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Predicting Change in Children's Aggression and Victimization Using Classroom-level Descriptive Norms of Aggression and Pro-social Behavior

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Abstract

This study examined aggressive and pro-social classroom descriptive norms as predictors of change in aggression and victimization during middle childhood. Participants included 948 children in third through fifth grade. Measures of teacher-reported aggressive and peer-reported pro-social descriptive norms were completed at the onset of the study. Children completed self-report measures of aggression and victimization on three occasions during one academic year. Multilevel growth models were analyzed to determine the amount of student-reported change in aggression and victimization attributable to the classroom norm variables. Results indicated that students in classrooms with higher initial mean levels of aggression reported larger increases in aggression and victimization over the school year. In contrast, boys with higher initial levels of aggression reported smaller increases in aggression than boys with lower initial levels of aggression, and both boys and girls with higher initial aggression reported declining victimization over the school year. Pro-social classroom norms were unrelated to change in aggression and victimization. The implications of the findings for future studies on the influence of classroom social norms as well as interventions for aggression and victimization are discussed.

The majority of research on aggression in schools has focused on the characteristics of aggressors and victims of aggression. For example, conduct problems, anger, hostile attribution errors, and a positive attitude toward aggression are characteristic of aggressive students (see Endresen & Olweus, 2001; Espelage, Bosworth, & Simon, 2001; Nansel et al., 2001). Physical weakness, internalizing problems, hyperactivity, limited emotional regulation, and low self-concept are characteristic of children who are victimized (Egan & Perry, 1998; Hodges & Perry, 1999; Pelligrini, Bartini, & Brooks, 1999; Schwartz, Proctor, & Chen, 2001). As research on aggression and victimization has progressed, however, the focus has moved beyond the characteristics of individual aggressors and victims to the larger school context. The purpose of this study is to extend prior research on the school context by investigating aggressive and

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pro-social classroom norms (i.e., the mean levels of aggressive and pro-social behaviors in classrooms) as predictors of change in aggressive behavior and victimization.

The identification of factors that predict change in aggression and victimization is important because involvement in aggressive incidents for both aggressors and victims has been linked to future maladjustment. Specifically, aggressors are at higher risk for emotional maladjustment, school dropout, and incarceration (Junger-Tas & Van Kesteren, 1999; Katiala-Heino, Rimpela, Martunen, Rimpela, & Rantanen, 1999; Nansel et al., 2001; Olweus, 1992). In addition, victims have higher risk for emotional and academic problems, including depression, anxiety, suicidal ideation, and school avoidance (Buhs, Ladd, & Herald, 2006; Hawker & Boulton, 2000; Juvonen, Nishina, & Graham, 2000; Nansel et al., 2001). Although aggressors and victims each have increased risk of emotional and academic problems, students who are both aggressive and victimized (i.e., aggressive victims) have the highest risk of future maladjustment (Perren & Alsaker, 2006; Schwartz, 2000) as well as the most stable levels of aggression over time (Kumpulainen, Räsänen, & Henttonen, 1999). Aggression and victimization also affect the larger school community, in addition to individual aggressors and victims, as documented in studies linking chronic victimization with high profile incidents of school violence (e.g., Vossekuil, Fein, Reddy, Borum, & Modzeleski, 2002).

To prevent these negative outcomes, researchers have developed programs targeting multiple factors that contribute to aggression and victimization. Because rates of aggression and victimization differ across classrooms and schools (Olweus, 1993; Roland, 1998), theories of aggressive behavior increasingly emphasize the role of the larger school environment (e.g., social-ecological theories; Espelage, Holt, & Henkel, 2003; Gallagher, Dadisman, Farmer, Huss, & Hutchins, 2007; Rodkin & Hodges, 2003) and interventions, in turn, increasingly target factors in the school context (e.g., Second Step Violence Prevention, Grossman et al., 1997; Bully Prevention Program, Olweus & Limber, 2002). Few research studies, however, have examined specific contextual factors related to aggressive behavior and victimization. Without greater application of the social-ecological perspective in research studies, intervention programs may overlook important factors in the school environment that influence aggressive behavior and victimization.

Social-ecological theories of aggression and victimization (Espelage et al., 2003; Gallagher et al., 2007; Rodkin & Hodges, 2003) emphasize the interplay between individual characteristics and social contexts (e.g., peers, classrooms, and schools). In particular, peers play a prominent role in the development and maintenance of aggressive behavior and victimization. Aggressive youth are likely to affiliate with aggressive peers (Dishion, Patterson, & Griesler, 1994; Espelage et al., 2003; Farmer et al., 2002; Pelligrini et al., 1999), reinforcing and escalating aggressive behavior. Non-aggressive peers also contribute to higher levels of aggressive behavior and victimization in schools. Observational studies indicate that peers are present during incidents of aggressive behavior, yet rarely assist the victims (O'Connell, Pepler, & Craig, 1999; Salmivalli, Lagerspetz, Bjorkqvist, Osterman, & Kaukianinen, 1996). Most often, peers support the aggressor directly by assisting and encouraging the aggressor or indirectly by silently observing (e.g., bystander behavior; Salmivalli & Voeten, 2004). Via these mechanisms, both aggressive and non-aggressive peers contribute to overall levels of aggressive behavior and victimization in schools.

Because peers are nested in other social contexts (e.g., classrooms) the behavioral climate of larger systems should be considered. Prior research has examined the impact of both descriptive norms (estimates of the frequency of a behavior within a group) and injunctive norms (estimates of normative beliefs about the appropriateness, utility, or acceptance of the behavior) on aggression in social contexts (Cialdini, Reno, & Kallgren, 1990; Henry et al., 2000). Many studies of the relation of classroom norms to aggression have focused on injunctive norms. For

example, studies have documented the impact of classmates' pro-aggression attitudes on increases in aggressive behavior (e.g., Henry et al., 2000; Huesmann & Guerra, 1997; Salmivalli & Voeten, 2004). Fewer studies have examined the relation of descriptive norms of aggressive behavior to aggression, and the studies have had inconsistent findings. Specifically, Thomas, Bierman, and the Conduct Problems Prevention Research Group (2006) found that exposure to classes in elementary school with high levels of aggression predicted higher levels of student aggression over multiple years. In addition, Kellam, Ling, Merisca, Brown, and Ialongo (1998) found that students who were initially aggressive were more likely to remain aggressive when in highly aggressive classrooms. In contrast, Henry et al. (2000) reported that aggressive classrooms affected neither student normative beliefs nor aggression. Because studies have had inconsistent results, the influence of aggressive classrooms on individual change in aggression and victimization is unclear.

Furthermore, none of the reviewed studies examined the impact of pro-social classroom behaviors. Related studies, however, suggest that pro-social peer behavior may influence levels of aggression and victimization. For example, Hawkins, Pepler, and Craig (2001) found that pro-social intervention by peers is effective in terminating playground incidents of aggressive behavior, and Lamarche et al. (2006) demonstrated that aggressive children with pro-social friends are less likely to be victimized. As described by Lamarche et al., pro-social peers may reduce levels of aggression and victimization by providing other children direct assistance in problematic peer situations in addition to supporting the development of appropriate social skills and regulation strategies in other children. These supportive roles for peers are actively incorporated in effective aggression prevention programs that target pro-social bystander behavior to reduce levels of aggression and victimization (e.g., Frey et al., 2005; Menesini, Codecasa, Benelli, & Cowie, 2003). Assuming that children in classes with higher levels of pro-social behavior are more likely to affiliate with pro-social peers, we hypothesized that pro-social classroom behaviors may influence aggression and victimization.

The estimation of classroom descriptive norms for behavior (i.e., use of the class average levels of aggression, pro-social behavior, etc.) may have utility for practitioners within multi-tiered intervention models for behavioral concerns. By collecting repeated, brief measures of student behavior that can be aggregated at the classroom-level, classrooms may be compared by practitioners to identify classes in need of interventions to improve student behavior (e.g., positive behavior supports; McKeivitt & Braaksma, 2008). In this manner, collection of classroom descriptive norms for behavior may be useful in the context of universal screening for classes in need of behavioral intervention prior to implementation of interventions for individual students. With the inclusion of brief measures of behavior that can be aggregated as measures of classroom norms, intervention models for behavioral concerns may more closely resemble three-tiered models for academic concerns (e.g., VanDerHeyden, Witt, & Gilbertson, 2007).

