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Media Violence and Adolescents' ADHD-Related Behaviors: The Role of Parental Mediation

Sanne Nikkelen, Helen Vossen, Jessica Piotrowski, and Patti Valkenburg

We examined the role of parental media mediation in the relationship between media violence and adolescents' ADHD-related behaviors. Survey data from 1,017 adolescents (10–14 years) show that parents can play an important role in this relationship, depending on the media mediation strategies that they use (i.e., restrictive or active mediation) and how they apply these strategies (i.e., in a controlling, inconsistent, or autonomy-supportive way). Our findings support the notion that contextual factors are critical in understanding media effects, and provide directions for how parents can manage their adolescents' violent media use, and possibly by extension, their ADHD-related behaviors.

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common childhood behavioral disorders, characterized by inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2013), with a prevalence of around five percent in Western societies (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). Associated risks include peer rejection, academic failure, and substance abuse (Willoughby, 2003), thereby posing a serious challenge to children, parents, teachers, and health care professionals. Although ADHD is clinically defined as a categorical disorder, most scholars agree that its core symptoms represent an underlying continuous distribution

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of behaviors (Lubke, Hudziak, Derks, van Bijsterveldt, & Boomsma, 2009). We adopt this view in the present study and refer to this continuum as ADHD-related behaviors.

It is often argued that frequent use of violent entertainment media (i.e., television and games) may contribute to the development of ADHD-related behaviors (Kronenberger et al., 2005; Levine & Waite, 2000; Zimmerman & Christakis, 2007). Indeed, a recent meta-analysis demonstrated a positive association between violent media use and ADHD-related behaviors (r = .12; Nikkelen, Valkenburg, Huizinga, & Bushman, 2014). This relationship was small, but comparable to other research focusing on media use and behavior (see, for example, recent meta-analyses on media violence and aggression, Anderson et al., 2010; Greitemeyer & Muegge, 2014). However, although relationships between media use and behavior can be small for the majority, they may be large for particular individuals. Hence, media effects theories, such as the Differential Susceptibility to Media effects Model (DSMM, Valkenburg & Peter, 2013a), stress the importance of examining social context factors when looking at media-behavior relationships. The DSMM posits that social context factors may influence how much and what types of media children use as well as the effects of these media on children's behavior. As yet, research on social context variables that may influence the relationship between violent media use and ADHD-related behaviors is nearly non-existent.

Concerning violent media use, a particularly salient social context factor to consider is parental mediation, that is, the way parents handle their child's media use. Parents may set certain rules about what content their child uses (i.e., restrictive mediation) or may discuss media content with their child (i.e., active mediation; Valkenburg, Krcmar, Peeters, & Marseille, 1999). As such, parental mediation can be an important precursor of violent media use, as well as a moderator of its effects. Given the positive relationship between violent media use and ADHD-related behaviors (Nikkelen et al., 2014), it is essential to understand when and how parental mediation strategies can reduce or enhance violent media use and effects. Such findings can help inform public policy interventions designed to prevent or reduce children's behavioral problems. To this end, the aim of this study is to investigate the role of parental mediation in the relationship between violent media use and ADHD-related behaviors in pre- and early adolescents (aged 10–14). We specifically focus on this age group because children's interest in violent content increases from pre- to early adolescence (Cantor, 1998), while in this age group parents still engage in parental mediation (Nikken, Jansz, & Schouwstra, 2007), which decreases later in adolescence.

Media Violence and ADHD-related Behaviors

There have been recurrent claims in the popular press as well as in scientific literature that television programs and video games are too violent in nature. Indeed, media entertainment frequently contains acts of violence (Bleakley, Jamieson, & Romer, 2012; Krahé, 2014), which has fueled a long-standing discussion about its potential harmful effect on children's aggression (see for example, Bushman & Huesmann, 2014; Elson & Ferguson, 2014). Recently, there has been an increasing interest in whether

violent media use can elicit ADHD-related behaviors as well. This potential relationship is often explained through the violence-induced arousal habituation hypothesis, which posits that violent media use affects children's arousal functioning (Nikkelen et al., 2014). Research has shown that, initially, violent content elevates arousal levels (Anderson & Bushman, 2001). With frequent exposure, children's baseline arousal level is attenuated to adjust for this continuous high stimulation (e.g., Ballard, Hamby, Panee, & Nivens, 2006). Low baseline arousal, in turn, is often linked to ADHD-related behaviors (e.g., Nigg, 2006). An alternative hypothesis states that, after repeated violent media use, children develop an aggression script, which is characterized by poor self-control of behavior (Anderson & Bushman, 2001). Poor self-control, in turn, is argued to be a core feature underlying ADHD-related behaviors (Barkley, 1997).

