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# Media Violence, Physical Aggression, and Relational Aggression in School Age Children: A Short-Term Longitudinal Study

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**Many studies have shown that media violence has an effect on children's subsequent aggression. This study expands upon previous research in three directions: (1) by examining several subtypes of aggression (verbal, relational, and physical), (2) by measuring media violence exposure (MVE) across three types of media, and (3) by measuring MVE and aggressive/prosocial behaviors at two points in time during the school year. In this study, 430 3rd–5th grade children, their peers, and their teachers were surveyed. Children's consumption of media violence early in the school year predicted higher verbally aggressive behavior, higher relationally aggressive behavior, higher physically aggressive behavior, and less prosocial behavior later in the school year. Additionally, these effects were mediated by hostile attribution bias. The findings are interpreted within the theoretical framework of the General Aggression Model. Aggr. Behav. 37:193–206, 2011.** © 2010 Wiley-Liss, Inc.

**Keywords: media violence; aggressive behavior; physical aggression; relational aggression**

## INTRODUCTION

Although there have been hundreds of studies of media violence and aggression, there are still serious gaps in our understanding of (1) the mediating mechanisms by which media violence may influence later behavior, (2) whether both physical and relational aggression may be affected by aggression in the media, and (3) whether developmental changes in children's aggressive behaviors are demonstrable in a short-term longitudinal context. Most studies of media violence either observe immediate short-term effects or very long-term effects of watching/playing violent media. This study attempts to identify mediators of media violence effects across multiple media (TV, video games, and movies/videos) and across multiple subtypes of aggression.

### The General Aggression Model

Drawing on the theorizing of Bandura [1977], Berkowitz [1984], Dodge [1980], and Huesmann [1988], Anderson and colleagues [e.g., Anderson and Dill, 2000; Anderson and Bushman, 2002] developed the General Aggression Model (GAM) to explain the development of aggressive cognitions, attitudes, and behaviors, including how exposure to media violence may contribute to enhancing or mitigating these aggressive constructs. This model describes a process by which both personal and situational inputs affect aggressive outcomes by influencing internal states and appraisal processes [Anderson and Dill, 2000].

Anderson and colleagues' General Aggression Model, like the other information processing models for aggression, differentiates between short- and long-term effects of media violence. In the short-term, the General Aggression Model predicts that violent media exposure can affect arousal, aggressive thoughts, and aggressive feelings, which in turn can

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influence aggressive behaviors. It is expected that the cognitive route is especially relevant for influencing behaviors. Specifically, individuals have a variety of cognitive scripts that they use to help guide and interpret behaviors. When an individual is exposed to media violence, scripts related to aggression are activated and strengthened, making aggressive behavior more likely in the immediate situation.

Regarding long-term exposure to violent content, the General Aggression Model, like the other information processing models of aggression, suggests that repeated episodes of viewing media violence may result in the development, overlearning, and reinforcement of aggression-related knowledge structures. These knowledge structures include vigilance for enemies [i.e., hostile attribution bias, Dodge and Frame, 1982], aggressive action against others, expectations that others will behave aggressively, positive attitudes toward use of violence [Huesmann and Guerra, 1997], and the belief that aggressive solutions are effective and appropriate.

## Media Violence Effects

Hundreds of correlational and experimental studies and a small number of longitudinal studies of media violence have established a relation between consumption of violent media and aggressive behaviors. Although many of these studies have focused on adults, several longitudinal studies of exposure to violent television have shown a strong relationship between early TV violence exposure and later aggression. In perhaps the first of these studies, Huesmann and his colleagues [e.g., Lefkowitz et al., 1972] followed a cohort of children starting in the third grade. When these same children were measured 11 years later, at age 19, exposure to TV violence in third grade predicted higher levels of aggression at age 19 ($r = .31$). The reverse was not true, however: aggression in the third grade did not predict consumption of television violence at age 19 ($r = .01$). This relation held even after statistically controlling for IQ, SES, and overall amount of TV viewing, although it was true only for boys in this study.

It is possible that the media effect was only seen with boys because the types of aggression assessed in that study were primarily physical aggression, which is more typical of boys than girls. In fact in later studies where nonphysical aggression was also measured (see below), effects have been found for females as well. All aggression involves the intent to harm [see Carlson et al., 1989]; however, there are several forms which should be considered. Girls are more likely to use indirect, social, and relational aggression as opposed to physical forms [Archer and Coyne, 2005]. Indirect aggression involves behaviors that harm another person but are done "behind their back" such as harming their possessions, and spreading stories and lies about them [Lagerspetz et al., 1988]. Indirect or direct aggression that damages, or threatens to damage, relationships or feelings of acceptance and inclusion has subsequently been called relational aggression [Crick, 1996]. Such behaviors have also been termed as indirect social aggression [Cairns et al., 1989]. Although each term adds uniqueness to the construct, it appears that, overall, the behaviors described under each term are more similar than distinct [see Archer and Coyne, 2005; Coyne et al., 2006]. We will use the term "relational aggression" in this study as we used measures primarily developed by Crick and colleagues from the original measures of indirect aggression developed by Lagerspetz et al. [1988]. Research has established relational aggression as a point of contrast with physical forms of aggression [see Crick et al., 1999, for a review]. Children who spread rumors, exclude peers, and engage in other relationship-oriented aggression are different than those who simply hit or kick to aggress against another. Studies show that relational aggression is associated with a significant level of negative consequences for both perpetrators and their victims [Crick et al., 1999], such as feelings of loneliness, depression, and social isolation.

A few studies have found that viewing physical violence on television can influence relational and verbal aggression in real life. This effect has now been found for preschoolers [Ostrov et al., 2006], school age children [Linder and Gentile, 2009], adolescents [Archer and Coyne, 2005; Coyne et al., 2004], and adults [Coyne et al., 2008]. In the short term, viewing media violence may activate (prime) both specific (physical violence) and more general (all types of aggression) scripts relating to aggressive behavior, increasing the likelihood that an individual would be more aggressive in general after viewing media violence. Social cognitive theory would suggest that the type of aggressive behavior enacted would be in part, also reflective of the individual's background and situation. As relational and verbal aggression are more socially acceptable (and carry a lower risk of punishment for the individual), these forms of aggression may be likely after exposure to media violence. Furthermore, in the long term, media violence exposure (MVE) may shape a person's general attitudes regarding the acceptability of aggressive behavior in real life, but

how that aggression is displayed becomes subject to other factors such as cultural appropriateness, personal habits, or situational factors.