In research, however, determination of the impact of classroom aggression and victimization (estimated through classroom descriptive norms) is complicated by the specific statistical methods used in extant studies. For example, Henry et al. (2000) included variables measured at the student and classroom level in path analyses with no correction for dependence due to the nesting of students within classrooms, possibly biasing standard errors and tests of statistical significance (Korn & Graubard, 1991; Zucker, 1990). Because research on classroom norms includes effects at both the student and classroom level, single-level methods (e.g., ordinary least squares regression, ANOVA, and structural equation modeling) are of limited utility and could produce biased results. In particular, single-level methods underestimate standard errors due to non-independence as a function of nesting of observations within groups, fail to acknowledge that predictors might have different effects at each level, and assume that relations

between student-level predictors and outcomes do not differ depending on higher level predictors (i.e., no cross-level interactions; Lee, 2000).

In sum, studies on aggressive classroom behavior have had inconsistent results, and no study, to our knowledge, has investigated pro-social classroom behavior as a predictor of change in aggression and victimization. Moreover, many studies of classroom norms have used single-level methods although multilevel methods are more appropriate. To address these gaps in the literature, we examined aggressive and pro-social classroom descriptive norms (i.e., the mean classroom levels of aggressive and pro-social behavior) as predictors of individual variation in longitudinal change in aggression and victimization during middle childhood. Based on research showing that aggression steadily increases during middle childhood (Nansel et al., 2001; Pellegrini & Bartini, 2001), we expected overall increases in aggression and victimization during the time of the study. In addition, we expected change in aggression and victimization to differ by classroom over the course of an academic year. We also expected the means of classroom aggressive and pro-social behavior (estimated based on descriptive norms) to predict change in aggression and victimization. Specifically, we hypothesized the following:

1. Classroom-level variation (differences between classrooms) will explain a significant proportion of the total variance in change in aggression and victimization over one academic year.
2. In classes with descriptive norms indicating higher initial mean levels of aggression, student aggression and victimization across one academic year will increase.
3. In classes with descriptive norms indicating higher initial mean levels of pro-social behavior, student aggression and victimization across one academic year will decline.
4. Classroom descriptive norms will explain a meaningful amount of the change in aggression and victimization, as evidenced by estimates of effect size.

Because patterns of aggressive behavior and victimization differ by gender (e.g., Crick & Bigbee, 1998; Crick & Grotpeter, 1996), we controlled for gender in all analyses and investigated whether predictions based on descriptive classroom norms differed by class gender composition (i.e., the proportion of boys in the class). By investigating the impact of classroom-level aggressive and pro-social behavior through multilevel modeling, we sought to expand current research on contextual influences on the development of aggression and victimization while using appropriate statistical methods to address the nested structure of our data.

Method

Participants

Students enrolled in four elementary schools from one public school system in a Southeastern state participated in the study. All of the schools were implementing programs (e.g., violence prevention, character education, and positive behavior supports) that targeted aggressive and pro-social behavior as part of the general curriculum. Parent information letters describing the research project were sent to the home of each third-, fourth-, and fifth-grade student within the four schools. Parents returned the form, indicating active or declined consent, to their child's classroom teacher. Of the total pool of 1,086 students, active parental consent for data collection was obtained for 948 students (87%). Similar proportions of students and classes were at each grade level (third: 35%, 17 classes; fourth: 34%, 15 classes; fifth: 31%, 14 classes). Students were evenly distributed by gender (51% girls), with the gender ratio of individual classes ranging from 35 to 65% girls. The approximate student racial and ethnic distribution, as labeled and reported in school records, was 47% White, 30% Black or African American, 11% Hispanic or Latino, 7% Asian and Pacific Islander, and 2% Multiracial. Although the overall racial and ethnic distribution of the sample approximated the distribution of the larger school district and

community, the distributions within the four schools varied (11–65% White, 6–64% Black or African American, 4–38% Hispanic or Latino, 3–14% Asian and Pacific Islander, and 4–6% Multiracial). As a result, the racial and ethnic distributions of individual classes in the study varied by school. Student-level information regarding free or reduced lunch status was not available; however, 28% of children in the school district were eligible for free or reduced lunch, with individual school estimates ranging from 16 to 53%. Nine percent of students in the sample were classified with disabilities, with the following primary classifications reported most frequently: Learning Disabled (4%), Other Health Impaired (3%), and Speech/Language Impaired (1%).

Students participated in the study during three assessment waves during one academic year: September–October, 2006; January, 2007; and April–May, 2007. Of the 948 students assessed during the first assessment wave in the fall, 35 students (4%) had an extended absence or moved to other schools prior to the spring data collection. To determine if differential attrition was present, students were compared on all study variables at Time 1 by attrition status. Students with incomplete data due to attrition had higher self-reported initial aggression and victimization ($p < .01$) and lower initial peer-reported pro-social behavior ($p < .01$). They did not differ from students remaining in the study on initial teacher-reported aggression, gender, or racial/ethnic identification. Of the 913 students remaining in the study over all assessment points, 799 (88%) had complete data on all study variables at each assessment point. Data from 948 students were included in analyses with missing data estimation as described below.

Measures

Archival data on children's gender and race/ethnicity were collected to describe the sample. Gender was dummy coded (0 = girls, 1 = boys) for use in analyses. Individual measures of social behavior were gathered from peers, teachers, and self-report.

Peer report—To assess pro-social behavior, students completed four sociometric ratings during the initial assessment wave. Participants were presented with a list of the names of each student in the class and asked to rate how much each person did the following: cooperates, is truthful and honest, is kind, and helps others. Ratings were made on a scale from 1 (Not at all) to 5 (A whole lot). Average ratings were calculated for each child based on the sum of ratings received divided by the number of ratings, excluding the student's self-rating. A factor analysis of the four pro-social behavior ratings supported the formation of a composite score (factor loadings ranged from .95 to .96); consequently, a pro-social behavior composite ($\alpha = .96$) was formed by averaging the four behavior ratings for each student. Although scores from only the first assessment wave were used in this study, the pro-social behavior composite exhibited moderate 3- to 4-month test-retest stability in this sample ($r_{12} = .83$, $r_{23} = .78$, $p < .01$). Peer reports of pro-social behavior, with items similar in content to the items used in this study, have been found to positively correlate with teacher reports of pro-social behavior and negatively correlate with teacher reports of aggressive and solitary behavior (Coie & Dodge, 1988).

Teacher report—Teachers were asked during the first assessment wave to rate all students in the class on three items from the Teacher Checklist of Social Behavior (Coie, Terry, Underwood, & Dodge, 1992) measuring direct aggression (verbal or physical fights with peers, says mean things to peers, threatens or bullies others) on a scale from 1 (Never true of this child) to 7 (Almost always true of this child). A factor analysis of the items indicated unidimensionality (factor loadings ranged from .82 to .91), and the items were internally consistent ($\alpha = .89$). The three items were averaged to form an aggressive behavior composite score. Although scores from only the first assessment wave were used in this study, ratings of direct aggression exhibited moderate 3- to 4-month test-retest stability in this sample ($r_{12} = .$

72, $r_{23} = .83, p < .01$). Ratings of aggression on the Teacher Checklist of Social Behavior (Coie et al.) positively correlate with direct observations and peer ratings of aggression (Putallaz et al., 2007).

Self report—Students were asked to complete the Self-report of Aggression and Victimization Scales for Children (McMillen & DeRosier, 2006) at each of the three assessment waves (see Table 1 for the items on each scale). Both the aggression and victimization scales included items assessing direct aggression (e.g., fighting, teasing, threatening) and relational aggression (e.g., rumor spreading, social exclusion). The instrument was selected for use based on its inclusion of both direct and relational forms of aggression and victimization and shorter overall length as compared to comparable measures. Students rated the frequency with which they engaged in or experienced each behavior at school during the past week on a four-point scale (“Never,” “1 time,” “2–3 times,” “Lots”).

Confirmatory factor analyses of each scale were conducted to assess the factor structure as well as measurement invariance across measurement waves¹. Three models were investigated for each scale. In the models for each scale, the latent constructs (i.e., aggression at T₁, aggression at T₂, etc.) were specified to load on the corresponding six items, measured on a four-point scale, at each time point. Residuals of the same item were allowed to covary at adjacent time points (e.g., the residual of item 1 at T₁ was specified to covary with the residual of item 1 at T₂), and the latent constructs were also allowed to covary. The first model for each scale assessed configural invariance (i.e., if the number of factors and pattern of loadings were similar across waves; Meredith, 1993). Overall model fit appeared to be adequate for the initial models [Aggression: $\chi^2(114) = 149.64, p < .05$, CFI = .99, RMSEA = .02, SRMR = .03; Victimization: $\chi^2(114) = 178.52, p < .01$, CFI = .99, RMSEA = .02, SRMR = .03]. In addition, inspection of the pattern of factor loadings (.60 to .82, see Table 1) and estimates of internal consistency for the aggression scale ($\alpha_1 = .82, \alpha_2 = .83, \alpha_3 = .85$) and victimization scale ($\alpha_1 = .88, \alpha_2 = .89, \alpha_3 = .89$) provided further support for configural invariance.

