Media violence as a risk factor for children:
A longitudinal study

Douglas A. Gentile[1,2]
David A. Walsh[2]
Paul R. Ellison[3]
Michelle Fox[4]
Jennifer Cameron[4]

Paper presented at the American Psychological Society 16th Annual Convention,
Chicago, Illinois (May, 2004)

Affiliations: [1]Iowa State University; [2]National Institute on Media and the Family; [3]Minnesota School of Professional Psychology; [4]University of Minnesota

Media violence as a risk factor for children: A longitudinal study

Abstract

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 across three types of media (television, movies/videos, and video games), and (3) by measuring media violence exposure and aggressive/prosocial behaviors at two points in time during the school year.   Four hundred thirty 3rd through 5th grade children were surveyed. Children who consumed more media violence early in the school year were more verbally aggressive, relationally aggressive, and physically aggressive later in the school year (by self-report, peer nomination, and teacher nomination). Children who consumed more media violence early in the school year were also more likely to have a hostile attribution bias later in the school year, and to be less prosocial later in the school year (by peer- and teacher-nomination). Media violence exposure is described as a risk factor for aggressive beliefs and behaviors, and it is argued that media violence exposure in combination with other risk factors for aggression (e.g., hostile attribution bias, sex, prior aggression) can produce an effect greater than any single risk factor alone.

Introduction

A significant number of studies have shown that media violence has an effect on children's subsequent aggression (see Anderson et al., 2003 and Gentile, 2003, for recent reviews). Violent media can take many forms, ranging from television programming and movies to video games and other interactive activities. This study examines a number of these different media formats. Previous studies of the impact of media violence on childhood aggression have been limited by a focus on physical forms of aggression, which tend to be more common among boys. Accordingly, less is known of the impact of media violence on aggression in girls.

This study expands upon previous research by examining subtypes of aggression in relation to violent media. In particular, 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. Relational aggression has been defined as "behaviors that harm others through damage (or the threat of damage) to relationships or feelings of acceptance, friendship, or group inclusion" (Crick, 1996). Studies show that relational aggression is associated with a significant level of negative consequences for both perpetrators and their victims (Crick et al., 1999).

Physical and relational forms of aggression are moderately correlated, which is to be expected (given that they are both forms of aggressive behavior). Nonetheless, relational aggression emerges as a distinct form of aggression and studies have begun to focus on the possible differential correlates of these subtypes (Crick et al., 1999). The current research separately considered both forms of aggression.

A second area of interest in the current study is that of social information processing styles related to exposure to media violence. In particular, we were interested in the possible relation of media violence to the formation of intent attributions. Previous research has demonstrated that the association between hostile attributional bias and social maladjustment is quite strong, and has been demonstrated with children of all ages (see Crick & Dodge, 1994, for a review). In particular, physically aggressive children tend to exhibit a hostile attributional bias, in which they tend to infer hostile intent from the actions of others, even when intent is ambiguous and might be benign. This style of processing understandably contributes to the development and maintenance of aggressive behavior. This research is also limited in regard to consideration of aggressive girls, as the focus of such studies tends to be aggressive boys. In contrast, Crick (1995) has shown that relationally aggressive children also tend to exhibit hostile attributional biases, although social context matters a lot. 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 attributional bias in relationally aggressive

children. Social information-processing theory suggests that violent media might activate cognitive structures, "making it more likely that other incoming information would be processed in an 'aggression' framework, possibly increasing aggressive behavior" (Bensley & Eenwyk, 2001). Considering that many children seem to be predisposed to assume hostility in ambiguous situations, violent media has the potential to be a destructive contributing factor. Thus, we examined relationships between violent media habits and hostile attributional bias (for instrumental and relational conflict situations) in the current study.

A Theoretical Model for Long-term Effects of Media Violence Exposure

Anderson and colleagues (Anderson & Dill, 2000; Anderson & Bushman, 2002) have developed the General Aggression Model (GAM) to explain theoretical links between media violence exposure and aggressive cognitions, attitudes, and behaviors. This model describes a "multi-stage process by which personological (e.g., aggressive personality) and situational (e.g., video game play and provocation) input variables lead to aggressive behavior by influencing several related internal states and the outcomes of automatic and controlled appraisal (or decision) processes" (Anderson & Dill, 2000, p. 773).

GAM differentiates between short- and long-term effects of media violence on children. In the short-term, GAM predicts that violent media exposure can affect aggressive thoughts, feelings, and behaviors. Regarding long-term exposure to violent content, GAM suggests that this may result in the development, over-learning, and reinforcement of aggression-related knowledge structures. These knowledge structures include vigilance for enemies (i.e., hostile attribution bias), aggressive action against others, expectations that others will behave aggressively, positive attitudes towards use of violence, and the belief that violent solutions are effective and appropriate. Repeated exposure to graphic scenes of violence is also postulated to be desensitizing. Furthermore, it is predicted that long-term media violence consumers become more aggressive in outlook, perceptual biases, attitudes, beliefs, and behavior than they were before the repeated exposure.

Several longitudinal studies of exposure to violent television have shown a strong relationship between early TV violence exposure and later aggression. In perhaps the best known of these studies, Huesmann and his colleagues (e.g., Lefkowitz, Eron, Walder, & Huesmann, 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, however it was true only for boys. It is possible that the effect was only seen with boys because both the types of aggression seen on TV in the 1960s and the types of aggression studied were primarily physical aggression, which is more typical of boys than girls. Later longitudinal studies have shown the effect with both boys and girls, however. For example, in a study of 557 participants (Huesmann, Moise-Titus, Podolski, & Eron, 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). It also predicted adult "indirect" aggression for women (indirect aggression is similar but not identical to relational aggression studied here; $r = .20$).

Fewer studies have looked at short-term longitudinal changes in aggressive beliefs and behaviors in relation to media violence exposure, and none have looked across multiple media. Children now have many more media options than were available when the longitudinal studies above were begun. Besides broadcast and cable television, children now can easily watch their favorite movies repeatedly on videotape or DVD, and children are also spending an increasing amount of time playing video games (Gentile & Anderson, 2003). The present study was designed to measure children's media violence exposure across three media (TV, movies/videos, and video games). The GAM predicts that heavy exposure to media violence will have several outcomes that could be measured in a longitudinal design. Media violence exposure (MVE) should predict increases in children's aggressive beliefs, such as hostile attribution biases. It also should predict increase in children's aggressive behaviors, and should predict decreases in children's prosocial behaviors.