The majority of studies assessing this link have only measured concurrent aggression and focus on violence in television, as opposed to other forms of media. Indeed, to our knowledge, only two published longitudinal studies exist that show a long-term effect of viewing media violence on future relational aggression. First, in a study of 557 children [Huesmann et al., 2003], childhood TV-violence viewing in first and third grades significantly predicted adult physical aggression 15 years later for both men and women ($r = .17$ and .15, respectively) and indirect (relational) aggression for women ($r = .20$). Second, Ostrov et al. [2006] examined whether exposure to media violence in preschool predicted physical and relational aggression two years later. Similar to Huesmann et al. [2003], exposure to media violence only predicted future relational aggression for girls.

## Potential Mediators: Social Information Processing Theory

One potential mediator of media violence effects is social information processing intent attributions. Previous research has demonstrated that the association between hostile attribution bias and social maladjustment is quite strong [Dodge and Frame, 1982], and has been demonstrated with both children and adults [see Crick and Dodge, 1994, for a review]. In particular, physically aggressive individuals tend to exhibit a hostile attribution bias, in which they tend to infer hostile intent from the actions of others, even when intent is ambiguous and might be benign. For example, when bumped in the hallway, aggressive children are more likely to assume that it was due to hostile intent rather than being an accident (whereas nonaggressive children show the opposite bias). A hostile attribution bias is theorized to contribute to the development and maintenance of aggressive behavior.

Crick [1995] has shown that relationally aggressive children also tend to exhibit hostile attribution biases, although social context matters greatly. In particular, Crick [1995] demonstrated that instrumental conflicts (e.g., a peer breaking your toy) are more salient and provocative for physically aggressive children, whereas relational conflicts (e.g., a peer fails to invite you to his birthday party) tend to elicit a response consistent with a hostile attribution bias in relationally aggressive children. Both social information-processing theory and the GAM suggest that violent media might activate cognitive structures that make it more likely that ambiguously hostile events will be interpreted within an aggressive framework, increasing the likelihood of an aggressive response [Bensley and Eenwyk, 2001]. Considering that many children seem to be predisposed to assume hostility in ambiguous situations, violent media have the potential to be a contributing factor. Thus, we examined relation between violent media habits and hostile attribution bias (for instrumental and relational conflict situations) in this study.

## Limitations of Past Research on Media Violence and Aggression

Developmental scholars have documented several long-term negative effects of violent media for children's future aggressive and delinquent behavior [for reviews, see Anderson et al., 2003; Bushman and Anderson, 2001; Huesmann and Kirwil, 2007]. Although these studies are important for addressing the media industry and their supporters' claim that violent television, movies, and videogames are not harmful [e.g., Freedman, 2002] they are limited in several key ways. The first concerns the reliance on forms of aggression that are salient for males (e.g., physical and verbal aggression). This comes at the expense of neglecting the study of relational aggression. Accordingly, we include various subtypes of aggression, including physical, verbal, and relational aggression in this study.

Related to this limitation is the issue of the specificity or generality of media violence effects. For example, although there are studies demonstrating that the general amount of media exposure is related to aggression [e.g., Johnson et al., 2002], several studies demonstrate that exposure to *violent* media is a better predictor of aggression than exposure to media in general [e.g., Anderson and Dill, 2000; Anderson et al., 2007]. In a study of adolescents, Gentile and his colleagues demonstrated that there were different effects of the *amount* and the *content* of video games [Gentile et al., 2004]. Specifically, increased amount was negatively related to school performance, whereas increased violent content was positively related to aggressive behaviors. Many studies of media violence do not make this distinction; we will, however, assess both amount and content of media in this study.

A third major limitation is a reliance on experimental and cross-sectional designs with the exception of a few notable longitudinal studies [cf. Anderson

et al., 2001; Huesmann et al., 2003; Johnson et al., 2002; Ostrov et al., 2006]. Indeed, to our knowledge, this is the first study to examine how total MVE influences several types of aggressive behavior in school age children both concurrently and longitudinally. Moreover, most developmental studies to date have focused solely on observing aggression in movies or in television. Thus, this longitudinal study was designed to measure MVE across three types of media (TV, movies/videos, and video games).

Fourth, many longitudinal studies do not attempt to measure the mechanisms that are theorized to mediate the relation between MVE and subsequent behavior. This study seeks to test whether hostile attribution bias mediates the relationship between media aggression exposure and aggressive behavior. Finally, although exposure to prosocial media content may promote prosocial behavior [Anderson et al., 2001; Fisch and Truglio, 2001; Gentile et al., 2009], *violent* media are likely to decrease prosocial behavior [Bushman and Anderson, 2009] in addition to increasing aggressive behavior [Anderson et al., 2001]. Consequently, this longitudinal study examines the impact on both aggressive and prosocial behavior.

### Overview of this Study

The goal of this study is two-fold: (1) to examine the link between consumption of media violence and increased use of physical, verbal, and relational aggression (and decreased use of prosocial behavior) concurrently and longitudinally; (2) to identify potential mediators for the link between viewing media aggression and using aggressive behavior. To accomplish these two goals, we used a longitudinal study examining the effects of media violence consumption among children.

Although many studies of media violence focus on children, it is rarely disclosed why particular age groups are chosen. In this study, we chose to study third through fifth grade children across one school year. There are several major developmental tasks that are critical for healthy development [see Gentile and Sesma, 2003, for a brief review related to media effects]. For school-age children, the most important is probably learning how to form friendships. To be successful, children must learn how to be part of a peer group, including learning and adapting one's behaviors to the norms of that peer group. Two issues are therefore salient. First, if children consume a lot of media violence, their conceptions of aggressive "norms" may shift; that is, they would likely come to see aggression as more normative and be more likely to exhibit a hostile attribution bias. This in turn could increase aggressive behavior and decrease prosocial behavior. These changes in behaviors may cause children to be rejected by the main peer group.

This study tested three hypotheses regarding violent media exposure:

Hypothesis 1: MVE will be significantly positively correlated with aggressive beliefs (i.e., hostile attribution bias) and behaviors, and significantly negatively correlated with prosocial behaviors at any single point in time.

