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Mutual Antipathy Involvement: Gender and Associations With Aggression and Victimization

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Abstract. The association between increases in antipathy involvement over time and growth in aggression and victimization was investigated. Results indicated that antipathy involvement was dynamically related to aggression and victimization, controlling for peer rejection. However, these longitudinal associations depended on the gender of the child. In particular, increases in the number of antipathy partners over time were associated with time-dependent increases in physical aggression and physical victimization for boys only. In contrast, growth in antipathy involvement predicted increases in relational aggression for girls only. These results suggest that negative peer relations at the dyadic level are important dynamic predictors of change in aggression and victimization over time. Implications for the practice of school psychology are discussed.

Understanding the development of children's aggressive behavior and experiences of victimization in the school setting has been an important goal of school professionals for decades. In fact, school psychologists have identified bullying and harassment as one of the key issues currently faced by children (Crockett, 2004). In addition, government and public pressure for school intervention programs addressing aggression and victimization is increasing (Espelage & Swearer, 2003; Limber & Small, 2003; Walker, 2004). This focus in part reflects the understanding that aggressive and victimized children exhibit a number of adjustment problems, such as depression, poor school performance, school avoidance, and dropping out of school (e.g., Buhs, Ladd, & Herald, 2006; Crick & Grotpeter, 1996; Day, Bream, & Paul, 1992; Farmer et al., 2003; Kochenderfer & Ladd, 1996; Miles & Stipek, 2006; Vitaro, Brendgen, & Tremblay, 2002). School-based interventions aimed at identifying at-risk children or working to reduce children's aggressive behavior patterns and experiences of victimization would benefit from information regarding how relationships with others at school (e.g., administrators, teachers, and peers) may influence involvement in aggression and victimization.

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One important factor associated with school-based aggression and victimization is negative relations with peers in the classroom. To date, most research in this area has concentrated on children's social position within the classroom as a whole, affording a central position for the study of constructs such as peer rejection. However, recently researchers have identified the role of peer relationships characterized by mutual dislike in children's aggression and victimization. Specifically, Abecassis, Hartup, Haselager, Scholte, and Van Lieshout (2002) found that children involved in "mutual antipathy relationships" (i.e., two children who identify each other as disliked peers) were more likely than their peers to engage in aggressive conduct and experience victimization. In addition to a focus on peer rejection, researchers have tended to focus on physical forms of aggression and victimization, neglecting types of behavior more salient for girls (e.g., relational aggression; Crick & Bigbee, 1998; Crick et al., 1999). The purpose of the present investigation was to explore the hypothesis that antipathy involvement is associated with change in aggression and victimization over time. This work expands the findings of previous research by adopting a longitudinal design to investigate the unique contribution of antipathy involvement in predicting aggression and victimization over time and examining the role of mutual antipathies in the prediction of relational, as well as physical, forms of these social experiences.

A plethora of research has established that rejection by peers is positively associated with children's engagement in physically aggressive behaviors (Coie & Dodge, 1998; Dodge et al., 2003; Ialongo, Vaden-Kiernan, & Kellam, 1998; Kupersmidt, Burchinal, & Patterson, 1995; Little & Garber, 1995; Pettit, Clawson, Dodge, & Bates, 1996; Pope & Bierman, 1999; Zimmer-Gembeck, Geiger, & Crick, 2005) and experiences of victimization (Hanish & Guerra, 2000; Hodges & Perry, 1999; Ladd & Troop-Gordon, 2003; Perry, Kusel, & Perry, 1988; Salmivalli & Isaacs, 2005; Schwartz, McFadyen-Ketchum, Dodge, Pettit, & Bates, 1999). However, researchers have recently begun to examine the importance of a second class of problematic peer relationships in the prediction of physical aggression and victimization. This work focuses on the dyadic level of social interaction rather than the broad group dynamics captured with the construct of peer rejection. In particular, research suggests many children have dyadic relationships characterized by mutual antipathy, defined as "relationships in which two children reciprocally identify one another as individuals whom they do not like" (Abecassis et al., 2002, p. 1543).

The focus on antipathy relationships reflects increased attention in the peer relationship literature on the importance of mutual, dyadic relationships in children's adjustment (Hartup, 1996; Rubin, Bukowski, & Parker, 1998). Evidence from the friendship literature suggests that group-level functioning (e.g., peer acceptance and rejection) and dyadic relationships (e.g., friendship quality) have independent effects on children's adjustment. For example, in one study, peer acceptance, friendship involvement, and friendship quality each made unique contributions to children's experiences of loneliness (Parker & Asher, 1993). In more recent work, low levels of peer preference and poor friendship quality each separately contributed to girls' reassurance-seeking behaviors (Prinstein, Borelli, Cheah, Simon, & Aikins, 2005). In addition, research indicates that children's experiences in the peer group (e.g., victimization) and perceptions of functioning with peers (e.g., self-perceptions of social acceptance) have important implications for children's adjustment (Troop-Gordon & Ladd, 2005). Taken together, these findings suggest that experiences at both the dyadic and group level are important factors in children's adjustment in the school setting. Moreover, given evidence that peer problems such as peer rejection and friendlessness tend to co-occur, researchers have called for work examining the unique contributions of each (Salmivalli & Isaacs, 2005).

Similar to findings in the friendship literature, it is possible that negative peer relations at both the group (i.e., peer rejection) and dyadic level (i.e., antipathy involvement) are

important factors involved in children's functioning. Antipathy relations do occur with some frequency, with most studies identifying approximately a third of students as involved in mutual antipathy relationships (Abecassis et al., 2002; Card & Hodges, 2003; Pope, 2003; Rodkin, Pearl, Farmer, & Van Acker, 2003; Schwartz, Hopmeyer-Gorman, Toblin, & Abou-ezzeddine, 2003). For example, Abecassis and colleagues (2002) reported that boys were more likely than girls (26% vs. 8%, respectively) to be involved in at least one same-sex antipathy relationship (i.e., antipathy relationships with a same-sex peer), whereas an equal proportion of boys and girls (approximately 17% of boys and 16% of girls) participated in mixed-sex enmity relationships (i.e., antipathy relationships with a peer of the opposite sex; Abecassis et al., 2002). Overall, then, mutual dislike appears to be a relatively frequent experience among elementary school children.

A central component of the antipathy definition is that the dislike is mutual—that is, both partners agree that the other is a disliked peer (Abecassis, 2003). However, although all antipathy relationships involve dislike, the qualities of mutual antipathies may differ from one relationship to another. For example, antipathies may differ in the intensity of dislike expressed (e.g., hatred vs. aversion). In addition, the behaviors expressed in the context of these relationships may include aggression, increased interaction, or avoidance (Abecassis, 2003). Finally, antipathies may emerge in a variety of ways. For example, it has been proposed that boys' greater involvement in same-sex antipathy relationships in middle childhood may reflect their relatively high involvement in bully–victim relationships (Abecassis et al., 2002). However, a number of additional processes have been proposed regarding the origins of antipathies, including friendships that "go bad," rivalry, and personality clashes (Abecassis, 2003).

