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Exposure to Violence, Social Information Processing, and Problem Behavior in Preschool Children

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Abstract

Understanding the mechanisms by which early risk factors for social maladjustment contribute to disruptive behaviors in social settings is vital to developmental research and practice. A major risk factor for social maladjustment is early exposure to violence which was examined in this short-term longitudinal study in relation to social information processing patterns and externalizing and internalizing behaviors in a sample of 256 preschool children. Data on exposure to violence were obtained via parent report, data on social information processing were obtained via child interview, and data on child problem behavior were obtained via teacher report. Findings supported the hypothesis that, compared to children not exposed to violence, children reported to witness and/or experience violence are more likely to attribute hostile intent to peers, generate aggressive responses, and evaluate socially unacceptable responses (aggressive and inept) as socially suitable. The former were also found to exhibit higher levels of externalizing and internalizing behaviors. Finally, social information processing mediated the link between exposure to violence and problem behavior thus supporting this study's general approach which argues that the link between exposure to violence and children's problem behaviors are better understood within the context of their perceptions about social relationships.

From a developmental perspective, it is important to examine the social perceptions and behaviors of children exposed to violence early in their lives to better understand how patterns of abnormal behaviors may be transmitted across generations (Cicchetti, 1984). Young children exposed to violence are at much greater risk of developing a range of antisocial behaviors both early (Dodge, Bates, & Pettit, 1990) and later in their lives (Caspi et al., 2002; Nofziger & Kurtz, 2005). In addition, the literature consistently shows a developmental pattern in which children who show conduct problems at an early age are at considerable risk for a variety of psychopathological problems into adolescence and adulthood (Caspi & Moffitt, 1995; Dodge & Pettit, 2003; Fraser et al., 2005; Parker & Asher, 1987; Reid, Webster-Stratton, & Hammond, 2003). More specifically, as children continue on a developmental trajectory of externalizing behavior from preschool to elementary to middle school, low level aversive behaviors such as noncompliance may be transformed into less frequent higher amplitude behaviors such as bullying and hitting (Ireland, Smith, & Thornberry, 2002). Then in adolescence, such behaviors may lead to chronic juvenile offense and criminal activities such as robbery and assault (Patterson, Forgatch, Yoerger, & Stoolmiller, 1998; Patterson & Yoerger, 2002; Snyder & Patterson, 1987; Snyder & Stoolmiller, 2002).

In addition, there is evidence that exposure to violence is related not only to externalizing but also to internalizing problems (Moylan, Sousa, Tajima, & Herrenkohl, 2010). Like the former, in the latter, there is evidence of a developmental trajectory in which internalizing

behaviors such as shy/withdrawn behaviors in the early years could develop into more pathological internalizing symptoms later in life (Dekovic, Buist, & Reitz, 2004; Sterba, Prienstien, & Cox, 2007).

In the present study, the links between exposure to violence and maladjusted behaviors were examined from a theoretical stance that posits that the motives to human behavior in general, and to maladjusted behavior in particular, can be better understood if the social perceptions that lie beneath the behavior are also taken into account (Crick & Dodge, 1994; Dodge, 1986; Widom, 1989). Indeed, myriad studies find distorted social perceptions to be related to social maladjustment in school-age children (e.g., Crick & Dodge, 1994; Dodge, 1986; Dodge et al., 1990; Dodge, Laird, Lochman, & Zelli, 2002; Dodge & Price, 1994; Garner & Lemerise, 2007; Lansford et al., 2006; Schultz, Izard, & Bear, 2004; Zelli & Dodge, 1999) and, to a lesser account, in preschool-age children (e.g., Hart, DeWolf, & Burts, 1992; Katsurada & Sguwara, 1998; Runions & Keating, 2007; Ziv & Sorongon, 2011). Moreover, and in relation to the expected trajectory of problem behavior discussed earlier, distorted social perceptions in kindergarten were found to predict disruptive social behaviors all over the school years but especially in high school (Lansford et al., 2006).

Nevertheless, the existing knowledge about the links between exposure to violence, social cognitive processes, and problem behavior is incomplete in two major ways. First, whereas the mediating role of social information processing on the link between violence exposure and externalizing behavior has been established (Dodge et al., 1990; Guerra, Huesmann, & Spindler, 2003; Schwartz & Proctor, 2000), the link between violence exposure and internalizing behavior has yet to be examined in conjunction with social cognitive processes. Second, these links have never been examined in preschool children. Thus, in the present study both internalizing and externalizing behaviors were examined and the focus was on preschool children.