A second set of models for each scale assessed weak factorial invariance (i.e., if factor loadings on the same items were equal across waves; Meredith, 1993). Model fit declined negligibly with the imposition of the equality constraints on the factor loadings [Aggression: $\chi^2(10) = 11.91, ns$; Victimization: $\chi^2(10) = 4.23, ns$], supporting weak factorial invariance over time. As a more stringent test of invariance, a third set of models for each scale assessed strong factorial invariance (i.e., if the intercepts of the items regressed on the factors were equal across waves; Meredith, 1993). Model fit declined negligibly with the imposition of the combined equality constraints on the factor loadings and item intercepts [Aggression: $\chi^2(20) = 21.46, ns$; Victimization: $\chi^2(20) = 8.45, ns$], supporting strong factorial invariance. Strong factorial invariance is a necessary condition in the specification of latent growth curve models (Hofer, 1999), and this requirement was met by both the student self-reported aggression and victimization scales in this study.

The items from each scale were averaged to form self-report aggression and victimization composite scores. The aggression ($r_{12} = .71, r_{23} = .77, p < .01$) and victimization scales ($r_{12} = .75, r_{23} = .74, p < .01$) were moderately stable over 3- to 4-month intervals in this study. The scales were positively correlated ($r = .43$ to $.45, p < .01$). In addition, the aggression and victimization scales were positively correlated with teacher ratings of aggression ($r = .25$ and $.14, p < .01$) and negatively correlated with peer-reported pro-social behavior ($r = -.30$ and $-.27, p < .01$).

¹Multilevel CFA or standard error corrections to address the nesting of students in classrooms would be preferred; however, the total number of classrooms is less than the number of free parameters in these models, yielding difficulties with model identification.

Procedure

Pencil-and-paper questionnaires were group administered to children in the classroom by trained research assistants. The following measures were administered at each time point: September–October, 2006 (student self-reported aggression and victimization, teacher-reported aggression, and peer-reported pro-social behavior); January, 2007 (student self-reported aggression and victimization); and April–May, 2007 (student self-reported aggression and victimization). Research assistants provided instructions to students using a standardized data collection script, and children, as part of a larger evaluation, completed the sociometric items followed by self-report questionnaires. Teachers completed comprehensive behavioral ratings, including the aggression measure, on an average of 21 students per class in a separate room with a trained research assistant while their students completed questionnaires.

Data Analyses

To represent between-classroom differences in aggression and pro-social behavior (i.e., the classroom-level descriptive norms), the peer pro-social behavior composites and teacher ratings of aggressive behavior were averaged for each class and centered at the grand mean. By centering the classroom-level aggressive and pro-social behavior variables at the grand mean, model intercepts represented the average initial value or average change in student self-reported aggression and victimization for students in classrooms with average classroom-level aggression and pro-social behavior (Snijders & Bosker, 1999). Although peer-reports of social behavior are often preferred over teacher-reports because peers have unique opportunities to observe social behavior (Weiss, Harris, & Catron, 2002), we were unable to administer peer ratings of negative behaviors due to ethical concerns, preventing our use of peer-reports to create normative classroom-level variables for both pro-social and aggressive behavior.

Student-level teacher-reported aggression and peer-reported pro-social scores were also centered at the grand mean so that model intercepts would represent the mean initial values and mean change in student self-reported aggression and victimization for students with average levels of teacher-reported aggression and peer-reported pro-social behavior (Snijders & Bosker, 1999). Classroom gender composition was operationalized as the proportion of boys in the class (range = 0 to 1). Zero-order correlations, means, standard deviations, and the timing of assessments for all variables are presented in Table 2.

Multilevel growth models (Level 1 = time, Level 2 = student, Level 3 = class) were fit to determine the statistical significance of initial aggressive and pro-social classroom descriptive norms as predictors of change in student self-reported aggression and victimization. Two models were estimated for each outcome variable (i.e., student self-reported aggression and victimization). In the first models, student- and classroom-level intercepts (initial values) and slopes (linear change per 3-month period) on each outcome were estimated with no student- or classroom-level predictors (the unconditional growth model). In the second models, classroom-level variables (class average initial teacher-reported aggression, class average initial peer-reported pro-social behavior, and class gender composition) and student-level variables (teacher-reported aggressive behavior, peer-reported pro-social behavior, and gender) were added as predictors of variance in initial levels and change in each outcome variable. We estimated interactions of the behavioral variables with gender at both the student and classroom level (e.g., initial student-level, teacher-reported aggression by gender and initial class average teacher-reported aggression by class gender composition); however, we removed non-statistically significant interaction effects from the final models for parsimony. We also fit models including cross-level interactions between the student- and classroom-level predictors to determine if relations between the student-level predictors and change in the outcomes varied depending on classroom-level predictors (e.g., to determine if the relation between student-level aggression and change in victimization differed depending on the level

of classroom-level aggression). No statistically significant cross-level interactions were found; consequently, we did not include cross-level interactions in the final models.

In three-level growth models, individual growth trajectories for students (i.e., initial values/intercepts and slopes representing the magnitude of change per 3-month period) are represented in the Level 1 model. In this study, the Level 1 model was the following:

$$Y_{tij} = \pi_{0ij} + \pi_{1ij}(\text{Time})_{tij} + e_{tij}$$

where Y_{tij} was the dependent variable (student self-reported aggression or victimization) at time t for child i in classroom j ; π_{0ij} was the initial level of student self-reported aggression or victimization for child ij ; π_{1ij} was the change in student self-reported aggression or victimization over a 3-month period for child ij ; $(\text{Time})_{tij}$ was assigned a value of 0 at T_1 , 1 at T_2 , and 2 at T_3 , representing 3-month intervals; and e_{tij} was the Level 1 random error term representing the deviation of child ij 's actual score from the score predicted by the Level 1 model.

The model for Level 2 represented the variation in growth parameters (intercepts and slopes) among individual children. In this study, the Level 2 model was the following:

$$\begin{aligned}\pi_{0ij} &= \beta_{00j} + \beta_{01j}(\text{Pro})_{ij} + \beta_{02j}(\text{Agg})_{ij} + \beta_{03j}(\text{Gen})_{ij} + \beta_{04j}(\text{Pro}^*\text{Gen})_{ij} + \beta_{05j}(\text{Agg}^*\text{Gen})_{ij} + r_{0ij} \\ \pi_{1ij} &= \beta_{10j} + \beta_{11j}(\text{Pro})_{ij} + \beta_{12j}(\text{Agg})_{ij} + \beta_{13j}(\text{Gen})_{ij} + \beta_{14j}(\text{Pro}^*\text{Gen})_{ij} + \beta_{15j}(\text{Agg}^*\text{Gen})_{ij} + r_{1ij}\end{aligned}$$

where β_{00j} was the average initial level of student self-reported aggression or victimization in class j , and parameters β_{01j} and β_{02j} estimated the average amount that the initial levels of student self-reported aggression or victimization changed for students in class j per unit of initial peer-reported pro-social behavior (β_{01j} , Did children with higher initial peer-reported pro-social behavior have lower initial self-reported aggression and victimization on average in class j ?) and initial teacher-reported aggressive behavior (β_{02j} , Did children with higher initial teacher-reported aggressive behavior have higher initial self-reported aggression and victimization on average in class j ?). Parameter β_{03j} assessed if boys had higher initial levels of student self-reported aggression or victimization in class j . Parameters β_{04j} and β_{05j} assessed if changes in the initial values of student self-reported aggression or victimization based on the values of initial teacher-reported aggressive behavior and peer-reported pro-social behavior differed by gender in class j , and r_{0ij} was the discrepancy between students' observed initial values of self-reported aggression or victimization and the predicted values based on the Level 2 equation for π_{0ij} .

In the second Level 2 equation, β_{10j} was the average growth per 3-month period in self-reported aggression or victimization for students in class j , and parameters β_{11j} and β_{12j} were the average amount that growth per 3-month period in student self-reported aggression or victimization changed for students in class j per unit of initial peer-reported pro-social behavior (β_{11j} , Did children with higher initial peer-reported pro-social behavior have less growth in self-reported aggression or victimization on average in class j ?) and initial teacher-reported aggressive behavior (β_{12j} , Did children with higher initial teacher-reported aggressive behavior have more growth in self-reported aggression or victimization on average in class j ?). Parameter β_{13j} assessed if boys had different growth per 3-month period in student self-reported aggression or victimization in class j . Parameters β_{14j} and β_{15j} assessed if the changes in the 3-month growth estimates in student self-reported aggression or victimization based on the values of initial teacher-reported aggressive behavior and peer-reported pro-social behavior differed by gender in class j , and r_{1ij} was the discrepancy between students' observed growth in self-

reported aggression or victimization per 3-month period and the predicted values based on the Level 2 equation for π_{1ij} .

