Rejection, feeling bad, and being hurt: Using multilevel modeling to clarify the link between peer group aggression and adjustment

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Abstract:

The association between affiliating with aggressive peers and behavioral, social and psychological adjustment was examined. Students initially in 3rd, 4th, and 5th grade (N = 427) were followed biannually through 7th grade. Students' peer-nominated groups were identified. Multilevel modeling was used to examine the independent contributions of adolescents' typical peer context (between-person effect) and changes in peer context (within-person effects) to adolescents' adjustment. Typically affiliating with aggressive groups and affiliating with more aggressive groups than usual predicted higher aggression for all youth. Typically affiliating with aggressive groups predicted negative adjustment (lower social preference and self-worth, higher victimization) for girls but neutral or positive adjustment for boys. Although typical peer context was consistently associated with adjustment, changes in peer context predicted small changes in adjustment for several outcomes. Results underscored the need to adopt a more differentiated picture of adolescents' dynamic peer context and its association with normative development.

Keywords: Peer relationships | Aggression | Psychological adjustment | Peer influence

Article:

A sizeable literature documents that youth who affiliate with deviant peers display higher levels of bullying, aggression, and delinquency (e.g., Boivin and Vitaro, 1995, Coie and Dodge,

1998, Elliott et al., 1985,Espelage et al., 2003 and Mrug et al., 2004). It is unclear whether this similarity reflects selection or influence. Adolescents' behavior may cause them to select deviant peers or peers' behavior may cause adolescents to become deviant (Kandel, 1978). Disentangling selection and influence processes is further complicated by the dynamic nature of peer networks. Youth's personal preferences and opportunities for interaction are constantly changing (e.g., Cairns, Leung, Buchanan, & Cairns, 1995). Yet, despite the instability in the *identities* of group members there can be stability in the *characteristics* of these peers (Dishion et al., 1997 and Neckerman, 1996). Youth may sever ties with one aggressive group and join another aggressive group: the identities of the group members have changed but their typical (i.e., averaged over time) peer context remains constant.

To disentangle selection and influence, peer researchers often infer influence from models in which peers' characteristics at Time 1 (T1) are used to predict an adolescent's behavior at Time 2, after controlling for his or her initial behavior (Kindermann, 1993). This approach draws upon a long tradition of inferring causation from cross-lagged correlations (Kenny & Harackiewicz, 1979); however, it assumes that the T1-Peer variable captures the unique effects of the T1-Peer context. Given that peer contexts have some continuity over time, the T1-Peer variable may be better conceptualized as reflecting two distinct components: (1) an adolescent's general tendency to affiliate with aggressive peers (i.e., his or her *typical*peer context); and (2) an adolescent's deviation from that tendency at Time 1 (i.e., his or her *current* peer context). In the present study, we use multilevel modeling to disentangle students' typical peer context from changes in their peer context. This approach allows us to test two distinct developmental propositions: that stable individual differences in peer context are linked to stable individual differences in adjustment (between-person effects) and that the unique features of the peer context at one time are linked to changes in adjustment (within-person effects).

Using repeated measurements to capture the typical and changing peer context

The difference between students' typical and changing peer context is best illustrated with an example. Fig. 1 shows the time-varying values of group members' aggression for two male students, measured across 10 waves. At wave 1, student 1 (black circles) is in a highly aggressive peer group ($Z = 1.0$). If we only had information about the peer context at this wave, we would not know whether this aggressive peer context is typical for student 1 or whether this aggressive peer context is an anomaly. Looking across all 10 waves, it is clear that student 1 *typically* affiliates with highly aggressive groups; the mean across all 10 waves is $Z = 0.9$. The peer context at wave 1 is only slightly more aggressive than his typical peer context. By contrast, student 2 (grey diamonds) *typically* affiliates with non-aggressive groups; the mean across all 10 waves is $Z = -0.2$. *Typical peer context* captures stable, individual differences in the tendency for students to affiliate with aggressive peer groups; thus, it is a between-person effect.

