescents per household) as well as the non-normality of the direct aggression and prosocial behavior measures, we used full-information maximum likelihood estimation with robust standard errors (MLR) (Múthen & Satorra, 1995). The three subscales of the AMES, as well as the measures of aggressive and prosocial behavior were included as latent constructs, whereas media violence and non-violent media were included as observed variables. The three subscales of the AMES were allowed to covary as they are related (Vossen et al., 2015). Also, prosocial behavior and aggression were allowed to covary as they are known to be related to each other (Obsuth, Eisner, Malti, & Ribeaud, 2015). Indirect effects were calculated using the delta method (Hayes & Sharkow, 2013).<sup>2</sup>

Model fit was evaluated using the comparative fit index (CFI), Tucker Lewis Index (TLI) and the root mean square error of approximation (RMSEA). These measures were favored over the Chi-square statistic, because this index is often found unreliable in large samples. Good model fit is indicated by a CFI larger than 0.95, a TLI larger than 0.95, and an RMSEA



**Figure 1.** Longitudinal mediation model with all mediators. Variables measured at the same timepoint were allowed to covary. Solid lines represent significant paths, whereas dashed lines represent non-significant paths. All paths are corrected for sex and non-violent media. \*  $p < .05$ , \*\*  $p < .01$ .

smaller than .05. A CFI and TLI between 0.90 and 0.95 and an RMSEA between .05 and .08 indicate acceptable model fit (Kline, 2010). All models included sex and nonviolent media use as control variables.

In addition, because we used latent factors for sympathy and affective/cognitive empathy and aggressive/prosocial behavior at multiple time points (we correct for T1) we tested whether factor loadings of the scales were equal over time (i.e., metric measurement invariance). We compared a model in which all factor loadings were allowed to vary over time (i.e., configural model) with a model where factor loadings are constrained to be equal over time (i.e. metric model). We calculated the Satorra-Bentler (SB) Scaled Chi-Square difference between the configural and metric model (Satorra & Bentler, 2001). If the SB Chi-Square difference is not statistically significant, full metric invariance is established. However, as full metric invariance is often considered overly

stringent, the comparison of path coefficients over time is admissible even when some indicators are not invariant (Byrne, Shavelson, & Muthen, 1989; Steenkamp & Baumgartner, 1998). We could establish partial metric measurement invariance for the model (SB  $\Delta\chi^2 = 27.43$ ,  $\Delta df = 17$ ,  $p = 0.06$ ) in which 3 out of 25 factor loadings were allowed to vary over time. The results presented in the results section are based on the partial metric invariant cross-lagged model. Finally, we tested the statistical difference between the mediation effects of affective empathy, cognitive empathy and sympathy by using an Mplus procedure described by Lau and Cheung (2012). In this procedure, new variables are constructed that represent the indirect effects. Subsequently, a new variable that represents the difference between two indirect effects (indirect effect 1 – indirect effect 2) is tested for significance.

## Results

### *Descriptive statistics*

Table 1 provides the bivariate correlations between the model variables. As expected, media violence exposure correlated positively with direct aggression at T1 and T3 and correlated negatively with prosocial behavior at T1 and T3. Media violence was also negatively related to affective empathy and sympathy at T2, but was not significantly related to cognitive empathy. Furthermore, affective empathy, cognitive empathy, and sympathy at T2 were all positively related to prosocial behavior, and negatively to direct aggression at T3. In addition, prosocial behavior and direct aggression were, as expected, negatively correlated with each other. Finally, girls used less media violence, scored higher on all affective empathy, cognitive empathy and sympathy and were less aggressive and more prosocial compared with boys.

### *Longitudinal mediation models*

The longitudinal mediation model with media violence exposure at Time 1 as independent variable, sympathy at T2 as mediator, and aggression and prosocial behavior at T3 as dependent variables proved to have acceptable fit (CFI = .92, TLI = .92, RMSEA = .04). As can be seen in the upper half of Table 2, the direct path from media violence at T1 to sympathy at T2 was significant, indicating that media violence was related to a decrease in sympathy. In addition, the direct path from sympathy at T2 to aggressive and prosocial behavior at T3 was significant. Sympathy was related to an increase in prosocial behavior and a decrease in direct aggression over time. However, while these direct paths were significant, the hypothesized indirect effect from media violence to aggression through sympathy was not significant (rejecting H1), nor was the indirect effect from media violence to prosocial behavior via sympathy (rejecting H2). See the upper part of Table 3 for the coefficients of the indirect effects.

Testing RQ1, the model with affective empathy as mediator had an acceptable fit (CFI = .92, TLI = .90, RMSEA = .04). The direct path from media violence to affective empathy at T2 was not significant; indicating that exposure to media violence was not related to changes in affective empathy. The direct paths from affective empathy at T2 to aggressive and prosocial behavior at T3 were not significant (Table 2). These results



**Table 3.** Standardized estimates, P-values and 95% confidence intervals for the indirect effects of the mediation models.

