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Domain Specificity in Relationship History, Social-Information Processing, and Violent Behavior in Early Adulthood

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Abstract

Using prospective longitudinal data, we tested 5 hypotheses: (a) that the relation between earlier developmental experiences (peer social rejection and victimization in a romantic relationship) and adult violent behavior toward peers and romantic partners is specific to relationship domain; (b) that the relation between social-information processing (SIP) biases and subsequent violence is also specific to relational domain (romantic partner vs. peer); (c) that the relation between developmental experiences and SIP biases is domain specific; (d) that domain-specific SIP mediates the impact of earlier developmental experiences on later violent behavior; and (e) that harsh parenting early in life is a domain-general predictor of SIP and later violent behavior. Harsh parenting was assessed through interviews with parents when their children were age 5 years. Classroom sociometric assessments indexing peer rejection were completed in elementary school, and self-report of victimization by romantic partners was provided at age 18 years. SIP was assessed via interview at age 22 years, and violent behavior was measured via self-and partner report at ages 23 years and 24 years. Structural equation analyses revealed specificity in the relation between developmental experiences and violence and in the prediction to and from SIP in the peer domain, but not in the romantic-relationship domain. The impact of early harsh treatment on violence toward peers was mediated by SIP biases in the peer domain. These findings provide support for domain specificity in the peer domain but for cross-domain generality in the romantic relationship domain in the development of violent behavior in early adulthood.

Keywords

harsh parenting; peer rejection; romantic partner victimization; social-information processing; violence

Interpersonal violence in adolescence and early adulthood is a serious public health concern with major consequences for perpetrators, victims, and society at large. Some violent individuals have been found to aggress toward specific targets and relational partners, whereas other violent individuals display a more global style of aggressive behavior that is not specific to partner or context (Holtzworth-Munroe & Stuart, 1994). An important question is to what extent individual differences in aggressive behavior can be characterized by domain (or partner) specificity.

Because violent behavior may become increasingly differentiated across contexts in early adulthood and because there may be domain specificity in relations among social-experiential factors, social-cognitive factors, and interpersonal aggression, there is a need to articulate and test models of the within- and cross-domain linkages among these constructs. The current research does so in the context of a prospective longitudinal study that has traced the development of aggressive behavior from early childhood through early adulthood. Two interpersonal relationship domains were of interest: relationships with romantic partners and with peers. Antecedent measures of harsh treatment in relationships with peers, romantic partners, and parents were collected in childhood and adolescence. Early adulthood measures of social-information processing (SIP; i.e., how individuals perceive, construe, and mentally generate responses to provocations by others in specific domains) were collected at age 22. Measures of violent behavior directed toward peers and romantic partners were collected when the participants were in their mid-20s. This is one of the very few studies in which SIP in early adulthood is examined and the first study in which domain specificity in relations among child and adolescent social experiences, SIP in early adulthood, and subsequent interpersonal violence is considered.

Central to formulations of SIP is the notion of situation specificity. Early work was focused on defining problematic situations and demonstrating that some individuals display competence in some situations but not others (D’Zurilla & Goldfried, 1971). Taxonomic research with grade-school children revealed a relatively small set of problematic social situations and that children experiencing difficulties in one type of situation were not necessarily likely to experience difficulties in other types of situations (Dodge, McClaskey, & Feldman, 1985). Building on this work, Dodge, Pettit, McClaskey, and Brown (1986) showed that SIP biases and deficits were specific to situation (i.e., provocation by a peer whose intent is ambiguous and being rebuffed by a group of peers at play). Children who displayed SIP biases and deficits in the peer provocation context were observed to be less competent in an actual (contrived) peer provocation; children who displayed SIP biases and deficits in the peer-group entry contexts were observed to be less competent during actual peer-group entry. The within-context links were significant, but the cross-context links were not. The notion of *situation* was expanded over the years to include type of provocation (Dirks, Treat, & Weersing, 2007), form of aggression (Dodge, Lochman, Harnish, Bates, & Pettit, 1997), and relational partner (Halligan, Cooper, Healy, & Murray, 2007). The present study was conceived within this tradition, applying a situation-specificity perspective to antecedents and underlying social-cognitive mechanisms of early adult interpersonal violence.

Violence Toward Peers and Romantic Partners During Early Adulthood

Violent behavior in early adulthood carries significant personal and interpersonal costs, including a diminished social network, superficial and unsatisfying friendships, difficulties in securing and maintaining adequate employment, and in more extreme circumstances, arrest and incarceration (Schulenberg & Zarrett, 2006). Current research and thinking suggest that antisocial behavior and violence in early adulthood has its roots in earlier dispositional (temperamental and genetic) factors, aggressogenic social-learning

experiences, and their interaction (Dodge & Pettit, 2003). Harsh treatment by parents in the home and rejection by peers in school represent two interrelated sets of risk factors that have been linked with early appearing and persistent forms of antisocial behavior, and the impact of both sets of risk factors on growth in aggressive behavior has been found to be partially mediated by SIP biases and deficits (Dodge, Bates, & Pettit, 1990; Dodge et al., 2003).

The establishment of successful romantic relationships represents another key developmental task of early adulthood (Collins & van Dulmen, 2006; Conger, Cui, Bryant, & Elder, 2000; Furman, 2002). As with peer relationships, success in this domain is demarcated by separate constructs of participation, competent prosocial behavior (e.g., intimacy and warmth), and restraint from antisocial behavior (i.e., intimate partner violence). Surveys suggest that 20% to 50% of those who are in intimate relationships during adulthood display violence toward a partner (Magdol et al., 1997; Silverman, Raj, Mucci, & Hathaway, 2001), with all the attendant risks of marital distress, emotional distress, and physical harm (Lawrence & Bradbury, 2001). Research on the developmental antecedents of relationship violence has tended to focus on early aggressive tendencies, harsh treatment by parents, and victimization by peers and early romantic partners.