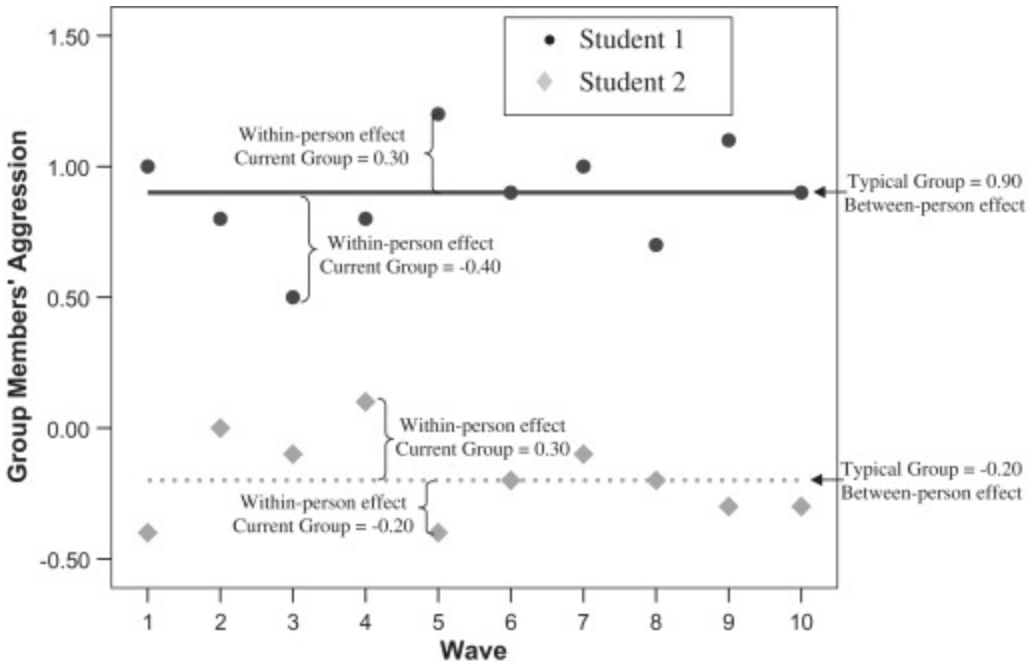

Fig. 1. Current and average group members' aggression for two students. Although the level of group member aggression varies across waves, on average Student 1 has highly aggressive group members and on average Student 2 has low aggressive group members.

At each wave, students may have a more or less aggressive peer context than usual. The degree to which students deviate from their own typical (or average) peer context defines their *current peer context*, a within-person effect. At wave 3, student 1 has a moderately aggressive peer context, $Z = 0.5$, so his current peer context is 0.4 SD below his typical peer context, $Z = 0.9$. At wave 5, his peer context is $Z = 1.2$, which is 0.3 SD above his typical peer context. Current peer context is computed similarly for student 2: at wave 4, he has a more aggressive peer context than usual (current peer context = 0.3) and at wave 5, he has a less aggressive peer context than usual (current peer context = −0.2). This strategy could also capture developmental trends over time. For example, a student who first begins to affiliate with more aggressive peers in middle school would first be in a low aggressive groups (i.e., negative current peer context), then he would be in moderately aggressive groups (i.e., current peer context of approximately zero) and finally he would be in high aggressive peer groups (i.e., positive current peer context).

After separating the effect of students' typical and current peer context, we can examine their independent associations with students' adjustment. If students who typically affiliate with aggressive groups (e.g., student 1) are *on average* more aggressive than students who typically affiliate with non-aggressive groups (e.g., student 2), then there would be a positive effect of typical peer context. If students are more aggressive at waves when they have more aggressive group members than usual (e.g., wave 5 for student 1 and wave 4 for student 2), then there would be a positive effect of current peer context.

Notably, the association between typical peer context and adjustment could reflect either selection or influence. For example, a positive association between peer context and rejection could arise if youth who tend to be in aggressive groups are continually rejected because of their affiliations (influence). The same association could also arise if rejected youth tend to affiliate with aggressive peers because they are excluded from non-aggressive groups (selection). The association between current peer context and adjustment could also reflect selection or influence: a positive association between current peer context and rejection could arise if affiliating with more aggressive peers than usual leads to rejection at that wave (influence) or if being rejected leads youth to join more aggressive peer groups than usual at that wave (selection).

It is possible to obtain a purer measure of influence, however. The association between *current* adjustment and affiliating with more aggressive groups than usual at the *previous* wave most likely only reflects influence. For example, a positive association between past group and current rejection is most likely due to influence rather than selection because it is unlikely that youth who are currently rejected systematically selected to affiliate with aggressive peers at the past wave. In the current study we explore whether *past peer context* predicts adjustment over and above the effects of typical and current peer context. Within-person peer context effects could also differ between students with different typical peer contexts. For example, students who typically have a low aggressive peer context (e.g., student 2) may be more sensitive to fluctuations in peer context. These differences can be tested with interaction terms between typical and current peer context as well as between typical and past peer context.