Although relatively little is known about the antecedents and quality of mutual antipathies, initial evidence indicates that participation in such relationships has significant implications for children's emotional and behavioral adjustment (Abecassis et al., 2002; Parker & Gamm, 2003; Pope, 2003; Rodkin et al., 2003). In particular, it has been suggested that antipathy relationships may be associated with children's involvement in aggression and victimization. For example, aggressive children may develop antipathy relationships because of their objectionable social behavior, and individuals with mutual antipathies may be more likely to suffer victimization at the hands of their disliked peer. Indeed, Abecassis et al. (2002) reported that same-sex antipathy involvement predicted both boys' and girls' concurrent bullying and antisocial behaviors, and boys' physical victimization by peers. In addition, mixed-sex antipathy participation was associated with heightened levels of bullying in boys. Impressively, the associations between antipathy involvement and both bullying and victimization were significant despite the fact that the analyses controlled for rejection by peers. Similarly, in another study, same-sex antipathy involvement was associated with adolescents' concurrent physical aggression and victimization by peers, even when controlling for peer acceptance (Parker & Gamm, 2003). Some researchers, however, have failed to replicate the association between antipathy involvement and concurrent physical aggression once rejection is controlled (Pope, 2003; Rodkin et al., 2003). Taken together, these findings indicate that the study of negative dyadic peer relationships may enhance our knowledge of children's school-based physical aggression and victimization beyond what has been yielded by studies of group peer relations (e.g., peer rejection), but that further replication of this work is necessary.

Recently, investigators have recognized the importance of extending studies of the correlates of peer rejection to include types of aggression and victimization particularly salient among females. One way that this has been accomplished has been to include measures of relational, in addition to physical, aggression and victimization in research. Whereas physical aggression is defined as behaviors that harm others though damage to one's physical well-being, relational aggres-

sion includes behaviors that harm others through damage to relationships or feelings of acceptance, friendship, or group inclusion (e.g., spreading rumors, giving another child the "silent treatment"; Crick & Grotpeter, 1995; Crick et al., 1999; Tomada & Schneider, 1997; for discussion of related constructs such as indirect or social aggression, see Bjorkqvist, Lagerspetz, & Kaukianen, 1992; Galen & Underwood, 1997). Correspondingly, relationally victimized children are individuals who are frequently targets of relationally aggressive behaviors (Crick & Bigbee, 1998; Crick & Grotpeter, 1996; Cullerton-Sen & Crick, 2005).

A number of studies have assessed gender differences in children's involvement in physical versus relational forms of aggression and victimization. In contrast to the gender breakdown observed with physical aggression and physical victimization, most studies with elementary school children have reported that females are more likely than males to be relationally aggressive and relationally victimized (Crick & Bigbee, 1998; Crick et al., 1999; Murray-Close, Ostrov, & Crick, in press; Parke & Slaby, 1983; Tomada & Schneider, 1997; Zimmer-Gembeck et al., 2005). However, some mixed findings have been reported. For example, in one study, males were actually *more* likely than females to be identified by peers as relationally aggressive (Henington, Hughes, Cavell, & Thompson, 1998). Nonetheless, taken as a whole, researchers have reported that males are more likely to be physically aggressive and physically victimized, whereas females are more likely to be relationally aggressive and relationally victimized (see Crick et al., 1999). These findings demonstrate that research examining only physical forms of aggression and victimization miss important information concerning the social experiences of females (Crick & Zahn-Waxler, 2003). Thus, the study of antipathy involvement, aggression, and victimization would benefit from a more gender-balanced approach that includes assessments of relational aggression and victimization.

Previous work indicates that peer rejection is associated with children's participation in relationally aggressive behaviors (Crick, 1996; Crick & Grotpeter, 1995; Rys & Bear, 1997; Werner & Crick, 2004; Zimmer-Gembeck et al., 2005) and experiences of relational victimization (Crick & Bigbee, 1998; Crick & Grotpeter, 1996). However, little research to date has explored the association between mutual antipathy involvement and relational aggression and relational victimization. It has been suggested that antipathy involvement might be associated with relational aggression use (Abecassis, 2003). For instance, Parker and Gamm (2003) proposed that children who are relationally aggressive may be especially likely to develop negative dyadic relationships with their peers, such as mutual antipathies. Alternatively, children with antipathies might have a greater incentive to engage in relationally aggressive behaviors as a means of harming their disliked peer. Consistent with this proposal, Parker and Gamm (2003) found that antipathy involvement was associated with relational aggression use, even when controlling for peer acceptance. However, the relation between antipathy involvement and relational victimization has not been explored in the research literature. Antipathy involvement may be related to children's relational victimization, as their disliked peers might use relationally aggressive behaviors to retaliate against them. Additionally, relationally victimized children may develop antipathy relationships with the perpetrators of relationally aggressive conduct. Thus, the present study examines the longitudinal association between mutual antipathy involvement and relational aggression and relational victimization.

The majority of research examining the association between mutual antipathy relationships and children's adjustment has identified the number of same- versus mixed-sex antipathy relationships. Theoretically, we may expect different developmental correlates of antipathy involvement depending on the gender composition of the antipathy dyad. Research indicates that children tend to self-segregate into same-sex peer groups during middle childhood (Maccoby, 1988, 1998). Given children's relatively high levels of interaction with same-sex peers during the elementary school

years, involvement in same-sex antipathy relationships may be associated with more negative behavioral problems than involvement in mixed-sex antipathies (Pope, 2003). In other words, children may more frequently encounter their same-sex antipathies and thus have opportunities to aggress against their disliked peer. In contrast, children tend to avoid opposite-sex peers (Powlishta, Serbin, Doyle, & White, 1994), which may in turn limit aggressive conduct in the context of mixed-sex antipathy relationships (i.e., they may avoid rather than aggress against their disliked peer). Therefore, it was expected that antipathy involvement with both same- and opposite-sex peers would contribute unique information regarding children's aggression and victimization; however, it was hypothesized that involvement in same-sex antipathy relationships would be more strongly associated with aggression and victimization.

