Efficacy of an Intervention to Reduce the Use of Media Violence and Aggression: An Experimental Evaluation with Adolescents in Germany

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Abstract Several longitudinal studies and meta-analytic reviews have demonstrated that exposure to violent media is linked to aggression over time. However, evidence on effective interventions to reduce the use of violent media and promote critical viewing skills is limited. The current study examined the efficacy of an intervention designed to reduce the use of media violence and aggression in adolescence, covering a total period of about 12 months. A sample of 683 7th and 8th graders in Germany (50.1% girls) were assigned to two conditions: a 5-week intervention and a no-intervention control group. Measures of exposure to media violence and aggressive behavior were obtained about 3 months prior to the intervention (T1) and about 7 months post-intervention (T2). The intervention group showed a significantly larger decrease in the use of violent media from T1 to T2 than the control group. Participants in the intervention group also scored significantly lower on self-reported aggressive behavior (physical aggression and relational aggression) at T2 than those in the control group, but the effect was limited to those with high levels of initial aggression. This effect was mediated by an intervention-induced decrease in the normative acceptance of aggression. No gender differences in program efficacy were found. The results show that a 5-week school-based intervention can produce changes in the use of media violence, aggressive norms, and behaviors sustained over several months.

Keywords Media violence · Intervention · Experimental evaluation · Longitudinal study

Introduction

Violent media are highly popular among adolescents, particularly among boys (Kirsh 2006). The underlying motives invoked to explain the attraction to violent media in adolescence range from a heightened need for arousal and sensation during this period of development (e.g., Slater 2003; Olson 2010) to social status concerns, for example the desire to appear brave and mature (Goldstein 1999). It has long been argued, however, that this favorite leisure activity can have detrimental effects on psychological functioning, especially on aggression-related thoughts, feelings, and behaviors. Meta-analytic evidence has demonstrated effect sizes in the region of .15 to .25 for the link between exposure to violent media and the tendency to engage in aggression, across different methodologies (Anderson and Bushman 2002; Ferguson 2007), different media (Anderson et al. 2010; Christensen and Wood 2007; Sherry 2001), and different outcome variables at the cognitive, affective, and behavioral level (Bushman and Huesmann 2006). Despite a fairly consistent pattern of findings,¹ there has been disagreement in the literature as to the interpretation of these effect sizes in terms of the potentially harmful effects of exposure to media violence on aggression. Ferguson and Kilburn (2009) concluded from their meta-analysis that there was no support for the claim that media violence increases aggressive behavior. However, they acknowledged that experimental studies using proxy measures of aggression did produce

¹ Meta-analyses and prospective studies using criminal violence as an outcome variable have produced smaller effect sizes (e.g., Ferguson and Kilburn 2009; Ferguson, in press; Savage and Yancey 2008), but they are less pertinent to the present study that was concerned with addressing the effects of media violence on a broader range of aggressive behaviors in a general population sample of adolescents.
substantive effect sizes and were relatively unaffected by publication bias, and their conclusions have been vigorously disputed by others (Anderson et al. 2010; Bushman et al. 2010; Huesmann 2010).

Although, as noted above, effect sizes found in the literature are considered small by conventional standards, their practical significance has been highlighted given the large number of users of violent media worldwide (Rosenthal 1990; Sparks and Sparks 2002). Therefore, reducing the level of exposure to violent media contents and challenging positive attitudes about violent portrayals may help to prevent or reduce aggressive behavior. The study reported in this article evaluated the efficacy of a school-based intervention program in reducing the use of media violence and aggression in a large sample of 7th and 8th graders in Germany, comparing the intervention group with a matched control sample in a pre-post-test quasi-experimental design over a period of 12 months.

Compared to the large number of studies seeking to demonstrate a causal impact of the exposure to media violence on aggression, the current body of knowledge about effective intervention strategies is limited, and the majority of available studies focused only on short-term changes in experimental settings (see Anderson et al. 2003; Cantor and Wilson 2003, for reviews). Typically, interventions designed to mitigate the aggression-enhancing effects of exposure to media violence focus on one or both of two outcome variables: restricted consuming and critical consuming. Restricted consuming refers to an overall reduction of media exposure and to the substitution of violent with nonviolent media content. Critical consuming refers to the promotion of an understanding of how media violence influences users and of the mechanisms by which violence is presented as acceptable, successful, and detached from negative consequences. Critical consuming is therefore directed at promoting an important aspect of media literacy, namely “the ability to analyze and evaluate media” (Kirsh 2010, p. 241).

Active evaluative mediation can be used to augment participants’ cognitive defenses against the portrayal of violence as realistic, attractive, and justified (Kirsh 2010). Media literacy theory (see Potter and Byrne 2007 for an overview) also stresses the importance of influencing the knowledge structures of the targets of a given intervention. Only when people know about and understand the mechanisms of media violence effects are they able to make informed decisions about exposing themselves to potentially harmful contents and to evaluate critically different media contents while using them.

Studies with elementary school children have provided mixed support for the effectiveness of media violence interventions in decreasing aggressive behavior. Robinson et al. (2001) demonstrated the efficacy of an intervention designed to promote restrictive consuming. Participants in the intervention group showed a reduction of media use compared to the control group. Importantly, they also showed a significant decrease in peer-rated (but not parent-rated) aggression and observed verbal aggression from baseline to post-test. In the same age group, studies focusing on critical consuming by providing factual information about media violence effects failed to demonstrate an effect on aggression, or even produced a boomerang effect, i.e., higher subsequent aggression in the intervention group (Byrne 2009; Nathanson 2004). However, evaluative mediation highlighting the undesirability of violence and aiming at creating negative attitudes about media violence turned out to be more effective in promoting a negative appraisal of violence in a violent TV show, particularly among heavy violence viewers (Nathanson 2004). Using a combined approach of reducing the amount of time spent with violent media and promoting critical consuming, a study by Rosenkoetter, Rosenkoetter, Ozretich, and Acock (2004) produced different effects for boys and girls. Girls in the intervention group scored higher on knowledge about TV violence effects and lower on TV viewing as well as identification with violent TV characters. The effect of the intervention on reducing peer-nominated aggression was significant only for boys. In a subsequent study with children in grades one through four, participants in the intervention group reported watching less violent television and expressed more critical attitudes about media violence than those in the control group, both immediately post-intervention and 8 months later. The short-term effect of reduced identification with violent characters was no longer present at the follow-up. No effect of the intervention on peer-rated aggression was found, neither immediately post-intervention nor at the 8 months follow-up (Rosenkoetter et al. 2009).