Although a small positive relationship between violent media use and ADHD-related behaviors exists (Nikkelen et al., 2014), there is likely variability in children's susceptibility to violent media use and effects, resulting from factors within the family context (Valkenburg & Peter, 2013b). Family factors can play an important role in determining what media a child is exposed to and what effect this has on the child's behaviors (Jordan, 2004). One family factor that is repeatedly found to influence media use and effects is parental mediation (Buijzen, van der Molen, & Sondij, 2007; Nathanson, 2002; Van den Bulck & Van den Bergh, 2000). To our knowledge, no earlier study has investigated the role of parental mediation in the media-ADHD relationship, which is therefore the main aim of this study.

Parental Media Mediation

Parental mediation refers to the strategies that parents employ to guide their child's media use. Two types of parental mediation are frequently distinguished: restrictive mediation (i.e., rule-setting to restrict media use) and active mediation (i.e., talking with children about media content, Nathanson, 1999; Valkenburg et al., 1999). In the literature, a distinction is often made between positive and negative active mediation (i.e., whether parents endorse or condemn the content in question, Nathanson, 2001a). In this study, we conceptualize active mediation as being critical of violent media content. Parental mediation can operate in two ways. First, parental mediation, and in particular restrictive mediation, can reduce media use (e.g., Van den Bulck & Van den Bergh, 2000). Second, mediation strategies can influence the effect that media has on children's behavior. Research on such moderating effects has focused mainly on the role of active mediation, and found that it can reduce potential harmful effects of media (e.g., Nathanson, 2004).

Parental mediation, however, does not always have the desired effect. Both restrictive and active mediation can be counter effective. For example, in one study, restriction of violent and sexual television content actually increased adolescents' viewing of this content with friends (Nathanson, 2002). In another study, active mediation was found to reduce the effect of violent media content on young children's positive attitudes towards the content, but enhanced positive attitudes in older children (Nathanson & Yang,

2003). Such "boomerang" effects have prompted a call for closer examination of the conditions under which parental mediation is effective and when it is not (Chakroff & Nathanson, 2008). Accordingly, some researchers (Valkenburg, Piotrowski, Hermanns, & de Leeuw, 2013) have argued that it is important to understand not only whether parental mediation strategies occur but also the manner in which they are conveyed. To that end, Valkenburg and colleagues (2013) developed a scale to measure parental mediation (the Perceived Parental Media Mediation Scale, or PPMMS) in which they not only distinguish different types of parental mediation, but also how these strategies are communicated to the child. The authors distinguish three common parenting styles, that is, controlling (i.e., using punishment or threat), inconsistent (i.e., being alternately strict and permissive), and autonomy-supportive parenting (i.e., being considerate of the child's perspective). Like parenting behaviors in general, the authors argue that parental mediation strategies may also be communicated to children in a controlling, inconsistent, or autonomy-supportive way. This is what sets the PPMMS apart from previous measures of parental mediation. Whereas previous scales have been designed to examine whether and to what extent parents use certain media mediation strategies (e.g., to what extent parents set rules or are critical of certain content), the PPMMS was designed specifically to evaluate *how* parents convey these strategies.

Valkenburg and colleagues (2013) explain that when parents use a parenting style that is perceived by the child as a threat to their independence, this will elicit reactance. Reactance, in turn, increases the likelihood that adolescents will engage in the behavior that parents are trying to limit, a so-called "boomerang-effect" (Brehm & Brehm, 1981). Based on this concept of reactance, parental mediation is argued to be counter-effective when parents try to force their rules and opinions onto their child (i.e., using a controlling style). Inconsistent mediation is also argued to be counter-effective, as it is likely to induce reactance as well (Gardner, 1989). In particular, the short-term acquiescing and avoidance of conflict that is typical of inconsistent parenting reduces the likelihood that teens will conform to behavioral norms (Patterson, 1982). In contrast, parental mediation is considered effective when it is done in an autonomy-supportive way, such that the child's opinion is valued (Joussemet, Landry, & Koestner, 2008). Valkenburg and colleagues (2013) present several findings lending support to the argument that it is not whether parents engage in media mediation, but *how* parents engage in it that matters. Specifically, the authors showed that while controlling and inconsistent parental mediation were positively related to unfavorable behaviors (i.e., family conflict and aggression), autonomy-supportive mediation was negatively associated with these behaviors.