In addition, based on evidence of gender differences in childhood, we expected that the correlates of antipathy involvement would reflect gender-specific values and experiences observed among children of this age. In particular, boys' emphasis on instrumentality and physical dominance and their relatively high levels of physical aggression and victimization (Crick et al., 1999; Crick & Zahn-Waxler, 2003; Cross & Madsen, 1997; Leadbeater, Blatt, & Quinlan, 1995) may make antipathy involvement especially predictive of physical aggression and experiences of physical victimization for boys. Indeed, Abecassis and colleagues (2002) reported that mixed-sex antipathy involvement was associated with bullying for boys only. In a similar vein, because girls tend to emphasize and value close, dyadic relationships, and because girls exhibit greater relational aggression and relational victimization than their male peers (Crick & Bigbee, 1998; Crick et al., 1999; Crick & Zahn-Waxler, 2003; Cross & Madsen, 1997; Leadbeater et al., 1995), we hypothesized that antipathy relationships would be especially important in predicting girls' relational aggression and victimization. This prediction is consistent with research suggesting that negative peer relationships at the group level (i.e., peer rejection) predict relational aggression for girls only (Werner & Crick, 2004). Overall, then, we expected that antipathy involvement would more strongly predict physical aggression and physical victimization for boys and relational aggression and relational victimization for girls.

One important limitation of the antipathy literature is that most studies adopt a cross-sectional design when examining the association between antipathy involvement, aggression, and victimization. Longitudinal work is preferable to cross-sectional research because it allows the association between antipathy involvement and *changes* in aggression and victimization to be explored. That is, longitudinal studies allow researchers to examine whether antipathy involvement is associated with increases in aggression or victimization over time. In the one longitudinal study investigating the relation between antipathy involvement and increases in physical aggression, Pope (2003) did not find a significant association between these two factors. However, no longitudinal research has examined the role of antipathy involvement in predicting growth in physical victimization, relational aggression, or relational victimization over time.

To address the longitudinal association between antipathy involvement and aggression and victimization, linear mixed models (LMMs) were employed. LMMs, which are an extension of regression models, use maximum-likelihood estimation procedures to estimate fixed effects. LMMs provide a number of advantages over more traditional methods when analyzing longitudinal data (see Bryk & Raudenbush, 1992; Long & Pellegrini, 2003; Verbeke & Molenberghs, 2000). For example, LMM procedures are more robust to violations of assumptions and permit more parsimonious models than traditional methods, which in turn yield higher power in the testing of effects (Long & Pellegrini, 2003; Verbeke & Molenberghs, 2000). In addition, these techniques are capable of modeling dynamic (time-varying) longitudinal predictors (see Long & Pellegrini, 2003; Pellegrini & Long, 2002). In other words, LMMs allow researchers to examine whether change over time in a predictor

is associated with time-dependent changes in the dependent variable. For example, LMMs allow an assessment of whether increases in the number of children's antipathy relationships are related to growth in their physically aggressive behaviors. Finally, LMM analyses are capable of accommodating missing data for cases in which the data are missing at random (Long & Pellegrini, 2003). In the present study, we were interested in exploring whether change in antipathy involvement over time was associated with growth in aggression and victimization. To address these questions, LMMs were used to estimate the dynamic covariation of antipathy involvement and aggression and victimization for both girls and boys (for a detailed explanation of this procedure, see Long & Pellegrini, 2003).

In sum, building on previous antipathy research (Abecassis et al., 2002; Pope, 2003; Rodkin et al., 2003; Schwartz et al., 2003), this study investigated the unique contribution of antipathy involvement in increases in children's aggression and victimization. Moreover, the present study examined whether participation in antipathy relationships was associated with relational forms of aggression and victimization, in addition to physical forms of such social experiences. We had three hypotheses: (a) we expected that increases in antipathy involvement over time would be associated with time-dependent increases in aggression and victimization; (b) we predicted that growth in same-sex antipathy relationships would be more strongly associated with increases in aggression and victimization than growth in mixed-sex antipathy involvement; and (c) we hypothesized that antipathy relationships would more strongly predict physical aggression and physical victimization for boys and relational aggression and relational victimization for girls.

Method

Participants

Participants were part of a longitudinal study examining the relation between aggression and adjustment. A total of 590 (50% female) fourth-graders were recruited from 40 classrooms in 10 elementary schools in a large midwestern city. All students in participating classrooms were invited to join the study. Consent forms were sent home with students following a 15-min age-appropriate description of the study to students by a trained research assistant. Seventy-three percent of all students invited to participate provided parental consent and assent and participated in the study. All fourth-grade children with consent and assent were included in the study. Ninety-four third- and fifth-grade students participated as well because they were in mixed-grade (third–fourth or fourth–fifth) classrooms; however, fourth-graders were targeted for the present study and thus only fourth-grade participants were included in analyses.

Thirty-one percent of the fourth-grade participants recruited were African American, 29% were European American, 16% were Asian American, 13% were Latino, 4% were Native American, and 6% represented other ethnic groups. The socioeconomic status of the sample was estimated to be lower class to middle class based on school demographic information. Specifically, 74% of students at participating schools qualified for free or reduced-price lunches.

Participants completed assessments during the fall (Time 1), the spring (Time 2), and the following fall (Time 3) of one calendar year. Twenty-seven children (5% of the original sample) assessed at Time 1 were not assessed at Time 2 because they moved out of participating classrooms; an additional 182 participants (31% of the sample) were not assessed at the Time 3 because they had moved out of participating classrooms or parental consent was not obtained. All students who had participated in the first assessment, regardless of attrition, were included in the LMM analyses because this technique can accommodate missing data. Children who dropped out of the study did not differ from those who participated at all three time points in gender, peer rejection, physical aggression, relational aggression, physical victimization, or relational victimization at Time 1. Attrition was associated with race, with African American, Asian American, and Latino participants

dropping out at higher rates than expected, $\chi^2 = 18.47$, $p < .01$.

Procedure

Assessments of peer rejection, mutual antipathy involvement, physical aggression, relational aggression, physical victimization, and relational victimization were conducted during the fall of the participants' fourth-grade year (Time 1), the spring of the fourth-grade year (Time 2), and fall of the fifth-grade year (Time 3). Assessments were spaced 4–6 months apart, and fall administrations were conducted during the late fall so that participants were familiar with their classmates. All participating children with informed parental consent and who provided assent participated in each classroom-administered assessment period. Children without parental consent or who did not provide assent were asked to read or work quietly at their desk during the administration procedure.

During the assessment sessions, a trained research assistant read aloud items from each measure. Participating children were provided with a class roster and asked to identify up to three classmates who best fit the description of each item. In addition, three to five research assistants circulated through the classroom to answer questions, to ensure that students were not discussing their answers, and to work individually with children who required additional attention (e.g., completing answers at a slower pace). Participating students were provided with cover sheets to ensure that their responses remained confidential during the administration period. Children were provided with a small gift (e.g., pencil) for their participation.