Hypothesis 2: MVE will be significantly positively correlated with *later* aggressive beliefs (i.e., hostile attribution bias) and behaviors (verbal, relational, and physical aggression), and significantly negatively correlated with later prosocial behaviors.

Hypothesis 3: The relation between early MVE and later aggressive and prosocial behaviors will be mediated by hostile attribution bias.

## METHOD

### Participants

Four hundred and thirty 3rd ($n = 119$), 4th ($n = 119$), and 5th grade ($n = 192$) students participated in the study. Students were recruited from five Minnesota schools, including one suburban private school ($n = 138$), three suburban public schools ($n = 265$), and one rural public school ($n = 27$). The sample was evenly divided between boys and girls, with 49% of the children being female (51% male). The average age of child was 9.7 years (SD = 1.03, range 7–11). Participants were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct" [APA, 1992].

### Procedure

Interested teachers volunteered their classrooms for inclusion in the study. Letters were mailed directly to parents informing them about the study and requesting consent. Consent levels were at least 70% for all classrooms. Each of the participating classrooms was a mandatory class (i.e., not elective), to reduce the likelihood of selection bias. Data were collected between November 2000 and June 2003.

Each participant completed three surveys: (1) a peer-nomination measure of aggressive and prosocial behaviors, (2) a self-report survey of media habits and demographic data, and (3) a self-report measure of hostile attribution bias. Trained research personnel administered the peer-nomination survey,

and classroom teachers administered the self-report surveys. The surveys were administered on consecutive days. Teachers also completed one survey for each participating child, reporting on the frequency of children's aggressive and prosocial behaviors.

Each participant completed each of these surveys at two points in time during a school year. The mean lag between measurements across schools was 5 months.

## Assessment of Social Adjustment

*Peer assessment of social adjustment*. A peer nomination instrument was used to assess children's social adjustment [e.g. Crick, 1995; Crick and Grotpeter, 1995]. Children were provided with a roster of classmates, with each student numbered. Students were asked to nominate three students for each of 10 items, by writing the numbers on the answer form. Confidentiality was stressed to maximize truthful responding and minimize the risk of hurt feelings. Two items were peer sociometric items (nominations of liked and disliked peers), which are used to assess peer acceptance and peer rejection [see Crick and Dodge, 1994 for a review]. Peer rejection was measured with this item, standardized across classrooms. The remaining eight items assess four different types of social behavior: physical aggression (2 items), relational aggression (3 items), prosocial behavior (2 items), and verbal aggression (1 item). See Table I for a listing of all items. Each child in a classroom was given a standardized score for each scale. Coefficient $\alpha$ was computed for each of the three subscales with multiple items and was found to be satisfactory, $\alpha = .92$ for physical aggression, .86 for relational aggression, and .80 for prosocial behavior.

*Teacher ratings of aggressive behavior*. Teachers completed a survey assessing the frequency of each child's aggressive and prosocial behavior as observed by the teacher, on a five-point scale anchored "never true" to "almost always true" [Crick, 1996]. This instrument consists of 12 behavioral subscales, including a variety of behaviors (e.g. aggressive behavior, victimization, prosocial behavior, and others). For the purposes of this study, only the subscales reflecting relational aggression, physical aggression, and prosocial behavior were used. These items are listed in Table II. Coefficient $\alpha$ was $\alpha = .92$ for teacher ratings of relational aggression, .92 for physical aggression, and .91 for prosocial behavior.

*Teacher-report of school performance*. One item asked how teachers to rate each child's average school grade.

*Self-report of fights*. One item asked how many physical fights the participants had been in during the school year.

## Assessment of Media Habits

*MVE*. Similar to the approach used by Anderson and Dill [2000], participants were asked to name their three favorite television shows, their three favorite video or computer games, and their three favorite movies/videos. For each nominated media product, participants rated how frequently they watched or played on a 5-point scale (1 = "Almost never," 5 = "Almost every day"). Participants were also asked to rate how violent they consider each media product to be on a 4-point scale (1 = "Not at all violent," 4 = "Very violent"). An overall violence exposure score was computed for each participant by taking the product of frequency of watching/playing

**TABLE I. Peer Nomination Subscale Items**

*Physical aggression subscale*
- Who hits, kicks, or punches others?
- Who pushes and shoves other kids around?

*Relational aggression subscale*
- Who tries to make another kid not like a certain person by spreading rumors about them or talking behind their backs?
- Who, when they are mad at a person, gets even by keeping that person from being in their group of friends?
- Who, when they are mad at a person, ignores the person or stop talking to them?

*Verbal aggression item*
- Who says mean things to other kids to insult them or put them down?

*Prosocial behavior subscale*
- Who does nice things for others?
- Who tries to cheer up other kids who are upset or sad about something? They try to make the kids feel happy again

**TABLE II. Teacher Rating Subscale Items Used in this Study**

*Physical aggression subscale*
- This child hits or kicks peers
- This child initiates or gets into physical fights with peers
- This child threatens to hit or beat up other children
- This child pushes or shoves peers

*Relational aggression subscale*
- When this child is mad at a peer, s/he gets even by excluding the peer from his or her clique or playgroup
- This child spreads rumors or gossips about some peers
- When angry at a peer, this child tries to get other children to stop playing with the peer or to stop liking the peer
- This child threatens to stop being a peer's friend in order to hurt the peer or to get what s/he wants from the peer
- When mad at a peer, this child ignores the peer or stops talking to the peer

and its violence rating, and then averaging the nine products (TV, video games, movies/videos). Coefficient α was computed for the overall MVE scale and found to be satisfactory (α = .80). Prior research has confirmed that when asked to rate the violence in media, participants' ratings most strongly correlate with the graphicness of the portrayal of physical violence, across age, sex, amount of television viewing, and other factors [Potter, 1999]. This approach to measuring MVE has been used successfully with children in other studies [e.g., Anderson et al., 2007; Gentile et al., 2004]. Recently, this approach has been validated with child ratings of violence in video games, with child ratings correlating with expert ratings at .75 [Gentile et al., 2009].

*Amount of television watching and video game play*. Participants provided the amount of time they spent watching television and playing video games during different time periods on weekdays and weekends. Weekly amounts were calculated from these responses.