Social Information Processing in Childhood

This investigation is guided, both theoretically and methodologically, by the social information processing (SIP) approach formulated by Dodge (1986) and reformulated by Crick and Dodge (1994). According to this approach, in the face of social stimuli, individuals progress through a series of stepwise mental mechanisms that are activated in response to external social cues and deactivated upon the individual's enactment of a behavioral response. These mental mechanisms or steps include: (1) the encoding of social cues; (2) the interpretation of the cue; (3) clarification of goals; (4) response construction; and (5) response decision (Crick & Dodge, 1994). These five mental steps are then followed by the sixth step of the process: the enactment of the behavioral response. In steps (1) and (2), individuals selectively focus on particular social cues and, based on these cues, interpret the context of the situation (e.g., the intent of the other interactant). In steps (3), (4), and (5), individuals access possible responses from previous experiences stored in long-term memory, evaluate these responses, and then select one to enact (Crick & Dodge, 1994). In this circular process, each mental step affects, and is affected by, a database of social behavior. This database includes the memory storage of past situations, acquired social rules, social schemes, and knowledge of appropriate and inappropriate social behaviors. If the individual's database is dominated by abrasive and harsh social experiences, it is likely that the knowledge of what is right or wrong, what is acceptable or unacceptable, and what is the correct response to a certain social situation, may be distorted (Dodge, 2006).

This approach was proven to be effective in identifying unique patterns of social information processing in children who show maladjusted behaviors, particularly in relation to three of the five mental stages: interpretation of cues, response construction, and response decision.

Chronically aggressive children, for example, were found to have distorted social information processing patterns in each of these steps. They have been found to be less accurate in their interpretation of peers' social intentions (Dodge & Price, 1994; Dodge, Murphy, & Buchsbaum, 1984; Hart et al., 1992; Katsurada & Sguwara, 1998; Lansford et al., 2006; Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005; Runions & Keating, 2007; Slaby & Guerra, 1988), more likely to construct aggressive or inept responses (Orobio de Castro et al., 2005; Schultz, & Shaw, 2003; Webster-Stratton & Lindsay, 1999), and more likely to expect positive instrumental and interpersonal outcomes for an aggressive response (Crick & Ladd, 1990; Hart et al., 1992; Orobio de Castro et al., 2005). Unique SIP patterns have also been found for shy/withdrawn children in this age group. For example, Burgess and colleagues have found that as opposed to aggressive children, shy/withdrawn children were more likely to attribute hostile intentions to unfamiliar than to familiar peers (Burgess, Wojslawowicz, Rubin, Rose-Krasnor, & Booth-LaForce, 2006). These and similar findings (e.g., Hanish & Guerra, 2004; Rubin, Chen, & Hymel, 1993) have led to the suggestion that withdrawn children have distinctive ways of thinking about interpersonal interaction in light of their own experiences of rejection and victimization (Burgess et al., 2006).

Social information processing in preschool children

Whereas most studies reviewed above have examined social information processing patterns in school-age children, only a fraction of them have examined these patterns before kindergarten. The few studies that did, however, have found similar links to those reported for school-age children. Katsurada and Sguwara (1998) have shown that hostile/aggressive preschoolers were more likely than their less aggressive peers to attribute a hostile intent to another person's actions. Their results also indicated that preschoolers were capable of distinguishing between intentional and unintentional actions when the stimulus materials were concrete and familiar to them. Hart and his colleagues (Hart et al., 1992) have shown that preschoolers who engaged in more antisocial/disruptive behavior expected more positive instrumental outcomes for hostile methods of resolving conflict than their less disruptive peers. Pettit, Harrist, Bates, & Dodge (1991), have reported that preschoolers' outcome expectations regarding aggressive and competent responses were predicted by the quality of their relationship with their parents. In more recent studies, Runions and Keating (2007) have shown that hostile attribution measured during the preschool years is a better predictor of problem behavior in first grade than hostile attribution measured concurrently in first grade, and Ziv and Sorongon (2011) have shown that children with aggressive tendencies evaluate more beneficial social and interpersonal outcomes for aggressive responses. As opposed to the above studies, Pettit, Brown, Mize, and Lindsey (1998) have reported that preschool children failed to distinguish between hostile and non-hostile intents and almost always report provocateurs to have hostile intent.

SIP as a mediator of the link between exposure to violence and problem behavior

Based on the theoretical social information processing model and the strong empirical support for it presented above, Dodge and his colleagues have hypothesized that abrasive early experiences lead to chronic aggressive behavior by having an impact on the development of social information processing patterns (Dodge et al., 1990). Children exposed to violence and abuse early in their lives may develop distorted processing patterns, and, as a result, exhibit maladaptive behavior at a later age. These early experiences may cause them to incorrectly process social cues resulting in their enactment of maladaptive behaviors. For example, they may be especially attentive to hostile cues, which could lead them to misinterpret the behavior of others as threatening, resulting in aggressive and/or other socially undesirable responses. In addition, they might base their selection of a response on distorted social rules thus selecting a socially inappropriate response. Their

harsh early experiences may lead them to display not only externalizing but also internalizing problems given the likelihood that internalizing behavior may be the more adaptive behavior in their abrasive home environment (Mrug, Loosier, & Windle, 2008).