Instrumentation

Peer rejection and mutual antipathy involvement. Children's peer rejection and mutual antipathy involvement were assessed with a peer report measure developed in previous research (Coie & Dodge, 1983; Crick & Grotpeter, 1995). Participants were asked to nominate up to three male or female classmates whom "you like to hang out with the least." Although some researchers have assessed peer rejection and mutual antipathy involvement using ratings (e.g., Parker & Gamm, 2003), most researchers employ a limited-nomination procedure in which children are asked to identify up to three disliked peers (e.g., Abecassis et al., 2002; Card & Hodges, 2003; Schwartz et al., 2003). Thus, a limited-nomination procedure was adopted in the present study to make the results comparable to previous research. The number of negative nominations received were standardized within each classroom and then summed to yield a peer rejection score.

Children were classified as having a mutual antipathy if the participant nominated a child that he or she liked to hang out with the least and that child reciprocated the nomination (Abecassis et al., 2002). Mutual antipathies were identified as either same- or mixed-sex relationships (Abecassis et al., 2002), and scores for both types of antipathy relationships could range from 0 (*no mutual antipathies*) to 3 (*all three disliked nominations were reciprocated*).

Assessment of aggression. In the assessment session, the Children's Social Behavior Scale—Peer Report was used to assess children's physical and relational aggression (Crick & Grotpeter, 1995; Crick, 1996, 1997). Three items describing physically aggressive behaviors (e.g., "children who hit, kick, or punch others") and five items describing relationally aggressive behaviors (e.g., "people who let their friends know that they will stop liking them unless the friends do what they want them to do") were read to participants. Participants were asked to select up to three male or female students in the class who fit the description of each item (Crick et al., 1999; Leff, Kupersmidt, Patterson, & Power, 1999). The number of nominations each participant received for the physical and relational aggression items, respectively, were standardized within classroom and then summed to yield aggression scores.

The psychometric properties of this measure have been established in prior research (e.g., Crick, 1996, 1997; Crick et al.,

1999). Research assessing the factor structure of this instrument has confirmed the existence of physical aggression and relational aggression factors with eigenvalues greater than 1.0, factor loadings ranging from .70 to .91, and low cross-loadings (Crick, 1997; Crick & Grotpeter, 1995; Grotpeter & Crick, 1996). In addition, this instrument has high test–retest reliability, with $r = .82$ and $r = .90$ over a 4-week period for relational and physical aggression, respectively (Crick, 1996). The validity of this measure has been demonstrated with moderate to high correlations between teacher reports and peer reports of physical ($r = .57$ for boys and $r = .63$ for girls) and relational aggression ($r = .69$ for boys and $r = .74$ for girls; Crick, 1996). Finally, the internal consistency of the physical and relational aggression subscales have been established in a number of previous studies (e.g., Crick, 1996; Crick & Grotpeter, 1995). In the present study, the internal consistency of the Children's Social Behavior Scale—Peer Report was good (e.g., $\alpha = .88$ and $\alpha = .95$ for relational aggression and physical aggression, respectively, at Time 1).

Assessment of victimization. Experiences of physical and relational victimization were assessed with the Social Experiences Questionnaire—Peer Report, a peer nomination instrument developed in previous research (Crick & Bigbee, 1998). A trained research assistant read four items describing victims of relational aggression (e.g., "kids who are ignored by classmates when someone is mad at them") and three items describing victims of physical aggression (e.g., "kids who are beat up a lot by other classmates"). Participants nominated up to three male or female children in their classroom who fit the description of each item. The number of nominations children received for the relational victimization and physical victimization, respectively, were standardized within classroom and then summed to yield victimization scores.

Previous research has established the favorable psychometric properties of the Social Experiences Questionnaire—Peer Report (Cullerton-Sen & Crick, 2005; Crick & Bigbee, 1998). For example, Crick and Bigbee (1998) assessed the factor structure of this instrument and confirmed the presence of the physical and relational victimization factors with eigenvalues greater than 1.0, high factor loadings (ranging from .60 to .87), and low cross-loadings between factors. The validity of this instrument has been established in prior research, with low to moderate correlations between peer- and teacher-reported physical and relational victimization ($r = .21$ and $r = .34$ for physical and relational victimization, respectively; Cullerton-Sen & Crick, 2005). Finally, previous research has demonstrated good internal consistency of the subscales of Social Experiences Questionnaire—Peer Report (Cullerton-Sen & Crick, 2005; Crick & Bigbee, 1998). In the present study, the internal consistency of the Social Experiences Questionnaire—Peer Report was good (e.g., $\alpha = .79$ for relational victimization and $\alpha = .81$ for physical victimization at Time 1).

Results

Frequency, Stability, and Change in Antipathy Involvement Over Time

Descriptive analyses of children's involvement in antipathy relationships at Time 1, presented in Table 1, indicated that most children were not involved in antipathy relationships. However, a minority of students did report having at least one antipathy relationship. The incidence of antipathy involvement reported in the present article is roughly comparable to that reported by Abecassis et al. (2002). In addition, consistent with previous research (Abecassis et al., 2002), gender differences in same-sex antipathy involvement were obtained, with boys exhibiting greater involvement in at least one same-sex antipathy relationships than girls, $\chi^2 = 9.50$, $p < .01$. In contrast, males and females did not differ in their participation in mixed-sex antipathy relationships.

Analyses also indicated that the number of antipathy relationships reported by males was moderately stable between Time 1 and Time 2, with $r = .27$, $p < .001$, and $r = .22$, $p < .001$, for same-sex and mixed-sex antip-

Table 1
Proportion of Children With Same- and Mixed-Sex Antipathy Relationships at Time 1, With Significance of Gender Differences

	Number of Mutual Antipathies				Gender Differences (χ^2)
	0	1	2	3	
Same sex					
Boys	79.2%	19.0%	1.8%	0.0%	$p < .05$
Girls	88.7%	10.2%	1.1%	0.0%	
Mixed sex					
Boys	87.5%	10.8%	1.1%	0.7%	ns
Girls	88.0%	11.3%	0.7%	0.0%	

Note. ns = Not significant.

athy involvement, respectively. For girls, the number of same-sex antipathy relationships reported was not stable between Time 1 and Time 2 ($r = 0.07$, not significant), but the number of mixed-sex antipathy relationships was ($r = .13$, $p < .05$). Moreover, the number of same-sex or mixed-sex antipathies reported at Time 1 did not predict the number reported at Time 3 for boys or girls, indicating substantial change in antipathy involvement over the course of the study. Indeed, in the present sample, 44% of children who participated at all three time points changed the number of same-sex mutual antipathy relationships and 32% reported different numbers of mixed-sex antipathy relationships at least once between Time 1 and Time 3, indicating that antipathy involvement did indeed change over time. The question that then arises is whether change in antipathy involvement is meaningfully associated with change in aggression and victimization over time.