Overall, the limited evidence evaluating systematic interventions to reduce the use of media violence and to mitigate its harmful effects presents a mixed picture. Moreover, results seem to vary by gender in a less than consistent way, and little is known about medium- to long-term intervention effects. Furthermore, all of the studies reviewed above were directed at young children of elementary school age. However, the neglect of adolescents as a target population for media violence interventions is unfortunate, as early adolescence is characterized by a confluence of risk factors as a result of biological, psychological, and social changes pertinent to aggression. Physical aggression has been shown to increase from about age 11, with a peak around 13–15 years of age (see Kirsh 2003 for a review), and heavy use of media violence may significantly contribute to the overall risk of aggression during this sensitive developmental period (Kirsh 2010). From a social learning point of view, media presentations
of aggression as instrumental and normatively acceptable should be particularly influential at this time, reinforcing aggressive behavioral tendencies. Therefore, interventions are to be evaluated not only in terms of their ability to decrease aggression from pre- to post-test but also in terms of their success in buffering the increase in aggression that seems to be a normative developmental pattern in the age group of early adolescents (e.g., Byrne 2009; Byrne et al. 2009; Huesmann et al. 1983).

Theoretical Basis for the Intervention

The intervention developed for this study aimed to reduce exposure to media violence and to affect aggressive behavior by decreasing the endorsement of aggression-enhancing normative beliefs. The theoretical basis was provided by Bandura’s (1977) social learning theory and Huesmann’s (1998) script theory that explain mechanisms by which exposure to media violence affects aggressive behavior and indicate how harmful effects may be reduced. According to Bandura, exposure to media violence may trigger a process of observational learning in which aggressive behavior is acquired through imitation. Imitation is most likely to occur if the models are attractive and if they are rewarded for their behavior, which is true for many forms of media violence (see, e.g., National Television Violence Study 1997). Huesmann’s (1998) script theory links observational learning from violent media characters to the development of aggressive scripts. A script consists of stored knowledge structures about how the person should behave in particular situations and what the likely outcome of those behaviors would be. Learning experiences from early childhood onwards play a key role in the acquisition of aggressive scripts, hostile world schemas, and normative beliefs approving of aggression, and it is here that the observation of violence in the media comes in. Media depictions of the use of violence as an acceptable and effective means of goal attainment contribute to the development of aggressive scripts that individuals may refer to when deciding between different courses of action in real life. Normative beliefs condoning aggression serve as filters guiding the enactment of scripts in behavior. Therefore, by changing the perception that aggression is normatively acceptable, scripts should be rehearsed less often and therefore, over time, less likely to be activated as guidelines for behavior.

In support of the script model, a link between the normative acceptance of aggression and aggressive behavior was established both cross-sectionally (Kikas et al. 2009; Werner and Nixon 2005) as well as over time (Huesmann and Guerra 1997; Zelli et al. 1999). Moreover, there is evidence that habitual use of violent media is linked to the normative acceptance of aggression (Huesmann and Kirwil 2007; Krahé et al. 2011). Finally, a longitudinal study by Möller and Krahé (2009) spanning 30 months showed that exposure to media violence affected aggressive behavior via promoting the normative acceptance of aggression over time, supporting results of an earlier cross-sectional study (Krahé and Möller 2004).

The research discussed so far referred to overall measures of aggression and normative acceptance and did not differentiate between physical aggression (behavior intended to cause physical harm) and relational aggression (behavior intended to cause harm by damaging the other person’s peer relationships; Crick and Grotpeter 1995). However, this distinction is important for several reasons. First, the two forms of aggression appear to be related differentially to gender. Whereas there is consistent evidence that boys are more physically aggressive than girls (Hay 2007), a similar gender difference has not been found for relational aggression. There is some evidence from behavioral observation studies that girls show more relational aggression than do boys, but studies using peer nominations typically found no gender differences in relational aggression (Archer and Coyne 2005). For a proper analysis of gender differences in aggression, physical and relational aggression should be considered separately. Second, recent studies have shown that different normative beliefs for physical and relational aggression are uniquely related to differences in physical and relational aggression, respectively (Werner and Hill 2010; Werner and Nixon 2005). Finally, distinguishing between physical and relational components of aggressive norms and behavior facilitates the analysis of possible cross-over effects from media depictions of physical aggression on users’ tendency to endorse relational aggression as acceptable and to engage in relational aggression. Evidence from previous research is mixed regarding the possibility of cross-over effects. No pathways were found from use of media violence to relational aggression in two longitudinal studies by Möller and Krahé (2009) and Krahé and Möller (2010). On the other hand, Ostrov et al. (2006) found that children who viewed high amounts of physical violence on television were subsequently more relationally aggressive. An experimental study by Coyne et al. (2008) found that participants exposed to media clips portraying either physical or relational aggression showed more aggression on both a physical and a relational measure of aggressive behavior, supporting the notion of a cross-over effect from one type of aggression in the media stimulus to the respective other type of aggression in users’ subsequent behavior. To our knowledge, no previous intervention study has examined separate effects on physical and relational aggression. In our study, we examined intervention efficacy on global measures as well.
as on the physical and relational components of aggressive norms and aggressive behavior.