The Level 3 model represented the variability among classrooms in the initial values and growth estimates (i.e., the intercepts and slopes) for student self-reported aggression or victimization. In this study, the Level 3 model was the following:

$$\begin{aligned}\beta_{00j} &= \gamma_{000} + \gamma_{001}(\text{CPro})_j + \gamma_{002}(\text{CAgg})_j + \gamma_{003}(\text{CGen})_{ji} + \gamma_{004}(\text{CPro} * \text{CGen}) + \\ &\quad \gamma_{005}(\text{CAgg} * \text{CGen}) + u_{00j} \\ \beta_{10j} &= \gamma_{100} + \gamma_{101}(\text{CPro})_j + \gamma_{102}(\text{CAgg})_j + \gamma_{103}(\text{CGen})_{ji} + \gamma_{104}(\text{CPro} * \text{CGen}) + \\ &\quad \gamma_{105}(\text{CAgg} * \text{CGen}) + u_{10j}\end{aligned}$$

where γ_{000} was the overall mean initial level of student self-reported aggression or victimization, and parameters γ_{001} and γ_{002} were the average amount that the initial levels of student self-reported aggression or victimization changed in class j per unit of class-average peer-reported pro-social behavior (γ_{001} , Did classes with higher mean initial peer-reported pro-social behavior have lower initial self-reports of aggression or victimization?) and initial teacher-reported aggressive behavior (γ_{002} , Did classes with higher mean initial teacher-reported aggressive behavior have higher initial self-reports of aggression or victimization?). Parameter γ_{003} assessed if the class average levels of student self-reported aggression or victimization differed based on the class gender composition. Parameters γ_{004} and γ_{005} assessed if the class-average changes in the initial values of student self-reported aggression or victimization based on the values of initial class-average teacher-reported aggressive behavior and class-average peer-reported pro-social behavior differed by class gender composition, and u_{00j} was the discrepancy between the observed class averages of the initial values of self-reported aggression or victimization and the predicted values of the averages based on the Level 3 equation for β_{00j} .

In the second Level 3 equation, γ_{100} was the overall mean change per 3-month period in student self-reported aggression or victimization, and parameters γ_{101} and γ_{102} were the average amount that the growth in student self-reported aggression or victimization changed per unit of class-average peer-reported pro-social behavior (γ_{101} , Did classes with higher mean initial peer-reported pro-social behavior have less growth in self-reports of aggression or victimization?) and initial teacher-reported aggressive behavior (γ_{102} , Did classes with higher mean initial teacher-reported aggressive behavior have more growth in self-reports of aggression or victimization?). Parameter γ_{103} assessed if the class average growth in student self-reported aggression or victimization differed based on the class gender composition. Parameters γ_{104} and γ_{105} assessed if the changes in the class-average growth estimates for student self-reported aggression or victimization based on the values of initial class-average teacher-reported aggressive behavior and class-average peer-reported pro-social behavior differed by class gender composition, and u_{10j} represented the discrepancy between the observed class average growth estimates for self-reported aggression or victimization and the predicted values of the averages based on the Level 3 equation for β_{10j} .

The models were estimated in *Mplus* 5.1 (Muthén & Muthén, 1998–2007) with the robust maximum likelihood estimator (to make the chi-square test and standard errors robust to non-normality; Yuan & Bentler, 2000), using full-information maximum likelihood (FIML) estimation to account for missing data. Based on the assumption that data missing due to attrition could be predicted by students' scores on measured variables at prior measurement occasions, FIML was used to estimate missing data due to the smaller potential for bias due to selective attrition as compared to complete case analysis (Allison, 2002; Raykov, 2005; Schafer & Graham, 2002).

The models tested the primary hypotheses by first determining the amount of variance in change of student self-reported aggression and victimization explained by classroom-level variation (Hypothesis 1). This hypothesis was tested on the basis of inspection of the intra-class correlations (ICC, the variance between classrooms divided by the total variance) for student self-reported aggression and victimization. Second, the models assessed the statistical significance of aggressive and pro-social behavior (based on classroom descriptive norms) as predictors of change in student self-reported aggression and victimization (Hypotheses 2 and 3). Last, the models investigated the magnitude of the influence of aggressive and pro-social behavior (based on classroom descriptive norms) on change in aggression and victimization (Hypothesis 4) by inspecting estimates of effect size.

The relative fit of the unconditional growth models as compared to the models with class and student-level predictors was determined by comparison of Akaike information criterion (AIC) and Bayes information criterion (BIC) values, with lower values indicative of improved model fit as predictors were added (Singer & Willett, 2003). As a measure of effect size for the classroom and student-level predictors, pseudo- R^2 was calculated by determining the proportion reduction in the student- and classroom-level random slope variances with the addition of the predictors (Singer & Willett, 2003).

Results

Model results with student self-reported aggression as the dependent variable are presented in Table 3, and the results with student self-reported victimization as the dependent variable are presented in Table 4.

Aggression

The results of the unconditional growth model, with student self-reported aggression as the dependent variable, indicated that a medium amount of the total variance in change in aggression (ICC = .14) was at the classroom level (i.e., there were between-classroom differences), according to Hox's (2002) guidelines for interpretation of the magnitude of the ICC. For students in the average class, student self-reported aggression increased on average over the academic year, as evidenced by the statistically significant slope of aggression ($\gamma_{100} = .07, p < .05$). Dividing this estimate of average growth by the SD of aggression at T_1 (.53) revealed that self-reported aggression increased by an average of .13 SD per 3-month period. The square root of the between-student variance estimate for the slope ($\sqrt{r_{1ij}} = \sqrt{.02} = .13$) can be calculated to determine the SD of the slope estimate (Raudenbush & Bryk, 2002), which can be used to illustrate the magnitude of individual variability around the estimate of class-average change in aggression per 3-month period. Comparing the SD of the slope estimate to the T_1 SD for aggression reveals that students with one SD higher than average growth in student self-reported aggression increased .38 SD per 3-month period, relative to the SD of T_1 aggression, and students with one SD lower than average growth decreased .11 SD per 3-month period.

The addition of student- and classroom-level predictors in the second model improved model fit, with both the AIC (3664.58 to 3518.49) and the BIC (3708.23 to 3629.87) decreasing. Teacher-reported student aggression was included as a student-level predictor (β_{02j}) as well as a class-level predictor (γ_{002} , teacher-reported class average aggression), as recommended by Raudenbush and Bryk (2002), to provide an estimate of the effect of classroom-level aggression with variance due to the relation between teacher-reported student aggression and student self-reported aggression removed.

Several statistically significant predictors of initial student self-reported aggression were found. At the student level, higher initial levels of peer-reported pro-social behavior were

related to lower initial self-reported aggression ($\beta_{01j} = -.17, p < .01$). In addition, boys with higher initial teacher-reported aggression had higher initial levels of self-reported aggression, as evidenced by the statistically significant aggression by gender interaction term ($\beta_{05j} = .06, p < .05$). Neither teacher-reported initial aggression (β_{02j}) nor gender (β_{03j}) was related to initial student self-reported aggression. Of the classroom-level predictors of initial student self-reported aggression, only the classroom gender composition was statistically significant ($\gamma_{003} = -.71, p < .01$). Classes with a higher proportion of boys had lower average initial student self-reported aggression.

Two statistically significant predictors of change in student self-reported aggression were found. At the student level, the teacher-reported initial aggression by gender interaction term was statistically significant ($\beta_{15j} = -.05, p < .05$), indicating that boys rated as less initially aggressive by teachers had more growth in self-reported aggression over the school year as compared to boys with higher initial teacher-reported aggression and girls. Initial teacher-reported aggression (β_{12j}), peer-reported pro-social behavior (β_{11j}), and gender (β_{13j}) were unrelated to change in student self-reported aggression. At the classroom level, mean teacher-reported initial aggression predicted change in class-average aggression ($\gamma_{102} = .05, p < .05$). Specifically, classes with higher mean levels of teacher-reported aggression reported larger average increases in aggression over the school year. Mean levels of peer-reported pro-social behavior (γ_{101}) and class gender composition (γ_{103}) were unrelated to change in class averages of student self-reported aggression.

To determine the magnitude of the influence of classroom-level estimates of aggression on change in student self-reported aggression, the amount of classroom-level variance in change explained by mean teacher-reported initial aggression ($R^2 = .33$) was multiplied by the amount of total variance in change in aggression attributable to classroom-level variation ($ICC = .14$), which produced the variance in overall reported change in student aggression across the school year associated with the classroom-level predictors, 5% in this case. The effect of the classroom-level aggression estimate (overall $R^2 = .05$) was of small magnitude using Cohen's (1988) guidelines for interpretation.