Developmental sequelae of affiliating with aggressive peers

The link between peers' aggression and individuals' aggression is clearly documented, but less is known about the social and psychological implications of affiliating with deviant peers. It is informative to consider this issue in the context of research on how aggression impacts individual development. Early evidence of homotypic continuity in aggression (Olweus, 1979) was followed by studies of heterotypic continuity (Rutter, 1989) linking childhood aggression to later psychological, social, and educational outcomes (Bierman, 2004, Boivin and Hymel, 1997, Cairns and Cairns, 1994 and Coie et al., 1982). Developmental models of the "cumulative consequences" (Caspi et al., 1987 and Moffitt, 1993) or "cascading" effects (Masten et al., 2005) of aggression now emphasize how early aggression triggers a downward spiral of negative outcomes such as lower achievement, school dropout, internalizing symptoms, and lower job attainment (Caspi et al., 1987, Masten et al., 1995, Masten et al., 2005 and Parker and Asher, 1987). In some cases, however, individual aggression may also linked to *adaptive* outcomes (e.g., Hawley, Little, & Rodkin, 2007). For example, some aggressive youth are viewed as "popular" by their peers (LaFontana and Cillessen, 2002 and Parkhurst and Hopmeyer, 1998).

Affiliating with aggressive peers may predict a range of social and psychological adjustment outcomes due to peer reputation effects and the unique features of interactions with aggressive

peers. Youth who affiliate with bullies rarely object to and often reinforce bullying (Atlas and Pepler, 1998 and Salmivalli et al., 1997). Peers may infer that these youth support hostile behavior and judge them "guilty by association." In this case, affiliating with aggressive peers may generate a negative peer reputation (Hymel, Wagner, & Butler, 1990) whereas affiliating with non-aggressive peers may mitigate the negative reputational impact of a student's own aggression. Alternatively, because some aggressive youth, particularly boys, have high social status (Farmer and Rodkin, 1996, Hawley, 2003, LaFontana and Cillessen, 2002, Parkhurst and Hopmeyer, 1998 and Rodkin et al., 2000) affiliating with aggressive peers could be linked to *higher* status.

Relationships with aggressive peers are often conflicted (Dishion, Andrews, & Crosby, 1995), which suggests that affiliating with aggressive peers may increase the risk of negative social experiences (e.g., victimization) and emotional difficulties. For example, preschool girls who affiliated with externalizing peers over the course of a semester had higher anxiety at the end of the semester (Hanish, Martin, Fabes, Leonard, & Herzog, 2005). Similarly, older youth who affiliated with deviant peers had higher rates of depressive symptoms both concurrently (Brendgen, Vitaro, & Bukowski, 2000) and 12‑18 months later (Mrug et al., 2004). Alternatively, having aggressive peers may be *protective* by shielding against aggression from non-friends (Hodges, Boivin, Vitaro, & Bukowski, 1999), which may indicate that some aggressive youth direct their aggression outside of their close relationships. In the current study, we extend this emerging research area by focusing on the link between aggressive peer affiliations and multiple measures of adjustment.

The role of gender

In reviewing the extensive empirical literature comparing the largely separate social worlds of girls and boys (e.g., Maccoby, 1998), Rose and Rudolph (2006) concluded that girls' and boys' peer relations differed along dimensions of behavioral and social-cognitive styles, stress and coping processes, and relationship provisions. These differences suggest that the association between an aggressive peer context and adjustment may be moderated by gender. For example, differences in behavioral styles and norms relating to direct aggression may lead to more negative reputational effects for girls who affiliate with aggressive peers. Consistent with the person-group similarity model (Wright, Giammarino, & Parad, 1986), peer acceptance and aggression are negatively correlated for boys in low aggression classes, but positively correlated for boys in high aggression classes (Stormshak, Bierman, Bruschi, Dodge, & Coie, 1999). This suggests that, to the extent that direct aggression is a more normative behavioral style among boys, affiliating with aggressive peers may carry less severe social sanctions and reputational consequences for boys. Conversely, there may be greater pressures for girls to affiliate with non-aggressive peers and greater reputational consequences for girls who violate these norms.

Potential gender differences in the nature of negative interactions among aggressive youth are largely unexplored. Both girls and boys engage in deviancy training, in which peers positively

reinforce deviant behavior; however, the baseline rates of deviancy training are higher among boys than among girls (Dishion, 2000). In addition to any gender differences in the negative features of interactions among aggressive youth, girls may be more negatively impacted by these interactions. Girls tend to be more invested in their relationships than boys; they report caring more about their relationships, experience more fear of negative peer evaluations, and report more intimate relationships (Rose & Rudolph, 2006). Furthermore, antisocial characteristics are associated with higher centrality for boys, but lower centrality for girls (Farmer & Rodkin, 1996). These differences suggest that aversive peer interactions may impact girls more, particularly in measures that tap the self-system (e.g., self-worth) and peer reputations. The limited empirical findings in this area are mixed, however. Two studies found no gender differences in the association between having aggressive friends and depression (Brendgen et al., 2000 and Mrug et al., 2004), whereas a third study found that exposure to externalizing peers led to increased anxiety for girls, but not for boys (Hanish et al., 2005).