Linear Mixed Models

To address whether changes in same-sex and mixed-sex antipathy relationships were related to change in physical and relational aggression over time, we employed LMM using SAS Proc Mixed. LMM techniques are an extension of traditional regression models and use restricted maximum-likelihood methods to estimate model parameters. As in multiple regression analyses, the estimates provided for each predictor in LMMs control for the influence of the other predictors in the model; thus, the unique role of each predictor can be assessed.

LMMs can be analyzed as multilevel models with a random-effects and measurement-error covariance structure (or hierarchical linear models; Bryk & Raudenbush, 1992); however, the random effects estimates tend to be unreliable when the predictors in LMMs are highly correlated (Pellegrini & Long, 2002). Given that the predictors in the present analyses were correlated (e.g., peer rejection and same-sex antipathy involvement, see Table 2), the LMM analyses in the present study included an autocorrelation covariance structure to test the fixed effects.

Antipathy Involvement and Growth in Relational Aggression

To address the hypotheses of this study, analyses were conducted to explore whether increases or decreases in the number of antipathy relationships reported by participants were dynamically associated with growth in their relational aggression. We expected that increasing involvement in antipathy relationships would predict increases in relationally aggressive behaviors over time. Second, we predicted that same-sex antipathy relationships would be stronger predictors of rela-

Table 2
Correlations Among Measures at Time 1

Measure	1	2	3	4	5	6	7	8
1. Rejection	1							
2. Same-sex antipathies	.31***	1						
3. Mixed-sex antipathies	.31***	−.08	1					
4. Relational aggression	.54***	.20***	.15***	1				
5. Physical aggression	.51***	.21***	.16***	.70***	1			
6. Relational victimization	.49***	.14**	.09*	.51***	.36***	1		
7. Physical victimization	.37***	.22***	.11*	.29***	.35***	.47***	1	
8. Gender	−.02	−.12*	−.03	.06	−.24*	.09*	−.26*	1

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

tional aggression than mixed-sex antipathies. Finally, given the relative salience of relational aggression among girls of this age, we predicted that the association between increases in antipathy involvement and relational aggression would be especially strong among girls.

To address these questions, relational aggression served as the dependent variable and the number of same-sex and mixed-sex antipathy partners reported served as the independent variables in the LMM analyses. Peer rejection was entered as a longitudinal predictor of relational aggression so that the unique contribution of antipathy relationships, beyond peer rejection, could be explored. In addition, given the relatively high overlap between relational aggression and physical aggression (see Table 2 for descriptive information regarding associations among the predictors), analyses also controlled for physical aggression so the dynamic association between antipathy involvement and relational aggression in particular could be explored (see Parker & Gamm, 2003, for a similar approach). In sum, gender (−1 = male, 1 = female), peer rejection, physical aggression, same-sex antipathy involvement, mixed-sex antipathy involvement, gender × same-sex antipathy involvement, and gender × mixed-sex antipathy involvement served as the predictors of relational aggression.[1] Although the number of mutual antipathies was positively skewed (see Table 1), many researchers in this area have nonetheless treated antipathy involvement as a dimensional variable in their data analyses (including correlations and regression analyses; Card & Hodges, 2003; Parker & Gamm, 2003; Pope, 2003). Consistent with this work, antipathy relationships were treated as a dimensional predictor in all analyses.

The results of this analysis are presented in Table 3. Results indicated that, overall, increases in both physical aggression and peer rejection were associated with time-dependent increases in relationally aggressive behaviors. In addition, the estimate for gender was significant, indicating that, consistent with previous work (see Crick et al., 1999), girls were more relationally aggressive than were their male counterparts. Examination of dynamic association between same-sex and mixed-sex antipathy involvement indicated that increases in the number of same-sex antipathy relationships reported by participants were associated with time-dependent increases in relationally aggressive behavior. However, this effect was qualified by a significant same-sex antipathy involvement × gender interaction, indicating that increases in same-sex antipathy involvement were related to growth in relational aggression for girls only. In addition, the mixed-sex antip-

Table 3
Dynamic Association Between Antipathy Involvement and Relational Aggression Over Time

Parameter	Estimate	*df*	*F* Value
Intercept[a]	−.07	1, 815[b]	0.60
Gender	.90***	1, 752	96.55
Rejection	.71***	1, 1313	64.60
Physical aggression	.94***	1, 1211	845.43
Same-sex antipathies	.31**	1, 1034	6.41
Same-sex × gender	.28*	1, 1063	5.85
Mixed-sex antipathies	.07	1, 1172	0.20
Mixed-sex × gender	.53***	1, 1237	14.26

[a]Although not pertinent to the hypotheses of the present study, group intercept estimates are reported for completeness. [b]Note that the *F* tests and degrees of freedom are approximate estimates in linear mixed modeling because maximum-likelihood estimation procedures are asymptotic (Long & Pellegrini, 2003). In addition, the degrees of freedom must be estimated from the data as well, which can result in different degrees of freedom for tests of different parameters (Long & Pellegrini, 2003).
*$p < .05$.
**$p < .01$.
***$p < .001$.

athy × gender interaction revealed that increases in mixed-sex antipathy relationships were associated with time-dependent increases in relational aggression for girls only. Thus, the positive association between antipathy involvement and relational aggression was obtained for girls but not boys.

Antipathy Involvement and Growth in Physical Aggression

A second analysis was conducted to investigate the dynamic association between antipathy involvement and physically aggressive behavior. We expected that increasing involvement in antipathy relationships, particularly among same-sex peers, would predict increases in physically aggressive behaviors over time. Moreover, given the relative salience of physical aggression among boys in middle childhood, we predicted that the association between increases in antipathy involvement and physical aggression would be especially strong for boys.

In this LMM analysis, physical aggression served as the dependent variable and the number of same-sex and mixed-sex antipathy partners reported served as the independent variables. As in the relational aggression analysis, we controlled for effects of peer rejection. In addition, relational aggression was entered as a longitudinal predictor so that the association between antipathy involvement and physically aggressive behaviors in particular could be explored. In sum, gender, peer rejection, relational aggression, same-sex antipathy involvement, mixed-sex antipathy involvement, gender × same-sex antipathy, and gender × mixed-sex antipathies served as predictors of physical aggression over time.[2]

The results of this analysis are presented in Table 4. Results indicated that, overall, increases in relational aggression and peer rejection over time were dynamically associated with increases in physically aggressive conduct. In addition, the estimate for gender was significant, indicating that boys were more physically aggressive than were girls. Moreover, increases in same-sex and mixed-sex antipathy relationships were associated with increases in physically aggressive conduct for boys only.