Victimization

The results of the unconditional growth model, with student self-reported victimization as the dependent variable, indicated that a medium amount of variance in change in victimization ($ICC = .11$) was at the classroom level. For students in the average class, student self-reported victimization stayed the same on average per 3-month period, as evidenced by the non-statistically significant slope of victimization ($\gamma_{100} = .02, n.s.$). Although mean growth was near-zero per 3-month period, students differed in growth in victimization, as evidenced by the between-student estimate of the variance of the growth estimates ($r_{1ij} = .03$). Comparing the square root of the variance estimate to the T_1 SD for victimization reveals that students with 1 SD greater than average change in self-reported victimization increased by .23 SD per 3-month period and students with 1 SD less change decreased by .18 SD per 3-month period.

The addition of student- and classroom-level predictors in the second model improved model fit, with both the AIC (5616.84 to 5479.13) and the BIC (5660.49 to 5580.83) decreasing. Based on the improved fit with the addition of the student and class level predictors, we considered the model interpretable.

Statistically significant student- and class-level predictors of student self-reported initial victimization were found. Students with higher peer-reported pro-social behavior ($\beta_{01j} = -.35, p < .01$) and boys ($\beta_{03j} = -.16, p < .01$) had lower initial levels of victimization. At the class level, students in classes with higher mean values of teacher-reported aggression had higher mean values of initial self-reported victimization ($\gamma_{002} = .17, p < .05$). All other student- and

class-level predictors were unrelated to initial victimization, and no statistically significant interactions of the predictors with gender were found.

No average change in self-reported victimization was found in the unconditional growth model; however, two statistically significant predictors of variance in change in victimization were found. Teacher-reported aggression had contrasting relations with change in self-reported victimization at the student and class levels. At the student level, higher teacher-reported aggression toward the beginning of the year predicted declines in victimization over the school year ($\beta_{12j} = -.04, p < .05$). In contrast, classes with higher average teacher-reported aggression had, on average, increasing victimization over time ($\gamma_{102} = .08, p < .05$). No statistically significant interactions of the predictors with gender were found, and the remaining predictors were unrelated to change in victimization.

To determine the magnitude of the influence of classroom-level estimates of aggression on change in student self-reported victimization, the amount of classroom-level variance explained by mean teacher-reported initial aggression ($R^2 = .20$) was multiplied by the amount of total variance in change in victimization attributable to classroom-level variation ($ICC = .11$) to obtain the proportion of the total variance in change in student-self-reported victimization attributable to classroom-level predictors. The effect of the classroom-level estimate of aggressive behavior (overall $R^2 = .02$) was of small magnitude.

Discussion

Although many studies have examined student-level predictors of aggression and victimization (see Espelage & Swearer, 2003b), few studies have examined the role of classroom-level analyses in the prediction of aggression and victimization. Consideration of the classroom context is important, though, because classroom-level differences explained approximately 11–14% of the total variance in change in student self-reported aggression and victimization in this study. In particular, classrooms with different mean levels of teacher-reported aggression had varied change in student self-reported aggression and victimization. These findings are consistent with prior studies documenting the relation of local normative estimates of aggression to reported levels of aggression in school settings (Kellam et al., 1998; Thomas et al., 2006) and further demonstrate the potentially useful role descriptive norms may play in understanding change in subsequent aggression and victimization.

Unexpectedly, teacher-reported aggression had contrasting relations with student self-reported aggression by level. Specifically, boys with higher initial levels of teacher-reported aggression had less growth in self-reported aggressive behavior over the school year. Conversely, students in classes with higher mean levels of teacher-reported aggression reported greater increases in self-reported aggression over the school year. Our finding of the largest increases in self-reported aggression for boys with lower initial teacher-reported aggression could reflect the presence of boys in our elementary school sample with the increasing aggression trajectory found in Schaeffer, Petras, Ialongo, Poduska, and Kellam (2003). Although most boys have either stable low or high levels of aggression during elementary school, approximately 9% of boys begin elementary school with low levels of aggression that steadily increase to the level of boys with high, stable aggression by entry to middle school (Schaeffer et al.). In addition, less growth in aggression might be expected for boys with high initial levels due to ceiling effects on the self-reported measure of aggression. Across all students, however, enrollment in classes with higher mean initial levels of aggression predicted greater increases in aggression over the school year. This finding replicated the results of prior studies documenting greater increases in aggression for students enrolled in classrooms with higher levels of aggression (Kellam et al., 1998; Thomas et al., 2006).

Contrasting results by level were also evident in the relation between teacher-reported aggression and self-reported victimization. At the student level, higher levels of teacher-reported aggression predicted declining self-reported victimization over time. This finding suggests that aggression may reduce victimization, as perceived by the student. Although aggression is often viewed as maladaptive by researchers and practitioners, the selective and skillful use of aggression can reduce overall levels of conflict as well as establish and maintain social order (see Hawley, Little, & Rodkin, 2007). However, the finding that children rated as initially aggressive by teachers reported declines in victimization could simply be an artifact of social information processing mechanisms impacting our self-report measure due to the tendency of aggressive children to describe aggressive strategies as effective (e.g., Dodge & Coie, 1987; Perry, Perry, & Rasmussen, 1986). Regardless of the accuracy of self-reports of victimization, though, we found that classroom-level aggression predicted increases in victimization, suggesting that the relation between student aggression and victimization may vary depending on the larger classroom context.

Contrary to our hypothesis, classroom-level estimates of pro-social behavior were unrelated to change in aggression and victimization. In our review of the literature, we found no studies investigating the impact of pro-social descriptive norms; however, the influence of pro-social descriptive norms appeared reasonable considering the focus of many aggression prevention programs on improving pro-social bystander behavior (e.g., Frey et al., 2005; Menesini et al., 2003). Although peer-reported pro-social behavior was unrelated to change in aggression or victimization at both the student and class level, students with higher levels of peer-reported pro-social behavior reported lower initial aggression and victimization. This finding of concurrent relations between pro-social behavior and aggression and victimization is consistent with prior research (e.g., Coleman & Byrd, 2003; Crick, 1996; Eron & Huesmann, 1984). In general, our findings support the greater importance of reported aggression as compared to reported pro-social behaviors in the development of student aggressive behavior and victimization, as may be expected given the greater attention that aggressive behavior has received in the literature (e.g., Kellam et al., 1998; Henry et al., 2000; Thomas et al., 2006). Future studies with measures of student pro-social behavior more closely related to pro-social bystander behavior are recommended to more thoroughly assess the impact of pro-social classroom norms on the development of aggression and victimization. Considering the effectiveness of pro-social intervention by peers in terminating instances of aggression (Hawkins et al., 2001), pro-social bystander behavior, rather than global pro-social behavior, may be more strongly related to change in aggression and victimization (Gini, Pozzoli, Borghi, & Franzoni, 2008).

Implications for Research

Our findings support the importance of investigating aggression and victimization in social-ecological models (e.g., Espelage et al., 2003; Gallagher et al., 2007; Rodkin & Hodges, 2003). In particular, initial teacher-reported aggression predicted change in student self-reported aggression and victimization differently at the student- and classroom-level, demonstrating the importance of including predictors at multiple levels. Also, the sizeable amount of variance in change in both aggression and victimization related to classroom-level differences points to the importance of examining additional classroom-level predictors. Because relevant classroom-level predictors are often not included in studies of aggression and victimization, important contextual effects might be overlooked. In addition, predictors might have varying effects at different levels, as we found in this study. Although we did not find any statistically significant cross-level interactions, social-ecological models of aggression support the premise that classroom-level predictors may strengthen or otherwise modify the relation of student-level predictors with aggression and victimization. Considering the variety

of ways that student-level and contextual variables can combine and interact, additional research examining contextual factors impacting aggression and victimization is needed.

As researchers focus on school- and classroom-level factors influencing the development of aggression and victimization, the use of multilevel models will be essential. In addition to providing less biased standard errors and tests of statistical significance, multilevel models evaluate if predictors have contrasting effects at different levels, as we found in this study, and detect the presence of cross-level interactions (i.e., if the relations between the student-level predictors and the outcomes differ depending on higher level predictors). In particular, the ability in multilevel modeling to test predictors at multiple levels and to determine if relations between student-level predictors and the outcomes vary depending on higher level factors is well-suited to test specific propositions of social-ecological models of aggression and victimization.

Implications for Practice

Based on the current findings, the most salient implication for practice is the potential utility of classroom descriptive norms in the prediction of aggression and victimization across classrooms. Although many interventions designed to reduce aggression and victimization in the school setting have primarily targeted the skill deficits of individual students (Farmer & Xie, 2007), this study further highlights the importance of attending to the social contexts of aggression. This emphasis on the social contexts of aggression is reflected in recent calls for comprehensive systems of preventive interventions, combining universal, selective, and indicated interventions to address school social dynamics in addition to the behavior of individual children (Farmer, Farmer, Estell, & Hutchins, 2008).