Parental Media Mediation, Media Violence, and ADHD-related Behaviors

The DSMM (Valkenburg & Peter, 2013a) offers a theoretical account for how parental mediation may influence the association between media violence and ADHD-related behaviors. This model posits that social context factors, including

parenting behaviors, can influence media effects in two ways. First, parents may influence how much media children consume, as well as the specific content they are exposed to, which in turn can influence behavior. Second, parents may strengthen or weaken media effects by influencing their children's cognitive (e.g., attention), emotional (e.g., empathy), or excitative (e.g., arousal) responses to media. These responses are argued to be the underlying mechanisms in media-behavior relationships. Applying the DSMM to the violent media-ADHD relationship, there are two mechanisms by which parental mediation may play a role. First, it may directly influence how much violent media the child actually uses. This primarily pertains to restrictive mediation, which entails rule-setting to prevent or reduce particular media use. Second, parental mediation may moderate the relationship between violent media use and ADHD-related behaviors. This particularly pertains to active mediation because this mediation strategy is expected to influence children's responses to violent media content.

Restrictive Parental Media Mediation Model. Concerning restrictive mediation, we expect that the way parents convey rules about violent media use will be related to the amount of violent media an adolescent uses. Consequently, these restrictive mediation styles may indirectly relate to an adolescent's ADHD-related behaviors, through their relationship with violent media use (see upper model in Figure 1). We expect that controlling restriction (i.e., getting angry and threatening to punish the child when he/she does not want to follow rules concerning violent media use) and inconsistent restriction (i.e., setting rules but not being consistent about enforcing them) are ineffective ways to reduce violent media use. In contrast, autonomy-supportive restriction (i.e., explaining why certain rules are set) is expected to be effective in reducing violent media use. We therefore formulate the following hypotheses:

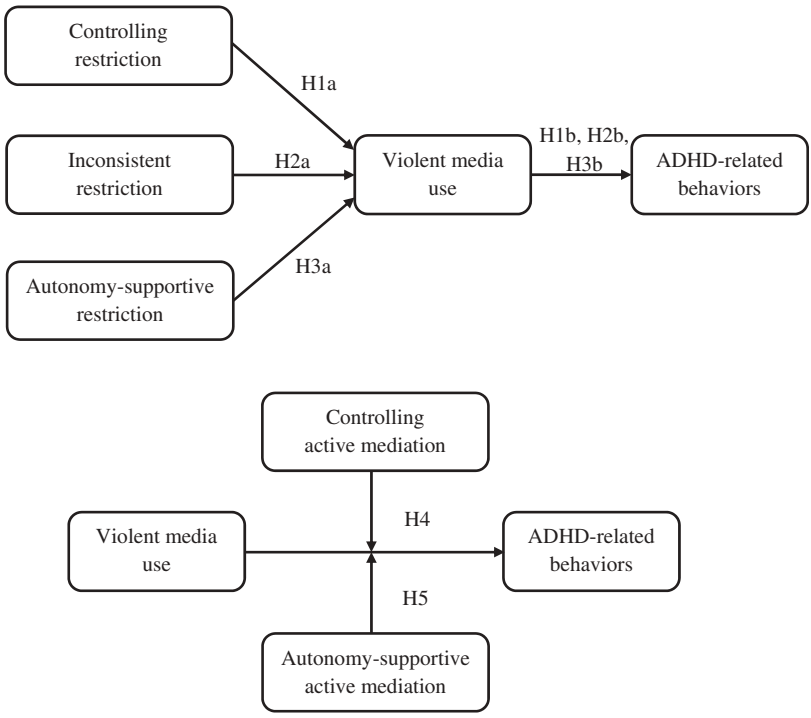
H_1: Controlling restriction will be related to more violent media use (H_{1a}), and indirectly related to more ADHD-related behaviors (H_{1b}).

H_2: Inconsistent restriction will be related to more violent media use (H_{2a}), and indirectly related to more ADHD-related behaviors (H_{2b}).

H_3: Autonomy-supportive restriction will be related to less violent media use (H_{3a}), and indirectly related to less ADHD-related behaviors (H_{3b}).

Active Parental Media Mediation Model. With respect to active mediation, we expect that the style in which parents condemn or criticize violent media content can strengthen or weaken the relationship between adolescent's violent media use and ADHD-related behaviors (see lower model in Figure 1). As aforementioned, one of the reasons why violent media is argued to influence ADHD-related behaviors is by activating an aggressive script in the child (i.e., a cognitive response state,

Figure 1
Models Hypothesizing Indirect Effect of Restrictive Mediation Styles (Upper) and Moderating Effect of Active Mediation Styles (Lower).