The current research tested three hypotheses regarding violent media exposure derived from GAM.

Hypothesis 1: Media violence exposure will be significantly positively correlated with aggressive beliefs (i.e., hostile attribution bias) and behaviors, and significantly negatively correlated with prosocial behaviors at any one point of time.

Hypothesis 2: Media violence exposure 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 media violence exposure and later aggressive and prosocial behaviors will be mediated by hostile attribution bias.

Method

Participants

Four hundred and thirty 3rd ($\underline{n}$ = 119), 4th ($\underline{n}$ = 119), and 5th grade ($\underline{n}$= 192) students participated in the study. Students were recruited from five Minnesota schools, including one suburban private school ($\underline{n}$ = 138), three suburban public schools ($\underline{n}$ = 265), and one rural public school ($\underline{n}$ = 27). The sample was almost evenly divided between boys and girls, with 49% of the children being female (51% male). Participants ranged in age from 7 to 11 years of age ($\underline{M}$ = 9.65; $\underline{SD}$ = 1.03). Eighty-six percent of the respondents classified their ethnic background as Caucasian (which is representative of the region).

Procedure

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

Each participant completed three confidential 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 were trained to administer the other 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 (including teachers) completed each of these surveys at two points in time during the school year. The first administration (Time 1) occurred between November and February of the academic year. The second administration (Time 2) occurred between April and May of the year. The time lag between the two administrations was therefore between two and six months.

Assessment of Social Adjustment

Peer Assessment of Social Adjustment.   A peer nomination instrument was used to assess children's social adjustment, and was adapted from a peer nomination instrument that has been used in several previous studies of children's social behavior (e.g. Crick, 1995; Crick & Grotpeter, 1995). This instrument consists of 10 items. Two of these items were the peer sociometric items (nominations of liked and disliked peers), which are used extensively in research of this nature to assess peer acceptance and rejection (see Crick & Dodge, 1994 for a review). The remaining 8 items assess four different types of social behavior: physical aggression (2 item subscale), relational aggression (3 item subscale), prosocial behavior (2 item subscale), and verbal aggression (1 item). See Table 1 for a listing of all items. Coefficient alpha was computed for each of the three subscales with multiple items and was found to be satisfactory, α = .92 for physical aggression, .86 for relational aggression, and .80 for prosocial behavior.

Teacher Ratings of Aggressive Behavior.   Teachers completed a survey assessing children's aggression and prosocial behavior. This instrument consists of twelve 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 in subsequent analyses. These items are listed in Table 2. Coefficient alpha was computed and found to be satisfactory for each subscale: α = .92 for teacher ratings of relational aggression, .92 for teacher ratings of physical aggression, and .91 for teacher ratings of prosocial behavior.

<u>Self-Report of Fights</u>. One item asked how many physical fights the participants had been in during the school year.

Assessment of Media Habits

<u>Media violence exposure</u>. Similar to Anderson and Dill's (2000) approach, 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 named media product, participants were asked to rate 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"). A violence exposure score was computed for each participant by multiplying the frequency of watching or playing each media product by its subjective violence rating, and then taking the mean of the three similar products. Accordingly, media-specific (i.e., Violent TV Exposure, Violent Video Game Exposure, and Violent Movies/Videos Exposure) violence exposure scores were computed for each participant. Finally, an overall violent media exposure score, the mean of all nine products (TV, video games, movies/videos), was also calculated. Coefficient alpha was computed for the overall media violence exposure scale and found to be satisfactory (α = .80)[1]. Previous research has confirmed that participants were likely to assess the violence in media products based on the amount of physical violence, rather than relational aggression. People's ratings were most strongly correlated with the graphicness of the portrayal of physical violence, across age, sex, amount of television viewing, and other factors (Potter, 1999).

<u>Amount of television watching and video game play</u>.   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.

<u>Amount of MTV & professional wrestling watched</u>.   Two items asked about participants' frequency of watching MTV or professional wrestling on a four-point verbally anchored scale (from "Almost never watch" to "Watch almost every day").

Assessment of hostile attributional bias/social information processing.

The final survey was an adapted version of a hostile attribution survey that has been reliably used in past research (e.g., Crick, 1995; Nelson & Crick, 1999). This instrument is composed of 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 in the school years. Four of the stories depict physical provocations and six represent relational provocations. Participants answer 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. This survey assesses the participant's perception of hostility from the outside world. Two scale scores result from analysis of this measure: intent attributions for relational provocation and intent attributions for physical provocations. 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 12 (0-8 for the physical aggression subscale and 0-12 for the relational subscale). Finally, coefficient alpha was computed for each of these scales and found to be satisfactory: intent attributions for relational provocations (α = .83), intent attributions for physical provocations (α = .75), and overall hostile attribution (α = .85).

Composite measures.

Composite measures of physical and relational aggression were created because we had multiple informants of those variables. 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

---

[1] It is unclear why one should expect the overall media violence exposure scale or the specific media violence exposure scales to have high reliability. Calculating violence exposure from favorite TV shows, movies, and games appears to be an empirically appropriate approach. However, it is entirely likely that some children would like both violent and non-violent media, which would make the scale appear unreliable, when in fact the scale is measuring exactly what it is intended to measure—that some people watch and play primarily violent media, some watch and play primarily non-violent media, and some watch or play a mix of violent and non-violent media.

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.

Peer ratings and teacher ratings of relational aggression were standardized and averaged to create a relational aggression composite. Coefficient alpha was computed for each of these scales and found to be satisfactory: the physical aggression scale at Time 1 ($\alpha = .87$), the physical aggression scale at Time 2 ($\alpha = .89$), the relational aggression scale at Time 1 ($\alpha = .90$), and the relational aggression scale at Time 2 ($\alpha = .91$).

Standardized ratings of peer acceptance were reverse-scored and averaged with standardized ratings of peer rejection to create a single peer rejection composite. These items were significantly correlated with each other, but only yielded alphas of .54 for Time 1 and .57 for Time 2, likely because this scale only comprised two items.

Results

At Time 1 children reported spending an average of 20.8 hours per week watching television ($SD = 13.9$), and 9.6 hours per week playing video games ($SD = 11.6$). These averages mask important sex-correlated differences, however. Third through fifth grade 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 3 presents the results from the first measurement. At Time 1, media violence exposure (MVE) is significantly and positively correlated with hostile attribution bias, verbally aggressive behaviors, and physically aggressive behaviors. MVE is significantly and negatively correlated with prosocial behaviors.