Emotional response T2	Aggressive Behavior T3			Prosocial Behavior T3		
	<i>b</i> *	<i>p</i> -value	95% CI	<i>b</i> *	<i>p</i> -value	95% CI
Separate models						
Affective empathy	.00	.857	[-.001, .001]	.00	.712	[-.002, .003]
Cognitive empathy	.002	.445	[-.002, .006]	-.007	.219	[-.02, .004]
Sympathy	.01	.125	[-.002, .02]	-.02	.066	[-.04, .001]
Total model						
Affective empathy	.00	.942	[-.01, .01]	-.001	.924	[-.01, .01]
Cognitive empathy	-.001	.684	[-.01, .004]	-.002	.505	[-.01, .004]
Sympathy	.02	.090	[-.002, .034]	-.03	.059	[-.002, .03]

indicate that affective empathy was not related to changes in social behavior over time. Because of the non-significant direct paths, the indirect effects of media violence exposure on both aggressive and prosocial behavior were not significant (see Table 3).

As for the model of cognitive empathy as mediator (RQ2), this model also showed adequate fit (CFI = .93, TLI = .92, RMSEA = .04). The direct path from media violence at T1 to cognitive empathy at T2 was not significant, and neither was the path between cognitive empathy at T2 and aggression at T3 (see Table 2). Cognitive empathy did predict prosocial behavior 1 year later, indicating that children higher in cognitive empathy reported an increase in prosocial behavior. However, neither of the two indirect paths was significant (see Table 3).

The model with all mediators included simultaneously was of adequate fit (CFI = .91, TLI = .91, RMSEA = .04). Similar to the separate models, the simultaneous model showed a significant path from media violence to sympathy at T2 as well as significant paths from sympathy at T2 to aggressive and prosocial behavior at T3 (lower part of Table 2, Figure 1). Affective empathy at T2 was not related to media violence exposure at T1 or to aggressive behavior at T3, but was negatively related to prosocial behavior.<sup>3</sup> Cognitive empathy at T2 was also not predicted by media violence exposure nor related to any of the behavioral outcomes at T3. None of the indirect effects were significant (see lower part of Table 3), although the indirect effect for media violence on prosocial behavior via sympathy approached significance. No statistical differences between the indirect effects of affective empathy, cognitive empathy and sympathy were found for both direct aggression (*B*'s between -.001 and .002, *p*'s > .145) or prosocial behavior (*B*'s between -.001 and .00, *p*'s > .097).

## Discussion

The aim of the present study was to investigate whether sympathy (and not affective or cognitive empathy) functions as an underlying mechanism of the relation between media violence exposure and social behavior in early adolescents. While previous studies have focused on empathy as an underlying mechanism, theory as well as some empirical findings suggests that sympathy might be the more relevant candidate (e.g., MacEvoy & Leff, 2012; Maibom, 2012; Vossen et al., 2016). Therefore, we used a three-wave longitudinal design in which we investigated specifically sympathy as possible mediator (H1,2). We also tested these pathways for cognitive and affective empathy (RQ1,2). Although neither sympathy nor cognitive and affective empathy provided a fully



significant indirect pathway between media violence and aggression or prosocial behavior, the findings of the direct paths do show that sympathy is more strongly related to both media violence and social behavior than cognitive or affective empathy.

### *Sympathy as mediator*

Previous empirical research has established a conceptual and empirical distinction between cognitive empathy, affective empathy, and sympathy (Vossen et al., 2015) and showed that media violence specifically decreases sympathy over time (Vossen et al., 2016). The current study empirically assessed the question whether this decreased sympathy also affects teens' aggressive and prosocial behavior in longitudinal mediation models. The extended General Aggression Model (Carnagey et al., 2007) poses that media violence exposure can influence the social behavior of adolescents via desensitization processes, which may manifest itself in, among other things, a decrease in sympathy. Therefore, we hypothesized an indirect effect of media violence on aggressive behavior (H1) and prosocial behavior (H2) through reduced levels of sympathy.

The longitudinal mediation models demonstrate that media violence exposure was significantly related to a decrease in sympathy 1 year later. This finding is consistent with previous research measuring sympathy or empathic concern (Möble et al., 2014; Prot et al., 2014, study 2; Vossen et al., 2016) and suggests that exposure to media violence reduces adolescents' concern for others in distress. In addition, the results of this study showed that sympathy predicted a decrease in direct aggression and an increase in prosocial behavior over time. These findings are also in line with previous longitudinal research (Carlo et al., 2010). However, perhaps due to the small size of the separate direct effects, the hypothesized indirect effect via sympathy was non-significant for both direct aggression and prosocial behavior. This means that our hypotheses cannot be accepted, and that further replication of our findings is necessary before we can fully conclude that sympathy acts as mediator between media violence and aggressive or prosocial behavior among adolescents.