Valkenburg & Peter, 2013a). Criticizing violent content (e.g., saying that there is too much fighting in the media) may hinder children's formation of aggressive cognitive scripts by setting a negative norm about violent content. However, whether this is effective may depend on the parenting style that is used. Following Valkenburg and colleagues (2013), we expect that a controlling active mediation style (i.e., when parents condemn violent content in a stern way, without being open to the child's opinion), will be counter-effective in mitigating the effect of violent media use. In contrast, we expect an autonomy-supportive active mediation style (i.e., when parents condemn violent content, but are sensitive to the child's opinion) to be effective in mitigating violent media effects. Valkenburg and colleagues (2013) did not construct a subscale to measure inconsistent active mediation. We therefore formulate the following hypotheses:

H_4: Controlling active mediation will strengthen the relationship between violent media use and ADHD-related behaviors.

H_5: Autonomy-supportive active mediation will weaken the relationship between violent media use and ADHD-related behaviors.

Method

Sample and Procedure

We analyzed survey data from 1,017 adolescents and one of their parents (79.0% mothers[1]). After receiving ethical approval, a private Dutch research company (TNS-NIPO/Veldkamp) collected the data between September and December 2012. Families were recruited through the research company's existing panel of approximately 60,000 nationally representative households. Because this study is part of a larger research design, which required the inclusion of sibling data, the research company recruited 516 families with at least two adolescents between ten and fourteen years old. Two adolescents from each family participated, resulting in a total of 1,032 adolescents. Of these 1,032 adolescents, 3 were excluded due to missing parent surveys, and 12 due to missing adolescent surveys, leading to our final sample of 1,017 adolescents (49.9% female, M_{age} = 12.39, SD_{age} = 1.38), of which 99.9% were sibling pairs. Adolescent-report questionnaires were used to measure violent media use and parental mediation. ADHD-related behaviors were measured using parent-report.

Measures

Parental Media Mediation. To measure parental mediation, adolescents completed the 28-item Perceived Parental Media Mediation Scale (PPMMS, Valkenburg et al., 2013). Previous research has shown that children's self-report of parent mediation strategies better predicts behavior than parent-report (Fujioka & Austin, 2002; Gentile, Nathanson, Rasmussen, Reimer, & Walsh, 2012). For both restrictive and active mediation, four main questions asked about the frequency with which the type of mediation occurred (e.g., "How often do your parents forbid you from watching certain television shows or movies because they have too much violence in them?" [restrictive mediation] and "How often do your parents tell you that there is too much violence (fighting and shooting) in the media (for example in movies or games)?" [active mediation]). Responses ranged from 1 = *never* to 5 = *very often*. After each main item, follow-up items tapped into the different styles of parental mediation and were introduced with the question "And if your parents do/would do this, how would they discuss this with you?" The four main items measuring frequency

of restrictive mediation were followed by three items (one for controlling, autonomy-supportive, and inconsistent restrictive mediation) and the four main items measuring frequency of active mediation were followed by two items (one for controlling and one for autonomy-supportive active mediation). Sample follow-up items are "They would get mad if I still want to watch these shows or movies" (controlling restriction) and "They would value their opinion more than mine" (controlling active mediation). Response options to these follow-up items ranged from 1 = *not true at all*, to 5 = *completely true*. The PPMMS has shown good reliability and validity (Valkenburg et al., 2013). For the purpose of the present study, we were only interested in the follow-up items measuring the styles of mediation. Scores on the four items for each mediation style were averaged to create measures of controlling restriction (CR; M = 1.95, SD = 0.80, α = .74), inconsistent restriction (IR; M = 2.08, SD = 0.85, α = .79), autonomy-supportive restriction (ASR; M = 3.35, SD = 1.03, α = .83), controlling active mediation (CAM; M = 2.45, SD = 0.79, α = .70), and autonomy-supportive active mediation (ASAM; M = 2.87, SD = 0.97, α = .83).

Violent Media Use. Violent media use was measured using direct estimates, which have been found reliable and valid for use in adolescent samples (Fikkers, Piotrowski, & Valkenburg, 2014).[2] We used separate measures for violent television viewing and violent gaming, with two items each: (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? We presented respondents with the following definition of violence: "All violence (for example, fighting and shooting) that living beings (for example, humans and monsters) do to each other." Response options for the first item ranged from 0 = *never* to 7 = *7 days per week*. The second item was answered by filling in hours and minutes. The two items were multiplied to calculate violent television viewing and violent gaming in hours per week. Subsequently, these two variables were summed to create one variable representing violent media use in hours per week (M = 5.48, SD = 10.97).