Although some individuals are violent across different relationships, many adults, including both men and women, are violent only in romantic relationships (Archer, 2000; Holtzworth-Munroe & Stuart, 1994; Straus, 1999). Some studies have found that risks for partner violence are similar to those for antisocial behavior directed toward adult peers more generally (Capaldi & Crosby, 1997; Magdol, Moffitt, Caspi, & Silva, 1998). However, other research has shown that general and partner violence may have distinguishable antecedents (Brendgen, Vitaro, Tremblay, & Lavoie, 2001). For example, proactive aggression in early adolescence predicts delinquency-related physical violence later in adolescence but not violence toward a romantic partner (Brendgen et al., 2001), whereas jealousy is often cited as leading to violence toward a romantic partner (Roscoe & Kelsey, 1986) but not to general violence. Thus, it may be the case that violent behavior directed toward peers, versus romantic partners, has distinct as well as overlapping developmental antecedents.

SIP Mechanisms Related to Violence in Early Adulthood

Researchers have described a wide range of developmental precursors to aggressive behavior (see Dodge, Coie, & Lynam, 2006, for a review). Experiences of maltreatment and rejection by parents, peers, and dating partners represent long-term, distal risk factors. At a more proximal level, SIP biases and deficits have been identified as a mechanism that both underlies aggressive behavior in specific situations and contexts and also provides a means through which earlier (and more distal) socialization experiences exert an impact on aggressive behavior (Dodge & Pettit, 2003). The theory is that exposure to harsh parenting and family aggression shapes children's processing of cues in social situations so that children come to believe that others often act with hostile intent and that behaving aggressively is a good way to solve interpersonal problems. Consequently, aggressive behaviors become easily accessible in children's repertoire of possible behavioral responses in a given situation. These cognitive processes then increase the likelihood that children will behave aggressively in future social situations (Dodge et al., 1990). This model has been framed in a general way that would apply to all future social relationships. Attachment theory (e.g., Bretherton, 2005) and coercion theory (e.g., Snyder, Reid, & Patterson, 2003) likewise emphasize the centrality of family experiences in children's development of general styles of interacting with others.

Robust associations between SIP and aggressive behavior have been found in research with child and adolescent populations (Orobio de Castro, Veerman, Koops, Bosch, &

Monshouwer, 2002). Compared with nonaggressive individuals, aggressive children and adolescents are less attentive to relevant social cues during interpersonal exchanges, more likely to make hostile attributions of others' intent in ambiguous provocation situations, more likely to access aggressive response options as means of solving interpersonal conflicts, and more likely to judge these options as both easy to perform and likely to lead to desirable outcomes. Research guided by the SIP formulation has focused almost exclusively on developmentally salient relational contexts of childhood and adolescence (Pettit & Mize, 2007). Little SIP research has been directed toward the salient developmental contexts of early adulthood.

As noted earlier, the notion that the processing of social information in response to specific social cues (or in specific social situations) has a stronger relation with behavior in response to those specific cues and situations has been central to contemporary formulations of SIP and its role in antisocial behavioral development (Crick & Dodge, 1994; Dodge & Pettit, 2003). Two points are noteworthy with respect to this literature as it pertains to the goals of the current study. First, *situation* typically has been defined in terms of a social challenge or task in interpersonal encounters with a peer. Less often, researchers have been concerned with specificity in processing across differing partners (e.g., with a known vs. unknown peer; with one's own child vs. a generic child; Dirks et al., 2007; Hubbard, Dodge, Cillessen, Coie, & Schwartz, 2001). Second, most research on social-cognitive processes and violent behavior has focused on children and adolescents not adults. New forms of aggression and violence—most notably, domestic violence—become increasingly common in early adulthood (Capaldi & Clark, 1998). Violence toward peers in early adulthood also is relatively common (Marcus, 2008). Little is known about adulthood era SIP and its specificity with respect to peers versus romantic partners.

Domain Specificity in Links Among SIP, Violence, and Socialization Experiences

Theories of the development of individual differences in SIP stress the role of early social experiences with caregivers (e.g., Dodge et al., 1990; Huesmann, 1998). Many of the same experiential factors that have been found to predict antisocial and violent behavior also have been found to be associated with SIP biases and deficits. These include harsh and abusive treatment by parents (e.g., Dodge et al., 1990; Price & Glad, 2003) and exposure to family aggression and a hostile family climate (e.g., Dodge et al., 1997; Fite et al., 2008; Schultz & Shaw, 2003).

However, SIP biases may stem not only from exposure to harsh parenting but also from experiences youths have had with social partners in specific types of relationships, such as peers or romantic partners. Indeed, there is some evidence that relationship history with peers has an impact on the attributions made by aggressive children. Dodge et al. (2003), for example, found that peer rejection during elementary school predicted subsequent SIP biases in hypothetical peer situations. There also is a small body of research linking SIP biases in romantic relationships to subsequent violence directed toward romantic partners (e.g., Clements & Holtzworth-Munroe, 2008; Holtzworth-Munroe & Hutchinson, 1993), and reciprocal relations over time have been found between spouses' attributions for one another's behavior and marital satisfaction (Karney & Bradbury, 2000). An unresolved question is how initial attributions and SIP biases are shaped in the context of extrafamilial relationships. Harsh treatment by peers and by romantic partners represents possible pathways through which SIP biases develop.

Maladaptive SIP may be expressed only with particular others (such as a parent, peer, or romantic partner), or it may reflect a generalized way of processing and responding to social

cues irrespective of partner. There has been little empirical examination of whether SIP biases are domain specific or whether they generalize across domains. Furthermore, it is unclear from prior research whether experiences in a particular relationship domain are predictive only of SIP problems and aggression in that domain or of SIP problems and aggression across domains.

The Present Study

The present study was guided by five research questions. First, do harsh experiences in the domains of peer social rejection and romantic relationships predict subsequent violent behavior toward peers and romantic partners with domain specificity? Second, do SIP biases in a relationship domain predict subsequent violence toward relationship partners in that domain and to a greater degree than in another domain? Third, do harsh early experiences in a given relationship domain predict subsequent SIP biases in that relationship domain and to a greater degree than harsh experiences in another domain? Fourth, do SIP biases in a relationship domain mediate links between harsh experiences in that domain and subsequent violence toward partners in that domain? Fifth, is harsh parenting a domain-general predictor of SIP biases and violent behavior? We addressed these questions using structural equation models for two key relationship domains of early adulthood, peer relationships and romantic relationships, with peer rejection during middle childhood and victimization by a romantic partner during adolescence, respectively, as indicators of harsh treatment within each relationship domain. Given the centrality of the notion of domain-specificity in SIP theory, we hypothesized that harsh experiences in a relationship domain would predict SIP biases in that relationship domain, which would in turn predict violent behavior in that domain. Because of the plausible alternate hypothesis that the child's initial level of externalizing problems could account for all other correlations, we controlled for initial externalizing problems.