The second column of Table 3 presents the results from the second measurement. At Time 2, media violence exposure (MVE) is significantly and positively correlated with hostile attribution bias, and verbally and physically aggressive behaviors. MVE is significantly and negatively correlated with prosocial behaviors.

Looking Forward and Backward in Time Correlations

The third column of Table 3 presents correlations when predicting Time 2 variables with media violence exposure at Time 1. At Time 1, media violence exposure significantly and positively predicts Time 2 hostile attribution bias, verbally and physically aggressive behaviors. Time 1 MVE significantly negatively predicts Time 2 prosocial behaviors.

The fourth column of Table 3 presents correlations between Time 1 variables and Time 2 MVE. At Time 2, media violence exposure (MVE) is significantly and positively correlated with Time 1 hostile attribution bias, and verbally and physically aggressive behaviors. Time 2 MVE is significantly negatively correlated with Time 1 prosocial behaviors.

Predicting Time 2 Aggression from Time 1 Media Violence Exposure, controlling for Sex, Lag, Total Screen Time, Parental Involvement in Media, Hostile Attribution Bias, and Prior Aggression

A series of stepwise regressions were conducted in which we entered several theoretically relevant control variables first before entering media violence exposure. Each of these variables is described below.

- Because sex has consistently been found to be predictive of aggressive beliefs and behaviors, controlling for sex of the child is a stricter test of the relation between earlier media violence exposure and later aggression.
- 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.
- Because we are 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.
- 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 media violence exposure.

- The GAM predicts that one mechanism through which MVE may affect later behavior is by changing cognitive mediating variables, such as hostile attribution bias. Furthermore, because many theorists suggest that trait hostility is not yet solidified as a personality trait at this age, hostile attribution bias may be a good proxy for what will become trait hostility. Thus, controlling for HAB also serves to control for the possibility that hostile children may consume more media violence.

- 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 serves two goals. First, it ensures that we are measuring change across time. Second, it makes our test of the effects of MVE very conservative because (a) the short lag time between tests (2-6 months) may be insufficient to show much change, and (b) because earlier MVE is likely to have affected Time 1 aggression, so controlling for Time 1 aggression also overcorrects for earlier MVE.

This conservative approach was adopted through series of step-wise regressions, in which child sex, race, and amount of school lag was entered in step 1, total screen time 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 4.

Media violence exposure at Time 1 significantly predicts Time 2 overall hostile attribution bias, even after controlling for sex, race, lag, parental involvement, and Time 1 hostile attribution bias (Table 5). Time 1 MVE also significantly predicts Time 2 verbally aggressive behavior and physically aggressive behavior, after controlling for each of the control variables. Overall, all models were statistically significant.

Path Analysis

Path analyses were conducted to test our hypothesized model of the direction of effects. Based on earlier studies (e.g., Anderson & Dill, 1999; Gentile, Lynch, Linder, & Walsh, 2004), we hypothesized that amount of media and the content would have differential impacts. 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 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 be related to aggressive and prosocial behaviors. Sex was also hypothesized to affect 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 acceptance.

Because this was a 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 expected to begin acting more aggressively. Children who are more aggressive were then expected to be less accepted by their peers. Therefore, the path analysis includes total screen time, violent media exposure, parent involvement, and sex as variables at Time 1. We entered a mean of Time 1 and Time 2 hostile attribution bias scores, in order to place it temporally between the two measurements.[2] School performance, verbal aggression, physical aggression, relational aggression, and prosocial behavior were Time 2 variables, as was the peer acceptance variable.

As can be seen in Figure 1, each of our hypotheses were confirmed. Media violence exposure and total screen time both increased hostile attribution bias, which in turn was related to increased verbally, physically, and relationally aggressive behavior, as well as decreased prosocial behavior. Verbal aggression and prosocial behavior were in turn related to Time 2 peer acceptance. MVE was also directly related (over and above the mediated path via hostile attribution bias) to increased verbal aggression, increased relational aggression, increased physical aggression, and decreased prosocial behavior. Having more involved parents resulted in children showing less hostile attribution bias and more prosocial behavior. Also, as was predicted, boys were more likely to be physically

---

[2] The path analyses were essentially the same whether Time 1, Time 2, or a mean of Time 1 and Time 2 hostile attribution bias was used. The mean was used because it fit our hypotheses most closely given that we only had measurements at two points in time.

aggressive, and girls were more likely to be verbally aggressive, relationally aggressive, and more prosocial towards their peers. The full intercorrelation matrix is shown in Table 5.

*Exploratory Correlations between Aggressive Behaviors and viewing MTV or Wrestling*

Although we are most interested in the overall level of violent content exposure, some recent research has suggested that certain types of programming (i.e., MTV and professional wrestling) may have measurable effects themselves (e.g., Robinson, 1998). As is shown in Table 6, children who watch MTV more regularly at Time 1 are more verbally, relationally, and physically aggressive, are less prosocial, and get worse grades in school.

Children who watch professional wrestling show a similar pattern of results, although it is more focused on physical aggression as opposed to relational aggression (Table 6). Children who watch wrestling more regularly at Time 1 are more likely to report being involved in physical fights, are more verbally and physically aggressive, are less prosocial, are more rejected by peers, and get worse grades in school.

Risk Factor Analysis

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 & Sesma, 2003), from a developmental perspective, it may be very useful 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 of 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.

Figures 2, 3, and 4 display an illustration of this approach. Each bar represents the percentage of students we would predict to have been involved in a physical fight by Time 2 during the school year. In Figure 2, the students are split by sex and by high or low media violence exposure at Time 1.[3] The high and low groups represent the 95th and 5th percentile scores, respectively. The medium group represents scoring at the median value. As may be seen in Figure 2, both variables matter – females who are low in MVE at Time 1 are the least likely to have been involved in physical fights at Time 2; in contrast, males who are high in MVE at Time 1 are the most likely to have been involved in physical fights at Time 2.