*Parent involvement in children's media habits*. Participants reported how frequently their parents watched TV with them, discussed the content with them, and set limits on the amount of time they may play video games.

### Assessment of Hostile Attribution Bias/Social Information Processing

Hostile attribution bias was measured with a survey that has been reliably used in past research [e.g., Crick, 1995; Crick et al., 2002; Nelson and Crick, 1999]. This instrument includes 10 stories, each describing an instance of provocation in which the intent of the provocateur is ambiguous. The stories were developed to reflect common situations that children and young adolescents might encounter. Four stories depict physical provocations and six depict relational provocations. Participants answered two questions following each story. The first presents four possible reasons for the peer's behavior, two of which indicate hostile intent and two reflect benign intent. The second question asks whether the provocateur(s) intended to be mean or not. Each measure was scored as a one if the participant selected a hostile intent, or as a zero if not.

Based on procedures delineated by Fitzgerald and Asher [1987], the children's responses to the attribution assessments were summed within and across the stories for each provocation type. Possible scores ranged from 0 through 20 (0–8 for the physical aggression subscale and 0–12 for the relational subscale), with higher scores indicating a greater hostile attribution bias. Coefficient α of the overall hostile attribution score was computed and found to be satisfactory (α = .85).

*Composite measures*. Because this study included multiple methods and multiple informants of children's behavior, composite measures of physical and relational aggression and prosocial behavior were created. Peer ratings of physical aggression, teacher ratings of physical aggression, and self-reports of physical fights were standardized and averaged to create a physical aggression composite. Some versions of the survey (approximately 40 surveys) asked whether participants had been involved in physical fights during the school year rather than asking how many physical fights the participants had been in. All self-report fight data were reduced to dichotomous data (yes/no fights) to make the versions compatible. The resulting composite physical aggression score yielded high reliability at both Time 1 (α = .87), and at Time 2 (α = .89)

Peer ratings and teacher ratings of relational aggression were standardized and averaged to create a relational aggression composite. The resulting composite relational aggression score yielded high reliability at both Time 1 (α = .90), and at Time 2 (α = .91).

Peer ratings and teacher ratings of prosocial behavior were standardized and averaged to create a relational aggression composite. The resulting composite prosocial behavior score yielded high reliability at both Time 1 (α = .87), and at Time 2 (α = .88).

## RESULTS

A series of analyses were conducted on the data. We first provide some basic descriptive statistics for the data and correlations between the variables. These correlations are provided for both concurrent and longitudinal data. We next conduct a series of hierarchical multiple regressions to assess the relations between MVE and all variables. Finally, we conduct a series of structural equation models to test our hypothesized model of the direction of effects.

### Descriptive Statistics

At Time 1 children reported spending an average of 20.8 hr per week watching television (SD = 13.9), and 9.6 hr per week playing video games (SD = 11.6). These averages mask important sex-correlated differences, however. Boys watched more television ($M = 22.6$, SD = 13.9) than girls ($M = 19.0$, SD = 13.6; $t(414) = 2.6$, $P < .01$). Boys also played

video games for significantly more time ($M = 13.4$, SD = 13.5) than girls ($M = 5.9$, SD = 7.8; $t(407) = 6.8$, $P < .001$).

## Single Point in Time Correlations

The first column of Table III presents the results from the first measurement. At Time 1, MVE was significantly and positively correlated with hostile attribution bias (overall, relational, and physical), verbally aggressive behaviors, and physically aggressive behaviors. MVE was significantly and negatively correlated with prosocial behaviors. There was not, however, a significant correlation between MVE and relational aggression.

The second column of Table III presents the results from the second measurement. At Time 2, MVE was significantly and positively correlated with hostile attribution bias (overall, relational, and physical), and verbally and physically aggressive behaviors. MVE was significantly and negatively correlated with prosocial behaviors. As with the first measurement, MVE was not related to the use of relational aggression.

## Looking Forward and Backward in Time Correlations

The third column of Table III presents correlations when predicting Time 2 variables with MVE at Time 1. At Time 1, MVE significantly and positively predicted Time 2 hostile attribution bias (all three), verbally and physically aggressive behaviors, but did not predict relationally aggressive behaviors. Time 1 MVE significantly negatively predicted Time 2 prosocial behaviors.

The fourth column of Table III presents correlations between Time 1 variables and Time 2 MVE. At Time 2, MVE was significantly and positively correlated with Time 1 hostile attribution bias (overall and physical only), and verbally and physically aggressive behaviors, but not relationally aggressive behaviors. Time 2 MVE was significantly negatively correlated with Time 1 prosocial behaviors. Note that these correlations were consistently lower than those predicting Time 2 outcomes from Time 1 MVE (column 3).

## Regression Analyses

A series of hierarchical regressions were conducted in which we first entered several variables that are theoretically related to aggression before entering MVE. Because these variables are likely to be related to both MVE and aggression, controlling for them is a conservative approach. Our rationale for controlling for each of these variables is described below. First, child sex was controlled because sex has consistently been found to be predictive of aggressive beliefs, aggressive behaviors, and MVE. Also, because we were interested in examining the effect of violent *content* rather than the effect of *amount of* media consumption, total screen time (TST) was included as a control variable. TST was normalized by conducting a square root transform to correct for a high degree of skew. Because of the substantial correlation between TST and MVE ($r = .38$),

**TABLE III. Correlations Between Violent Media Exposure and Hostile Attribution, Aggressive Behaviors, Prosocial Behaviors, and Parent Involvement**

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | Violent media exposure (Time 1 with Time 1) | Violent media exposure (Time 2 with Time 2) | Violent media exposure (Time 1 MVE with Time 2 outcomes) | Violent media exposure (Time 2 MVE with Time 1 outcomes) |
| *Hostile attribution* | | | | |
| Overall hostile attribution | .16*** | .21*** | .22*** | .12* |
| Relational hostile attribution | .12* | .18*** | .20*** | .08 |
| Physical hostile attribution | .16*** | .20*** | .20** | .13* |
| *Aggressive behaviors* | | | | |
| Verbal aggression (peer nomination) | .25*** | .29*** | .31*** | .22*** |
| Relational aggression (peer and teacher nomination) | .07 | .02 | .02 | .00 |
| Physical aggression (self-report, peer and teacher nomination) | .40*** | .47*** | .44*** | .34*** |
| *Prosocial behaviors* | | | | |
| Prosocial behavior (peer and teacher nomination) | −.36*** | −.31*** | −.35*** | −.30*** |

*$P < .05$; **$P < .01$; ***$P < .001$.