ADHD-related Behaviors. To measure ADHD-related behaviors, parents filled out the Dutch ADHD questionnaire (Scholte & Van der Ploeg, 2010). It consists of 18 items, which closely match the ADHD criteria in the DSM-V (American Psychiatric Association, 2013) and have shown good reliability and validity (Scholte & Van der Ploeg, 2010). Items were rated on a 5-point scale with 0 = "never," 1 = "sometimes," 2 = "regularly," 3 = "often," and 4 = "very often." A total ADHD-score was created by summing all 18 items (M = 15.82, SD = 13.29, α = .94). The mean score in our sample was similar to the mean score (i.e., M = 14.80, SD = 13.10) in the Dutch population (Scholte & Van der Ploeg, 2010).

Control Variables. Based on previous literature, our analyses controlled for adolescents' age, sex, and socio-economic status (SES).[3] Violent media use increases with adolescents' age (Valkenburg & Cantor, 2001), whereas ADHD-

related behaviors tend to decrease (Biederman, Mick, & Faraone, 2000). Concerning sex, boys are typically more interested in violent content (Olson et al., 2007) and display more ADHD-related behaviors (Gershon & Gershon, 2002). SES is generally negatively associated with violent television use (Gorely, Marshall, & Biddle, 2004) and children's behavior problems (Bradley & Corwyn, 2002). Age was measured in years. Sex was coded as 0 = *boy*, 1 = *girl*. SES was a composite of parents' educational level and household income. Educational level referred to the highest educational level of the parent who completed the survey (1 = "no education," 2 = "primary education," 3 = "pre-vocational education," 4 = "lower secondary education," 5 = "higher secondary education," 6 = "bachelor's degree," 7 = "master's degree"). Household income referred to the net household income per month. Composite SES was calculated by averaging the standardized scores of educational level and household income.

Statistical Analyses

To analyze the indirect effect of restrictive mediation (H_1–H_3), we used structural equation modeling (SEM). All variables were modeled as manifest indicators. We first tested the model including all covariance paths between the independent variables. Insignificant covariance paths were then deleted for reasons of parsimony. We evaluated model fit using the comparative fit index (CFI), the Tucker–Lewis fit index (TLI), and the root mean square error of approximation (RMSEA). CFI and TLI values between .90 and .95 and RMSEA values between .05 and .08 indicate acceptable model fit, and CFI and TFI values larger than .95 and RMSEA values smaller than .05 indicate good model fit (Fan, Thompson, & Wang, 1999). To test the moderation model for active mediation (H_4 and H_5), we conducted an OLS regression analysis. Independent variables were centered. All analyses controlled for age, sex, and SES.

The original violent media use variable was highly skewed, with a large group of respondents scoring close to zero. As this could potentially bias our results, we recoded the continuous measure of violent media use into five groups (0 [0 hours], 1 [>0 - 2.5 hours], 2 [>2.5 – 7.5 hours], 3 [>7.5 – 20 hours], 4 [>20 hours]), which more closely resembled a normal distribution (M = 1.46, SD = 1.17). All analyses included this recoded measure of violent media use. The results of the recoded media violence were comparable to those with the original continuous measure.

Analyses were conducted using STATA 12.1. We used robust clustering to correct for the clustered nature of our data (i.e., sibling data) and bootstrapping to account for skewness of our outcome variable (bias-corrected and accelerated 95% confidence intervals, 1,000 bootstrap samples). Before conducting the analyses, data were inspected for multivariate outliers using the Mahalanobis distance, which follows a chi-square distribution. Cases were considered outliers when their distance score exceeded the chi-square value at an alpha of .001 (Rousseeuw & Vanzomeren,

1990). One case was considered an outlier in the mediation model and two in the moderation model. Outliers were removed from the analyses.

Results

Bivariate Correlations

Table 1 displays the bivariate correlation coefficients among study variables. As expected, violent media use positively correlated with ADHD-related behaviors. Autonomy-supportive restriction was negatively associated with violent media use, whereas inconsistent restriction was positively associated with violent media use. Controlling restriction was not related to violent media use. From all mediation strategies, only inconsistent restriction was positively related to ADHD-related behaviors.