Table 4
Dynamic Association Between Antipathy Involvement and Physical Aggression Over Time

Parameter	Estimate	*df*	*F* Value
Intercept	−.07	1, 693	1.02
Gender	−.71***	1, 646	117.13
Rejection	.30***	1, 1149	29.40
Relational aggression	.37***	1, 1392	743.47
Same-sex antipathies	−.03	1, 880	0.13
Same-sex × gender	−.20**	1, 898	8.56
Mixed-sex antipathies	.09	1, 1004	1.10
Mixed-sex × gender	−.21*	1, 1053	5.90

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

Antipathy Involvement and Growth in Relational Victimization

A third analysis was conducted to investigate the dynamic association between antipathy involvement and experiences of relational victimization over time. We expected that increasing involvement in antipathy relationships, especially among same-sex peers, would predict time-dependent increases in children's relational victimization. Moreover, given the relatively high levels of relational victimization among girls of this age, we predicted that the association between increases in antipathy involvement and growth in relational victimization would be especially strong for girls.

In this LMM analysis, relational victimization served as the dependent variable and the number of same-sex and mixed-sex antipathy partners reported served as the independent variables. We further controlled for peer rejection. In addition, physical victimization was entered as a longitudinal predictor, given the high degree of overlap between physical and relational victimization (see Table 2); thus, the association between antipathy involvement and relational victimization in particular could be examined. In sum, gender, peer rejection, physical victimization, same-sex antipathy involvement, mixed-sex antipathy involvement, gender × same-sex antipathies, and gender × mixed-sex antipathies served as predictors of relational victimization.[3]

The results of this analysis, presented in Table 5, revealed that peer rejection and physical victimization tracked with relational aggression over time. In addition, the significant gender estimate indicated that, consistent with previous work (Crick & Bigbee, 1998), girls were more relationally victimized than were their male counterparts. However, neither increases in same-sex antipathy involvement nor increases in mixed-sex antipathy relationships were associated with growth in relational victimization for boys or girls.

Antipathy Involvement and Growth in Physical Victimization

A fourth analysis was conducted to investigate the dynamic association between antipathy involvement and experiences of physical victimization over time. We expected that increases in antipathy relationships, especially among same-sex peers, would predict time-dependent increases in children's physical victimization. Moreover, given the relatively high levels of physical victimization among boys of this age, we predicted that the association between increases in antipathy involvement and

Table 5
Dynamic Association Between Antipathy Involvement and Relational Victimization Over Time

Parameter	Estimate	*df*	*F* Value
Intercept	.02	1, 865	0.14
Gender	.46***	1, 764	57.42
Rejection	.78***	1, 1360	147.78
Physical victimization	.42***	1, 1371	363.46
Same-sex antipathies	−.01	1, 1154	0.01
Same sex × gender	.08	1, 1162	0.72
Mixed-sex antipathies	−.04	1, 1297	0.15
Mixed sex × gender	.07	1, 1343	0.44

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

growth in physical victimization would be especially strong for boys.

In this LMM analysis, physical victimization served as the dependent variable and the number of same-sex and mixed-sex antipathy partners reported served as dynamic predictors. As in previous analyses, we also controlled for the effects of peer rejection. In addition, relational victimization was entered as a longitudinal predictor so that the association between antipathy involvement and physical victimization in particular could be examined. In sum, gender, rejection, relational victimization, same-sex antipathy involvement, mixed-sex antipathy involvement, gender × same-sex antipathies, and gender × mixed-sex antipathies served as predictors of physical victimization.[4]

The results of this analysis, presented in Table 6, indicated that increases in relational victimization and peer rejection over time were dynamically associated with increases in experiences of physical victimization. In addition, the estimate for gender was significant, indicating that boys were more physically victimized than were girls. Moreover, the longitudinal relation between same-sex antipathy involvement and physical victimization approached significance ($p < .09$), suggesting that increases in same-sex antipathy relationships were associated with time-dependent increases in physical victimization. In addition, the gender × same-sex antipathy involvement interaction approached significance ($p < .08$), indicating that the positive association between same-sex antipathies and physical victimization over time approached significance for boys only. Finally, the gender × mixed-sex antipathy involvement interaction was significant, demonstrating that increases in mixed-sex antipathy relationships were associated with increases in physical victimization for boys only.

Discussion

The goal of the present study was to investigate the longitudinal association between antipathy relationship involvement and school-based aggression and victimization. Consistent with our hypotheses, we found that children who exhibited increases in mutual antipathy involvement also displayed growth in their aggressive behavior and experiences of victimization. However, this relation depended on the gender of the child and the form of aggression and victimization assessed. Specifically, increases in same-sex and mixed-sex antipathy relationships were related to growth in physical aggression for boys only and growth

Table 6
Dynamic Association Between Antipathy Involvement and Physical Victimization Over Time

Parameter	Estimate	*df*	*F* Value
Intercept	−.06	1, 876	0.87
Gender	−.64***	1, 771	93.15
Rejection	0.28***	1, 1362	15.21
Relational victimization	.49***	1, 1407	352.49
Same-sex antipathies	.18†	1, 1159	2.96
Same sex × gender	−.17†	1, 1175	3.21
Mixed sex antipathies	.05	1, 1278	0.17
Mixed sex × gender	−.23*	1, 1330	3.87

† $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

in relational aggression for girls only. In addition, among boys only, growth in physical victimization was associated with increases in mixed-sex antipathy and marginally associated with increases in same-sex antipathies.

Contrary to our expectations, same-sex antipathy involvement did not appear to be a stronger dynamic predictor of children's aggression and victimization than mixed-sex antipathy relationships. This finding suggests that the sex segregation typical of elementary school children does not prohibit expressions of dislike toward opposite-sex peers. Consistent with this idea, Sroufe, Bennett, Englund, Urban, and Shulman (1993) proposed that children find cross-gender interaction permissible when it is accompanied by behaviors that communicate the child's dislike of the peer (e.g., insults or aggression). Thus, children with opposite-sex antipathy partners may not hesitate to openly communicate their dislike using aggressive behaviors. Our finding that involvement in both same-sex and mixed-sex antipathy relationships predicts children's experiences of aggression and victimization is consistent with the idea that children enact aggression in the context of their opposite-sex, as well as same-sex, antipathy relationships.

Interestingly, increases in relational victimization were not dynamically associated with change in antipathy involvement for either boys or girls. At present, it is unclear why children with antipathy relationships were not more relationally victimized than were their peers. It is important to note, however, that we controlled for multiple dynamic and static predictors of change in relational victimization over time (e.g., peer rejection, physical victimization, and gender), thus making our analyses somewhat conservative when testing the fixed effects. A larger sample may yield greater power for testing the association between relational victimization and antipathy involvement in future studies.

Implications for School Psychologists

Implications for understanding students at risk for aggression and victimization. The findings of the present study have important implications for the profession of school psychology. This work has the potential to contribute to the identification of students at risk for developing problems with aggression and victimization. For instance, our findings are consistent with the hypothesis that negative relationships with peers at school contribute to students' involvement in aggres-

sion and experiences of victimization. Although most work in this area has emphasized the role of rejection by classmates, this study demonstrates that dyadic dislike with peers provides additional information regarding who is aggressive and who is victimized.