The hypothesis that social information processing mediates the relationship between abrasive early experiences and maladaptive behavior was supported in a number of studies with school-age children. Guerra et al. (2003) found that social cognitions such as normalizing violent behavior and aggressive fantasy mediate the relationship between children's exposure to community violence and subsequent aggressive behavior. Similarly, Schwartz and Proctor (2000) found that distorted social information processing patterns mediate links between exposure to community violence and social adjustment in the child's school peer group. Finally, Dodge and colleagues (1990) found that SIP patterns fully mediate the relationships between early physical abuse and later aggressive behavior.

The present study

No study to date has examined whether the mediating patterns described above are found in preschool children. Thus, this study has the potential to extend the current literature by examining the links among violence exposure, social information processing, and maladaptive behavior in that age group.

In addition, whereas previous social information processing studies with preschoolers focused primarily on externalizing (mostly aggressive) behavior as an outcome, the present study also includes internalizing behavior as an important outcome. This is significant given a) the literature that reports relations between exposure to violence and both externalizing and internalizing behavior (e.g., Klevens, Dukue, & Ramirez, 2002; Nofziger & Kurtz, 2005), b) Burgess et al.'s (2006) suggestion regarding the unique ways in which withdrawn children think about social interaction, c) the general consideration of withdrawal behavior as a symptom or type of internalizing problems (Rubin, Burgess, Kennedy, & Stewart, 2003; Rubin, Coplan, and Bowker, 2009), and d) the suggestion that violence in the home may have a greater impact on internalizing than externalizing problems (Mrug et al., 2008).

In this study, the interplay between inept/withdrawn SIP patterns, aggressive SIP patterns, internalizing problem behavior, and externalizing problem behavior, were examined as they relate to exposure to violence. Two main hypotheses were posed: the first was that exposure to violence will be positively related to more distorted SIP patterns and to higher levels internalizing *and* externalizing behaviors. The second hypothesis was that social information processing will mediate the link between exposure to violence and maladjusted behavior in preschool such that the indirect path between exposure to violence and problem behavior via social information processing patterns will be significant. The study's hypothesized structural model is presented in Figure 1.

Method

Participants

The 256 preschool children (130 girls; ages 48 to 63 months ($M = 55$ months, $SD = 6.2$ months) at the beginning of the study) who participated in this study were recruited in two cohorts. The first cohort was recruited in 2006–2007 and included 196 children (99 girls). The second cohort was recruited in 2010–11 and included 60 children (31 girls). The two cohorts were recruited from the same large metropolitan area in the United States. However, the recruitment of cohort 2 was designed such that at-risk families would be over-represented in the complete sample. Thus, cohort 2 was more homogeneous in that it was recruited in one large inner-city preschool center serving children from low-SES families

(part of cohort 1 was also recruited within that smaller geographical region). T-Tests comparing the two cohorts on the study's main outcome variables (SIP and problem behavior) showed no statistically significant differences.

The total number of children for whom exposure to violence was reported was 50 (19.5% of the sample). Of these children, 21 were part of the second cohort. Forty-three percent of children were Black (all 60 children in the second cohort were Black), 37 percent were White, 11 percent were Asian, and nine percent were Latino. Information on household income (retrieved from the parent report) was available for 217 recruited families; 30 (14%) reported household annual income lower than \$25,000 per year; 38 (17%) reported an annual income of \$25,000 to \$50,000 per year, 35 (16%) reported an annual income of \$50,000 to \$75,000, and 114 (53%) reported a household annual income higher than \$75,000 per year.

Procedure

In both cohorts, similar data were collected at two time points. Violence exposure and sociodemographic data used in this study were collected through a self-administered questionnaire completed by the children's mothers (for 14 children or 5% of the sample it was the grandmother who completed the questionnaire packet) in October 2006 to January 2007 (cohort 1) and November 2010 to February 2011 (cohort 2). Social information processing data were collected via direct interviews with the child at his/her preschool center during the same data collection point. Finally, problem behavior data were collected via teacher questionnaires close to the end (April–June) of the 2006–2007 (cohort 1) and 2010–2011 (cohort 2) preschool years. All parents signed their consent for their children's participation in the study prior to the beginning of the study, and all children gave their verbal assent at the beginning of the interview session. Families and teachers received monetary compensation for their participation.