To test for domain specificity versus generality in these links, SIP biases in peer relationships were examined as mediators of the link between victimization in a romantic relationship during adolescence and violence toward a romantic partner in early adulthood, and SIP biases in romantic relationships were tested as mediators of the link between peer rejection during childhood and violence toward peers during early adulthood. Because of evidence that individuals' SIP biases may be specific to particular relationship partners (e.g., Peets, Hodges, Kikas, & Salmivalli, 2007), we hypothesized that SIP biases would be domain specific to either peer relationships or romantic relationships and would not mediate links between harsh early treatment and subsequent violence in the alternate domain. Domain specificity with respect to harsh parenting was not tested because of theoretical considerations (as noted in the following paragraph) and because the age-22 years SIP assessments focused solely on SIP biases in the peer domain and in the romantic partner domain.

In tests of domain-general SIP and domain-general violence, we hypothesized that early harsh treatment by parents would predict later violent behavior across all domains. Social-learning theory (Snyder et al., 2003) and attachment theory (Bretherton, 2005) both suggest that early experiences with one's parents are so central to the development of one's general interpersonal orientation and working models of relationships that these early experiences would have pervasive effects on all relationship outcomes. The extended hypothesis was that harsh parenting would antecede SIP toward both peers and romantic partners and that SIP in these two domains would mediate the impact of early harsh parenting on violence toward peers and toward romantic partners.

Method

Participants

Families were participants in an ongoing, multisite longitudinal study of child development (Dodge et al., 1990; Pettit, Bates, & Dodge, 1997). Participants were recruited when the children entered kindergarten in 1987 or 1988 at three sites: Knoxville, Tennessee, Nashville, Tennessee, and Bloomington, Indiana. Parents were approached at random during kindergarten preregistration and were asked whether they would participate in a longitudinal study of child development. About 15% of children at the targeted schools did not preregister. These participants were recruited on the first day of school or by subsequent contact. Of those asked, approximately 75% agreed to participate. The sample consisted of 585 families at the first assessment; this sample was demographically representative of the schools and communities from which it was drawn. Boys comprised 52% of the sample (girls comprised 48%). Eighty-one percent (81%) of the sample were European American, 17% were African American, and 2% were from other groups. Follow-up assessments were conducted annually through age 24 years. Analyses for the present study were based on 85% ($n = 497$) of the original 585 families who provided data on at least one peer or romantic partner outcome variable at age 23 years or age 24 years. The 497 participants included in the analyses were of higher socioeconomic status in kindergarten than were the 88 original participants who were not included in the analyses, $F(1, 567) = 19.07, p < .001$, were more likely to be female, $\chi^2(1, N = 585) = 22.02, p < .001$, and more likely to be European American, $\chi^2(2, N = 585) = 16.81, p < .001$, but these two groups did not differ significantly by mother-rated externalizing behavior problems in kindergarten. Adequate sample size for structural equation modeling has multiple aspects. The models in the current work are saturated, and so power to reject a null hypothesis of perfect fit or close fit is not applicable. Rather, we focus on the required sample size to detect indirect effects, as estimated by Fritz and MacKinnon (2007). For the method we selected, the percentile bootstrap, power is .8 to detect a product of two small (standardized $b = .14$) coefficients with a sample size of 558, somewhat larger than our sample size. However, power increases rapidly with the smaller of the two coefficients: If both are at least a moderate .26 (standardized), a sample size of 162 yields power of .8. Thus, we believe that our sample size is adequate for our planned tests of mediation.

Procedures and Measures

Data were collected from target participants and their peers, romantic partners, and mothers, using questionnaires and structured interviews. Measures and descriptive statistics are listed in Table 1.

Relationship history risk factors

Harsh parenting: During the summer before children started kindergarten, mothers completed three measures related to harsh discipline. First, an interviewer administered the structured concerns and constraints interview, which includes five hypothetical vignettes involving child misbehavior (e.g., child losing a race and calling the winner a bad name). After each vignette was presented to the mother, she was asked what she would do if her child behaved this way. The mother's free response was coded 1 if it involved the use of physical punishment and 0 if it did not. A total physical punishment score was computed by averaging across the five vignettes so that higher scores corresponded with greater use of physical punishment.

Second, at this assessment, mothers also completed a modified version of the Conflict Tactics Scale (Straus, 1979) that included 14 discipline behaviors, ranging from a discussion of issues to physical and verbal violence. The mother reported how frequently (0 = *never*, 6

= *almost every day*) she had used each discipline strategy over the past 12 months and prior to the last 12 months. For the present study, we used a modified version of the Aggression Scale (see Strassberg, Dodge, Bates, & Pettit, 1992; $\alpha = .6$ to $.9$), which measures physical discipline and violence, including threatening or actually throwing something at the child, hitting or spanking the child with the hand, or hitting or spanking the child with an object.

Third, trained researchers conducted in-depth interviews with mothers in their homes asking questions regarding how the child was disciplined, whether the child was ever physically punished, and if so, how physical punishment was delivered (e.g., spanking with hand or with object; Deater-Deckard, Dodge, Bates, & Pettit, 1996), for each of two developmental eras (ages 1 year to 4 years, and 4 years to 5 years). Following these questions, interviewers privately rated the discipline received by the child on a 5-point scale ranging from 1 (*nonrestrictive, mostly positive guidance; the parent reports no physical punishment; the majority of misbehavior is controlled with reasoning or appropriate use of other non-physical punishments, or the parent monitors the child to avoid trouble*) to 3 (*moderately restrictive, sometimes physical; the parent reports a mixture of discipline methods and some sense that the type of discipline covaries with the nature of the misbehavior*) to 5 (*strict, often physical; the parent reports numerous restrictive and physical means of discipline and uses physical discipline for much misbehavior*). The interviews of 56 randomly selected mothers were either attended in person or listened to on tape by a second rater; interrater reliability was good ($r = .80$). The ratings across the two developmental periods were averaged ($\alpha = .73$). Scores from these three measures were standardized and averaged to create a harsh parental discipline composite (see Deater-Deckard et al., 1996, for additional details).