This is particularly significant given the relatively high prevalence of mutual antipathy relationships (relative to peer rejection) and the fact that even popular children may be involved in such relationships (Abecassis et al., 2002). Thus, assessing antipathy involvement may allow educators to cast a broader net when identifying children at risk for behavior problems. Moreover, it is possible that very few antipathy relationships account for a large proportion of aggression and victimization in childhood. Indeed, in the present study, most students with antipathy partners had only one such relationship and yet involvement in antipathies predicted aggression and victimization. This finding has two important implications. First, assessing antipathy involvement may help educators identify specific contexts in which children are especially likely to engage in aggression (e.g., when interacting with their antipathy partner). Second, educators may be able to reduce substantial levels of aggression and victimization by helping students negotiate interactions with their antipathy partners. Overall, then, assessing same-sex and mixed-sex antipathy relationships in addition to peer rejection may assist school psychologists in identifying at-risk students and interpersonal contexts that encourage aggressive behavior patterns and victimization.

Implications for understanding relational aggression and victimization. A further implication of this study is that gender is an important factor when examining the development of aggressive behavior patterns and victimization in the school context. First, consistent with previous work (Crick et al., 1999), we found that boys were more likely than girls to be physically aggressive and physically victimized. In contrast, girls were at increased risk for relational aggression and relational victimization. Thus, school professionals concerned about boys' and girls' involvement in aggression and victimization would benefit from attending to relational, in addition to physical, forms of such experiences. Second, this study highlights the fact that problematic peer relationships such as mutual antipathies are associated with negative experiences for both boys and girls, but that the specific form of maladjustment may differ by gender. Thus, mutual antipathy involvement may facilitate identification of boys and girls at risk for different types of behaviors and experiences.

Implications for school-based interventions. The findings of the present study also have potential implications regarding school-based interventions aimed at reducing students' involvement in aggression and victimization. First, attention to negative dyadic relationships within the school context may inform the development of intervention programs. Specifically, interventions aimed at reducing aggression and rejection frequently target general social and conflict resolution skills (e.g., Ang & Hughes, 2002; Oden & Asher, 1977; Orpinas, Horne, & Staniszewski, 2003; Shure, 1989). In addition, some researchers have proposed that educators should help children at risk for victimization establish high-quality dyadic friendships, given evidence that involvement in such relationships is associated with decreased experiences of victimization (Rodkin & Hodges, 2003).

The findings of the present study, however, offer new avenues regarding intervention programs. First, in addition to increasing children's high-quality friendships, school psychologists may benefit from helping students reduce their antipathy involvement. Second, it is possible that some individuals only exhibit conflict with their antipathy partners rather than with the larger peer group (e.g., popular children with antipathies). Thus, the social skills, conflict resolution skills, and problem-solving skills typical of many intervention programs may benefit from helping aggressive or victimized children learn effective strategies for specifically dealing with antipathy partners. In other words, antipathy relation-

ships may provide an ideal context in which to promote social skills and conflict-resolution strategies. This approach is consistent with the recent call among school psychologists to use naturally occurring relationships to promote social skills and competence (Elias, Zins, Graczyk, & Weissberg, 2003) and to consider the development of aggression from a social-ecological perspective (Espelage & Swearer, 2003; Rodkin & Hodges, 2003).

In addition, the results of the present study support the proposal that interventions aimed at reducing aggression and victimization in the school setting should target both physical and relational forms of aggression (Leff, Power, Manz, Costigan, & Nabors, 2001). Specifically, boys with mutual antipathies may benefit from an emphasis on reducing physical aggression, whereas girls may gain more from efforts to minimize their relationally aggressive conduct. Overall, attention to how antipathy relationships develop and to ways in which they can be minimized may help reduce expressions of aggression and experiences of victimization in the school context.

Limitations

Despite the interesting findings of the present study, a number of limitations must be acknowledged. First, one limitation of the dynamic predictor design with LMMs is that the causal nature of the antipathy-aggression and antipathy-victimization relations cannot be ascertained. As in most nonexperimental research, it is unclear whether antipathy involvement leads to increases in aggression and victimization over time or whether negative interactions with peers such as bully–victim encounters lead to the development of antipathy relationships. We believe there are likely reciprocal effects regarding these associations. Consistent with this proposal, research investigating the association between peer rejection and physical aggression has supported the hypothesis that negative peer relations both contribute to *and* result from aggressive conduct (Dodge et al., 2003; Ialongo et al., 1998; Kupersmidt et al., 1995; Little & Garber, 1995; Pettit, Clawson, Dodge, & Bates, 1996; Pope & Bierman, 1999). It seems likely that the association between antipathy involvement and aggression is similarly reciprocal, with aggressive children developing antipathies as a result of their undesirable social behavior and children with mutual antipathies engaging in increasing levels of aggressive conduct to harm their antipathy partner. Related to this point, victimized children may develop antipathy relationships with their provocateurs, and involvement in antipathy relationships may lead to increases in experiences of victimization at the hands of a disliked peer. Future longitudinal research would benefit from exploration of the causal, and potentially reciprocal, relations among antipathy relationships and aggression and victimization.

In addition, the findings of the present study are limited by the methodology used to identify antipathy relationships. Specifically, we employed a limited nominations procedure to identify mutual antipathies (i.e., children were limited to three nominations regarding a disliked peer). Although most previous research in this area has used this nomination technique (Abecassis, 2003; Abecassis et al., 2002; Card & Hodges, 2003; Schwartz et al., 2003), additional methodologies including unlimited nominations or peer ratings have been used as well (e.g., Parker & Gamm, 2003; Pope, 2003). The limited nomination procedure is a more stringent test of antipathy involvement and results in the identification of fewer antipathy relationships than other methodologies (Pope, 2003). The greater number of antipathy relationships identified with alternative procedures, in turn, may increase the likelihood of finding significant findings owing to increased variance on the antipathy measure (Pope, 2003). Moreover, other methods may result in less skewed antipathy data that is more amenable to statistical analyses. Finally, the low stability of antipathy relationships over time reported in the present study may reflect the relatively stringent assessment of antipathy relationships employed. In a similar vein, the phrasing of the negative nomination items has varied from study to study (see Abecassis, 2003), which may potentially af-

fect the number of antipathy relationships identified. Thus, we believe the results of this study should be replicated with different antipathy assessment procedures.