FIGURE 2
Predicted likelihood of physical fights at Time 2
as a function of sex and media violence exposure

---
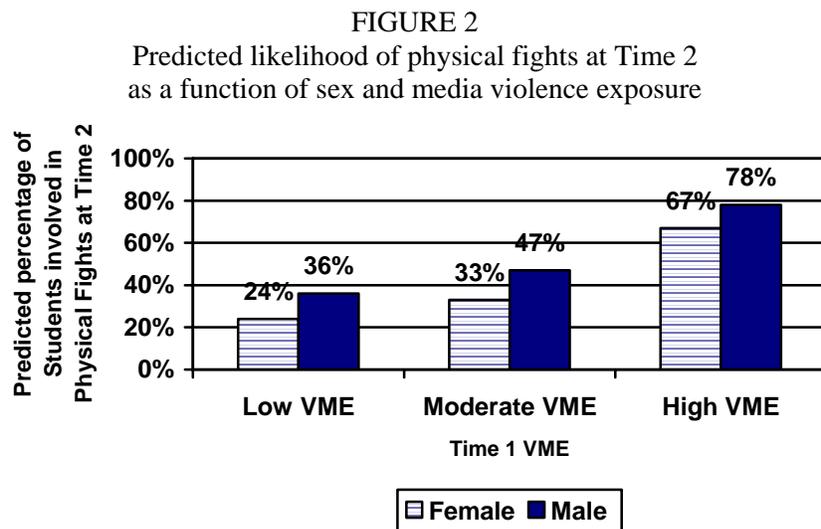
[3] To create these graphs, logistic regressions were conducted to predict physical fights at Time 2 with each list of independent variables. High, medium, and low values for each variable were created by using the 95th, 50th, and 5th percentile scores on each variable, and inserting them into the equation $p = e^x/(1+e^x)$, where p is the probability of a fight at time two and x is the result from inserting the high, medium, and low values into the logistic equation $x = B_{constant} + B_{sex}(value) + B_{mve}(value)$. Because no interaction terms were significant, they were not included in the equation.

In Figure 3, the students are split by high or low hostile attribution bias at Time 1 and by high or low media violence exposure at Time 1. Again, both variables matter -- overall, children with a hostile attribution bias are more likely to be involved in physical fights, but students who consume the most media violence are more likely to be involved in fights regardless of whether they have a hostile attribution bias. As each additional risk factor increases, the risk of physical aggression increases. If a child is high on both Time 1 hostile attribution bias and violent media exposure, there is an 84% likelihood that that child will get into a physical fight by Time 2.

FIGURE 3
Predicted likelihood of physical fights at Time 2 as a function of
hostile attribution bias and media violence exposure
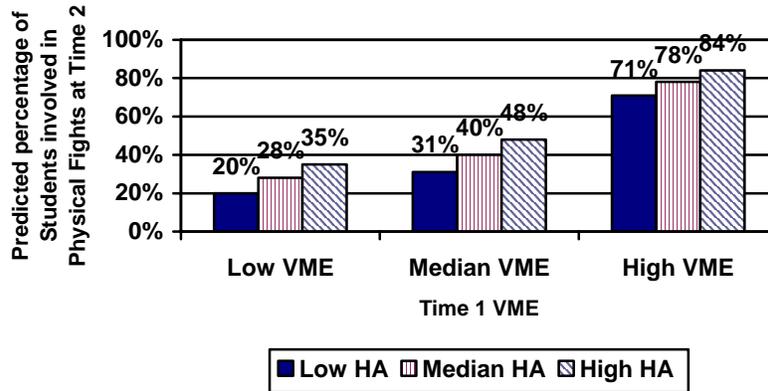
Similarly in Figure 4, the students are split by whether they had reported being involved in physical fights at Time 1 and by high or low media violence exposure at Time 1. Again, both variables matter -- the students who had not been in fights by Time 1 and who were low on MVE at Time 1 are the least likely to have been involved in physical fights at Time 2; in contrast, the students who had been involved in physical fights at Time 1 and also were high on MVE at Time 1 are the most likely to have been involved in physical fights at Time 2.

FIGURE 4
Predicted likelihood of physical fights at Time 2 as a function of
involvement in physical fights at Time 1 and media violence exposure
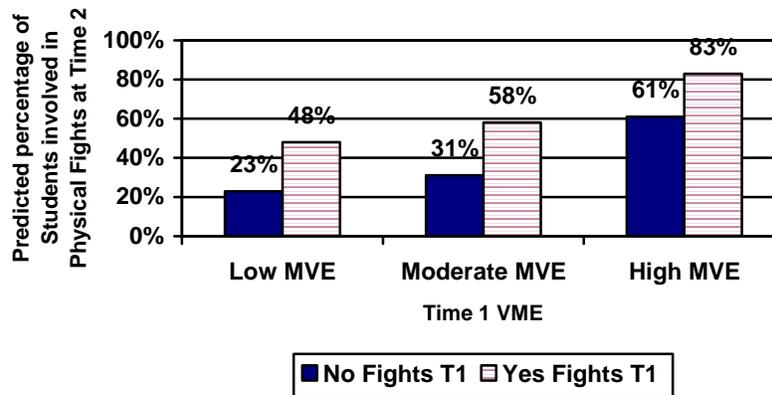
As these three figures show, no one variable is the sole "cause" of aggression. Yet, each of these variables, hostile attribution bias, sex, media violence exposure, and prior aggressive behavior is related to future aggressive behavior. As such, each could be described as a risk factor for aggression. One strength of this approach is that it predicts the results shown in Figures 2-4, namely that as risk factors combine, the risk of aggressive behavior increases. A media diet high in violence in combination with other risk factors produces an effect greater than either risk factor alone. In fact, one should notice that if a student is in the high MVE group he or she is very likely to get into fights at Time 2, even if he or she is at low risk on the other variable. Thus, the girls who consume a lot of media violence are *more* likely than boys who consume the median amount to get into fights. Similarly, students who are low on hostile attribution but consume a high amount of media violence are more likely than students who

are high on hostile attribution who do not view a high amount of media violence. This pattern is also similar for children who have not been involved in fights at Time 1 who consume a high amount of media violence.

Using this risk factor approach, we could also predict that if we combined more risk factors, the ability to predict fights should get stronger and more fine-grained. Figure 5 displays the predicted likelihood of physical fights at Time 2 based on four risk factors: whether children score high or low on hostile attribution bias, whether children are male or female, whether children had been involved in physical fights at Time 1, and whether children consume a low or high amount of media violence. As can be seen, all four variables matter: High hostile attribution bias children are more likely to get into fights, prior fighting predicts later fighting; boys are more likely to get into fights; and high media violence exposure predicts greater likelihood of fights. As predicted by the risk factor approach, the group with the least predicted risk of physical fights are (1) girls who have (2) a low hostile attribution bias, (3) have not been involved in fights previously, and (4) who consume very little media violence. The group with the greatest predicted risk of physical fights are (1) boys who have (2) a high hostile attribution bias, (3) have been involved in fights previously, and (4) who consume a very high amount of media violence.