Social rejection by elementary-school peers: Sociometric nominations were made by children's peers in kindergarten through third grade. Children whose parents consented for them to participate (at least 75% of the children in each classroom) were presented with pictures (for kindergarten and first graders) or names (for second and third graders) of their classmates and were asked to nominate up to three classmates they liked the most and up to three classmates they liked the least (Harrist, Zaia, Bates, Dodge, & Pettit, 1997). A social preference score was created in each year by taking the standardized difference between the standardized like most nomination score and the standardized like least nomination score each child received (Coie, Dodge, & Coppotelli, 1982). Peer rejection in each year was determined by social preference scores less than -1 , standardized like most scores less than 0, and standardized like least scores greater than 0 (Coie & Dodge, 1983). Number of years peer rejected reflected a sum of the number of years from kindergarten through third grade the child was rejected by peers.

Victimization by adolescent romantic partner: At the age of 18 years, participants were interviewed and completed questionnaires. A total of 226 participants reported being in a romantic relationship of at least 2 months duration. These participants completed a short version of the Revised Conflict Tactics Scale (Straus, Hamby, Boney-McCoy, & Sugarman, 1996) to describe violence that may have occurred in the context of disagreements with their romantic partner. Six items (e.g., pushing, punching, slapping; 0 = *never*, 20 = *20 or more times in the last year*) were asked to assess the participant's physical victimization in the romantic relationship. The items were averaged to create an index of the participant's victimization by adolescent romantic partner ($\alpha = .73$).

SIP in early adulthood—When participants were 22 years old, they were presented with five vignettes describing challenging peer situations (e.g., You tell a friend something personal and ask your friend not to discuss it with anyone else. However, a couple of weeks later, you find out that a lot of people know about it.) and five vignettes describing

challenging situations in romantic relationships (e.g., You are at a gathering with a group of friends and learn that your girlfriend or boyfriend and one of the people at the gathering used to be a couple; they spend most of the night talking with each other.). The measure was developed for the present study, drawing on three peer vignettes developed by Coccaro, Noblett, and McCloskey (2009). Participants were asked to imagine that they were the person in the vignette who had been provoked. Following each vignette, participants were asked a series of questions to assess their SIP related to the vignette. First, participants were asked how likely it was that the other actor in the vignette was being mean to them (1 = *not at all likely*, 5 = *very likely*). Responses were averaged across vignettes to create an index of hostile attributions in peer relationships ($\alpha = .54$) and in romantic relationships ($\alpha = .61$). Second, participants were asked how aggressively they would respond if they were in that situation (1 = *not at all*, 5 = *very aggressively*). Responses were averaged across vignettes to create an index of aggressive responding in peer relationships ($\alpha = .71$) and in romantic relationships ($\alpha = .74$). Third, participants were asked several questions regarding their thoughts about hypothetical aggressive responses that were presented as possible reactions to each vignette: (a) How good or bad do you think this is, as a way to act (1 = *very bad*, 5 = *very good*); (b) if you acted this way, how much would the other person respect you (1 = *very much*, 5 = *not at all*; reverse coded); (c) how would you feel about yourself if you acted like this (1 = *very bad*, 5 = *very good*); and (d) how much would other adults like you if they saw you acting like this (1 = *very much*, 5 = *not at all*; reverse coded). Responses were averaged within and across vignettes to create an index of aggressive response evaluation in peer relationships ($\alpha = .89$) and in romantic relationships ($\alpha = .91$). Composite SIP related to peers ($\alpha = .61$) and SIP related to romantic partners ($\alpha = .66$) variables were created by standardizing and averaging the three SIP steps in each domain.

Violence toward adult peers and romantic partners—When participants were ages 23 years and 24 years, they completed the General Violence Questionnaire (Holtzworth-Munroe, Meehan, Stuart, Herron, & Rehman, 2000), which assesses violence in a number of specific relationships. Participants' reports of their violence toward same-sex peers, opposite-sex peers, and coworkers were assessed with six items (e.g., You pushed, shoved, grabbed, slapped, or threw something at them; You punched, hit, kicked, bit, or slammed them against a wall; 0 = *never*, 20 = *20 or more times in the last year*) for each type of relationship. Items were averaged across these three types of adult peer relationships and across the 2 years to create an index of violence toward adult peers ($\alpha = .72$).

A total of 379 participants were in a romantic relationship at age 23 years, age 24 years, or both. If participants were in a romantic relationship, they and their romantic partner completed the Revised Conflict Tactics Scale (Straus et al., 1996) to describe violence that may have occurred in the context of disagreements with one another. In each of the 2 years (i.e., ages 23 years and 24) years, 13 items (e.g., pushing, punching, slapping; 0 = *never*, 20 = *20 or more times in the last year*) were asked to assess physical violence in the romantic relationship. The items were averaged across years (or just within a single year if the participant was not in a romantic relationship in one of the years) to create an index of the participant's violence toward the romantic partner from the perspective of the participant and the romantic partner ($\alpha = .88$).

Externalizing behavior problems in early childhood—During the summer before children started kindergarten, mothers completed the Child Behavior Checklist (Achenbach, 1991), which includes items that describe problems such as getting in fights and being disobedient at school. For each item, mothers rated whether the statement was *not true for the child* (0), *somewhat or sometimes true* (1), or *very true or often true* (2). The 33 items in the mother-rated externalizing behavior subscale were summed to create a composite ($\alpha = .88$).

Results

Interrelationships Among Study Variables

As shown in Table 1, early harsh parenting and number of years rejected by peers in elementary school were positively correlated; neither was associated with victimization by a romantic partner in adolescence. Harsh parenting predicted SIP deficits in the peer domain and violence toward both peers and romantic partners.