Measures

Violence exposure—The same measure of exposure to violence used in the Family and Child Experiences Study (FACES; Administration on Children Youth and Families (ACYF), 2006) was used. As part of the larger sociodemographic parent questionnaire administered in both cohorts, six questions were asked about the child's exposure to violence in the family/home during the last year. Questions included items such as: "has your child ever been a witness to domestic violence?" "Has your child ever been a victim of domestic violence?" "Has your child ever been a victim of a violent crime?" This measure was previously reported to have good psychometric properties (ACYF, 2006; Ziv, Alva, & Zill, 2010). In this study, the internal consistency score for this scale was .79. The answers were used to create an exposure flag variable coded 0 (no exposure was reported) and 1 (Child was reported to be exposed to violence during the last year). Information on exposure to violence (maternal report) was available for 244 participants (95% of the sample).

Social information processing—SIP was measured with The Social Information Processing Interview – Preschool Version (SIPI-P; Ziv & Sorongon, 2011). This is a 20-minute long structured interview depicting a series of vignettes in which a protagonist is either being rejected by two other peers (in the "*peer-rejection*" vignette) or provoked by another peer (in the "*peer-provocation*" vignette). The peers' intent is portrayed as either ambiguous or nonhostile/accidental (but never as intentionally hostile, see examples below). Each type of vignette is combined with each type of peer intent to generate four stories: (1) a nonhostile rejection story (the protagonist asks two other children if he/she can join their game but the children reject the request by saying that the teacher does not allow for more than two children to play that game); (2) an ambiguous rejection story (similar to the

previous one but this time the other children do not respond to the protagonist's request); (3) an accidental provocation story (a child accidentally spills the protagonist's milk); and (4) an ambiguous provocation story (the protagonist is watching TV when another child takes the remote control and changes the channel without asking or saying anything).

The stories are told by the interviewer using a storybook easel with illustrations of bears instead of human children to reduce the risk of race-specific biases (Leff et al., 2006). There are parallel picture books for boys and girls. As the child hears the story, the interviewer stops at scripted points and poses questions addressing the hypothesized information processing steps. Table 1 presents the SIPI-P questions as they apply to the social information processing steps.

Social information processing scores—Four main scores were derived from the SIPI-P in the present study. These scores were constructed to reflect the three theoretical steps described in the social information processing model that were found to be most telling in the SIP literature.

- Step 2 –** *Interpretation*, yielded one score: *Hostile Attribution* which is a frequency count of the number of times the child describes the other child/children as having hostile intents across the four stories. Thus, the range for this score is 0 to 4 with higher scores representing higher tendency to attribute hostile intent to peers. The internal consistency reliability score, as measured by Cronbach's alpha was .78.
- Step 3 –** *Response construction*, yielded one score: *aggressive response generation* (originally, the intent was to have an inept response generation score as well, but the children rarely produced this type of response). This score is derived from the child's responses to an open-ended question "What would you say or do if this happened to you?" The answers are used to create aggressive flag variables (coded 0, 1) for each story. The values for the flags are combined across the four stories to create the aggressive response generation score such that higher scores represent more aggressive construction of responses. The range of this score is 0 (the child never produced an aggressive response) to 4 (the child produced an aggressive response in each of the four stories). The internal consistency score for this scale was high at .92, and inter-rater agreement between the coders of the open-ended question (three interviewers who coded 20% of each of the other interviewers' responses) was 100 percent.
- Step 4 –** *response decision*, yielded two scores: 1) *positive evaluation of an aggressive response* and, 2) *positive evaluation of an inept response*. These two scores are constructed from a combination of the 12 response evaluation questions (4 stories $\times$ 3 questions per response per story, see Table 1) pertaining to the two types of non-competent responses: aggressive (e.g., the child hits the other child and says: "You better give it back or else...") and inept (e.g., the child cries and says: "Nobody wants to play with me..."). The total number of responses within each type was then summed across stories to create two scores with a possible range of 0–12, with higher scores representing a more positive evaluation of the specific response. Thus, higher scores in the two scales (aggressive and inept) represent more distorted perceptions. The internal consistency scores for the two scales were .88, and .87, respectively.

Time 1 social information processing data were available for all 256 children participating in the study (a full set of SIPI data was a preliminary condition to be included in the sample).

Teacher ratings of problem behavior—Teachers were asked to rate how often children exhibited various externalizing and internalizing behaviors: “never” (0), “sometimes” (1), or “very often” (2). This widely used problem behavior scale (ACYF, 2005, 2006) is derived from the Personal Maturity Scale (Alexander & Entwisle, 1988), the Child Behavior Checklist for Preschool-Age Children, Teacher Report (Achenbach, Edelbrock, & Howell, 1987), and the Behavior Problem Index (Zill, 1990). An example of an externalizing item is “hits or fights with others.” An example of an internalizing item is “keeps to himself or herself; tends to withdraw.” Scores for externalizing and internalizing behaviors had a range of 0–12, with Cronbach’s alphas of .88, and .82, respectively. Behavior ratings were available for 253 participants (99% of the total sample).