FIGURE 5

Predicted likelihood of physical fights at Time 2 as a function of hostile attribution bias, involvement in physical fights at Time 1, sex, and media violence exposure
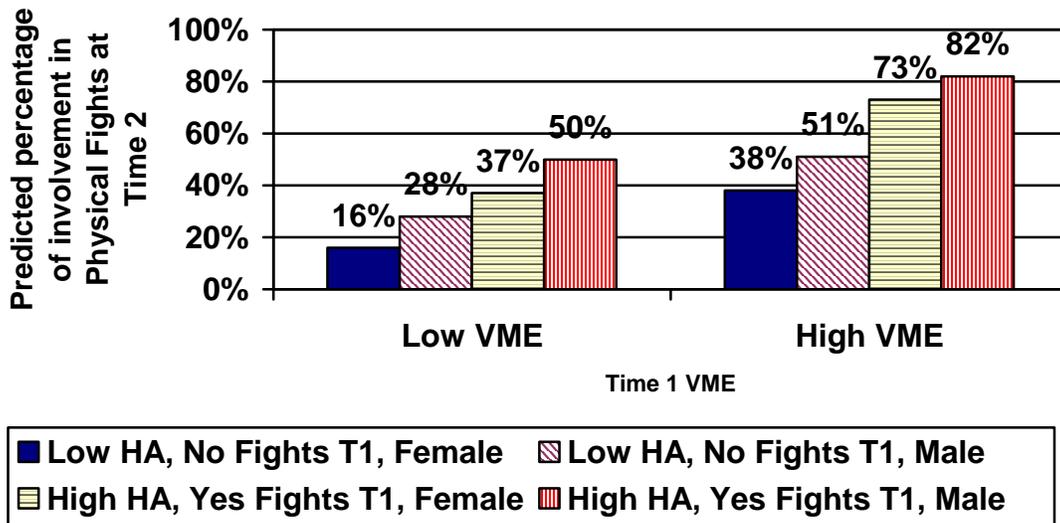

This pattern is identical to that found in a study of adolescents, where violent video game play and trait hostility were both measured (Gentile, Lynch, Linder, & Walsh, 2004). Both hostility and violent game play were related to physical fights, but the combination was greater than either alone.

Additional confirmation of the utility of the risk factor approach would be to examine the effects of protective factors. Theoretically, active parental involvement in children's media habits should serve as a protective factor for later aggressive habits (Austin, 1993; Austin, Pinkleton, & Fujioka, 2000; Corder-Bolz, 1980). As can be seen in Figures 6 and 7, this hypothesis is borne out by the data. Although boys are more likely than girls to be involved in physical fights, if their parents are more involved in their media habits, their risk of fights is decreased. In addition, although girls are less likely overall to get into physical fights, if their parents are involved in their media habits, their risk for fights is diminished by almost half (Figure 6).

FIGURE 6
Predicted likelihood of physical fights at Time 2
as a function of sex and Time 1 parent involvement
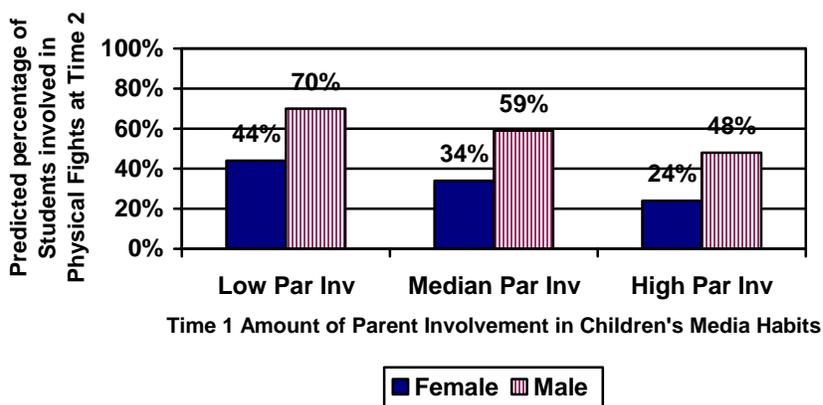
Furthermore, as shown in Figure 7, although children who are exposed to greater amounts of media violence at Time 1 are more likely to be involved in physical fights by Time 2, if their parents are more involved in their media habits, their risk of fights is decreased. As would be predicted, the greatest likelihood of fights at Time 2 is predicted by high media violence exposure and low parental involvement (85% likelihood). Conversely, the lowest likelihood of fights is predicted by low media violence exposure and high parental involvement (21%).

FIGURE 7
Predicted likelihood of physical fights at Time 2
as a function of Time 1 parent involvement and media violence exposure
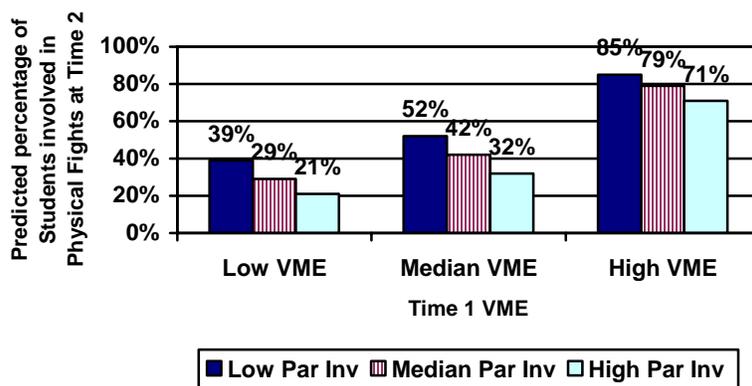

Figure 8 displays the results of the logistic equation predicting Time 2 fights from the combination of hostile attribution bias, involvement in physical fights at Time 1, sex, media violence exposure, and parental involvement. Not all combinations are shown, but as predicted by the risk and protective factor approach, the group with the least predicted risk of physical fights (14%) are (1) girls who have (2) a low hostile attribution bias, (3) have not been involved in fights previously, (4) who consume very little media violence, and (5) who have parents who are highly involved in their media habits. Children with the greatest predicted risk of physical fights (86%) are (1) boys who have (2) a high hostile attribution bias, (3) have been involved in fights previously, (4) who consume a very high amount of media violence, and (5) whose parents are not involved in their media habits.