**TABLE IV. Step-Wise Regression Analyses: Significant Predictors of Time 2 Hostile Attribution, Aggressive, and Prosocial Behaviors**

| | Significant predictors of Time 2 DVs after all IVs entered | β weights of significant predictors after all IVs entered | Total $R^2$ after all IVs entered |
|---|---|---|---|
| *Hostile attribution* (*Time 2*) | | | |
| Time 2 overall hostile attribution bias | Time 1 hostile attribution | .64*** | .45*** |
| | Time 1 MVE | .13** | |
| *Aggressive behaviors* (*Time 2*) | | | |
| Time 2 verbal aggression (peer nomination) | Time 1 hostile attribution bias | .07 | .50*** |
| | Time 1 verbal aggression | .65*** | |
| | Time 1 MVE | .12* | |
| Time 2 relational aggression (peer and teacher nomination) | Time 1 total screen time | −.07 | .60*** |
| | Time 1 parental involvement | .07 | |
| | Time 1 relational aggression | .75*** | |
| Time 2 physical aggression (self-report, peer and teacher nomination) | Time 1 physical aggression | .61*** | .53*** |
| | Time 1 MVE | .18*** | |
| *Prosocial behaviors* (*Time 2*) | | | |
| Time 2 prosocial behavior (peer and teacher nomination) | Time 1 hostile attribution | −.09* | .46*** |
| | Time 1 prosocial behavior | .69*** | |

*$P<.05$; **$P<.01$; ***$P<.001$.

controlling for TST reduces the ability to find an effect of MVE. Additionally, parental involvement in children's media habits is likely to result in children consuming less media (amount) as well as less violent media (content). Thus, parental involvement may moderate any effects of MVE. We also controlled for hostile attribution bias. Some theorists suggest that because trait hostility is not yet solidified as a personality trait at this age, HAB may be a good proxy for what will become trait hostility. Therefore, controlling for HAB also serves to control for the possibility that hostile children may consume more media violence. However, because HAB is a hypothesized mediating variable, this is a very conservative approach.

We also controlled for a number of time variables in the analyses. Because not every school had the same lag between Time 1 and Time 2 and amount of lag is relevant to the amount of effect expected (i.e., a longer lag should theoretically show a larger effect, all other things being equal), lag time should also be controlled. Finally, each test controlled for the Time 1 measure of each dependent variable. That is, when testing for the effect on physical aggression at Time 2, physical aggression at Time 1 was entered as a control variable. This ensures that we are measuring change across time, and makes the test of the effects of MVE very conservative because earlier MVE is likely to have affected Time 1 aggression, so controlling for Time 1 aggression also overcorrects for earlier MVE as well as correcting for other predictors of aggression that were not explicity measured in this study.

Hierarchical regressions were conducted, in which child sex, race, and amount of school lag was entered in step 1, TST was entered in step 2, parental involvement was entered in step 3, hostile attribution bias was entered in step 4, Time 1 aggressive variables were entered in step 5, and Time 1 MVE was entered in step 6. The results of these analyses are displayed in Table IV.

MVE at Time 1 significantly predicted Time 2 overall hostile attribution bias, even after controlling for sex, race, lag, parental involvement, and Time 1 hostile attribution bias (Table IV). Time 1 MVE also significantly predicted Time 2 verbally aggressive behavior and physically aggressive behavior, after controlling for each of the control variables. Overall, all models were statistically significant.

## Structural Equation Model

A structural equation model was conducted (using MPlus 5.1) to test our hypothesized model of the direction of effects. Based on earlier studies [e.g., Anderson and Dill, 2000; Gentile et al., 2004], we hypothesized that *amount* of media and the *content* would have differential impacts. Additionally, we hypothesized that greater amounts of time viewing screen-based media (TV, videos/DVDs, and video games) would have a direct effect on school performance, but would not be directly related to aggressive behaviors. Greater amounts of MVE was

predicted to have a direct effect on aggressive and prosocial behaviors, but would not have a direct effect on school performance. However, violent media content was also predicted to increase hostile attribution biases, which in turn would also mediate the effects between violent content and aggressive and prosocial behaviors. Parent involvement in children's media was hypothesized to reduce children's screen time and MVE. Sex was also hypothesized to be related to the expression of aggressive and prosocial behaviors, in that girls were expected to exhibit more verbal and relational aggression, as well as more prosocial behavior, but boys were expected to exhibit more physical aggression. Finally, it was hypothesized that aggressive and prosocial behaviors would be related to peer rejection.

Because this was a short-term longitudinal study, our hypotheses were time-based as well. Children who consume more media violence early in the school year were hypothesized to begin to have greater hostile attribution biases. Once children start assuming that peer behaviors have hostile intent, they are likely to begin acting more aggressively. Children who become more aggressive were then expected to be more rejected by their peers. Therefore, the model includes TST, violent media exposure, parent involvement, and sex as variables at Time 1 (it also includes lag and minority status included as control variables). We entered a mean of Time 1 and Time 2 hostile attribution bias scores, in order to place it temporally between the two measurements. School performance, verbal aggression, physical aggression, relational aggression, and prosocial behavior were Time 2 variables, as was peer rejection.

As can be seen in Figure 1, the model showed good fit (see bottom of Fig. 1 for all statistics), thus confirming our hypothesized paths. Parental involvement was negatively associated with both weekly screen time and MVE. MVE and TST both predicted higher hostile attribution bias, which in turn was related to higher verbally, physically, and relationally aggressive behavior, as well as lower prosocial behavior. Weekly screen time negatively predicted school grades. Furthermore, higher aggression and lower prosocial behavior were related to Time 2 peer rejection. MVE was also directly related (over and above the mediated path via hostile attribution bias) to higher verbal aggression, higher relational aggression, higher physical aggression, and lower prosocial behavior. Tests of the indirect paths for MVE via hostile attribution bias were significant for all three aggression subtypes (verbal $P = .008$, relational $P = .006$, and physical $P = .022$) and marginally significant for prosocial behavior ($P = .058$). It should be noted that the model in Figure 1 only shows the path from relational aggression to rejection, due to high collinearity between the three aggression subtypes (see Table V). All three significantly predict increased rejection when entered independently (verbal aggression $\beta = .50$, relational aggression $\beta = .52$, and physical aggression $\beta = .40$). Also, as was predicted, boys were more likely to be physically aggressive, and girls were more likely to be verbally aggressive, relationally aggressive, and more prosocial toward their peers. Nonetheless, when a multigroup model was conducted to test for differences between boys and girls, there was no significant difference in model fit between them, indicating that although boys and girls may start at different levels, MVE has the same basic effect on both. The full intercorrelation matrix is shown in Table V.