Other variables—Parents provided information on household income, parent education, marital status and other sociodemographic characteristics of the child and family. Children completed the *Picture Vocabulary subtest of the Woodcock-Johnson Psycho-Educational Battery –Third edition* (WJ; McGrew and Woodcock, 2001) to control for children’s expressive language skills. The WJ test was administered at the middle of the SIPI-P interview session (after the first two stories so that children’s interest and attention were maintained).

Results

Preliminary analyses

Descriptive statistics of the study’s main outcome variables are reported in Table 2. As can be seen, and as expected in a study using a community sample to examine questions about extreme-type behaviors, most variables (with the exception of hostile attribution) were skewed to the left. This means that a majority of children in that sample did not exhibit high levels of the examined variables. Next, to identify possible control variables for the main analysis, analyses were conducted to examine links between social information processing problem behavior scores and a variety of child and family characteristics. The results are presented in Table 3. With the exception of gender and race, all other control variables were related to at least two outcome variables. Of the six outcome variables (four social information processing variables and two behavior variables), only internalizing behavior was not significantly related to any of the control variables. Variables that were found to be related to any outcome, were entered into the relevant models in the main analyses.

Main analyses

Table 4 presents the zero order correlations among all of the study main variables. As can be seen, exposure to violence was related to all four SIP variables and the two problem behavior variables. Strong correlations were found between exposure to violence and the two SIP variables representing aggressive tendencies: aggressive response generation ($r = .45$ (244), $p < .001$); and positive evaluation of an aggressive response ($r = .50$ (243), $p < .001$). Medium to strong correlations were found also between the SIP and problem behavior variables. The strongest links between SIP and problem behaviors were found in relation to the two SIP variables representing a positive evaluation of a non-competent response: positive evaluation of an aggressive response was strongly related to both problem behavior indices (with externalizing behavior: $r = .43$ (253), $p < .001$; with internalizing behavior: $r = .43$ (252), $p < .001$); positive evaluation of an inept response was also related to both problem behavior indices (with externalizing behavior: $r = .34$ (252), $p < .001$; with internalizing behavior: $r = .41$ (253), $p < .001$).

Next, to examine whether social information mediated the effects of exposure to violence on problem behavior, the procedures outlined by Mackinnon (2008) and Shrout and Bolger

(2002) were followed. According to Mackinnon (2008), mediation is best examined when structural equation modeling is used. A case in which a previously significant link between an independent variable (in the present study: exposure to violence) and a dependent variable (in the present study: problem behavior) is reduced to zero when a proposed mediator (in the present study: social information processing) is introduced into the equation represents full mediation. When the same link is reduced in magnitude but remains significant, it is a case of partial mediation. The Shrout and Bolger (2002) bootstrapping approach allows for the estimation of a confidence level (i.e., a p value) for the significance of the indirect path (i.e., the path from exposure to violence to problem behavior via social information processing). Bootstrapping is considered to be a more powerful and less conservative test of mediation compared to the more conventional Sobel test (MacKinnon, 2008). A number of separate models were examined based on the full hypothesized SEM presented in Figure 1 via AMOS version 18 (Arbuckle, 2009). The four models that showed mediation and adequate fit to the data are presented in Table 5. The model that best fits the data (model 4) included exposure to violence as a predictor (observed variable); SIP (latent variable) as a mediator (with the two SIP indices that represented the positive evaluation of a non-competent response, namely, positive evaluation of an aggressive response (PEAR) and positive evaluation of an inept response (PEIR)); and problem behavior as an outcome with both externalizing and internalizing behaviors included in this latent variable. The hypothesized model has shown excellent fit to the data based on conventional fit indexes: CFI = .99; TLI = .99; and RMSEA = .011. Model 4 is also portrayed in Figure 2.

As can be seen in Table 5 and Figure 2, this analysis provided strong support for the hypothesis of the mediating role of social information processing on the link between exposure to violence and problem behavior. The previously significant link between exposure to violence and problem behavior was reduced to zero when social information processing was introduced into the equation. Calculated by the bootstrap method (via AMOS with 2,000 samples), the indirect path of .44 was significant at $p < .001$. Because the direct link between exposure to violence and problem behavior was reduced to zero when the latent construct SIP was introduced to the equation, these results represent a full mediating effect of social information processing on that link.