The Current Study

Building on the contributions of social learning theory and the script model, the current study examined the efficacy of a class-based intervention in a large sample of 7th and 8th grade high school students in Germany. The intervention was designed to reduce the amount of time spent with violent media contents and, thereby, to prevent an increase in aggressive behavior by decreasing the endorsement of aggression-related normative beliefs via the promotion of critical attitudes toward media violence. The main contents of the intervention are described in the Methods section. The intervention focused on physically aggressive media portrayals in movies, TV shows, and video games and did not particularly discuss the presentation of relational aggression in the media. The intervention was embedded in an ongoing longitudinal study on the impact of exposure to media violence on aggressive behavior (Krahé and Möller 2010). Such a combined longitudinal-experimental design is particularly suitable for evaluating the efficacy of intervention programs. It combines longitudinal data that provide information about natural changes over time with an experimental evaluation of intervention effects on the course of development (Farrington 2006; Huesmann et al. 1983).

Following a baseline measurement (T1) of exposure to media violence, normative beliefs about aggression, and self-reported aggressive behavior, participants were assigned to the intervention or control group on a class basis. The intervention began about 3 months after the baseline assessment. The program was delivered by trained researchers in five sessions over 5 weeks, each lasting two school periods. It was complemented by two parent evenings at the beginning and the end of the 5-week period. Seven months after the intervention (T2), the level of exposure to violent media, normative beliefs, and self-reports of aggressive behavior were assessed again.

The purpose of our study was to evaluate changes in the use of violent media as well as in aggressive behavior as a result of the intervention and to examine the prediction, based on social-cognitive models of aggression, that the effect could be attributed, at least partly, to changes in the normative acceptance of aggression. Accordingly, the first two hypotheses referred to the efficacy of the intervention in reducing the use of media violence and changing aggressive behavior. The third and fourth hypotheses addressed the role of a change of normative beliefs about aggression as a mediator of intervention effects.

Hypothesis 1 held that participants in the intervention group would report less use of media violence than participants in the no-intervention control group 7 months after the intervention. Hypothesis 2 predicted that participants in the intervention group would report less aggressive behavior than participants in the control condition at 7 months post-intervention. The effect is expected primarily for physical aggression, but potential cross-over effects on relational aggression will also be examined.

According to social-cognitive theories (Huesmann 1998), one mechanism assumed to underlie the proposed changes in aggressive behavior is a decrease in the normative acceptance of aggression due to an enhanced critical thinking about media violence portrayals. In line with these theories, it was predicted in Hypothesis 3 that participants in the intervention group would show less acceptance of aggression-enhancing norms than participants in the control condition at 7 months post-intervention. Furthermore, we assumed that lower levels of aggression in the intervention group compared to the control group at T2 would be mediated by a decrease in the normative acceptance of aggression (Hypothesis 4).

Three potential moderators of intervention efficacy were examined for which previous research had failed to provide conclusive answers: initial levels of exposure to media violence, initial levels of trait aggression, and gender. First, building on studies that found differential effects for low versus high violence viewers (e.g., Nathanson 2004), it was examined whether heavy or light users of media violence would respond differently to the intervention. Second, it was analyzed whether participants high versus low in initial trait aggression would show different responses to the intervention. It has been argued that highly aggressive individuals are more susceptible to the aggression-enhancing effects of violent media stimuli (see Anderson et al. 2003 for a review). Therefore, the possibility was examined that the intervention would be more effective in reducing the normative acceptance of aggression as well as aggressive behavior in more aggressive participants. Third, gender was included in the design because past research has consistently shown boys to spend far more time using violent media compared to girls (e.g., Rehbein et al. 2009), and to show higher levels of aggressive behavior as well as normative acceptance of aggression (e.g., Möller and Krahé 2009; Krahé and Möller 2011). Gender differences in mean levels of exposure to media violence as well as aggressive norms and behavior raise the question whether boys and girls would also be differentially responsive to intervention efforts, as suggested by Rosenkoetter et al. (2004, 2009). Our design enabled us to explore potential gender differences in program efficacy controlling for pre-intervention gender differences in exposure to media...
violence and separating effects on the physical and relational components of aggressive norms and behavior.

Method

Sample

The sample consisted of 683 secondary school students (342 girls, 341 boys), who took part in two assessments separated by an interval of about 12 months. At T1, they were in 7th and 8th grade, with an average age of \( M = 13.3 \) years \( (SD = .87) \). Participants came from 10 schools located in different districts of the city of Berlin, Germany. Berlin has a three-tier secondary school system leading to basic qualification (Hauptschulabschluss), vocational qualification (Realschulabschluss) or university entrance qualification (Abitur). Schools from all three tiers were recruited for the study. The majority of participants were German nationals (89.3%), 2.9% were Turkish nationals, 4.1% had dual citizenship of Germany and another country, the remaining 3.7% came from a range of different countries. Approval for the study and all materials used was obtained from the University Ethics Committee as well as from the school regulating body overseeing the schools in question. Students were invited to participate in the study on a voluntary basis and were told that they could withdraw from the study at any time. In addition to obtaining student assent, active parental consent was obtained for students under the age of 14 in line with the general consent regulations for school-based research in Berlin. Response rates were very high, with no more than one or two students per class at most not participating, almost exclusively due to missing consent forms rather than stated nonconsent. At both T1 and T2, participants received book tokens worth 10 Euros in return for participation.

In nine schools, one 7th and one 8th grade class were assigned randomly to the intervention condition and one class per year was randomly assigned to the control condition. In the tenth school, only 7th grade students were available for participation. In total, there were 38 classes with 349 participants in the intervention group (174 girls and 175 boys) and 334 participants in the control group (168 girls and 166 boys). The intervention started about 3 months after the T1 data were collected and was completed about 7 months before the T2 measurements.

Intervention

The intervention consisted of 5 weekly sessions, each lasting two school periods (90 min), accompanied by two parent evenings at the beginning and the end of the program. The students’ curriculum addressed two main areas: restricted consuming, aimed at reducing the use of violent media, and critical consuming, aimed at promoting negative attitudes toward violent media.