Finally, given the prominence of hostile attribution bias in the above model, we decided to examine more specifically how HAB mediates the relations between total weekly screen time and MVE and aggressive behavior. A path model was constructed in MPlus, with weekly screen time and MVE predicting physical and relational forms of hostile attribution bias, which in turn predicted physical and relational aggression. Given the sex differences in the earlier model, sex was again added as a moderator. It was predicted that weekly screen time and MVE would both be associated with both types of HAB, and that physical HAB would be related to physical aggression, while relational HAB would be related to relational aggression. Figure 2 shows all predicted path coefficients and model fit. MVE was positively associated with both physical and relational HAB. As predicted, physical HAB then was positively associated with physical aggression, while relational HAB was positively associated with relational aggression. Additionally, MVE predicted both physical and relational aggression above and beyond that explained by the mediation of HAB. Weekly screen time was only positively associated with physical, but not relational HAB. When a multi-group model was run separately for boys and girls, the media pathways were not significantly different, but the HAB paths were. For boys, the path between physical HAB and physical aggression was significant ($\beta = .15$) but the path for relational aggression was not ($\beta = .06$). For girls, the path between relational HAB and relational aggression was significant ($\beta = .25$), but the path for physical aggression was not ($\beta = .03$).

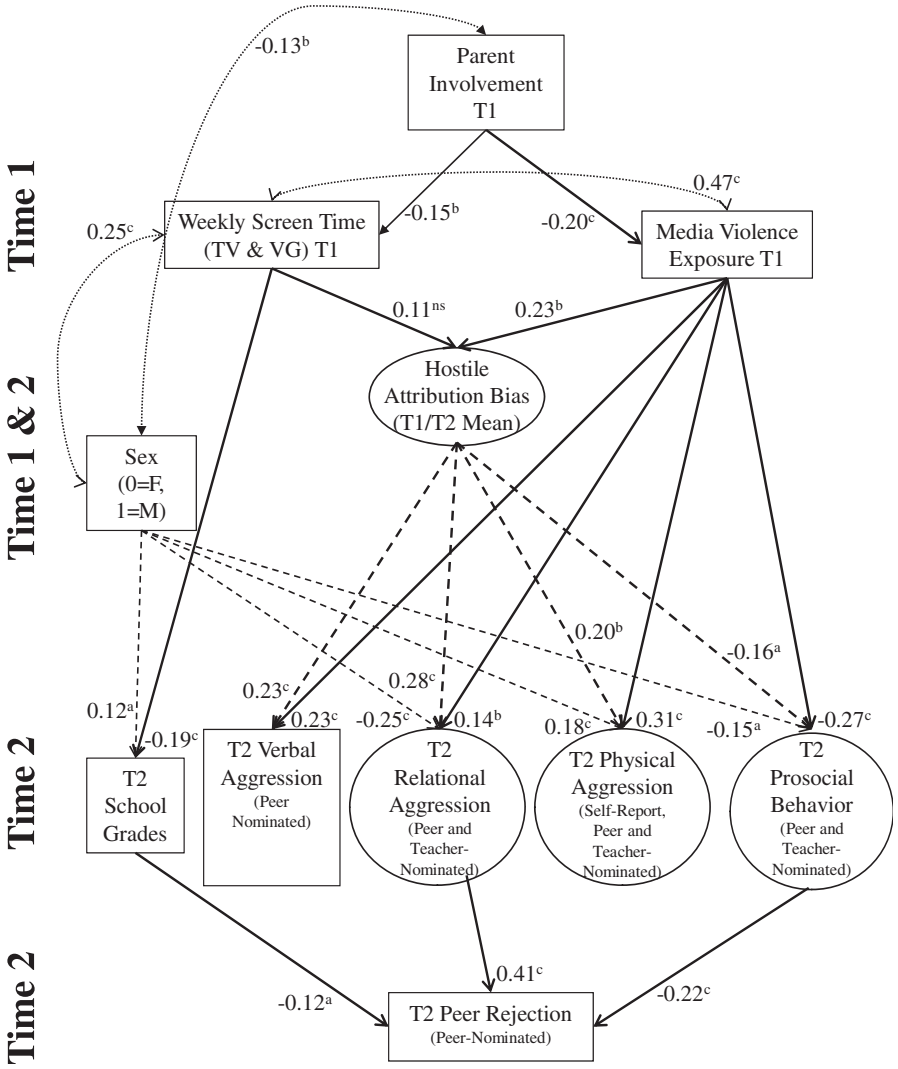


**Fig. 1. Structural equation model of longitudinal relations. Model fit: $\chi^2 = 531.0$, df = 234, $P < .001$; CFI = .95, TLI = .94, RMSEA = .05, SRMR = .06. Time 2 grades, aggression subtypes, and prosocial behavior are allowed to correlate (and all correlations are significant—only PA and RA are shown here); $^{+}P < .10$; $^{a}P < .05$; $^{b}P < .01$; $^{c}P < .001$.**