Peer rejection in elementary school was significantly and positively associated with violence toward peers but not violence toward romantic partners at ages 23–24 years. Victimization by an adolescent romantic partner predicted violence toward romantic partners at ages 23–24 years and predicted violence toward peers, although not as strongly.

Early peer rejection predicted SIP deficits in the peer domain but not SIP deficits related to romantic partners. Victimization by an early romantic partner predicted SIP deficits related to romantic partners and SIP deficits related to peers.

SIP deficits in the peer domain predicted later violent behavior toward both peers and romantic partners. SIP deficits in the romantic relationship domain predicted violent behavior toward romantic partners and violent behavior toward peers.

All associations were generally modest in magnitude. Men were more likely than women to exhibit SIP biases and deficits in the peer domain; women were more likely to show biases and deficits in the romantic relationship domain. Gender differences were not found for violence toward peers or violence toward a romantic partner, and this was the case both for self-reported violence and partner-reported violence.

Hypothesis Testing

We next turned to an examination of domain generality versus specificity in associations among harsh treatment in earlier social relationships, SIP biases, and violence toward peers or romantic partners. All models were estimated as path analyses in Mplus version 5.2 (Muthén & Muthén, 2009). Missing data were handled with full information maximum likelihood (FIML) estimation, which results in unbiased parameter estimates and appropriate standard errors when data are missing at random. Even when the missing at random assumption is not fully met, full information maximum likelihood estimates are generally better than estimates obtained with listwise deletion or other ad hoc methods (Schafer & Graham, 2002). As shown in Table 1, on average, 4% of cases were missing data on the study variables, with the exception of romantic partner victimization and violence toward romantic partners, which were missing 45% and 23% of cases, respectively, because not all participants had romantic partners at the waves when these variables were assessed. Mplus's facility for testing indirect effects with bootstrapped confidence intervals was used, following the recommendation of MacKinnon (2008) for complex models. That is, each indirect effect was estimated as the product of the two component path coefficients with an asymmetric empirical confidence interval derived from the percentile bootstrap with 3,000 draws. The 95% confidence interval is calculated as the 2.5 and 97.5 percentiles of the empirical distribution of the indirect effect. The net result of this approach is a confidence interval for the indirect effect that does not rely on assumptions of normal sampling distributions, which Bollen and Stine (1992) established as being the exception rather than the rule for products of coefficients.

We first tested the conceptual model including early peer rejection, victimization by a romantic partner, parental harsh discipline, SIP toward peers and romantic partners, and later violence in the domains of peer and romantic relationships, with early externalizing behavior

problems as a covariate (see Figure 1). The model was saturated and thus (trivially) fit perfectly. Significant paths and coefficients for the direct effects are shown in Figure 2.

The test of Hypothesis 1 indicated that there were no significant direct effects of early peer rejection on violence toward peers or of victimization by a romantic partner on violence toward romantic partners. The test of Hypothesis 2 indicated that SIP toward peers had a significant direct effect on violence toward peers, but SIP toward romantic partners did not have a significant direct effect on violence toward romantic partners. The test of Hypothesis 3 indicated that early peer rejection had a significant direct effect on SIP toward peers but not toward romantic partners; early victimization by a romantic partner had a significant direct effect on SIP toward both peers and romantic partners. The test of Hypothesis 4 indicated a significant indirect effect of victimization by a romantic partner at age 18 years on violence toward a romantic partner at ages 23–24 years through the two SIP variables at age 22 years, the sum of products of coefficients ($a_1b_1 + a_2b_2$) = 0.045, 95% CI [0.008, 0.112], though neither individual indirect effect was significant (confidence intervals included zero). Victimization by a romantic partner also showed a significant indirect effect on violence toward peers, mediated by SIP toward peers ($ab = 0.009$), 95% CI [0.001, 0.020]. There was a significant indirect effect of peer rejection on violent behavior toward peers via SIP toward peers ($ab = 0.004$), 95% CI [0.000, 0.013].

The test of Hypothesis 5 indicated that harsh discipline significantly predicted SIP toward peers, but not toward romantic partners. Harsh discipline yielded significant total effects (direct plus indirect) on violent behavior toward later romantic partners (estimated = 0.038), 95% CI [0.003, 0.079], and violent behavior toward peers, estimated = 0.012, 95% CI: 0.003, 0.024. The direct effects of harsh discipline on violent behavior were not significant. We found a significant indirect effect of harsh discipline on violence toward peers, mediated by SIP toward peers ($ab = 0.004$), 95% CI [0.0004, 0.010], but not on violence toward romantic partners. There were no significant indirect effects via SIP related to romantic partners (confidence intervals included zero).

Because previous research often has found gender differences in violent behavior (e.g., Magdol et al., 1997; Moffitt, Caspi, Rutter, & Silva, 2001), we contrasted multigroup models by gender to determine whether the associations of interest differed for men and women. A model in which the eight paths comprising the indirect effects were constrained to be equal for men and women did not fit significantly worse than did a model in which paths were free to vary across gender, $\chi^2(10, N = 497) = 7.85, ns$. Therefore, we concluded that the associations of interest did not differ by gender.

Discussion

The findings reported here advance an understanding of the socialization and social-cognitive pathways through which interpersonal violence in adulthood may develop. The study represents the first-ever report of SIP mediating the effect of early harsh parenting on any adult outcome and extends this line of inquiry to pathways involving general experience history, general social-cognitive mediators, and domain-specific experiences and mediators. Evidence supported domain generality of developmental antecedents of violent behavior and the mediation of these relations through peer-domain SIP deficits.

Domain Generality in Socialization and SIP

Theory and data from attachment and social-learning perspectives suggest that important early experiences with parents have a general impact on later violent behavior that is mediated by general cognitive processes. In the context of the current study, this would be the case if both peer SIP and romantic partner SIP mediated the relation between early harsh

parenting and later violence toward both peers and romantic partners. Findings supported the role of peer SIP, but not romantic partner SIP, in mediating the link between early harsh parenting and later violence toward peers.