Restricted consuming To reduce the use of media violence, students were first instructed to monitor their personal media habits by keeping a daily diary for a week recording all use of media. The discussion of the prominence of media violence in participants’ everyday routines was used to raise awareness regarding problematic levels of exposure to media violence. Participants were then instructed to observe a “media-free weekend”, during which no TV, movies or electronic games should be used, as a starting point for changing daily routines concerning the use of media. A variety of alternative leisure activities were generated and specific strategies were discussed in class that helped them to self-regulate their use of media. Specific assignments concerning reductions of general media use and violence consumption were given as homework from week to week to try out different strategies to reduce consumption and change exposure patterns in the long run.

Critical consuming Participants were shown a range of examples of violent media content to practice identifying violent portrayals in the media. The chosen clips from TV shows and a martial arts game showed atypical forms of violence, such as fantasy- and cartoon violence, that are less obvious than scenes of real-life or realistic violence and therefore provided good teaching examples. The clips were discussed in class and students learned to identify particular features of the presentation of violence (e.g., that violence is rewarded within a game through points or cheers; that the suffering of victims is not shown). To increase knowledge about the effects of media violence on users’ aggression, underlying short-term mechanisms, such as priming aggressive thoughts and feelings, were explained and illustrated in short demonstrations and exercises. Long-term mechanisms, such as desensitization or learning processes including altering normative beliefs about aggression via media influences, were discussed and cross-linked with vivid real-life examples and personal experiences by writing short stories or producing comic strips. In the final part of the intervention, participants engaged in a process of actively rehearsing the newly acquired knowledge about the effects of media violence and the self-regulation of media use. In small groups, they wrote a script for a situation pertinent to the issue of media violence that they then enacted in a role-playing exercise. The scenes were filmed, subsequently edited by the trainers and presented by the participants to their parents at the second parent evening (see below).

Enlisting parental involvement The training included two parent meetings before and after the 5-week
intervention period as well as two accompanying parents’ newsletters about the media-free weekend and about age rating systems. The parent meetings were designed to corroborate the two goals of reducing exposure to violent media and promoting critical viewing skills. Accordingly, the first parent evening covered the following topics (more detailed information about the contents of the sessions can be obtained from the first author): Providing guidelines for sensible media diets and exposure times as well as effective monitoring strategies, enlisting support for the child in observing the media-free weekend and in reducing exposure on a daily basis, and informing parents about potentially harmful effects of exposure to violence media. At the second parent meeting, the parents were shown the film clips produced by the students in the final part of the intervention. Because all films were related to the issue of exposure to media violence and its potentially harmful effects, the presentations served to initiate a critical discourse between children and parents about the problematic aspects of media violence.

Faithfulness of program implementation Both the intervention sessions and the parent evenings followed a detailed written protocol to ensure faithfulness of program implementation. All members of the research team underwent extensive training conducted by the first author. Following the weekly sessions, each school team entered a progress report into a shared diary that was accessible to all members of the group.

Measures

Exposure to media violence Exposure to media violence at T1 and T2 was measured using genre lists for movies, TV series, and electronic games derived from previous research (Möller and Krahe 2009; Krahe and Möller 2010). For each item on the lists, students were asked to indicate how frequently they used the respective genre on a 5-point scale ranging from (0) never to (4) very often.

For movies, 10 genres were provided: adventure, action, horror/slasher, comedies, military and war, crime thrillers, romantic fiction, martial arts, science fiction, and cartoon/animation films. For TV series, 10 genres were provided: adventure, action, hospital soaps, comedy, daily afternoon soaps, family series, crime thrillers, mystery, science fiction, and cartoon/animation series. Finally, for electronic games, 11 genres were presented: action adventure, construction strategy, classic adventure, military strategy, genre mix (a combination of shooter and racing games such as Grand Theft Auto), beat-em ups, role playing games, shooters, simulations, sports games, and survival horror games. Each game category was illustrated by a specific example prominent at the time of the data collection.

Ratings of violent content were obtained for each genre from independent media experts (see Krahe and Möller 2010). All raters were provided with a definition of “violent content” and instructed to rate the level of violence typically characteristic of each genre, using a 5-point scale from (1) nonviolent to (5) very violent. Each genre was rated by three independent raters. Interrater agreement as indicated by Kendall’s W was w = .87, p < .01, for films, w = .75, p < .01, for TV series, and w = .92, p < .01, for games. A mean violence score was computed across raters for each category on the three genre lists.

General information about media use Four questions were included to measure participants’ overall media use regardless of violent content. (1) “How often do you watch TV or videos/DVDs?”, (2) “How often do you play video games?”, (5-point scale: 0 = not at all, 1 = fewer than once a week, 2 = 2–3 times a week, 3 = every other day, 4 = every day), (3) “On average, how much time do you spend watching TV or videos/DVDs per day?”, (4) “On average, how much time do you spend playing video games per day?”, (6-point scale: 0 = not at all, 1 = less than 30 min, 2 = 30–60 min, 3 = 1–1.5 h, 4 = 1.5–2 h, 5 = more than 2 h).

Normative acceptance of aggression At both times T1 and T2, normative acceptance of aggression was measured with a vignette describing a provocation scenario based on Möller and Krahe (2009). The vignette read as follows:

“Imagine you are extremely angry with one of your classmates because he/she treated you in a mean and unfair way in front of others that morning. After school you meet this person again and this time the two of you are alone. Immediately he/she starts quarrelling with you again, saying nasty things ...”

Following the scenario, a list of five possible reactions was presented and participants were asked to indicate how acceptable it would be for them to respond in that particular way in the situation. Two of the items represented physical aggression (e.g., “to kick and push him/her”), and three responses reflected relational aggression (e.g., “to spread rumours about him/her”). Responses were made on a 4-point scale ranging from (0) not at all ok to (3) totally ok.