The present study

In the current study, we focus on capturing the peer context by exploring whether typical, current, or past peer context predict adjustment across a broad range of domains, over and above individual aggression and network size. We expected that affiliating with aggressive peers would be associated with higher aggression, lower social preference, higher risk of victimization, and lower self worth. Because direct forms of aggression are more normative for boys and because girls are more likely than boys to seek supportive relationships and to define themselves based on their relationships, we expected that an aggressive peer context would have more negative implications for girls' adjustment. Because both selection and socialization shape development, we expected that individual differences in peer context (i.e., between-person variation) would be associated with average adjustment and that *changes* in current and past peer context (i.e., within-person deviations from the typical peer context) would predict *changes* in adjustment.

Method

Participants

Participants were in the 3rd, 4th and 5th grades in a school district serving a rural, working-class community in Fall 2001. The youth were involved in a cohort-sequential study that followed each cohort through the end of 7th grade, when students were approximately 13 years old. To describe students' peer contexts, all participants provided data at each wave (92‑94% of all enrolled students). Current analyses focus on a sample of 427 youth enrolled in the target grades at the first wave (193 girls, 234 boys; 146 3rd, 146 4th, 135 5th graders). Sixty-seven percent (n = 286) of the sample participated at all waves (6‑10 waves, depending on the cohort) and 95% (n = 406) participated at four or more waves. Non-participants were less likely to be named as friends, but did not differ reliably on being nominated as aggressive by peers.

All youth in the district attended a single elementary (*K* – 5th grade) and middle school (6th – 8th grade). In elementary school, there were six self-contained classes (*M* = 25 students per class). In 6th grade, youth remained with peers from their homeroom class (*M* = 23 students per class) for most of the day, switching teachers for different subjects. In 7th grade, youth switched peers and teachers for each subject. Consistent with the community population, 99% of the participants were Caucasian. The distribution of achievement scores for 5th graders at the school was similar to the statewide distribution, but the district had above average poverty and school dropout rates.

Procedures

Peer-nominations and self-reports were obtained through a 45-min group-administered survey in October and May of each school year. Teachers left the room during survey administration and completed a brief survey about each participant in their class. Two weeks prior to data collection, parents received a letter describing the study. Students participated only if they assented and if their parents did not return a form exempting them from the study.

Measures

Peer relationships

Students nominated classmates whom they liked most, liked least, and who fit each of 12 behavioral descriptions. Students were given a roster and allowed to make unlimited nominations for each item; nominations were not limited to same-gender classmates. *Peer-nominated Aggression* was the mean number of nominations received for “starts fights” and “hits or picks on others” (median $r = 0.94$) divided by the number of nominators in the class (elementary school) or grade (middle school). *Peer-nominated Victimization* was the mean proportion of nominations received for “gets picked on a lot” and “gets hit or pushed a lot” (median $r = 0.89$). The different number of nominators led the raw proportion scores to vary considerably between elementary and middle school, so mean proportion of aggression and mean proportion of victimization nominations were standardized within grade. *Social Preference* was the standardized difference between the number of “liked most” and “liked least” nominations received, standardized within class [grade] and gender (Coie et al., 1982).

Self-worth

Students were provided with 12 paired statements from the Self-Perception Profile for Children (Harter, 1982). From each pair, they selected the statement that was more true for them, and then indicated whether it was “sort of true” or “really true” for them. *Self-Worth* was the mean of four items (the statements indicating higher self-worth were: think the way they do things is just fine; are happy with themselves most of the time; like the way they are leading their life; like the kind of person they are; median $\alpha = 0.75$).

Group members

Groups of youth who interact frequently were identified with the Social Cognitive Mapping approach (Cairns, Cairns, Neckerman, Gest, & Gariepy, 1988). Students were asked, "Are there some kids in your class who hang around together a lot?" The number of times two students are named in the same group correlates with the number of times that pair is observed to interact (Gest, Farmer, Cairns, & Xie, 2003). Peer reports were aggregated into a co-nomination matrix; off-diagonal cells indicated the number of times each dyad was named in the same group. We used principal components analysis with Varimax rotation to identify groups of three or more youth with similar nomination profiles (Gest, Moody, & Rulison, 2007). Youth belonged to any group on which they had a component loading >0.32, ensuring that they shared 10% of the variance in their nominations with the group. Students with loadings on more than one component at any wave (10‑30%) were considered to be members of multiple groups. A student's *group members* were classmates who were in the same group as that student. For students who were in more than one group, classmates from each group were considered to be their group members. Students who did not load on any component (<4%) were isolates.