There is abundant evidence that early harsh parenting predicts early SIP biases and deficits (Dodge & Pettit, 2003), but the current study is the first to demonstrate that early (prior to age 5) harsh parenting predicts SIP biases and deficits that last into early adulthood. The mechanisms through which the experience of harsh parenting increases the likelihood of later aggression are well known and include modeling of aggression, negative reinforcement for behaving in coercive and manipulative ways, and anger and emotional dysregulation resulting from being the target of punitive discipline. These mechanisms theoretically would apply to a variety of antisocial and violent outcomes, including violence directed toward both peers and romantic partners. Research on the developmental antecedents of romantic-relationship violence has yielded findings linking the experience of early harsh treatment to later cognitions about, and behavior toward, romantic partners (e.g., Pettit et al., 2006). However, no previous study has simultaneously considered cross-domain violence and cross-domain social cognitions as downstream outcomes of harsh discipline and other forms of harsh treatment. At the bivariate level, early harsh parenting predicted violence toward both peers and romantic partners, but the structural analyses show that after taking into account violence toward peers, early harsh discipline does not predict violence toward romantic partners. Similar results were found for social rejection by elementary-school peers and victimization by an adolescent romantic partner: Each predicted SIP biases and violence in the peer domain but not in the romantic relationship domain.

It is important to note that contemporary perspectives on harsh discipline and other forms of harsh treatment have emphasized that child adjustment characteristics may elicit negative reactions from caregivers and that harsh treatment and behavior problems are related in reciprocal, transactional ways (Pettit & Arsiwalla, 2008). Our focus in the current study was on the identification of socialization pathways to adult violence. By controlling for initial (kindergarten) levels of externalizing behavior, we sought to rule out—at least partially—an alternative explanation that links among harsh treatment, SIP, and violence were driven by early appearing patterns of aggressive, disruptive behavior. It still is possible that later-appearing antisocial behavior patterns would account for as much or more of the variance in SIP and violent behavior as early experiences with peers, partners, and parents. Even those later-appearing behavior patterns, however, likely are the result of ongoing transactions between children and adolescents and salient relationship partners.

Because of the possibility of gender differences in violent behavior outcomes and their predictors, we examined the role of gender in our analyses. Bivariate correlations showed that men were more likely than women to exhibit SIP biases and deficits in the peer domain; women were more likely to show biases and deficits in the romantic relationship domain. Men may be more likely to misjudge peers' intentions in conflict situations because possible confrontation with peers—especially physical confrontation—triggers scripts and schemas that develop in the context of competition with peers across childhood and adolescence (Ruble, Martin, & Berenbaum, 2006). Women may be more likely to misjudge romantic partners' intentions because of jealousy and relationship insecurity that develop in the context of emotionally intense friendship networks and in earlier dating relationships (Connolly, Craig, Goldberg, & Pepler, 2004). No gender differences in violence were found in the present study, which may be attributable to the way in which we measured violence. A conclusion that might be drawn from recent research and thinking on gender and violence is that women are more likely to be seriously injured by a partner but are equally likely to be a perpetrator (e.g., see Holtzworth-Munroe, 2005). Our measures of violence focus on

prevalence rather than injury, which may explain the absence of gender differences. Multigroup models showed no gender differences in the indirect effects of interest.

Domain Specificity in Socialization and SIP

Consistent with a domain-specificity model, early social rejection by elementary-school peers predicted adult violence toward peers through SIP biases in the peer domain. However, victimization by a romantic partner also predicted adult violence toward peers through SIP biases in the peer domain, which is inconsistent with a domain-specificity model. Formulations of the role of SIP in the development of conduct problems and aggression (Dodge & Pettit, 2003) have stressed that SIP biases and deficits serve as a connecting link—a mechanism of transmission—through which experiences of harsh treatment in a particular relational domain exert an impact on subsequent displays of violence in that relational domain. The findings reported here provide only limited support for these formulations. In this sample of young adults, with these particular measures of SIP, biases and deficits that were specific to peers served as a general mediator; biases and deficits that were specific to romantic partners did not serve as a mediator.

That indirect effects with romantic partner SIP were nonsignificant is somewhat puzzling in light of the correlation patterns shown in Table 1. As can be seen, victimization by a romantic partner was positively and significantly associated with romantic partner SIP, which in turn was significantly associated with romantic partner violence. On the other hand, peer rejection was not significantly correlated with romantic partner SIP. The bivariate findings, then, are consistent with domain specificity, but these findings do not extend to the dual-domain structural analyses. Most likely this is due to the substantial empirical overlap between the peer SIP and romantic partner SIP measures. This overlap may explain why peer SIP and romantic partner SIP conjointly mediated the link between romantic partner victimization and violence toward a romantic partner, but the component paths (i.e., separate indirect effects for each SIP domain) were nonsignificant.

Whereas there was no evidence for domain specificity in the romantic relationship domain, the findings for the peer domain are consistent with the predictive model outlined in the introduction. Peer rejection in middle childhood predicted peer-domain SIP biases and deficits at age 22 years, which in turn predicted violence directed toward peers at ages 23–24 years. These findings join with prior research documenting the role of negative peer experiences in the development of SIP problems (Dodge et al., 2003; Lansford et al., 2009), but extend these findings by showing that the links are enduring (i.e., that they persist across adolescence and into early adulthood) and that early peer experiences and peer-relevant SIP forecast later violence toward peers.

Socialization models that have incorporated SIP as an explanatory mechanism have focused on the mediating role of SIP in the association between adverse relational experiences and subsequent aggression and violence (e.g., Dodge et al., 1990). Tests of mediation require that antecedents (e.g., harsh parenting or peer rejection) predict SIP biases and deficits and later violent behavior and that SIP predicts later violent behavior. The extent to which SIP accounts for (explains) the direct pathway between early harsh treatment and later violence provides an indication of the degree of mediation. However, recent discussions of indirect versus mediated effects (e.g., MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) have drawn attention to the ways in which conceptually relevant intervening variables may serve as important linking mechanisms between predictors and outcomes, especially in longer term longitudinal studies in which the antecedents and outcomes are temporally removed. Such was the case in the present study, in which the span between the peer rejection indicators and later violence toward peers ranged from 15 years to 19 years. The peer-domain model, therefore, is best construed in terms of a developmental cascade (Dodge

et al., 2009) in which early harsh treatment by peers fosters the development of a maladaptive SIP style marked by a tendency to interpret peers' intentions in potential conflict situations in a biased (hostile) manner, to access aggressive responses to address the conflict, and to believe that aggression will be successful in resolving the conflict. These SIP biases and deficits then act to increase the likelihood of peer-directed violence.