Aggressive behavior Self-reports of aggressive behavior were obtained at T1 and T2, using items based on a previous study by Möller and Krahe (2009). Five items addressed physical aggression (e.g., “I have pushed another person”), and five items addressed relational aggression (e.g., “I have spread gossip about people I don’t like”). For each item, participants were asked to rate how often they had shown the respective behavior in the past six months, using a 5-point scale from (0) never to (4) very often.
Procedure

At T1 and T2, the measures were administered by trained project staff during normal class hours. To be able to match the questionnaires from T1 to T2 without jeopardizing anonymity, participants generated a personal code. This procedure was formally approved by the data protection commissioner of the Berlin school authority.

Results

Descriptive Results and Correlations

The items referring to general use of media administered at T1 revealed that participants were regular users of TV, films, and video games. Only 1.8% reported that they never watched TV or DVDs, with 52.4% watching daily. In terms of time per day, 71% of users reported watching TV or DVDs for more than an hour per day. No gender differences were found on these two items. For video games, daily use was reported by 26.9% of the sample, 12.4% indicated that they did not play such games at all. On the days played, 48.6% played for more than an hour. The use of video games differed substantially between boys and girls. Of the girls, 19.1% did not play games at all compared to only 1.8% of the boys. Conversely, 42.4% of boys reported playing every day compared to 11.7% of the girls. In terms of time played per day, 29.0% of girls and 68.3% of boys used video games for more than one hour. These data are very similar to those of a recent survey with more than 44,000 adolescents in Germany (average age: 15.3 years) where 31.2% of girls and 68.8% of boys used video games for more than one hour per day (Rehbein et al. 2009, p. 19).

To arrive at a measure of exposure to violent media, those genres that contained some measure of violence as reflected in expert violence ratings of higher than 2 on the 5-point scale from (1) nonviolent to (5) very violent were selected for the media violence exposure index. This was true for eight movie genres (all except romantic fiction and comedies, violence ratings ranging from 2.33 for adventure to 5.00 for horror films), six of the TV series (all except hospital series, comedy, daily soap and family series; violence ratings from 2.33 for mystery and adventure series to 3.33 for action series) and seven video game genres (all except classic adventures, simulations, sports games, and construction strategy games; range from 2.67 for action adventures to 5.00 for survival horror games). Participants’ frequency ratings for each of the selected genres were multiplied by the average violence rating of that genre obtained from the experts. The resulting product scores were then averaged across the 21 genres to yield an overall measure of the use of violent media. Correlations between types of media were substantial, T1: $r = .72^{***}$ between films and games, $r = .69^{***}$ between films and TV series, and $r = .52^{***}$ between games and TV series; T2: $r = .62^{***}$ between films and games, $r = .67^{***}$ between films and TV series, and $r = .47^{***}$ between games and TV series. Therefore, the overall measure of exposure to media violence aggregated across the three types of media was used in the subsequent analyses. The ten genres with expert violence ratings of less or equal two (two movie genres, four TV series genres, and four video game genres) were combined into an overall index of exposure to nonviolent media using the same method described above. Use of violent and nonviolent media was substantially correlated at both T1 and T2 (see Table 1).

Mean scores of aggression and normative beliefs were computed for the total scales and for the physical and relational subscales. The means and standard deviations for all measures, along with information about internal consistency, are presented in Table 1. All measures showed good reliability. It should be noted that conceptually, the media violence consumption measures were not required to have high internal consistency because the different genres and media could be used independently of one another and the index therefore presented a cumulative measure of exposure (Anderson et al. 2007, p. 99). Nonetheless, the alphas reported in Table 1 are substantial, suggesting that preferences for violent media show a consistent pattern across genres. The alpha for the measure of exposure to nonviolent media was lower with .60, which was expected given the greater heterogeneity of this measure across genres and types of media.

There were no differences between the intervention and control groups on the T1 measures of general, nonviolent, and violent media consumption, normative beliefs about aggression, and aggression, multivariate $F (9,664) = .78$, $p = .64$. Univariate effects of an additional MANOVA revealed significant gender differences at both T1 and T2 on all variables in the study, as displayed in Table 1, with boys obtaining higher scores than girls.

The zero-order correlations of all variables for boys and girls are displayed in Table 2. Despite gender differences in the means, the pattern of correlations was similar in both gender groups. Exposure to media violence showed a significant positive correlation with self-reported aggression for girls and boys at T1 and T2. The correlations of exposure to media violence and aggressive norms at T1 and T2 were significant for girls. For boys, the use of media violence was related to endorsement of physical norms only at T1, whereas positive correlations with all three norm measures could be found at T2. The use of nonviolent media was significantly, but weakly, related to relational aggression at T1 for both gender groups and to physical aggression for boys at T2.
Examining the Effects of the Intervention on Media Use, Aggressive Norms and Aggressive Behavior

To examine the proposed effects of the intervention, regression and path analyses were performed using MLwiN 2.22 (Rasbash et al. 2010) and Mplus 6.1 (Mutén and Mutén 2011). To test Hypotheses 1–3, several random intercept models were estimated. Because all dependent variables were skewed, a non-parametric bias corrected bootstrapping approach was conducted using MLwiN. This approach is recommended by Carpenter et al. (2003). Since a bootstrapping approach was used, confidence intervals are reported to test for statistical significance. Betas are significant if the value 0 is not included in the confidence interval. The width of all confidence intervals was 95%, which is comparable to at least $p < .05$ (Efron 1979). Each model was calculated using 20 sets with 500 sampling iterations in each set. The hierarchical structure of the data (683 students nested within 38 classrooms) was taken into account by using a two-level approach. Whereas the intercept of all models was modeled as random to account for differences between classes, the different predictors were entered as fixed.

To test the mediation models for H4, Mplus was used. The hierarchical structure of the data was taken into account by using a clustering approach (using class membership as a cluster variable, “type = complex”). A MLR estimator was used to correct for the non-normality of the self-reported aggression-related variables. These approaches ensured robust standard errors and test statistics (see Muthén 1998–2004; Muthén and Satorra 1995).