FIGURE 8

Predicted likelihood of physical fights at Time 2 as a function of hostile attribution bias,
involvement in physical fights at Time 1, sex, media violence exposure, and parental involvement
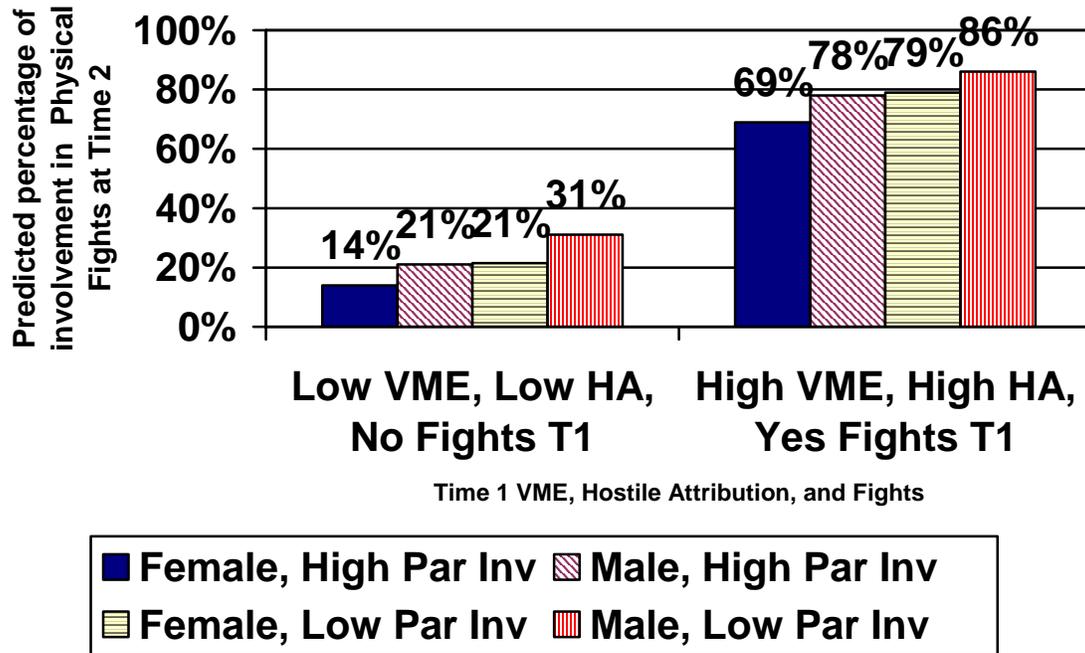
Discussion

The hypotheses we advanced were generally supported by the results. At both Time 1 and Time 2, violent media exposure was significantly positively correlated with (1) hostile attribution bias, (2) verbal aggression, and with (3) physical aggression (Table 3). 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 (Figure 1).

A conservative series of tests is shown in Table 4, in which each variable at Time 2 was predicted by media violence exposure 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). 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 more 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 of the control variables and Time 1 verbal/physical aggression (respectively) at Time 1. Therefore, early media violence exposure not only predicts later aggressive behaviors, but predicts that children who consume more media violence early in the school year will become *more aggressive* and *less prosocial* by later in the school year. These results are consistent with the long-term predictions of the GAM.

Hypothesis 3, that hostile attribution bias would mediate the relation between MVE and aggressive and prosocial behaviors, was supported (Figure 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. Furthermore, MVE also was directly related to aggressive and prosocial behaviors in addition

to the mediated pathways. As predicted, total screen time was most related to school performance (a negative relationships), but was not related to aggressive and prosocial behaviors except in a marginally significant pathway mediated via hostile attribution bias; similarly MVE was only marginally related to school performance. The importance of these aggressive and prosocial behaviors is not solely due to their obvious damaging or beneficial immediate effects, but the path analyses also suggest that aggressive and prosocial behaviors are strongly related to peer rejection. Given that MVE is the largest predictor of aggressive and prosocial behaviors, these results suggest that parental concern about the long-term negative effects of violence exposure is not displaced.

Although the hypotheses were largely supported, two results are perhaps surprising. First, the relation between MVE and relational aggression is much 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 the violence in favorite media, rather than about insulting or sarcastic content. It may be that with more sensitive measures, the relation will be displayed with more clarity. Second, although Time 1 MVE predicted Time 2 aggressive and prosocial behaviors, the reverse was also found (Table 3). Time 2 MVE was significantly positively correlated with hostile attribution bias, verbal and physical aggression, and prosocial behavior. 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, Slaby, & Eron, 1994; Huesmann & 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" relationship 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 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.

This study is limited by its correlational nature. Although early MVE has been 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.

Overall, however, these results are surprisingly robust given the short time lag between survey administrations (2 - 6 months). Many studies have shown immediate effects of violent media (for reviews, see Strasburger & Wilson, 2003; Gentile & Anderson, 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 to be preliminary, they do suggest that MVE may be related to measurable changes in children's hostile attribution biases, verbally and physically aggressive behaviors, and prosocial behaviors in as short a time as two to six months.

References

Anderson, C. A., Berkowitz, L., Donnerstein, E., Huesmann, L. R., Johnson, J. D., Linz, D., Malamuth, N. M., & Wartella, E. (2003). The influence of media violence on youth. *Psychological Science in the Public Interest, 4*, 81-110.

Anderson, C. A. & Bushman, B. J. (2002). The general aggression model: An integrated social-cognitive model of human aggression. *Annual Review of Psychology, 53.*

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality & Social Psychology, 78*, 772-791.

Austin, E. W. (1993). Exploring the effects of active parental mediation of television content. *Journal of Broadcasting & Electronic Media, 37*, 147–158.

Austin, E. W., Pinkleton, B. E., & Fujioka, Y. (2000). The role of interpretation processes and parental discussion in the media's effects on adolescents' use of alcohol. *Pediatrics, 105*, 343–349.

Bensley, L., & Eenwyk, J. (2001). Video games and real-life aggression: review of the literature. *Journal of Adolescent Health, 29*, 244-257.

Corder-Bolz, C. R. (1980). Mediation: The role of significant others. *Journal of Communication, 30*, 106–118.

Crick, N. R. (1995). Relational aggression: The role of intent attributions, feelings of distress, and provocation type. *Development and Psychopathology, 7*, 313-322.