In the romantic-relationship domain, the findings are consistent with a mediational model in which victimization by a romantic partner predicts SIP biases and deficits with peers, which in turn predict later violence toward adult peers. The developmental sequence described above for the peer domain applies to the romantic domain as well. But victimization by a romantic partner predicted only cross-domain (peer) SIP biases and deficits. Why might victimization by a romantic partner be mediated by SIP biases specific to peers? We would speculate that because romantic relationships in adolescence tend to be embedded in the larger peer network (Connolly et al., 2004) the experience of harsh treatment by a romantic-relationship partner might lead to broad relationship expectations and beliefs that color SIP in other relational domains. To the extent that peers and partners constitute a fairly tight-knit social network, experiences with peers and with partners may engender similar SIP styles and similar (adaptive or maladaptive) behavioral outcomes.

Limitations

Data for the current study were collected over a span of 19 years (age 5 years to age 24 years), with a variety of methods and reporters supplying information. Coherent predictive relations from childhood and adolescence to early adulthood were found. However, assessments of harsh treatment in the domains of interest—peers and romantic partners—were conducted at different points in development. On the one hand, this was a sensible approach because peer-group acceptance is developmentally salient in middle childhood, and establishing and maintaining relationships with a romantic partner are developmentally normative in late adolescence. On the other hand, this temporal imbalance may have influenced the patterns of results for peers and romantic partners. Because the latter relied on more closely spaced assessments, it is not clear whether this represents a substantive finding or a methodological artifact.

In terms of informant, data were drawn from parents, classroom peers, romantic partners, and the participants themselves. The SIP measures and the violent behavior measures (with the exception of partner report of violence at ages 23–24 years) were based on participant report. This leaves open the possibility that shared method variance accounts for some portion of the relation between SIP and violent behavior. Also, because SIP in relation to parents was not assessed, we were unable to conduct a full test of domain-specificity versus domain-generality for harsh parenting. Concern about this potential limitation is tempered, however, by existing theory and data suggesting that early parent–child relationships set the stage for subsequent interpersonal functioning across a range of contexts and domains.

This study tested models that depict one set of pathways through which violent behavior in adulthood may develop. Other pathways no doubt exist, such as ones that focus on parenting and peer relations (including affiliations with antisocial peers) in adolescence and ones that focus on attachment and emotional insecurity. Future research might profit from developing, contrasting, and integrating models that draw from differing theoretical orientations and that use methods from a variety of sources.

Conclusion

This research is important because it extends the study of SIP biases and deficits into early adulthood, a time in life when new forms of violence, particularly against romantic partners,

begin to emerge. Precursors of early adult SIP and violent behavior in experiences of harsh treatment and rejection in childhood and adolescence were identified and provided evidence of significant links among experiences of harsh treatment, SIP, and violent behavior.

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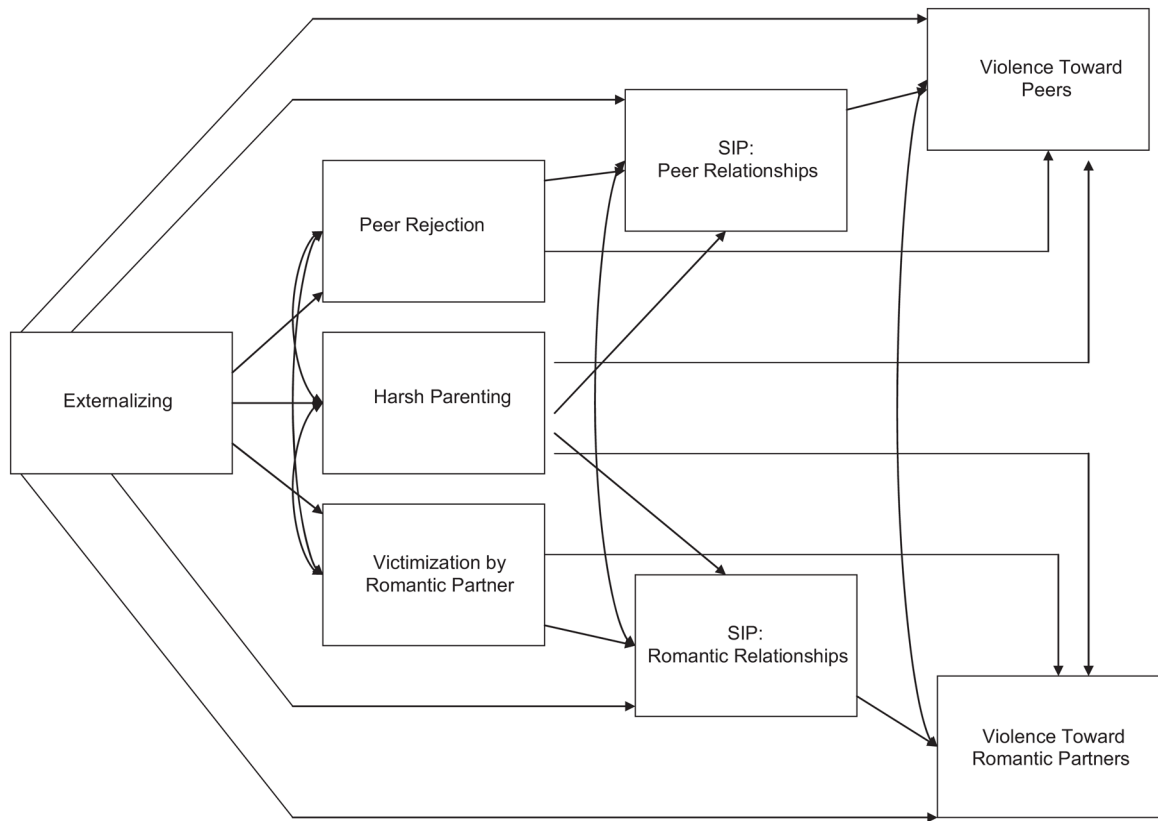


Figure 1. Conceptual model showing direct effects of harsh treatment in peer and romantic relationships on subsequent violence in those domains and indirect effects through social-information processing (SIP) biases in peer and romantic partner domains. Disturbances are not explicitly shown; double-ended paths between endogenous variables are expected covariances between disturbances.