Because of the gender differences found on all variables, gender was included as a covariate in each of the models. To test for moderator effects of gender, exposure to media violence at T1, and aggressive behavior at T1, respectively, interaction terms were computed using centered variables. No significant interactions were found with experimental condition either for gender or initial level of media violence exposure. No three-way interactions (e.g., gender by condition by aggression at T1) were significant. Intervention effects in terms of changes in exposure to media violence, normative beliefs, and aggressive behavior over time were equal for boys and girls and were not dependent on participants’ level of exposure to media violence at T1. Therefore, only the moderation tests for aggression at T1 are reported below.

To examine the prediction in Hypothesis 1 that the intervention would lead to a reduction in exposure to media violence, a regression model was computed with experimental condition (control = 0; intervention = 1) and the interaction term of condition by T1 aggression as predictors and gender, T1 use of media violence, T1 aggression, and T2 use of nonviolent media as covariates. The analysis yielded a significant condition effect, $B = -.47$, (C.I. = -.78, -.10), indicating a greater decrease in the use of media violence in the intervention group compared to the control group ($\beta = -.31$). $^2$ The means showing the difference in exposure

<table>
<thead>
<tr>
<th>Measure (Range)</th>
<th>Items</th>
<th>$z$</th>
<th>$M$</th>
<th>SD</th>
<th>Boys</th>
<th>Girls</th>
<th>$F (1,651)$</th>
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<tbody>
<tr>
<td>T1 Use of violent media (0–20)$^a$</td>
<td>21</td>
<td>.90</td>
<td>5.09</td>
<td>2.72</td>
<td>6.65</td>
<td>3.57</td>
<td>305.70***</td>
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<tr>
<td>T2 Use of violent media (0–20)$^a$</td>
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<td>.90</td>
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$^a$ Multiplicative index of frequency and violence ratings for all measures of media use

$*** p < .001$

$^2$ Because there is no agreement about calculating effect sizes in multilevel models (Raudenbush and Bryk 2002; Roberts and Monaco 2006), the Betas will be presented that also allow a comparison of the effects (Goldstein 2004; Rosenthal and DiMatteo 2001).
Table 2 Zero-order correlations

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EMV exposure to media violence, ENVM exposure to nonviolent media, Phy physical, Rel relational

Coefficients for boys (N = 323) are above the diagonal, coefficients for girls (N = 334) are below the diagonal

*** p < .001; ** p < .01; * p < .05
to media violence at T1 and T2 for the two groups are presented in Fig. 1. The interaction effect was nonsignificant, indicating that the reduction in the use of media violence in the intervention group was not dependent on initial levels of aggressive behavior.

To test whether the intervention also reduced the use of nonviolent media, a parallel regression analysis was conducted with use of nonviolent media at T2 as outcome and experimental condition and the interaction term of condition by T1 aggression as predictors, including gender, T1 use of nonviolent media, and T1 aggression as well as T2 use of media violence as covariates. There was no effect of condition ($b = -0.04$, C.I. $= -0.23$, 0.16) nor an interaction effect ($b = -0.00$, C.I. $= -0.05$, 0.05). Thus, the intervention did not produce a reduction in time spent using nonviolent media. Rather, the effect was content specific as only the exposure to violent media was reduced over time.

To test Hypothesis 2, stating that the intervention group would show less aggression at T2 compared to the control group, another regression analysis was conducted with aggression as the criterion variable. Experimental condition (control $=0$; intervention $=1$) and the interaction term of condition and T1 aggression were the predictors of interest, gender and T1 aggression were included as covariates. The main effect of condition was nonsignificant, $B = -0.02$ (C.I. $= -0.15$, 0.01). However, a significant interaction effect was found, $B = -0.18$ (C.I. $= -0.32$, 0.05): Participants high in T1 aggression benefited from the intervention, as reflected in lower T2 aggression scores compared to the highly aggressive participants in the control condition ($b = -0.19$), whereas those low in initial aggression showed no significant difference between the two conditions. The results are presented in Fig. 2.

To analyze intervention effects separately for physical and relational aggression, parallel regression analyses were conducted. The results were highly similar to the total aggression measure. Significant interaction effects of condition by T1 aggression facet were found for physical aggression $B = -0.14$ (C.I. $= -0.28$, 0.01) and for relational aggression $B = -0.16$ (C.I. $= -0.30$, 0.01), indicating that only participants high in T1 aggression in the intervention group showed less aggressive behavior at T2 than their equally aggressive peers in the control classes ($b = -0.13$ for physical aggression; $b = -0.16$ for relational aggression).

To examine if the intervention group showed less normative acceptance of aggression at T2 as predicted in Hypothesis 3, a regression model was computed introducing the experimental condition and the interaction of condition by T1 aggression, controlling for gender and normative beliefs at T1. The analysis yielded no significant main effect of condition, $B = -0.02$ (C.I. $= -0.13$, 0.11). However, the interaction effect was significant $B = -0.20$, (C.I. $= -0.34$, 0.05). More aggressive participants in the intervention group showed less acceptance of aggression at T2 than their counterparts in the control group ($b = -0.20$). No difference was found for participants low in T1 aggression. The interaction effect is displayed in Fig. 3.

To test for differential effects for physical and relational normative beliefs, the same regression analysis was repeated for the physical and relational subscales, respectively. For norms endorsing physical aggression, neither main nor interaction effects of the intervention could be found. However, regarding the normative acceptance of relational aggression, a significant interaction was found, $B = -0.25$ (C.I. $= -0.41$, 0.07). Relationally aggressive participants in the intervention group showed less acceptance of relational aggression at T2 than those in the control group ($b = -0.25$).