Crick, N. R. (1996). The role of overt aggression, relational aggression, and prosocial behavior in children's future social adjustment. *Child Development, 67*, 2317-2327.

Crick, N., & Dodge, K. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin, 115*, 74-101.

Crick, N., & Grotpeter, J. (1995). Relational aggression, gender, and social-psychological adjustment. *Child Development, 66,* 710-722.

Crick, N. R., Werner, N. E., Casas, J. F., O'Brien, K. M., Nelson, D.A**.**, Grotpeter, J. K., & Markon, K. (1999). Childhood aggression and gender: A new look at an old problem. In D. Bernstein (Ed.), *Volume 45 of the Nebraska symposium on motivation: Gender and motivation.* (pp. 75-141). Lincoln, NE: University of Nebraska Press.

Donnerstein, E., Slaby, R. G., & Eron, L. D. (1994). The mass media and youth aggression. In L. D. Eron, J. H. Gentry , & P. Schlegel (Eds.), *Reason to hope: A psychosocial perspective on violence and youth* (pp. 219-250). Washington, DC: American Psychological Association.

Fitzgerald, P., & Asher, S. R. (1987, August). Aggressive-rejected children's attributional biases about liked and disliked peers. Paper presented at the annual meeting of the American Psychological Association, New York.

Gentile, D. A. (Ed.), *Media violence and children.* Westport, CT: Praeger Publishing.

Gentile, D. A. & Anderson, C. A. (2003). Violent video games: The newest media violence hazard. In D. A. Gentile (Ed.), *Media violence and children.* (pp. 131-152). Westport, CT: Praeger Publishing.

Gentile, D. A., Lynch, P. J., Linder, J. R., & Walsh, D. A. (2004). The effects of violent video game habits on adolescent aggressive attitudes and behaviors. *Journal of Adolescence, 27*, 5-22..

Gentile, D. A. & Sesma, A. (2003). Developmental approaches to understanding media effects on individuals. In D. A. Gentile (Ed.), *Media violence and children.* (pp. 19-37). Westport, CT: Praeger Publishing.

Huesmann, L. R., & Miller, L. S. (1994). Long-term effects of repeated exposure to media violence in childhood. In L. R. Huesmann (Ed.), *Aggressive behavior: Current perspectives*, 153-186, New York: Plenum Press.

Huesmann, L. R., Moise-Titus, J., Podolski, C., & Eron, L.D. (2003). Longitudinal relations between children's exposure to TV violence and their aggressive and violent behavior in young adulthood: 1977-1992. *Developmental Psychology, 39*, 201-222.

Lefkowitz, M. M., Eron, L. D., Walder, L. O., & Huesmann, L. R. (1972). Television violence and child aggression: A follow-up study. In G. A. Comstock & E. A. Rubenstein (Eds.), *Television and social behavior*. Vol. III: Washington, D.C.: U.S. Government Printing Office.

Nelson, D. A. & Crick, N. R. (1999). Rose-colored glasses: examining the social information-processing of prosocial young adolescents. *Journal of Early Adolescence, 19*, 17-38.

Potter, W. J. *On media violence*. Thousand Oaks, Calif: Sage Publications, 1999.

Robinson, T. N. (1998). Television and music video exposure and risk of adolescent alcohol use. *Pediatrics, 102*, p5. Web site: www.pediatrics.org/cgi/content/full/102/5/e54 (visited 6/18/2001).

Strasburger, V. C. & Wilson, B. J. (2003). Television violence. In D. A. Gentile (Ed.), *Media violence and children.* (pp. 57-86). Westport, CT: Praeger Publishing.

Table 1. 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, get even by keeping that person from being in their group of friends?
- Who, when they are mad at a person, ignore the person or stop talking to them?

Verbal aggression item:
- Find the number of three kids who say 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 2. 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.

TABLE 3
Correlations between Violent Media Exposure and
Hostile Attribution, Aggressive Behaviors, Prosocial Behaviors, and Parent Involvement

	1 Violent Media Exposure (Time 1 with Time 1)	2 Violent Media Exposure (Time 2 with Time 2)	3 Violent Media Exposure (Time 1 MVE with Time 2 Outcomes)	4 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 & Teacher Nomination)	.07	.02	.02	.00
Physical Aggression (Self-Report, Peer & Teacher Nomination)	.40***	.47***	.44***	.34***
Prosocial Behaviors				
Prosocial Behavior (Peer & Teacher Nomination)	-.36***	-.31***	-.35***	-.30***

$^{+}p < .10,$ $*p < .05,$ $**p < .01,$ $*** p < .001$

TABLE 4
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	Beta 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***	.46***
	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	.64***	
	Time 1 MVE	.11*	
Relational Aggression (Peer & Teacher Nomination)	Time 1 Total Screen Time	-.07+	.60***
	Time 1 Parental Involvement	.06+	
	Time 1 Relational Aggression	.75***	
Time 2 Physical Aggression (Self-Report, Peer & Teacher Nomination)	Time 1 Physical Aggression	.64***	.52***
	Time 1 MVE	.18***	
Prosocial Behaviors (Time 2)			
Time 2 Prosocial Behavior (Peer & Teacher Nomination)	Time 1 Hostile Attribution	.64***	.46***
	Time 1 Prosocial Behavior	.13**	