**TABLE V. Intercorrelations Between Predictor and Outcome Variables in the Structural Equation Path Model (Ns Range Between 428 and 321)**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Total screen time (T1) | | | | | | | | | | |
| 2. Violent media exposure (T1) | .38$^{c}$ | | | | | | | | | |
| 3. Parent involvement in media | −.15$^{b}$ | −.20$^{c}$ | | | | | | | | |
| 4. Sex (1 = Male, 0 = Female) | −.27$^{c}$ | −.48$^{c}$ | −.13$^{b}$ | | | | | | | |
| 5. Hostile Att bias (T1/T2) | .18$^{b}$ | .25$^{c}$ | −.13$^{a}$ | .12$^{a}$ | | | | | | |
| 6. School performance (T2) | −.17$^{c}$ | −.13$^{b}$ | .10 | −.05 | −.16 b | | | | | |
| 7. Verbal aggression (T2) | .15$^{c}$ | .30$^{c}$ | −.07 | −.21$^{c}$ | .29$^{c}$ | −.22$^{c}$ | | | | |
| 8. Physical aggression (T2) | .18$^{b}$ | .41$^{c}$ | −.15$^{b}$ | .36$^{c}$ | .28$^{c}$ | −.21$^{c}$ | .80$^{c}$ | | | |
| 9. Relational aggression (T2) | −.01 | .09 | .01 | −.12$^{a}$ | .29$^{c}$ | −.22$^{c}$ | .77$^{c}$ | .55$^{c}$ | | |
| 10. Prosocial behaviors (T2) | −.16$^{b}$ | −.33$^{c}$ | .22$^{c}$ | −.24$^{c}$ | −.20$^{b}$ | .31$^{c}$ | −.35$^{c}$ | −.45$^{c}$ | −.35$^{c}$ | |
| 11. Peer rejection (T2) | .08 | .16$^{c}$ | −.07 | −.02 | .17$^{b}$ | −.31$^{c}$ | .51$^{c}$ | .41$^{c}$ | .52$^{c}$ | −.38$^{c}$ |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

T1 indicates Time 1; T2 indicates Time 2.
$^{a}P < .05$; $^{b}P < .01$; $^{c}P < .001$.

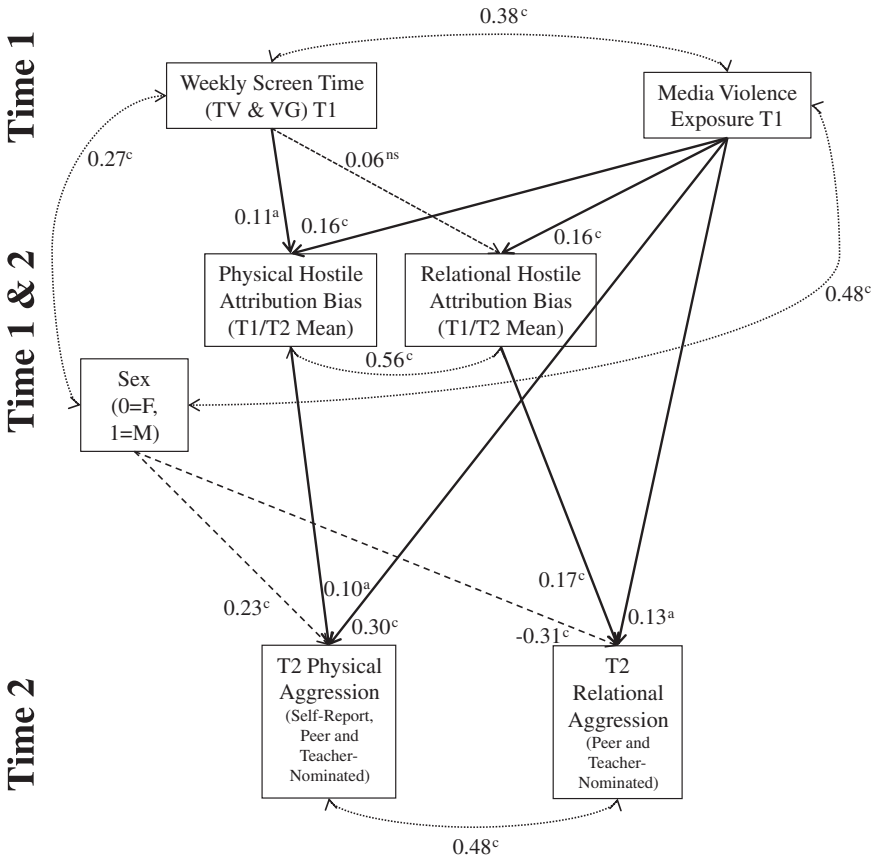


**Fig. 2. Structural equation model of specific hostile attribution bias mediation. Model fit: $\chi^2 = 14.6$, df = 6, $P < .05$; CFI = .98, TLI = .94, RMSEA = .06, SRMR = .03. $^{+}P < .10$; $^{a}P < .05$; $^{b}P < .01$; $^{c}P < .001$.**

## DISCUSSION

The hypotheses were supported by the results. At both Time 1 and Time 2, MVE was significantly positively correlated with (1) hostile attribution bias, (2) verbal aggression, and (3) physical aggression (Table III). Similarly at both Time 1 and Time 2, MVE was significantly negatively correlated with prosocial behavior. Because this study involved repeated measures, it is possible that by Time 2, participants were beginning to guess the intent of the study and may have modified their Time 2 responses to be more socially appropriate. Although this is a potentially serious weakness of this study, if true, it would only serve to lower the ability to predict Time 2 attitudes and behaviors from Time 1 MVE. Yet, in accordance with Hypothesis 2, Time 1 MVE significantly predicted Time 2 (1) hostile attribution bias, (2) verbal, relational, and physical aggression, and (3) prosocial behavior (Fig. 1).

A conservative series of tests is shown in Table IV, in which each variable at Time 2 was predicted by MVE after controlling for a wide range of theoretically relevant variables (sex, race, lag, parental involvement, Time 1 hostile attribution bias, and Time 1 aggressive behaviors subtypes). This series of tests goes beyond predicting later aggressive behaviors with earlier MVE, and looks at *change* in aggressive behaviors as predicted by early MVE. Fewer of these conservative tests reached levels of statistical significance, but three key tests were significant. Time 1 MVE is a significant predictor of hostile attribution bias at Time 2 even after controlling for each of the control variables and hostile attribution bias at Time 1. Time 1 MVE is a significant predictor of verbal aggression and physical aggression at Time 2 even after controlling for all control variables and Time 1 verbal/physical aggression (respectively) at Time 1. These results are consistent with the long-term predictions of the GAM.