Finally, Hypothesis 4, predicting that the effect of the intervention on reducing aggressive behavior would be mediated by a decrease in normative beliefs about aggression, was examined in a path model according to MacKinnon (2008), enabling us to consider both direct and indirect paths from the predictor to the criterion. As displayed in Table 2, there were substantial correlations between the potential mediator, normative beliefs at T2, and the outcome variable, aggression at T2 in the total sample (.57 for boys and .43 for
However, because the link between condition and normative beliefs as well as aggressive behavior could only be established for participants high in T1 aggression, the condition by T1 aggression interaction term was included in the analysis. Gender and T1 normative beliefs were introduced as control variables in the model. As displayed in Fig. 4, aggression at T2 was predicted by aggressive norms at T2 as well as by T1 aggression. Neither condition nor the condition by T1 aggression interaction significantly predicted T2 aggression. Normative beliefs at T2 were predicted by T1 aggression and the condition by T1 aggression interaction term, as reported above. The condition main effect was nonsignificant.

The most interesting path in this model, namely the indirect effect, was significant: Condition by T1 aggression predicted aggression at T2 via normative beliefs at T2 ($B = -0.07$, $t = -2.12$, $p < .05$), indicating that the lower aggression score at T2 for the more aggressive participants at T1 in the intervention group was mediated by a decrease in the normative acceptance of aggression. The direct link between the interaction of experimental condition and T1 aggression on aggressive behavior at T2 (as described for the test of Hypothesis 2) was no longer significant when normative beliefs at T2 were introduced as a mediator. Thus, the prediction in Hypothesis 4 that lower T2 aggression in participants in the intervention group compared to the control group would be mediated by a decrease in the normative acceptance of aggression was supported for the subgroup of participants who scored high on T1 aggression.

Regarding the two facets of aggression, the mediational model only could be tested for the relational component of aggressive norms and behavior because no condition effect was found for the physical component of normative beliefs (see Hypothesis 3 above). For relational aggression, the mediational path was supported empirically as the indirect effect was significant: Condition by relational aggression T1 predicted relational aggression T2 via normative beliefs at T2 ($B = -0.08$, $t = -2.68$, $p < .01$). The paths of the full model for relational aggression are displayed in italics in Fig. 4.
Discussion

Evidence from experimental, cross-sectional, and longitudinal studies has demonstrated a link between the use of violent media and aggressive behavior (Anderson et al. 2003). Although the effect sizes are generally small, and there is disagreement as to how they should be interpreted with regard to the potentially harmful effects of media violence use (e.g., Ferguson and Kilburn 2010; Huesmann 2003), the fact that violent media content in the form of movies, television programs, video games, and music is universally accessible and widely used renders even small effects practically significant. Moreover, although some individuals may be more susceptible to media violence effects than others, Anderson et al. (2003) concluded: “The existing empirical research on moderators suggests that no one is exempt from the deleterious effects of media violence; neither gender, nor nonaggressive personality, nor superior upbringing, nor higher social class, nor greater intelligence provides complete protection” (p. 104).

This conclusion calls for interventions designed to reduce exposure to media violence that are directed at community samples of children and adolescents. Accordingly, the present study was conducted to evaluate the efficacy of a school-based intervention developed by the authors to reduce exposure to media violence and to influence aggressive behavior by challenging normative beliefs about aggression via promoting critical consuming in a large sample of 7th and 8th graders in Germany. An experimental pre-post-test design was used to compare the intervention group with a matched control sample from the same year within each school, with post-intervention measures taken about 7 months after the end of the program. The intervention combined a series of five double-period sessions in each class with two parent evenings at the beginning and at the end of the 5-week period. It also comprised a set of homework tasks, including the observation of a media-free weekend. Intervention effects were expected with regard to reduced exposure to violent media and to lower levels of aggressive behavior in the intervention group due to decreased normative acceptance of aggression.

The first important finding of the evaluation was that the intervention was successful in reducing the use of violent media. Participants in the intervention group reported significantly less time spent using violent films, TV shows, and video games than participants in the control group at T2 7 months after the intervention. The effects held for boys as well as girls despite significant gender differences in the use of violent media and were also independent of the level of use of violent media or level of aggression at T1.

The focus of the intervention was on the reduction of the use of violent media rather than a decrease of media consumption in general, and accordingly an effect was observed for exposure to violent media only and not for exposure to nonviolent media. In fact, rather than restricting the use of media generally, which is counterproductive in an adolescent sample (see research by Bushman 2006, on the “forbidden fruit effect” and reactance in response to restricting access to violent media), a substitution approach was used. It consisted of discussing the advantages of using nonviolent in comparison to violent media to avoid strong reactance tendencies in response to a complete media turnoff approach. The aim was to maintain participants’ motivation to cooperate in the intervention, which is a critical precondition for the effectiveness of media literacy programs (Byrne et al. 2009).

Regarding the ultimate criterion of intervention success as far as the media violence-aggression debate is concerned, different perspectives can be applied. Of course, a reduction in aggressive behavior would be the optimal result. However, considering that adolescence is a developmental period in which an increase in aggression is almost age-normative, an intervention can be said to be successful to the extent that it can curb this increase. As Byrne et al. (2009, p. 240) argued, the purpose of this kind of intervention “is not necessarily to decrease aggression, but rather to prevent media-induced aggression, holding it at the level of children who were not exposed to violent media”. Our intervention succeeded in this respect as participants who were comparably high in T1 aggression reported less aggression at T2 in the intervention group than in the control condition. This finding ties in with results by Huesmann et al. (1983) for elementary school children selected because of their high exposure to television violence. At 4 months follow-up assessment, participants in their intervention group were rated as less aggressive by their peers than those in the control group. Although aggression increased over time for both groups, “the increase for the experimental group was much less than for the control group” (Huesmann et al. 1983, p. 906).

In the current study, the intervention effect was found not only for the total measure of aggression but could also be shown for each of the two components, physical and relational aggression. The findings provide tentative evidence that just as cross-over effects were observed from exposure to physical and relational violence in the media to the respective other facet of aggressive behavior (Coyne et al. 2008), an intervention reducing exposure to media violence, which is predominantly physical in nature, may have cross-over effects on reducing relational aggression. Boys scored higher than girls on physical as well as on relational aggression at both times, but no moderation...
effect for gender on intervention efficacy could be established for either of the two components.