The three more discrete models presented in Table 5 provide more details about how the mediated path: exposure to problem behavior via SIP, was established. These three models explored the mediated path separately to externalizing behavior as an outcome (models 1 and 2) and to internalizing behavior as an outcome (model 3). In the two models examining mediation with externalizing behavior as an outcome, the zero-order coefficient of exposure to violence on externalizing ($\beta = .33$; $p < .001$) dropped considerably although it remained statistically significant ($\beta = .24$; $p < .001$; $\beta = .16$; $p < .05$, respectively), and the indirect effect of exposure on externalizing behavior via both SIP mediators (aggressive response generation and the positive evaluation of an aggressive response) was statistically significant ($\beta = .09$; $p < .001$; $\beta = .17$; $p < .001$, respectively). In the model examining mediation with internalizing behavior as an outcome, the zero-order coefficient of exposure to violence on internalizing ($\beta = .30$; $p < .001$) dropped considerably although it remained statistically significant ($\beta = .15$; $p < .05$), and the indirect effect of exposure on internalizing behavior via the positive evaluation of an inept response was statistically significant ($\beta = .15$; $p < .001$).

Discussion

Because children exhibiting behavior problems early in life are at risk to develop poor adaptation skills in school and beyond, a major goal of early child development research is to increase the understanding of factors that make some children more vulnerable to externalizing and internalizing problems in the school or preschool settings (Baker, Grant, &

Morlock, 2008). One such factor is exposure to violence in the home environment (Department of Health and Human Service (DHHS), 2001). Thus, studies that can contribute to our knowledge of the mechanisms by which early exposure to violence may lead to behavioral disturbances are needed. The findings reported here enhance understanding of the links between violence exposure and problem behavior in the preschool years by emphasizing the social cognitive processes that guide such behavior. The data suggest that compared to children not exposed to violence, children who were reported to witness and/or experience violence are more likely to attribute hostile intent to peers, generate aggressive responses, and evaluate socially unacceptable responses (aggressive and inept) as socially suitable.

Moreover, that this tendency was true for both aggressive and inept responses suggests that the possible effects of violence exposure on social cognition are multi-dimensional (i.e., seeing and/or experiencing aggression leads to a range of social information processing distortions) rather than one-dimensional (i.e., exposure to violence leads to violent/aggressive distortions only). This suggestion is strengthened by the finding that exposure to violence was found to be related to both externalizing and internalizing problems. This particular finding supports assertions that the environmental roots of externalizing and internalizing problems may be many times similar (Klevens et al., 2002; Nofziger & Kurtz, 2005).

Beyond these main effects, perhaps the most intriguing finding of this study is the mediating effect of social information processing on the links between exposure to violence and problem behavior. The model that best fitted the data included a latent SIP mediator constructed from the two response evaluation variables (positive evaluation of an aggressive response and positive evaluation of an inept response), and a latent problem behavior outcome constructed from the two problem behaviors reported by the teacher: externalizing and internalizing. In that case, the previously significant link between exposure to violence and problem behavior was reduced to zero. These findings strongly support the theoretical perspective that the motives for maladjusted behavior can be better explained by understanding the social perceptions that lie beneath the behavior (Crick & Dodge, 1994; Dodge, 1986; Widom, 1989). It seems that children exposed to violence show conduct problems in preschool, at least in part, because they believe these behaviors to be appropriate and advantageous in challenging social situations.

Evidence for the mediating role of SIP was also found in the models examining these effects separately for externalizing and internalizing behaviors. The mediating effect of aggressive response generation and aggressive response evaluation on the link between exposure to violence and externalizing behavior support similar findings with school age children (e.g., Guerra et al., 2003) and the mediating effect of inept response evaluation on the link between exposure to violence and internalizing behaviors extends the emphasis of social information processing theory on aggression to include unique influences on internalizing behaviors (as suggested by Burgess et al., 2006).

The results should also be considered in the light of current suggestions in developmental psychology that humans are born with a tendency to match outcome with intent and that the ability to differentiate between the two (e.g., to understand that a bad outcome does not necessarily mean a bad intent) is an important milestone in the development of Theory of Mind (ToM) that normally occurs during the preschool years (Call & Tomasello, 1998; Dodge, 2006). Children in the current sample are in the midst of this developmental process; this could explain why hostile attribution was the only social information processing variable to be only weakly related to externalizing behavior and not related to internalizing behavior. Given the age of children in this sample, it is likely that some have yet to reach the

developmental milestone of differentiating outcome from intent, regardless of their exposure to violence. This assertion is supported by the finding that hostile attribution was the only SIP variable not skewed to the left, which means that many children in this study (again, regardless of their exposure status) were describing the intent of others in non-hostile situation as yet hostile. This finding also seems to accord with previous SIP research with preschool children. For example, a Meta analytic examination of social information processing found that the argument for hostile attribution bias as a predictor of aggression in preschool children is not well established (Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002).