Restrictive Parental Media Mediation Model

H_1, H_2, and H_3 posited an indirect effect of restrictive media mediation styles on ADHD-related behaviors via violent media use. The final model had good model fit, CFI = 1.00, TLI = 1.03, RMSEA = .00 (90% confidence interval [CI]: .00/.01)[4]. Results are illustrated in Figure 2.[5] Similar to the bivariate correlations, violent media use was positively related to ADHD-related behaviors, $b^* = .12$, $z = 2.90$, $p = .004$. Controlling restrictive mediation was negatively related to violent media use, $b^* = -.06$, $z = -2.04$, $p = .041$, rejecting H_{1a}. When examining the indirect effect, we found no significant indirect relationship between controlling restriction and ADHD-related behaviors, $b^* = -.01$ $z = -1.75$, $p = .081$, rejecting H_{1b}. Inconsistent restriction was positively related to violent media use, $b^* = .16$, $z = 5.45$, $p < .001$, and positively, indirectly related to ADHD-related behaviors, $b^* = .02$, $z = 2.56$, $p = .010$, supporting H_{2a} and H_{2b}. Lastly, autonomy-supportive restriction was negatively related to violent media use, $b^* = -.17$, $z = -5.71$, $p < .001$, consistent with H3a, and negatively, indirectly related to ADHD-related behaviors, $b^* = -.02$, $z = -2.62$, $p = .009$, supporting H_{3b}.

Active Parental Media Mediation Model

In H_4 and H_5, we expected that style of active mediation would moderate the relationship between violent media use and ADHD-related behaviors. The regression model (Wald $\chi^2 = 46.82$, $p < .001$, $R^2 = .05$) did not support these hypotheses. There was no interaction between controlling active mediation and violent media use, $b = -0.02$, SE = .09, $z = -0.28$, $p = .778$, nor between autonomy-supportive active mediation and violent media use on ADHD-related behaviors, $b = -0.17$, SE = .40, $z = -0.42$, $p = .677$.

Table 1
Bivariate Correlations among Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Media violence[a]									
2. ADHD	.16***								
3. CR	-.02	.05							
4. IR	.23***	.07*	.19***						
5. ASR	-.28***	-.04	.17***	-.10*					
6. CAM	-.02	.04	.42***	.24***	.18***				
7. ASAM	-.13***	-.06	.15***	-.02	.54***	.12***			
8. Sex[b]	-.44***	-.16***	-.06	-.10**	.18***	-.07*	.14***		
9. Age	.17***	-.06	.10**	.13***	-.02	.06	.08*	-.02	
10. SES	-.09**	-.03	.02	.00	.08**	.08*	.02	.02	-.02

Note. [a] Recoded in 5 groups. [b]0 = *boy*, 1 = *girl*. CR = controlling restriction; IR = inconsistent restriction; ASR = autonomy-supportive restriction; CAM = controlling active mediation; ASAM = autonomy-supportive active mediation.* $p < .05$. ** $p < .01$. *** $p < .001$.

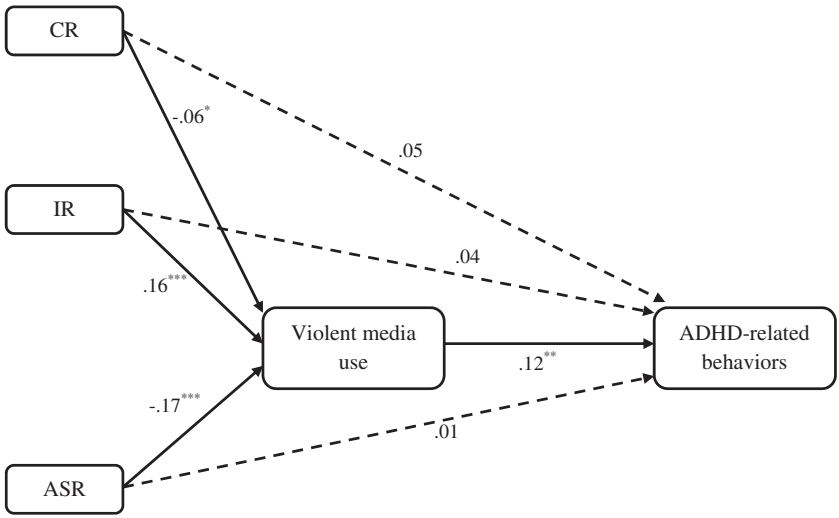
Discussion

Previous studies indicate that violent media use may play a role in the development of ADHD-related behaviors. Given that current media effects theorizing would not expect this relationship to be true for all children, it is important to examine social context factors that determine which children may be at particular risk for developing ADHD-related behaviors. To this end, the aim of this study was to examine the role of parental mediation in the relationship between violent media use and adolescents' ADHD-related behaviors. Our findings indicate that parents may play an important role in this relationship, depending on the media mediation strategies that they use and how they apply these strategies.

Restrictive Parental Media Mediation

We hypothesized that restrictive parental mediation would have a direct relationship with violent media use as well as an indirect relationship with adolescents' ADHD-related behaviors via violent media use. More specifically, we expected that controlling and inconsistent restrictive mediation would be related to more violent media use (H_{1a} and H_{2a}) and indirectly related to more ADHD-related behaviors (H_{1b} and H_{2b}), while we expected autonomy-supportive restrictive mediation to be associated with less violent media use (H_{3a}), and indirectly associated with fewer ADHD-related behaviors (H_{3b}).