In a similar vein, future work in this area would benefit from assessing aggression and victimization with a variety of methods. In the present study, limited peer nominations were used to measure children's aggressive behavior and experiences of victimization. Although this is the most common methodology used in this research area (see Crick et al., 1999), alternative methods such as unlimited peer nominations, teacher reports, and self-reports are available as well (e.g., Crick, 1996; Cullerton-Sen & Crick, 2005). Limited nominations may lead children to nominate only the most aggressive and victimized peers, leading to an underestimation of these behaviors in individuals with lower levels of these behaviors. Thus, future work should replicate these findings with additional measures of aggression and victimization. Moreover, inclusion of additional forms of problematic peer interactions (e.g., verbal aggression) would contribute to a more complete picture regarding the relation between antipathy involvement and aggression and victimization.

A further limitation of the present study is that aggression and victimization were assessed at the classroom level. The processes underlying the relation between antipathy involvement and aggression in the present study require further elucidation. It is possible, for example, that antipathy relationships are associated with victimization at the hands of others in the classroom rather than victimization by the antipathy partner in particular. Research explicitly examining the quality of antipathy relationships, including the use of aggression within the antipathy dyad, would help clarify this important point.

A final limitation of the present research was the relatively high attrition across the course of the study. Although dropping out of the study was not associated with gender or the behavioral measures in the study, attrition was associated with race. This attrition calls into question the generalizability of the research findings, particularly to minority groups. Selective attrition may result from cultural factors, and future research in this area should employ additional efforts to retain underrepresented groups. For example, researchers may benefit from increased integration into the research setting, racial matching between researchers and participants, and involving community consultants and collaborators (Miranda, 1996; Stevenson, 2003; Thompson, Neighbors, Munday, & Jackson, 1996).

Conclusion

Overall, the results of this study suggest that children who are increasingly involved in antipathy relationships with their peers are more likely to exhibit growth in aggression and victimization over time. However, the association between antipathy involvement and aggression and victimization is best understood in the context of gender-linked behavior and experiences. Specifically, this study demonstrates that change in antipathy involvement is associated with time-dependent change in relational aggression for girls only. In contrast, increases in antipathy relationships were related to growth in physical aggression and physical victimization for boys only. In other words, antipathy involvement predicts forms of aggression and victimization that are particularly salient among children of the participant's gender. This study emphasizes the necessity of considering different developmental correlates of antipathy involvement for boys and girls. Taken as a whole, the current work indicates that understanding dyadic reciprocated antipathies may help school psychologists identify children at risk for aggression and victimization and design interventions aimed at reducing such conduct.

Footnotes

[1]To investigate the dynamic association between antipathy involvement and relational aggression, the following LMM equation was used:

$$y_j = \gamma_0 + \gamma_1 g + \gamma_2 rej_j + \gamma_3 pagg_j + \\ + (\gamma_4 + \gamma_5 g)ss_j + (\gamma_6 + \gamma_7 g)ms_j \quad (1)$$

where y_j is the mean relational aggression score at the jth time point; g represents gender (-1 = males; 1 = females); and rej_j, $pagg_j$, ss_j, and ms_j are the mean rejection score, mean physical aggression score, mean number of same-sex antipathies, and mean number of mixed-sex antipathies reported at the jth time point, respectively. In Equation 1, γ_0 is the group intercept of relational aggression (i.e., the predicted mean relational aggression score when scores on all other predictors are 0) and γ_1 indicates the gender difference in the group intercept of relational aggression. In addition, γ_2, γ_3, γ_4, and γ_6 index the dynamic association between relational aggression and peer rejection, physical aggression, same-sex antipathy involvement, and mixed-sex antipathy involvement, respectively. To allow for exploration of gender interactions in the present analyses, γ_5 indicates gender differences in the dynamic covariation of same-sex antipathy involvement and relational aggression and γ_7 indexes genders differences in the dynamic covariation of mixed-sex antipathy involvement and relational aggression.

[2]To investigate the dynamic association between mutual antipathy involvement and physical aggression, the following LMM equation was used:

$$y_j = \gamma_0 + \gamma_1 g + \gamma_2 rej_j + \gamma_3 ragg_j + \\ + (\gamma_4 + \gamma_5 g)ss_j + (\gamma_6 + \gamma_7 g)ms_j \quad (2)$$

where y_j is the mean physical aggression score and $ragg_j$ represents the mean relational aggression score at the jth time point, respectively. In Equation 2, γ_0 is the group intercept of physical aggression and γ_1 indexes the gender difference in the group intercept of physical aggression. Moreover, γ_2, γ_3, γ_4, and γ_6 represent the strength of the dynamic association between physical aggression and peer rejection, relational aggression, same-sex antipathy involvement, and mixed-sex antipathy involvement, respectively. In addition, γ_5 represents the gender difference in the dynamic covariation of same-sex antipathy involvement and physical aggression and γ_7 indicates the gender differences in the dynamic covariation of mixed-sex antipathy involvement and physical aggression.

[3]To investigate the dynamic association between mutual antipathy involvement and relational victimization, the following LMM equation was used:

$$y_j = \gamma_0 + \gamma_1 g + \gamma_2 rej_j + \gamma_3 pvic_j + \\ + (\gamma_4 + \gamma_5 g)ss_j + (\gamma_6 + \gamma_7 g)ms_j \quad (3)$$

where y_j is the mean relational victimization score and $pvic_j$ represents the mean physical victimization score at the jth time point, respectively. In Equation 3, γ_0 is the group intercept of relational victimization and γ_1 indexes the gender difference in relational victimization. Moreover, γ_2, γ_3, γ_4, and γ_6 represent the strength of the dynamic association between relational victimization and peer rejection, physical victimization, same-sex antipathy involvement, and mixed-sex antipathy involvement, respectively. In addition, γ_5 represents the gender difference in the dynamic covariation of same-sex antipathy involvement and relational victimization, and γ_7 indicates the gender differences in the dynamic covariation of mixed-sex antipathy involvement and relational victimization.

[4]To investigate the dynamic association between mutual antipathy involvement and physical victimization, the following LMM equation was used:

$$y_j = \gamma_0 + \gamma_1 g + \gamma_2 rej_j + \gamma_3 rvic_j + \\ + (\gamma_4 + \gamma_5 g)ss_j + (\gamma_6 + \gamma_7 g)ms_j \quad (4)$$

where y_j is the mean physical victimization score and $rvic_j$ represents the mean relational victimization score at the jth time point, respectively. In Equation 4, γ_0 is the group intercept of physical victimization and γ_1 indexes the gender difference in physical victimization. Moreover, γ_2, γ_3, γ_4, and γ_6 represent the strength of the dynamic association between physical victimization and peer rejection, relational victimization, same-sex antipathy involvement, and mixed-sex antipathy involvement, respectively. Additionally, γ_5 represents the gender difference in the dynamic covariation of same-sex antipathy involvement and physical victimization and γ_7 indicates the gender differences in the dynamic covariation of mixed-sex antipathy involvement and physical victimization.

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