In this study, aggressive classroom descriptive norms (i.e., the mean level of aggressive behavior in the class) were created from a 3-item teacher report measure; however, the formation of classroom descriptive norms using other measures (e.g., direct observations, peer report) may also be useful in practice. For practical utility, we recommend that the measure be brief so that assessments may be repeated over time. Although we used multilevel modeling to predict change in student reports of aggression and victimization in this study, statistical analyses should not be necessary to use information on descriptive norms for specific behaviors to identify classes in need of class-wide behavioral intervention or to monitor progress in the class during implementation of interventions. In this way, brief measures of behavior that can be aggregated into classroom-level composites may be useful in the context of universal screening for behavioral concerns, similar to the manner in which brief academic assessments are used in multi-tiered models to address academic concerns (e.g., VanDerHeyden et al., 2007).

Limitations and Future Research

This study has at least several limitations. First, our dependent variables of aggression and victimization were measured by self-report. Although measures of aggression and victimization correlate across informants (Pelligrini & Bartini, 2000), self-reports of aggressive behavior tend to be underestimates due to the influence of social desirability (Smith & Sharp, 1994). Self-reports of victimization, in contrast, tend to be higher than peer-reported estimates (Perry, Kusel, & Perry, 1988). Consequently, future examinations of the influence of classroom norms would benefit from measures of aggression and victimization using multiple informants. Additionally, the inclusion of measures from other informants would facilitate more detailed investigation of the construct validity of the student self-reported aggression and victimization scales.

Second, although the non-independence of observations due to the nesting of students in classes was modeled in our multilevel analyses, the non-independence due to nesting of students in schools was not addressed. School factors, such as the social and emotional climate and overall emphasis on academic learning, have been found to impact student behavioral and emotional adjustment as well as engagement in risky behavior (Kasen, Cohen, & Brook, 1998; Kasen, Johnson, & Cohen, 1990). In addition, aggression and victimization are often conceptualized as school-wide problems (e.g., Baker, 1998; Espelage & Swearer, 2003a). In this study, however, only four schools were sampled, providing inadequate power for school level analyses in multilevel modeling. Studies utilizing a larger number of schools will be better able to disentangle the influence of the classroom from the larger school social context.

Last, this study employed variable-oriented analyses, though much of the literature on aggression and victimization has used person-oriented analyses. For example, researchers have compared and contrasted students classified as aggressors, victims, or aggressive victims (e.g., Solberg, Olweus, & Endresen, 2007). The current study, in contrast, examined classroom-level variables through descriptive norms that predicted growth in levels of reported aggression and victimization. To better integrate this line of research into the person-oriented literature, future studies should investigate the impact of classroom-level variables on the prevalence of classification (e.g., Are more students identified as aggressors over time in aggressive classrooms?) and the levels of aggression and victimization for specific aggressor/victim groups.

Despite the limitations, this study provides further support for the investigation of aggression and victimization within a social-ecological model (e.g., Espelage et al., 2003; Gallagher et al., 2007; Rodkin & Hodges, 2003). A significant amount of the change in student aggression and victimization was due to between-classroom variation, and aggressive classroom descriptive norms predicted increases in aggression and victimization over the school year. Considering the stated importance in many aggression prevention efforts on the modification of classroom and school level factors, future empirical studies of contextual influences on the development of aggression and victimization using appropriate statistical methods (e.g., multilevel modeling) are recommended to identify critical factors for intervention.

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References

- Allison, PD. Missing data. Thousand Oaks, CA: Sage; 2002.
- Baker JA. Are we missing the forest for the trees? Considering the social context of school violence. *Journal of School Psychology* 1998;36:29–44.
- Buhs ES, Ladd GW, Herald SL. Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement? *Journal of Educational Psychology* 2006;98:1–13.
- Cialdini RB, Reno RR, Kallgren CA. A focus theory of normative conduct: A theoretical refinement and re-evaluation of the role of norms in human behavior. *Advances in Experimental Social Psychology* 1990;24:201–234.
- Cohen, J. Statistical power analysis for the behavioral sciences. Vol. 2. New York: Academic Press; 1988.
- Coie JD, Dodge KA. Multiple sources of data on social behavior and social status in the school: A cross-age comparison. *Child Development* 1988;59:815–829. [PubMed: 3383681]

- Coie JD, Terry R, Underwood M, Dodge KA. A teacher checklist for social behavior. 1992Unpublished manuscript
- Coleman PK, Byrd CP. Interpersonal correlates of peer victimization among young adolescents. *Journal of Youth and Adolescence* 2003;32:301–314.
- Crick NR. The role of overt aggression, relational aggression, and prosocial behavior in the prediction of children's future social adjustment. *Child Development* 1996;67:2317–2327. [PubMed: 9022243]
- Crick NR, Bigbee MA. Relational and overt forms of peer victimization: A multi informant approach. *Journal of Consulting and Clinical Psychology* 1998;66:337–347. [PubMed: 9583337]
- Crick NR, Grotpeter JK. Children's treatment by peers: Victims of relational and overt aggression. *Development and Psychopathology* 1996;8:367–380.
- Dishion, TJ.; Patterson, GR.; Griesler, PC. Peer adaptations in the development of antisocial behavior: A confluence model. In: Huesmann, LR., editor. *Handbook of child psychology: Vol. 3. Social, emotional, and personality development. Vol. 5.* New York: Wiley; 1994. p. 779-861.
- Dodge KA, Coie JD. Social-information-processing factors in reactive and proactive aggression in children's peer groups. *Journal of Personality and Social Psychology* 1987;53:1146–1158. [PubMed: 3694454]
- Egan SK, Perry DG. Does low self-regard invite victimization? *Developmental Psychology* 1998;34:299–309. [PubMed: 9541782]
- Endresen, IM.; Olweus, D. Self-reported empathy in Norwegian adolescents: Sex differences, age trends, and relationships to bullying. In: Bohart, AC.; Arthur, C.; Stipek, DJ., editors. *Constructive and destructive behavior: Implications for family, school, and society.* Washington, DC: American Psychological Association; 2001. p. 147-165.
- Eron LD, Huesmann LR. The relation of prosocial behavior to the development of aggression and psychopathology. *Aggressive Behavior* 1984;10:201–211.
- Espelage DL, Bosworth K, Simon TS. Short-term stability and change of bullying in middle school students: An examination of demographic, psychosocial, and environmental correlates. *Violence and Victims* 2001;16:411–426. [PubMed: 11506450]
- Espelage DL, Holt MK, Henkel RR. Examination of peer-group contextual effects on aggression during early adolescence. *Child Development* 2003;74:205–220. [PubMed: 12625446]
- Espelage DL, Swearer SM. Research on school bullying and victimization: What have we learned and where do we go from here? *School Psychology Review* 2003a;32:365–383.
- Espelage, DL.; Swearer, SM., editors. *Bullying in American schools: A social-ecological perspective on prevention and intervention.* Mahwah, NJ: Lawrence Erlbaum; 2003b.
- Farmer TW, Farmer EMZ, Estell DB, Hutchins BC. The developmental dynamics of aggression and the prevention of school violence. *Journal of Emotional and Behavioral Disorders* 2007;15:197–208.
- Farmer TW, Leung MC, Pearl R, Rodkin PC, Cadwallader TW, Van Acker R. Deviant or diverse peer groups? The peer affiliations of aggressive elementary school students. *Journal of Educational Psychology* 2002;94:611–620.
- Farmer TW, Xie H. Aggression and school social dynamics: The good, the bad, and the ordinary. *Journal of School Psychology* 2007;45:461–478.
- Frey KS, Hirschstein MK, Snell JL, Edstrom LVS, MacKenzie EP, Broderick CJ. Reducing playground bullying and supporting beliefs: An experimental trial of the Steps to Respect program. *Developmental Psychology* 2005;41:479–491. [PubMed: 15910156]
- Gallagher, KC.; Dadisman, K.; Farmer, TW.; Huss, L.; Hutchins, BC. Social dynamics in early childhood classrooms: Considerations and implications for teachers. In: Saracho, ON.; Spodek, B., editors. *Contemporary perspectives on social learning in early childhood education.* Charlotte, NC: Information Age Publishing; 2007.
- Gini G, Pozzoli T, Borghi F, Franzoni L. The role of bystanders in students' perception of bullying and sense of safety. *Journal of School Psychology* 2008;46:617–638. [PubMed: 19083376]
- Grossman DC, Neckerman HJ, Koepsell TD, Liu PY, Asher KN, Beland K, et al. Effectiveness of a violence prevention curriculum among children in elementary school. *Journal of the American Medical Association* 1997;277:1605–1611. [PubMed: 9168290]