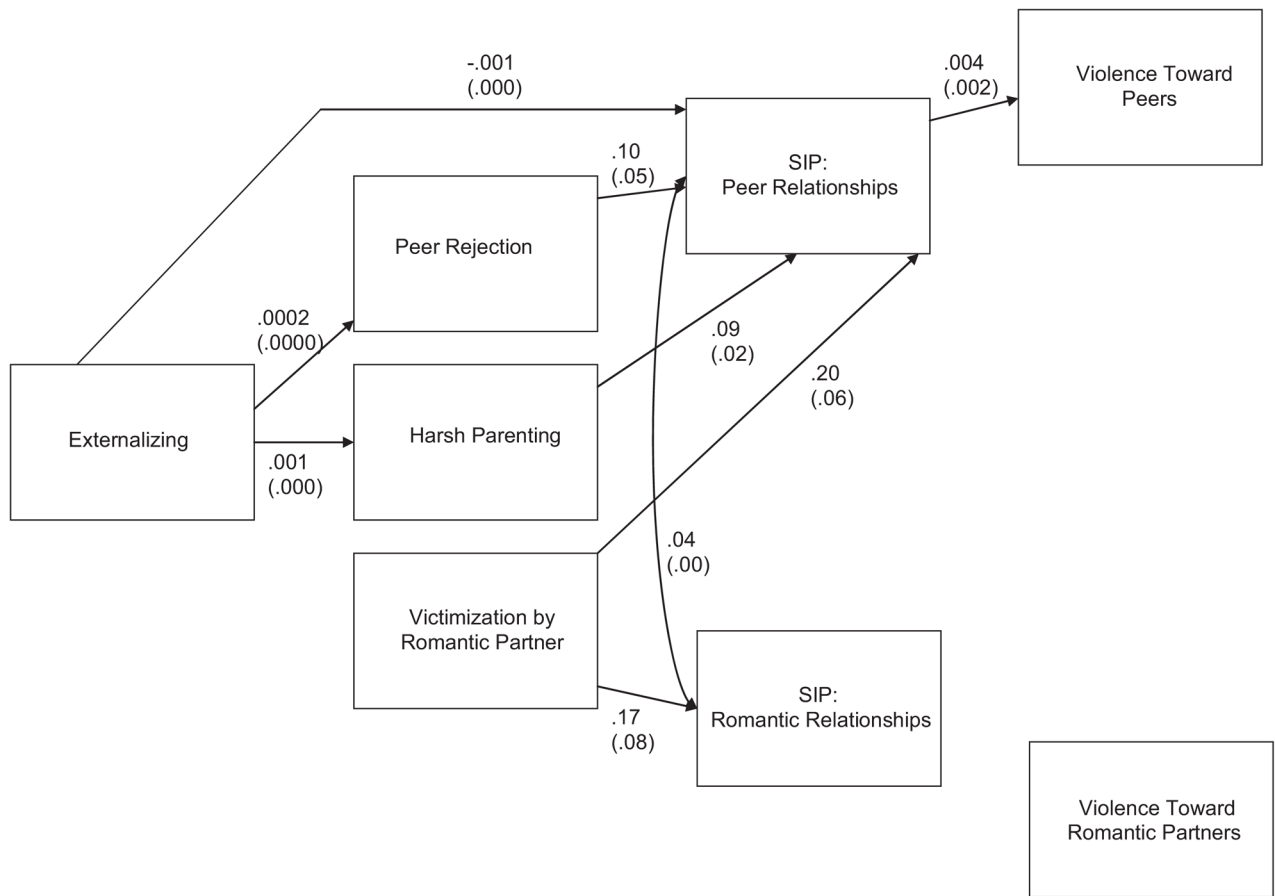


Figure 2. Model showing significant unstandardized path coefficients (and standard errors) of harsh treatment in parent–child, peer, and romantic relationships on social-information processing (SIP) biases and violence. Indirect paths are described in the text. Disturbances are not explicitly shown; double-ended paths between endogenous variables are significant covariances between disturbances.

Table 1

Descriptive Statistics and Bivariate Correlations

Variable	1	2	3	4	5	6	7	8	9
1. Harsh parenting ^d	—								
2. Number of years peer rejected ^b	.15**	—							
3. Victimization by romantic partner ^c	.01	.08	—						
4. SIP related to peers ^c	.16**	.11*	.29***	—					
5. SIP related to romantic partners ^c	.01	.03	.23***	.63**	—				
6. Violence toward peers ^c	.16**	.13*	.18**	.26***	.22***	—			
7. Violence toward romantic partner ^{c,d}	.17**	.09	.27***	.27***	.24***	.40***	—		
8. Child externalizing ^d	.36***	.18***	-.13	-.02	-.04	.10*	.16**	—	
9. Child gender (0 = male, 1 = female)	-.10*	-.07	-.10	-.13	.14**	-.05	.03	-.06	—
<i>N</i>	493	494	226	438	436	488	379	482	497
% Male									52%
<i>M</i>	-0.11	0.34	0.33	0.00	0.00	0.08	0.17	11.48	
<i>SD</i>	1.91	0.71	1.17	0.75	0.78	0.17	0.62	7.10	
Participant age when assessed (years)	5	5-8	18	22	22	23-24	23-24	5	5

Note. SIP = social-information processing.

^aMother report.

^bPeer report.

^cSelf report.

^dRomantic partner report.

* $p < .05$.

** $p < .01$.

*** $p < .001$.