### *Differences between sympathy, affective empathy, and cognitive empathy*

A secondary aim of this study is to formally distinguish between sympathy, affective empathy, and cognitive empathy. For this reason, we also offered statistical tests of affective and cognitive empathy as mediators (RQ1, 2). As expected based on theory and previous studies, media violence exposure was not significantly related to affective or cognitive empathy over time, and affective and cognitive empathy did not consistently predict social behavior. The findings from the present study thus suggest that changes in the ability to share (affective empathy) or understand (cognitive empathy) the emotions of another person are unrelated to media violence and do not form an explanation of the previously established relation between media violence exposure and direct aggression or prosocial behavior.

Because the direct paths between media violence and sympathy, and between sympathy and aggressive/prosocial behavior were significant (whereas these direct paths were largely nonsignificant for affective and cognitive empathy), we tentatively conclude that sympathy is a more meaningful intermediary variable than affective or cognitive empathy, and that it is worthy of further study. Future research is therefore advised to

clearly distinguish between these three concepts (both conceptually and in measurement) and at minimum include a clear measure of sympathy in empirical work. Describing differential pathways and pinpointing sympathy as the key mediator of these three concepts would be an important conceptual specification to the extended GAM and work on desensitization processes. In addition to this conceptual distinction, we offer several other methodological suggestions for future empirical research.

### *Suggestions for future research*

Capturing change in a longitudinal design is challenging for several reasons. First, the present study employs a three-wave panel study with 1-year intervals. These 1-year intervals were chosen to have a comparable design to previous studies who have also used 1-year intervals (e.g., Krahé & Möller, 2010; Mößle et al., 2014). Perhaps the changes that we are interested in are not large enough to capture over such intervals, because of the high stability of both social behavior and empathy and sympathy (see Table 1 and Figure 1). Future research could deal with this in several ways. First, using a longer time span could help capture more change over time and possibly even establish sensitive age periods in which adolescents are more susceptible to the effects of media (Rich & Qureshi, 2014). On the other hand, it may also be relevant to investigate *shorter-term* interrelations between media use, sympathy, and teens' social behaviors (states rather than traits, or "the person in the situation" as described by the GAM). Experience-sampling methods may be used to test whether higher than average use of media violence for an early adolescent is related to their daily variations in sympathy and social behaviors. Such data can then be tested using newly developed analytical tools for intensive longitudinal data (Hamaker & Wichers, 2017).

Second, we may consider using psychophysiological measures instead of self-report questionnaires to capture the subtle changes in emotional responsiveness. Psychophysiological measures such as heart rate, skin conductance, or EEG have the advantage of being "precise" and more able to detect subtle changes, and are not subject to personal interpretation (Ravaja, 2004). Previously, psychophysiological research has provided evidence for an effect of repeated media violence exposure on physiological, affective, and cognitive responding to real-world violence as predicted by the GAM (for a review, see Carnagey et al., 2007). However, these studies are often performed in laboratory settings that may lack ecological validity. Future research that combines longitudinal survey research with psychophysiological measures (e.g., Krahé et al., 2011) could offer a more detailed picture of state changes in emotional response over time.

A third potential reason for why we could not establish the hypothesized indirect effects is that our sample is relatively well adjusted and young. While 25% of our sample used violent media for 6 or more hours a week, the majority of respondents reported a rather low level of media violence exposure (almost 15% reported not being exposed to any violent media at all). This skewed distribution of media violence patterns is common in media violence measures (Gentile et al., 2014; Mößle et al., 2014). Perhaps the influences of media violence become especially apparent from a certain amount or specific form (via television or games) of exposure. Comparing a group with high media violence exposure (e.g., violent game addicts) with a low exposure group, may reveal larger differences in sympathy and subsequent social behavior. In addition, the social environment of

adolescents may moderate their reaction to media violence. For example, research has shown that perceived peer aggression could change the relation between media violence exposure and aggression via injunctive norms (Fikkers, Piotrowski, Lugtig, & Valkenburg, 2016).

## Conclusions

This study provides more clarity about the role of emotional responsiveness in the relation between media violence and social behavior. While we did not find support for the hypotheses that media violence influences social behavior *through changes* in sympathy, the study does show the importance of distinguishing between affective empathy, cognitive empathy, and sympathy. Importantly, media violence exposure affects adolescents' concern for others (sympathy), but not their understanding (cognitive empathy) or ability to share (affective empathy) the emotions of others. Furthermore, as a moral emotion, sympathy is specifically relevant for changes in aggressive and prosocial behavior in adolescents (Carlo et al., 2010). This study is a first step towards understanding whether and how sympathy explains effects on teens' aggressive and prosocial behavior, ultimately with the aim of finding ways to "reduce the bad and promote the good" for today's teens. Future research that improves on the methodological challenges described above should provide more insight into whether or not a decrease in sympathy functions as an explanation for a possible relation between media violence and social behavior in adolescents.

## Notes

1. Since only the upper values were adjusted, the quartiles before and after adjusting the outliers are identical.
2. Because of the clustered nature of the data, we were not able to report bootstrapping intervals for the indirect effects.
3. The unexpected negative relation between affective empathy at T2 and prosocial behavior at T2 is most likely due to multicollinearity, given that the bivariate correlations (Table 1) and the separate model of affective empathy (Table 2) do show a positive relation between affective empathy and prosocial behavior.

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