- Hawker DS, Boulton ML. Twenty years' research on peer victimization and psychosocial maladjustment: A meta-analytic review of cross-sectional studies. *Journal of Child Psychology and Psychiatry* 2000;41:441–455. [PubMed: 10836674]
- Hawkins DL, Pepler DJ, Craig WM. Naturalistic observations of peer interventions in bullying. *Social Development* 2001;10:512–527.
- Hawley, PH.; Little, TD.; Rodkin, PC. *Aggression and adaptation: The bright side to bad behavior*. Mahwah, NJ: Erlbaum; 2007.
- Henry D, Guerra N, Huesmann R, Tolan P, Van Acker R, Eron L. Normative influences on aggression in urban elementary school classrooms. *American Journal of Community Psychology* 2000;28:59–81. [PubMed: 10824274]
- Hodges EVE, Perry DG. Personal and interpersonal consequences of victimization by peers. *Journal of Personality and Social Psychology* 1999;76:677–685. [PubMed: 10234851]
- Hofer, SM. Assessing personality structure using factorial invariance procedures. In: Mervielde, I.; Deary, F.; DeFruyt, F.; Ostendorf, F., editors. *Personality psychology in Europe*. Vol. 7. Tilburg, the Netherlands: Tilburg University Press; 1999. p. 35–49.
- Hox, J. *Multilevel analysis: Techniques and applications*. Mahwah, NJ: Lawrence Erlbaum; 2002.
- Huesmann LR, Guerra NG. Children's normative beliefs about aggression and aggressive behavior. *Journal of Personality and Social Psychology* 1997;72:408–419. [PubMed: 9107008]
- Junger-Tas, J.; Van Kesteren, J. *Bullying and delinquency in a Dutch school population*. The Hague, Netherlands: Kugler; 1999.
- Juvonen J, Nishina A, Graham S. Peer harassment, psychological adjustment, and school functioning in early adolescence. *Journal of Educational Psychology* 2000;92:349–359.
- Kasen S, Cohen P, Brook JS. Adolescent school experiences and dropout, adolescent pregnancy, and young adult deviant behavior. *Journal of Adolescent Research* 1998;13:49–72. [PubMed: 12348538]
- Kasen S, Johnson J, Cohen P. The impact of school emotional climate on student psychopathology. *Journal of Abnormal Child Psychology* 1990;18:165–177. [PubMed: 2348030]
- Katjala-Heino R, Rimpela M, Martunen M, Rimpela A, Rantanen P. Bullying, depression, and suicidal ideation in Finnish adolescents: School survey. *British Medical Journal* 1999;319:348–351. [PubMed: 10435954]
- Kellam SG, Ling X, Merisca R, Brown CH, Ialongo N. The effect of the level of aggression in the first grade classroom on the course and malleability of aggressive behavior into middle school. *Development and Psychopathology* 1998;10:165–185. [PubMed: 9635220]
- Korn EL, Graubard BI. Epidemiologic studies utilizing surveys: Accounting for the sampling design. *American Journal of Public Health* 1991;81:1166–1173. [PubMed: 1951829]
- Kumpulainen K, Räsänen E, Henttonen I. Children involved in bullying: Psychological disturbance and the persistence of the involvement. *Child Abuse and Neglect* 1999;23:1253–1262. [PubMed: 10626609]
- Lamarche V, Brendgen M, Boivin M, Vitaro F, Pérouse D, Dionne G. Do friendships and sibling relationships provide protection against peer victimization in a similar way? *Social Development* 2006;15:373–393.
- Lee VE. Using hierarchical linear modeling to study social contexts: The case of school effects. *Educational Psychologist* 2000;35:125–141.
- McKevitt, BC.; Braaksma, AD. Best practices in developing a positive behavior support system at the school level. In: Thomas, A.; Grimes, J., editors. *Best practices in school psychology*. Vol. 5. Vol. 2. Washington, DC: National Association of School Psychologists; 2008. p. 735–748.
- McMillen, J.; DeRosier, ME. *Self-report of aggression and victimization scales for children*. Cary, NC: 3-C Institute for Social Development; 2006.
- Menesini E, Codecasa E, Benelli B, Cowie H. Enhancing children's responsibility to take action against bullying: Evaluation of a befriending intervention in Italian middle schools. *Aggressive Behavior* 2003;29:1–14.
- Meredith W. Measurement invariance, factor analysis and factorial invariance. *Psychometrika* 1993;58:525–543.
- Muthén, LK.; Muthén, BO. *Mplus user's guide*. Vol. 5. Los Angeles: Author; 1998–2007.

- Nansel TR, Overpeck M, Pilla RS, Ruan WJ, Simons-Morton B, Scheidt P. Bullying behaviors among U.S. youth: Prevalence and association with psychosocial adjustment. *Journal of the American Medical Association* 2001;285:2094–2100. [PubMed: 11311098]
- O'Connell P, Pepler D, Craig W. Peer involvement in bullying: Insights and challenges for intervention. *Journal of Adolescence* 1999;22:437–452. [PubMed: 10469508]
- Olweus, D. Bullying among school children: Intervention and prevention. In: Peters, RD.; McMahon, RJ.; Quinsey, QL., editors. *Aggression and violence through the lifespan*. London: Sage; 1992. p. 100-125.
- Olweus, D. *Bullying at school: What we know and what we can do*. Oxford, UK: Blackwell; 1993.
- Olweus, D.; Limber, S. *Bullying prevention program*. Boulder, CO: Center for the Study and Prevention of Violence; 2002.
- Pelligrini AD, Bartini M. An empirical comparison of methods of sampling aggression and victimization in school settings. *Journal of Educational Psychology* 2000;92:360–366.
- Pelligrini AD, Bartini M. Dominance in early adolescent boys: Affiliative and aggressive dimensions and possible functions. *Merrill-Palmer Quarterly* 2001;47:142–163.
- Pelligrini AD, Bartini M, Brooks F. School bullies, victims and aggressive victims: Factors relating to group affiliation and victimization in early adolescence. *Journal of Educational Psychology* 1999;91:216–224.
- Perren S, Alsaker FD. Social behavior and peer relationships of victims, bully-victims, and bullies in kindergarten. *Journal of Child Psychology and Psychiatry* 2006;47:45–57. [PubMed: 16405640]
- Perry DG, Kusel SJ, Perry LC. Victims of peer aggression. *Developmental Psychology* 1988;24:807–814.
- Perry DG, Perry LC, Rasmussen P. Cognitive social learning mediators of aggression. *Child Development* 1986;52:700–711. [PubMed: 3720399]
- Putallaz M, Grimes CL, Foster KJ, Kupersmidt JB, Coie JD, Dearing K. Overt and relational aggression and victimization: Multiple perspectives within the school setting. *Journal of School Psychology* 2007;45:523–547. [PubMed: 18836518]
- Raudenbush, SW.; Bryk, AS. *Hierarchical linear models: Applications and data analysis methods*. Vol. 2. Thousand Oaks, CA: Sage; 2002.
- Raykov T. Analysis of longitudinal studies with missing data using covariance structure modeling with full-information maximum likelihood. *Structural Equation Modeling* 2005;12:493–505.
- Rodkin PC, Hodges EVE. Bullies and victims in the peer ecology: Four questions for psychologists and school professionals. *School Psychology Review* 2003;32:384–400.
- Roland, E. *School influences on bullying*. Durham, UK: University of Durham; 1998.
- Salmivalli C, Lagerspetz C, Bjorkqvist K, Osterman K, Kaukianinen A. Bullying as a group process: Participant roles and their relations to social status within the group. *Aggressive Behavior* 1996;22:1–15.
- Salmivalli C, Voeten M. Connections between attitudes, group norms, and behavior in bullying situations. *International Journal of Behavioral Development* 2004;28:246–258.
- Schaeffer CM, Petras H, Ialongo N, Poduska J, Kellam S. Modeling growth in boys' aggressive behavior across elementary school: Links to later criminal involvement, conduct disorder, and antisocial personality disorder. *Developmental Psychology* 2003;39:1020–1035. [PubMed: 14584982]
- Schafer JL, Graham JW. Missing data: Our view of the state of the art. *Psychological Methods* 2002;7:147–177. [PubMed: 12090408]
- Schwartz D. Subtypes of victims and aggressors in children's peer groups. *Journal of Abnormal Child Psychology* 2000;28:181–192. [PubMed: 10834769]
- Schwartz, D.; Proctor, LJ.; Chen, DH. The aggressive victim of bullying: Emotional and behavioral dysregulation as a pathway to victimization by peers. In: Juvonen, J.; Graham, S., editors. *Peer harassment in school: The plight of the vulnerable and victimized*. New York: Guilford; 2001. p. 147-174.
- Singer, JD.; Willett, JB. *Applied longitudinal data analysis: Modeling change and event occurrence*. New York, NY, US: Oxford University Press; 2003.