On the other hand, constructing responses to challenging social situations and evaluating their prospective outcomes seem less demanding cognitive processes in that they do not include the need to interpret the intent of others and are thus confined to the self. ToM does not seem to be a major factor here, and the child is not asked to “read the minds” of others to understand their intent. Thus, differences in response construction and the evaluation of a given response may more easily be viewed in preschool children.

Limitations and future directions

The intriguing results presented here should be viewed with caution, however. For one thing, to answer the important clinical question about the possible outcomes of exposure to violence, a large enough number of children for whom exposure was reported was required and for that two samples recruited four years apart were combined. Whereas the design of the two studies is identical in terms of the variables reported here, other variables may affect the findings, including the time between cohorts and the sociodemographic differences between the two samples. Even so, the pattern of findings within each cohort is consistent with the results for the two samples combined, as reported above.

There are other limitations. The design includes only two time points in measurement, even though the theoretical model covers three time points (time 1 is exposure to violence, time 2 is social information processing, and time 3 is the maladaptive behavior outcome). Thus, this study relies on cross-sectional correlations for part of the analysis and cannot draw causal conclusions as to the links between the three main constructs. This could be addressed in future studies by incorporating a design that includes at least three measurement points. Note however, that although this is a flaw of this study, it could be considered only as a minor technical flaw because of the way the three constructs were measured in this study. First, exposure to violence information was based on maternal report of exposure over **the last year**. Thus, even though it was measured concurrently to the SIP data presented in this study, in reality it represents **past** data about the child. Second, SIP data were collected via direct interview, thus representing **present** (here and now) data about the child. Finally, behavior data were collected in average six months after SIP data were collected and teachers were asked to report on children’s behavior **during the last month**, thus representing information about the child’s behavior that occurred in the **future** compared to the time the SIP data were retrieved.

In addition, the main predictor in this study – exposure to violence - is based on parental reports, and with the question of exposure to violence being extremely sensitive, it is likely that at least some underreporting on this question had occurred here. With that in mind, however, the percentage of children reported as exposed to violence in this study is consistent with previous reports where the same measure of exposure to violence is used (ACYF, 2006; Ziv et al., 2010).

Finally, because the extant literature on social information processing in preschool is relatively sparse, future studies examining the mediating role of social information

processing on the link between early risk and the development of problem behavior should take advantage of approaches used in other information processing research. For example, more cognitive psychology research in recent years has focused on executive functions and information-regulation (Garon, Bryson, & Smith, 2008; Miyake et al., 2000). It will be intriguing to explore whether examining social information processing along with theoretically related executive functions such as cognitive flexibility and attention shift could better explain the mechanisms by which early risk develops into maladjusted behavior.

Clinical implications

The findings reported here have implications for successful, early interventions. Because children's social adjustment is an important indicator of later maladaptive behavior (Caspi & Moffitt, 1995; Dodge & Pettit, 2003; Fraser et al., 2005; Parker & Asher, 1987), investigations of the cognitive processes that facilitate social behavior in childhood could be useful in efforts to prevent such behavior. As the social information processing model describes specific processes that can be taught through practice and demonstration, it could be targeted to socially maladjusted preschoolers, much like successful, existing initiatives with elementary school-age children (e.g., Conduct Problems Prevention Research Group, 1992, 1999; Fraser et al., 2005). Data from this study could inform the development of effective interventions by pointing to specific social perceptions that should be altered. For example, intervention programs with preschool children at risk of developing maladjusted behaviors may consider focusing their efforts on promoting children's correct identification of competent and non-competent social actions, as this seems to be the main distinguishing factor between children with and without reported problem behaviors.

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Figure 1.

Hypothesized structural equation model connecting exposure to violence to problem behavior via social information processing. Latent Variables: SIP = Social Information Processing; PB = Problem Behavior. Observed variables: HA = Hostile Attribution; ARG = Aggressive Response Generation; PEAR = Positive Evaluation of Aggressive Response; PEIR = Positive Evaluation of Inept Response; EXT = Externalizing behavior; INT = Internalizing behavior.

Figure 2.

Final empirical structural equation model (model 4) connecting exposure to violence to problem behavior via social information processing. Latent Variables: SIP = Social Information Processing; PB = Problem Behavior. Observed variables: PEAR = Positive Evaluation of Aggressive Response; PEIR = Positive Evaluation of Inept Response; EXT = Externalizing behavior; INT = Internalizing behavior. Value in parenthesis represent zero-order link between exposure to violence and problem behavior (without SIP in the equation).