Figure 2
Final Structural Equation Model for the Relationship Between Restrictive Mediation Styles, Violent Media use, and ADHD-Related Behaviors.



Note. Analysis Controlled for Age, Sex and SES. Covariance Paths are not Displayed for Reasons of Clarity. The Following Insignificant Covariance Paths Were Removed From the Model: Sex & Age, Sex & SES, Age & SES, Age & ASR, SES & IR, and SES & CR. Coefficients Represent Standardized Betas. CR = Controlling Restriction; IR = Inconsistent Restriction; ASR = Autonomy-Supportive Restriction. Indirect Relationships With ADHD-Related Behaviors: CR: B* = -.01; IR: B* = .02*; ASR: B* = -.02**.

As predicted, we found that adolescents whose parents were more inconsistent in applying media rules consumed greater amounts of violent media and, in turn, displayed more ADHD-related behaviors. Also in line with our expectations, adolescents whose parents relied on more autonomy-supportive mediation practices consumed less violent media content and, in turn, displayed less ADHD-related behaviors. Controlling restrictive mediation, in contrast to our hypotheses, was related to less violent media use, and had no indirect relationship with ADHD-related behaviors. Like inconsistent restriction, controlling restriction is typically thought to induce reactance (e.g., Byrne & Lee, 2011) and was therefore expected to be associated with more violent media use. A possible reason why we find evidence to support reactance with inconsistent parenting and not with controlling parenting may have to do with the cross-sectional nature of our data and our sample's age. Research suggests that controlling parenting is initially effective in reducing undesired behaviors (Baumrind, 1966; Lamborn,

Mounts, Steinberg, & Dornbusch, 1991), but in the long term backfires and leads to resistance. In this study, we have only examined one point in time in relatively young adolescents, and as such, this reactance may not yet have emerged. We did not test for age effects because our sample's age range is too small to investigate moderation by age. Age differences are more likely to occur when comparing our sample of young adolescents with older adolescents (e.g., 15 and up). Future research replicating our study with longitudinal data and larger age ranges, in which the influence of parenting is investigated over time can provide valuable insight into whether the short-term benefits of controlling parenting do in fact reverse in the long-term.

Active Parental Media Mediation

While restrictive mediation was expected to directly relate to violent media consumption, active parental mediation was expected to moderate the relationship between violent media use and ADHD-related behaviors. Specifically, controlling active mediation was expected to strengthen the relationship between violent media use and ADHD-related behaviors (H_4), whereas autonomy-supportive active mediation was expected to weaken this relationship (H_5). Our results did not provide evidence for these expectations; whether parents discussed harmful media content with their adolescent in a more controlling or in a more autonomy-supportive manner did not influence the relationship between violent media use and ADHD-related behaviors. These findings are somewhat surprising since previous studies have shown that active mediation can mitigate negative effects of violent media content (e.g., Nathanson, 2004).

A possible explanation for why we did not find a moderating effect of active mediation may lie in the fact that active mediation is typically manipulated in experimental settings in which the mediation can be specifically tailored to the content under investigation (e.g., having the child focus on the feelings of the victim in aggressive scene, Nathanson & Cantor, 2000). Active mediation may be inherently more difficult to measure in a survey, which typically consists of more general questions. Another explanation may lie in the potential underlying mechanisms of the media violence – ADHD relationship. As outlined in the introduction, violent media may elicit ADHD-related behaviors by (1) activating aggressive scripts and/or (2) inducing high arousal. Active mediation was particularly expected to influence the formation and activation of aggressive scripts. Our null findings for active mediation might therefore suggest that the likely underlying mechanism in the media violence – ADHD relationship is not the aggressive-script pathway, but rather the arousal-inducing pathway, which may not be influenced by active mediation. At present, empirical evidence for the role of arousal (or other potential mechanisms) in the relationship between media violence and ADHD-related- behaviors is lacking. Research examining these mechanisms is warranted, especially if we hope to understand how parental behavior can alter this relationship. For now, it is too early to

dismiss the moderating role of active mediation, because our lack of findings may be specific to the media-ADHD relationship. Future studies should therefore try to replicate our findings with other outcome variables, such as aggression or prosocial behavior.