- Smith, PK.; Sharp, S. The problem of school bullying. In: Smith, PK.; Sharp, S., editors. School bullying. London: Routledge; 1994. p. 1-19.
- Snijders, TAB.; Bosker, RJ. Multilevel analysis: An introduction to basic and advanced multilevel modeling. London: Sage; 1999.
- Solberg ME, Olweus D, Endresen IM. Bullies and victims at school: Are they the same pupils? *British Journal of Educational Psychology* 2007;77:441–464. [PubMed: 17504556]
- Thomas DE, Bierman KL. The Conduct Problems Prevention Research Group. The impact of classroom aggression on the development of aggressive behavior problems in children. *Development and Psychopathology* 2006;18:471–487. [PubMed: 16600064]
- VanDerHeyden AM, Witt JC, Gilbertson D. A multi-year evaluation of the effects of a response to intervention (RTI) model on identification of children for special education. *Journal of School Psychology* 2007;45:225–256.
- Vossekuil, B.; Fein, RA.; Reddy, M.; Borum, R.; Modzeleski, W. The final report and findings of the Safe School Initiative: Implications for the prevention of school attacks in the United States. Washington, DC: U.S. Department of Education and U.S. Secret Service; 2002.
- Weiss B, Harris V, Catron T. Development and initial validation of the peer-report measure of internalizing and externalizing behavior. *Journal of Abnormal Child Psychology* 2002;30:285–294. [PubMed: 12041713]
- Yuan, KH.; Bentler, PM. Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. In: Sobel, ME.; Becker, MP., editors. *Sociological Methodology* 2000. Washington, DC: American Sociological Association; 2000. p. 165-200.
- Zucker DM. An analysis of variance pitfall: The fixed effects analysis in a nested design. *Education and Psychological Measurement* 1990;50:731–738. EJD 1/27/09

Table 1

Items and Factor Loadings on the Aggression and Victimization Self-Report Scales

Scale	Item	Loading T1	Loading T2	Loading T3
Aggression	Pushed, kicked, or hit a kid on purpose.	.70	.68	.72
	Left another kid out on purpose.	.60	.64	.74
	Started a fight or argument with a kid.	.66	.65	.64
	Tried to get other kids to be mean to a kid.	.58	.61	.69
	Teased or called a kid a mean name.	.78	.80	.82
	Said mean things behind another kid's back.	.68	.72	.69
Victimization	A kid pushed, kicked, or hit me on purpose.	.67	.70	.70
	Another kid left me out on purpose.	.74	.74	.75
	Another kid started a fight or argument with me.	.67	.65	.69
	A kid got other kids to be mean to me.	.77	.83	.79
	A kid teased me or called me a mean name.	.79	.80	.83
	A kid said mean things about me behind my back.	.77	.80	.77

Table 2
Zero-Order Correlations, Means, and Standard Deviations for all Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. SR Aggression T1	--											
2. SR Aggression T2	.59**	--										
3. SR Aggression T3	.54**	.65**	--									
4. SR Victimization T1	.43**	.32**	.31**	--								
5. SR Victimization T2	.37**	.44**	.39**	.67**	--							
6. SR Victimization T3	.32**	.37**	.45**	.58**	.67**	--						
7. TR Student Aggression T1	.25**	.28**	.28**	.14**	.25**	.18**	--					
8. PR Student Pro-social T1	-.30**	-.32**	-.29**	-.27**	-.29**	-.27**	-.52**	--				
9. Student Gender	.09**	.08*	.01	.00	-.02	.00	.10**	-.30**	--			
10. TR Class Aggression T1	.10**	.11**	.19**	.14**	.20**	.18**	.45**	-.06	.01	--		
11. PR Class Pro-social T1	-.12**	-.18**	-.17**	-.11**	-.14**	-.15**	-.08*	.39**	-.02	-.16**	--	
12. Class Gender Composition	-.08*	-.03	.04	-.02	.00	-.01	.04	-.04	.15**	.10**	-.10**	--
Mean	1.37	1.45	1.52	1.82	1.88	1.87	.00	.00	.50	.00	.00	.00
Standard Deviation	.53	.58	.63	.83	.87	.86	.63	1.17	.50	.53	.24	.08

Note. SR = Student self report, TR = Teacher report, PR = Peer report. These estimates do not account for non-independence due to nesting of students within classrooms.

$p < .01$

Table 3
Multilevel Models Predicting Initial Levels and Change in Student-Reported Aggression

		Unconditional Growth Model	With Student- and Class-Level Predictors
<u>Fixed Effects</u>			
Initial Level (π_{0ij})	Intercept (γ_{000})	1.373 (.025) **	2.010 (.339) **
	PR Pro-social (β_{01j})		-.174 (.035) **
	TR Aggression (β_{02j})		.030 (.024)
	Gender (β_{03j})		-.060 (.046)
	TR Aggression*Gender (β_{05j})		.058 (.023) *
	PR Class Pro-social (γ_{001})		-.107 (.094)
	TR Class Aggression (γ_{002})		.015 (.036)
	Class Gender (γ_{003})		-.708 (.231) **
Change (π_{1ij})	Intercept (γ_{100})	.070 (.013) **	.110 (.180)
	PR Pro-social (β_{11j})		-.017 (.021)
	TR Aggression (β_{12j})		.030 (.022)
	Gender (β_{13j})		.032 (.046)
	TR Aggression*Gender (β_{15j})		-.049 (.024) *
	PR Class Pro-social (γ_{101})		-.050 (.040)
	TR Class Aggression (γ_{102})		.052 (.025) *
	Class Gender (γ_{103})		.111 (.159)
<u>Variance Components</u>			
Within Student	Residual σ^2 (e_{ij})	.118 (.015)	.118 (.015)
Between Student	Intercept σ^2 (r_{0ij})	.159 (.023)	.131 (.021)
	Slope σ^2 (r_{1ij})	.018 (.008)	.016 (.008)
Between Class	Intercept σ^2 (u_{00j})	.017 (.006)	.010 (.004)
	Slope σ^2 (u_{10j})	.003 (.002)	.002 (.001)
<u>Pseudo-R^2</u>			
Between Student	Intercept R^2		.18
	Slope R^2		.11
Between Class	Intercept R^2		.41
	Slope R^2		.33

Note. TR = Teacher report, PR = Peer report. Standard errors are presented in parentheses for parameter estimates. Statistical significance is only indicated for estimates of fixed effects.

*
 $p < .05$,

**
 $p < .01$

Table 4
Multilevel Models Predicting Initial Levels and Change in Student-Reported Victimization

		Unconditional Growth Model	With Student- and Class-Level Predictors
<u>Fixed Effects</u>			
Initial Level (π_{0ij})	Intercept (γ_{000})	1.828 (.044) **	1.612 (.532) **
	PR Pro-social (β_{01j})		-.352 (.048) **
	TR Aggression (β_{02j})		.045 (.029)
	Gender (β_{03j})		-.157 (.055) **
	PR Class Pro-social (γ_{001})		.033 (.133)
	TR Class Aggression (γ_{002})		.169 (.067) *
	Class Gender (γ_{003})		-.247 (.460)
Change (π_{1ij})	Intercept (γ_{100})	.022 (.017)	-.110 (.279)
	PR Pro-social (β_{11j})		-.046 (.030)
	TR Aggression (β_{12j})		-.041 (.018) *
	Gender (β_{13j})		-.009 (.031)
	PR Class Pro-social (γ_{101})		-.006 (.072)
	TR Class Aggression (γ_{102})		.079 (.037) *
	Class Gender (γ_{103})		.017 (.260)
<u>Variance Components</u>			
Within Student	Residual σ^2 (e_{ij})	.227 (.015)	.227 (.017)
Between Student	Intercept σ^2 (r_{0ij})	.434 (.034)	.382 (.032)
	Slope σ^2 (r_{1ij})	.029 (.010)	.028 (.010)
Between Class	Intercept σ^2 (u_{00j})	.056 (.014)	.034 (.011)
	Slope σ^2 (u_{10j})	.005 (.003)	.004 (.002)
<u>Pseudo-R^2</u>			
Between Student	Intercept R^2		.12
	Slope R^2		.03
Between Class	Intercept R^2		.39
	Slope R^2		.20

Note. TR = Teacher report, PR = Peer report. Standard errors are presented in parentheses for parameter estimates. Standard errors are presented in parentheses for parameter estimates. Statistical significance is only indicated for estimates of fixed effects.

*
 $p < .05$,

**
 $p < .01$