*** $p < .001$

Table 1

The SIPI-P questions, composite scores, and range of scores, as a function of the social information processing steps

Social information processing step	Question	Composite score
Interpretation	"Were the other kids mean or not mean?"	Hostile Attribution
Response construction	"What would you say or do if this happened to you?"	Aggressive response Generation
Response Decision (based on set responses provided by the interviewer)	1. "Was it a good thing or a bad thing to say (do)?"	Positive evaluation of aggressive response
	2. "If you did that, do you think the other children would like you?"	Positive evaluation of inept response
	3. "Do you think the other children would let you play if you did that?"	

Note. Question presented in general form (language was adapted based on the content of each story). Range of scores was calculated after combining the four stories. The three response evaluation questions are asked separately for each type of response

Table 2

Descriptive statistics of study main outcome variables

Score	M	SD	Observed Range	Possible Range	Skewness
Exposure to Violence	.20	.40	0-1	0-1	1.54
Social information processing:					
Hostile attribution	2.04	1.60	0-4	0-4	-.06
Aggressive response generation	0.27	0.69	0-4	0-4	3.28
Positive evaluation of aggressive response	1.53	2.37	0-11	0-12	1.63
Positive evaluation of inept response	3.13	3.33	0-12	0-12	.84
Problem behavior:					
Externalizing	2.02	2.58	0-10	0-12	1.31
Internalizing	1.52	2.18	0-8	0-12	1.55

Table 3

Bivariate correlations between child and family characteristics and social information processing and behavior ratings (N = 217)

	Social Information Processing				Problem Behavior	
	HA	ARG	PEAR	PEIR	Externalizing	Internalizing
Child characteristics:						
Age (in months)	-.31 ***	-.16 *	-.26 ***	-.01	-.09	-.02
Expressive language score	.05	-.11	-.30 ***	-.10	-.19 **	-.05
Gender	.04	-.04	-.03	.04	.12	.03
Race	.13	-.09	-.10	-.12	.04	.12
Family Characteristics:						
Household income	.13	-.28 ***	-.39 ***	-.14 *	-.26 ***	-.12
Maternal education	-.21 **	-.21 **	-.32 ***	-.19 **	-.20 **	-.09
Marital status	-.11	.28 ***	.26 ***	.02	.23 **	.10

Note. HA = Hostile attribution; ARG = Aggressive response generation; PEAR = positive evaluation of aggressive response; PEIR = positive evaluation of inept response.

Positive correlation coefficients for marital status represent higher ARG, PEAR, and externalizing behavior scores for children of unmarried mothers.

*
p < .05;

**
p < .01;

p < .001

Zero-order correlations among exposure to violence, social information processing, and problem behavior scores (N = 256)

Table 4

	1	2	3	4	5	6	7
1. Exp	1	.13 *	.45 ***	.50 ***	.42 ***	.33 ***	.30 ***
2. HA		1	.05	.06	.17 **	.17 **	.09
3. ARG			1	.38 ***	.14 *	.32 ***	.12
4. PEAR				1	.58 ***	.43 ***	.43 ***
5. PEIR					1	.34 **	.41 ***
6. Ext						1	.51 ***
7. Int							1

Note. Exp = Exposure to violence; HA = Hostile Attribution; ARG = Aggressive Response Generation; PEAR = Positive Evaluation of Aggressive Response; PEIR = Positive Evaluation of Inept Response; Ext = Externalizing behaviors; Int = Internalizing behaviors

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

Table 5

Mediation analysis Exposure to violence → Social information processing → Problem behavior

Effect	Estimate	t value	P	R ²
Model 1: Exp→ARG→Ext				
Externalizing				.15
Indirect (mediation)	.09	3.20	.001	
Direct (controlling for ARG)	.24	3.80	.000	
Zero-order	.33	5.61	.000	
Model 2: Exp→PEAR→Ext				
Externalizing				.21
Indirect (mediation)	.17	5.36	.000	
Direct (controlling for PEAR)	.16	2.52	.012	
Zero-order	.33	5.61	.000	
Model 3: Exp→PEIR→Int				
Internalizing				.19
Indirect (mediation)	.15	5.60	.000	
Direct (controlling for PEIR)	.15	2.40	.017	
Zero-order	.30	4.89	.000	
Model 4 (full model) Exp→SIP→PB				
Problem Behavior				.29
Indirect (mediation)	.44	9.27	.000	
Direct (controlling for SIP)	-.01	-.06	.95	
Zero-order	.44	5.67	.000	

Note. N = 256. Exp = Exposure to violence; ARG = aggressive response generation; Ext = externalizing behavior; PEAR = positive evaluation of aggressive response; PEIR = positive evaluation on inept response; Int = internalizing behavior; SIP = social information processing (latent); PB = problem behavior (latent)