$^+p < .10$, $*p < .05$, $**p < .01$, $*** p < .001$

Table 5

Intercorrelations between predictor and outcome variables in the path analysis (Ns range between
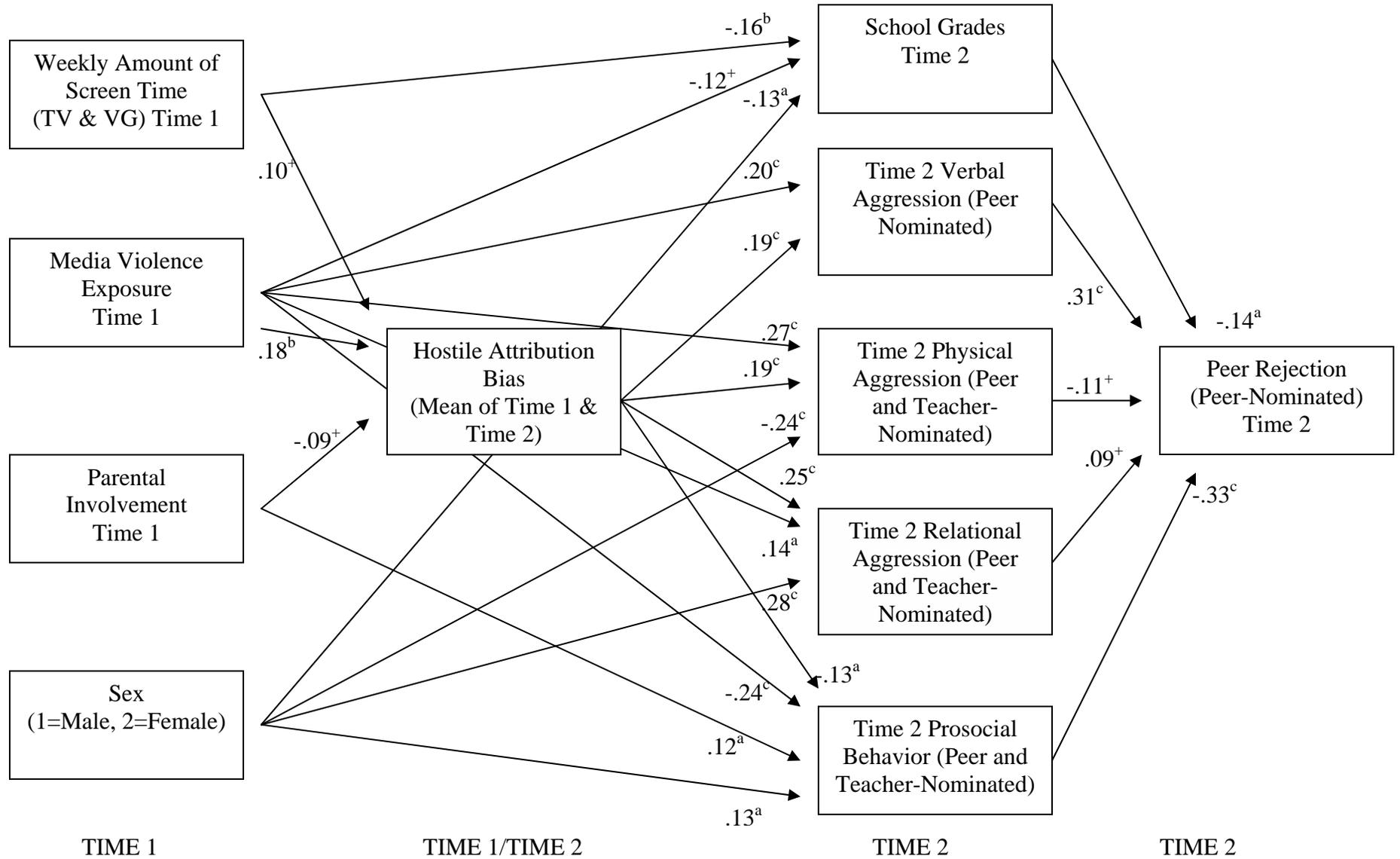
428 and 321)

	1	2	3	4	5	6	7	8	9	10
1. Total Screen Time (T1)										
2. Violent Media Exposure (T1)	.38 [c]									
3. Parent Invlvmt in Media (T1)	-.02	-.12 [a]								
4. Sex (1=Male, 2=Female)	-.25 [c]	-.48 [c]	.11 [a]							
5. Hostile Att Bias (T1/T2)	.17 [c]	.22 [c]	-.12 [a]	-.12 [a]						
6. School Performance (T2)	-.20 [c]	-.14 [a]	-.00	-.05	-.14 [a]					
7. Verbal Aggression (T2)	.17 [c]	.31 [c]	-.04	-.21 [c]	.25 [c]	-.22				
8. Physical Aggression (T2)	.19 [c]	.44 [c]	-.09 [c]	-.39 [c]	.25 [c]	-.18 [c]	.61 [c]			
9. Relational Aggression (T2)	-.06	.02	.06	.23 [c]	.24 [c]	-.18 [c]	.50 [c]	.38 [c]		
10. Prosocial Behaviors (T2)	-.14 [b]	-.35 [c]	.17 [c]	.26 [c]	-.19 [c]	.32 [c]	-.38 [c]	-.49 [c]	-.36 [c]	
11. Peer Rejection (T2)	.11 [a]	.15 [b]	-.08	.02	.13 [b]	-.31 [c]	.39 [c]	.26 [c]	.34 [c]	-.46 [c]
	1	2	3	4	5	6	7	8	9	10

TABLE 6
Exploratory Correlations between Viewing MTV or Professional Wrestling and Hostile Attribution, Aggressive Behaviors, Prosocial Behaviors, and Parent Involvement
(at Time 1)

	Frequency of Viewing MTV at Time 1	Frequency of Viewing Wrestling at Time 1
Hostile Attribution		
Time 1 Overall Hostile Attribution	.08	.11*
Time 2 Overall Hostile Attribution	.14**	.17***
Aggressive Behaviors		
Time 1 Verbal Aggression (Peer Nomination)	.22***	.17***
Time 1 Verbal Aggression (Peer Nomination)	.26***	.14**
Time 1 Relational Aggression (Peer & Teacher Nomination)	.25***	.09
Time 2 Relational Aggression (Peer & Teacher Nomination)	.22***	.09
Time 1 Physical Aggression (Self-report, Peer & Teacher Nomination)	.28***	.21***
Time 2 Physical Aggression (Self-report, Peer & Teacher Nomination)	.22***	.24***
Time 1 Physical Fights (Self Report)	.08	.22***
Time 2 Physical Fights (Self Report)	.07	.18***
Prosocial Behaviors		
Time 1 Prosocial Behavior (Peer & Teacher Nomination)	-.18***	-.21***
Time 2 Prosocial Behavior (Peer & Teacher Nomination)	-.19***	-.18***
Peer Rejection		
Time 1 Peer Rejection (Peer Nomination)	.00	.17***
Time 2 Peer Rejection (Peer Nomination)	.10*	.19***
School Performance		
Time 1 Grades (Teacher Nomination)	-.31***	-.25***
Time 2 Grades (Teacher Nomination)	-.31***	-.21***

$^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***} p < .001$

FIGURE 1: Path Analysis of Longitudinal Relations

TIME 1   TIME 1/TIME 2   TIME 2   TIME 2

$^{+}p < .10, ^{a}p < .05, ^{b}p < .01, ^{c}p < .001$