Implications and Directions for Future Research

The results of this study have several important theoretical implications. First, our results confirm the previously found positive relationship between violent media use and ADHD-related behaviors. Although the relationship is small, the consistency of this finding across several studies and samples (i.e., Gentile, Swing, Lim, & Khoo, 2012; Kronenberger et al., 2005; Zimmerman & Christakis, 2007) is notable. Given the large role that media plays in the lives of adolescents, continued investigations into the relationship between media violence and ADHD-related behaviors are warranted. In particular, it is important to move beyond cross-sectional data to longitudinal data in order to better establish causal order. Although we theorized that parental mediation affects violent media use, it is conceivable that violent media use elicits certain parent's mediation styles. If adolescents frequently consume violent media despite their parents' efforts to prevent or reduce this use, parents may be less likely to use autonomy-supportive strategies when setting rules about violent media use. Moreover, although it is often assumed that violent media use increases ADHD-related behaviors, it is also possible that children who already display ADHD-related behaviors prefer arousal-inducing activities because of their low baseline arousal (Lazzaro et al., 1999). Using violent media content may be such an activity. Efforts to test these transactional relationships are critical if we hope to identify direction of effect.

Our findings provide support for investigating the role of social context factors in the relationship between media violence and ADHD-related behaviors. There are several other variables that would be relevant to consider. For example, in this study we specifically focused on mediation strategies that are intended to reduce the use or the effect of violent content. However, it may also be worthwhile to study the role of parent's modeling of violent behavior (i.e., being aggressive themselves), co-use of violent media (i.e., using violent media together), and positive mediation (i.e., endorsing violent content). Also, it may be valuable to examine the timing of mediation, as a recent experimental study suggest that mediation is most effective when it is done before or during media exposure, as opposed to mediation after exposure (Rasmussen, 2014). Another particularly fruitful area of investigation is the role of peers. Adolescence reflects a transition period during which the influence of the parent decreases while peer influence increases. Concerning media violence, peers may influence how much violent media an adolescent consumes via co-viewing (Nathanson, 2001b), and may accept or condemn the violent acts portrayed (Nathanson, 2001b). By highlighting the role of social context factors like these,

future studies can provide a more comprehensive picture of the media violence—ADHD relationship.

Lastly, this study provides empirical evidence supporting the argument that the role of parental mediation is best understood by distinguishing not only the type of mediation strategies (i.e., active and restrictive) but also how these strategies are applied. In doing so, we are able to obtain a clearer idea of when and why certain mediation strategies are more effective than others, and thus provide parents with a clear message as to how to effectively manage media use in their household. This study, for example, suggests that parents interested in managing their teens' media violence consumption should approach rule-setting in an autonomy-supportive manner. This means explaining to teens why violent content may be inappropriate for them and respecting the teens' opinions in this process. In doing so, not only may violent media use be curbed, but this study suggests that it may also indirectly relate to adolescents' ADHD-related behaviors.

Conclusion

Researchers have only begun to understand the relationship between media violence and ADHD-related behaviors. Our results suggest that parents can play a meaningful role in this relationship. In particular, the study points to the importance of engaging in autonomy-supportive media restriction when managing teens' violent media consumption. This is an important finding as it not only supports the notion that contextual influences are critical in understanding media effects, but also offers a suggestion for how parents can manage their adolescents' violent media use, and potentially by extension, adolescents' ADHD-related behaviors.

Notes

1. The authors of the Dutch ADHD questionnaire (which was the only parent-report questionnaire in this study) report a high agreement between mothers and fathers on this scale (Scholte & Van der Ploeg, 2010). Therefore, we believe that the overrepresentation of mothers in our sample does not influence our results.
2. We solely measured violent television and game content because previous literature has provided clear argumentation for why violence in these media could be related to ADHD-related behaviors and has repeatedly shown positive relationships between the two. There is as of yet little evidence or argumentation about how other types of media would be related to ADHD-related behaviors. Furthermore, the PPMMS was specifically targeted to media violence.
3. It might be argued that parenting style goes beyond the media context and that the analyses should control for general parenting style. However, we found that general measures of controlling, inconsistent, and autonomy-supportive parenting were only weakly related to violent media use. Moreover, including these variables as controls in our analyses did not change the results. Thus our data suggest that with respect to violent media use, parental media mediation styles are more influential than general parenting styles.

4. STATA does not provide model fit for SEM models using robust clustering. Model fit was therefore obtained using MPLUS 7.2. However, because MPLUS cannot combine robust clustering and bootstrapping, the model fit indices are reported for the model including robust clustering only.
5. As previous research suggested that children with high ADHD-related behaviors may be more attracted to violent media content, we also tested the indirect effect with violent media use as outcome and ADHD-related behaviors as mediator and found no significant indirect effects for all three restrictive mediation styles.

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