Hypothesis 3, that hostile attribution bias would mediate the relationship between MVE and aggressive and prosocial behaviors, was also supported (Fig. 1). Time 1 MVE predicted increases in hostile attribution bias, which in turn predicted increases in

verbally, relationally, and physically aggressive behaviors, as well as decreases in prosocial behavior. Figure 2 showed that this mediation was specific to the form of HAB and aggression, with physical HAB mediating the relation between MVE and physical aggression (stronger effect for boys), and with relational HAB mediating the relation between MVE and relational aggression (stronger effect for girls). Furthermore, MVE was also directly related to aggressive and prosocial behaviors in addition to the mediated pathways. As predicted, TST was most related to school performance (a negative relation), but was not directly related to aggressive and prosocial behaviors. The importance of these aggressive and prosocial behaviors is not solely due to their obvious damaging or beneficial immediate effects, but the results also suggest that aggressive and prosocial behaviors are strongly related to peer rejection. Given that MVE predicts both aggressive and prosocial behaviors, and that the effects were not significantly different for boys or girls, these results suggest that parental concern about the long-term negative effects of MVE is not misplaced.

Additionally, the amount of media exposure and the content of media exposure have different, largely independent effects. That is, exposure to aggressive media predicted aggressive behavior much more strongly than exposure to media in general. Exposure to nonaggressive media should not teach aggressive scripts and behaviors, and therefore, not have a direct effect on aggressive behavior. These results are consistent with other recent research that has measured amount and content of media separately [e.g., Gentile et al., 2004; Ostrov et al., 2006; see also Gentile and Stone, 2005, for a conceptual analysis of multiple dimensions through which media can have effects]. This is not to say that no relation can ever exist between amount and aggressive behaviors; for example, too much screen time could reduce time to learn social skills.

It is also important to note that although this study found a pattern of results consistent with theoretical predictions, the amount of variance in aggressive behaviors explained by MVE is limited. As we have argued elsewhere [Gentile and Sesma, 2003], from a developmental perspective, it may be appropriate to consider media violence within a developmental risks and resilience approach. From this approach, the question of whether MVE "causes" later aggressive behavior is re-framed to ask what all the risk factors for aggressive behaviors are (including media violence), and to see how they either combine or interact to predict increases in aggressive behaviors. Note that the SEM provides a demonstration of the stacking of risk and protective factors. For example, looking at Time 2 prosocial behavior, MVE and hostile attribution are both risk factors for decreased prosocial behavior, whereas being a girl is a protective factor, predicting increased prosocial behavior.

Although the hypotheses were largely supported, two results are perhaps surprising. First, the relation between MVE and relational aggression is less robust than that for verbal and physical aggression. This may be due to the manner in which MVE was measured, by asking specifically about violence in favorite media, rather than about gossiping, social exclusion, or other relationally aggressive content. Although this is similar to how other studies have measured MVE effects, it suggests an assumption of generalized effects rather than specificity of effects [Coyne et al., 2008; Gentile et al., 2010]. That is, it is hypothesized that violence exposure would have an effect on all subtypes of aggression. Although these data provide some support for a general hypothesis, the difference in how robust the effects are with relational aggression suggests that a specificity model may fit the data better. Indeed, other research has revealed that viewing relational aggression in the media is specifically related to relational aggression in real life [Coyne et al., 2004; Linder and Gentile, 2010]. It may be that with more sensitive measures that measure *both* violent media exposure and relationally aggressive media exposure, the relation will be displayed with more clarity. Future studies should test this hypothesis.

Second, although Time 1 MVE predicted Time 2 aggressive and prosocial behaviors, the reverse was also found (Table III). Time 2 MVE was significantly positively correlated with hostile attribution bias, verbal and physical aggression, and prosocial behavior at Time 2. The most likely interpretation of these data is that a hypothesis that aggressive behavior does not predict later MVE is at least partially incorrect. Instead, as others have suggested [e.g., Donnerstein et al., 1994; Huesmann et al., 2003; Huesmann and Miller, 1994], there is a bidirectional relationship between MVE and aggressive behaviors, at least in the short-term. It may be that over the long term [e.g., 11 years in Lefkowitz et al., 1972], there is no relation between early aggressive behavior and later MVE, but there is in the short-term (e.g., up to 6 months in this study). This dilemma presents another possible interpretation. It may be that there is little or no "true" relation between early aggressive behavior and later

MVE, but when measured with a short interval between administrations, there is high test–retest reliability. This reliability would be the evidence of stability in both MVE and aggressive behavior in the short-term; this would help to explain why we find evidence of early aggressive behavior predicting later MVE but Lefkowitz et al. [1972] did not and Huesmann et al. [2003] found only marginal relations in that direction.

It should be noted that this study is limited by its correlational nature. Although early MVE was shown to predict later aggressive behaviors controlling for several theoretically relevant competitor variables, we were unable to experimentally manipulate children's MVE. Thus, it is possible that some unmeasured variable is responsible for both the MVE and the increases in aggression over time. Another limitation of the study is that we also only measured one aspect of social information processing theory, namely hostile attribution bias. It is possible that other steps in the social information processing may be influenced by MVE.

Overall, however, the longitudinal results seem surprisingly robust given the short time lag between survey administrations (2–6 months; mean = 5 months). Many studies have shown immediate effects of violent media [for reviews, see Gentile and Anderson, 2003; Strasburger and Wilson, 2003] on aggressive beliefs and behaviors. Other studies have shown long-term changes of aggressive behaviors related to MVE. Yet, to our knowledge, no studies have documented the shortest amount of time needed to find *changes* in aggressive beliefs and behaviors related to MVE. While the present results should be considered preliminary, they do suggest that MVE may be related to measurable changes in children's hostile attribution biases, verbally, physically, and relationally aggressive behaviors, and prosocial behaviors in as short a time as two to six months.

The broader implications of these findings are worrying. Children who consumed higher amounts of media violence early in the school year had changed to have higher hostile attribution biases (both relational and physical) with resultant increased aggressive behaviors and decreased prosocial behaviors, which were related to increased peer rejection. This may be evidence of the beginning of a vicious circle. As children become more aggressive, they become ostracized from the main peer group [Bierman and Wargo, 1995]. In turn, they may form a clique with other aggressive children. In that subgroup, they may reinforce each others' aggressive media habits and aggressive attitudes and behaviors, furthering the problem. Also, in that subculture there is often a de-emphasis on school performance. Each of these risk factors increases the risk of long-term negative outcomes for children. Although this developmental trajectory is theoretically sound, it has yet to be tested empirically in long-term longitudinal studies. Future research should continue to examine the effects of media exposure to violence and inform the public about the effects it may have on our relationships with others.

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