As intended, the intervention was found to challenge the normative acceptance of aggression on the total measure of aggressive norms, but the effect was limited to participants scoring higher on initial aggression. However, considering the two components of aggression separately, only the acceptance of relational aggression was decreased correspondingly. The failure to find a parallel effect for the normative acceptance of physical aggression may be explained by a floor effect on this subscale. Nevertheless, the results regarding the normative acceptance of aggression attest to the effectiveness of the critical consuming elements of the intervention for the subgroup with relatively high starting levels of aggression.

Furthermore, our mediational analyses supported the prediction that the effect of the intervention on aggressive behavior would be mediated by a decrease in the normative acceptance of aggression. For the total measure of aggression and the relational aggression subscale, it was shown that, among participants high in initial aggression, the significant effect of the intervention was mediated by a decrease in the normative acceptance of aggression. These results are in accordance with social-cognitive models stressing the link between knowledge structures, such as normative beliefs, and aggressive behavior (e.g., Anderson et al. 2003; Huesmann 1998).

Our study has several strengths. First, it is one of very few interventions directed at adolescents. Adolescents differ in their media habits from elementary school children in several ways, not least in their ability to get access to violent media not suitable for their age group (Kirsh 2006). Previous studies have shown that evaluative mediation in the form of critical comments by adults, shown to work well with younger children, is less effective and potentially counterproductive with adolescents (Nathanson 2002). Therefore, the emphasis of our intervention was on promoting a critical understanding of the effects of media violence through active mediation that required a deeper elaboration of the information on the detrimental effects of exposure to violent media.

A second strength of the present study is the large sample size compared to other studies. Our study included participants from 10 schools and 38 classes, and classes were matched within schools and years before assigning them to the intervention and control groups. By comparison, Robinson et al. (2001) had 218 participants from two schools, randomizing at the school level, and Rosenkoetter et al. (2004) included 12 classes from four schools with 177 participants in total. To our knowledge, the study by Rosenkoetter et al. (2009) is the only one to include similarly large samples of classes and participants as the present research, but their participants were of a younger age.

Third, our study used a long follow-up period of 7 months for the assessment of intervention effects. Other studies either measured their outcome variables immediately after the intervention (Robinson et al. 2001) or used shorter follow-up periods (e.g., 2 weeks in Rosenkoetter et al. 2004). Again, the study by Rosenkoetter et al. (2009) is the only one to include a similarly extensive follow-up period.

Finally, like most other school-based media violence interventions, participants were assigned to the intervention and control groups on a class basis. Thus, participants were nested within classes. Whereas some previous studies have ignored this issue (e.g., Rosenkoetter et al. 2004), the present analysis used statistically appropriate methods to account for the nested structure of the data.

Despite the encouraging results, the present study also has its limitations. One is that, although significant, the differences between the intervention and control groups were small in magnitude. The multilevel analyses used in our study did not yield effect size estimates based on explained variance. We reported Beta coefficients because they can be interpreted as changes in standard deviations in the dependent variable for dichotomous variables. Therefore, their interpretation is similar to Cohen’s $d$ (Cohen 1992). Our main effect of the intervention on a decrease in exposure to media violence yielded a Beta of $-0.31$ for the seven-month post-intervention interval. By comparison, Rosenkoetter et al. (2004) found an immediate post-intervention effect of $d = -0.35$ for violent TV viewing and Rosenkoetter et al. (2009) showed an effect of $d = -0.15$ for the follow-up measure 8 months post-intervention. For the aggression-related outcomes, effect sizes cannot be compared directly to earlier research that reported main effects of the intervention because in our study the intervention effect on aggressive behavior was moderated by initial levels of aggression. As noted by Rosenthal (1990), even small effects may have substantial social consequences, given the pervasiveness of violent media use, and the magnitude of the present effects should be evaluated relative to the long follow-up period. Moreover, it is worth noting that several control variables were included in each of the models in the attempt to reduce the probability of third-variable effects.

Second, in interpreting the effectiveness of the intervention, it needs to be recognized that the measures used in this study relied on self-reports. Such reports may have been susceptible to social desirability. Further evaluations are needed that include data from other informants or use behavioral measures of aggression to overcome this limitation.

The approach used in our study was an omnibus intervention directed at a heterogeneous sample in terms of their use of violent media and level of aggression. However,
there is evidence that not all users are equally affected by violent media in their tendency to show aggressive behavior. Applying the Five Factor Model of personality to the study of individual differences in the media-violence-aggression link, Markey and Markey (2010) showed that high levels of psychoticism (indicated by a combination of low conscientiousness and low agreeableness) and trait aggression (indicated by the combination of high neuroticism and low agreeableness) were associated with stronger links between the use of violent video games and aggression. Other research also found that individuals high on trait aggression showed a greater increase in hostility and aggression after exposure to media violence than individuals low on trait aggression (e.g., Arriaga et al. 2006). Findings such as these suggest that interventions to reduce the use of media violence should be evaluated in terms of their ability of changing exposure to media violence, normative acceptance of aggression, and aggressive behavior in this risk group. The findings from our evaluation show that the reduction of time spent using violent media occurred in the intervention group regardless of initial levels of aggression, but that participants with high aggression scores at T1 profited more from the intervention as far as aggressive behavior and the normative acceptance of aggression were concerned.

The present findings contribute to the literature on how to reduce exposure to violent media to change aggressive behavior. They demonstrate the efficacy of an intervention directed at an adolescent audience, a target group largely neglected in past research. With a compact curriculum of five sessions, a decrease in the use of violent media was still detectable in the intervention group after 7 months. In addition, the intervention succeeded in attenuating aggression among participants high in initial aggression, and this effect was due to a decrease in the normative acceptance of aggression.

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References


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