Group members' aggression

At each wave, we calculated the average standardized peer-nominated aggression of a student's group members. Students who were isolates at a particular wave were treated as missing. Youth with no group members are a potentially interesting subset of adolescents, however the focus of this study on the features of peer networks precludes a detailed analysis of these adolescents here.

Preliminary analyses

Table 1 provides the means and standard deviations for all outcome variables. Aggression was highly skewed, so we used an inverse transformation (multiplied by −1 to keep the direction of the effect the same). Self-worth was moderately negatively skewed, so we reflected it and then used a natural log transformation. Victimization was especially skewed, so we created a dichotomous variable at each wave. Prior research indicates that about 10% of students can be classified as extremely victimized (Perry, Kusel, & Perry, 1988), therefore we classified students in the top 10% of nominations at each wave as victimized and all others as not victimized.

Table 1. Descriptive information for outcome variables.

	3rd		4th		5th		6th		7th	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
Peer-nominations: aggression										
N	140	140	268	265	389	391	385	377	366	362
Mean	0.05	0.06	0.05	0.05	0.05	0.06	0.01	0.01	0.01	0.01

SD	0.09	0.10	0.09	0.09	0.10	0.11	0.03	0.03	0.02	0.02
Skew	2.67	2.71	3.17	2.68	3.41	2.97	6.61	7.42	9.96	9.00
Kurtosis	8.11	7.98	12.85	7.92	13.59	10.38	55.87	68.17	133.74	113.55
Peer nominations: standardized social preference										
N	140	140	268	265	389	391	385	377	366	363
Mean	0.03	−0.02	0.01	0.03	0.02	0.05	0.05	0.02	0.05	0.04
SD	0.97	0.97	0.96	0.95	0.97	0.96	0.98	0.98	1.04	0.98
Skew	−0.27	−0.42	−0.41	−0.26	−0.52	−0.38	−1.09	−1.12	−1.24	−0.89
Kurtosis	−0.03	−0.20	−0.20	−0.42	−0.38	−0.09	4.12	5.08	5.16	3.97
Peer nominations: proportion of victimized nominations										
N	140	140	268	265	389	391	385	377	366	363
Mean	0.03	0.03	0.02	0.03	0.03	0.04	0.01	0.01	0.01	0.01
SD	0.04	0.04	0.04	0.05	0.07	0.08	0.02	0.02	0.03	0.03
Skew	4.89	2.11	3.58	3.39	3.22	3.59	9.33	7.22	9.87	10.51
Kurtosis	38.31	6.49	18.29	13.82	12.00	14.36	114.60	64.04	121.85	140.16
Adolescent-report: self-worth										
N	129	136	239	241	358	359	369	342	349	351
Mean	3.23	3.24	3.29	3.31	3.35	3.33	3.41	3.34	3.41	3.33
SD	0.70	0.69	0.66	0.68	0.69	0.71	0.64	0.69	0.62	0.67
Skew	−0.71	−0.93	−0.82	−0.89	−1.17	−1.03	−1.21	−0.95	−1.06	−0.95
Kurtosis	−0.40	0.54	0.16	0.00	0.97	0.49	1.40	0.26	0.98	0.56

Results

Analytic plan

We used a multilevel modeling (MLM) strategy to explore whether adolescents' typical peer context was associated with average behavioral (aggression), social (social preference, victimization) and psychological (self-worth) adjustment and whether *changes* in peer context coincided with *changes* in adjustment. One advantage of MLM is that it can account for correlated errors, which occur when time is nested within student (Singer & Willett, 2003). Another advantage of MLM is that it does not require balanced data. Because of our cohort-sequential design, some students did not have data in 3rd or 4th grade. In addition, not all students were present at every wave; at any given wave, some students were absent, had moved, or were exempt. By using MLM, we were able to use grade, rather than wave, as the index of time and we were able to use data from all 427 students. Students contributed information for effect estimation only at waves when they participated.

For each outcome, we estimated a series of two-level models with SAS PROC MIXED, using the Satterthwaite method to estimate degrees of freedom. Because we dichotomized victimization, we used SAS PROC NLMIXED to predict the log odds of being victimized (Wolfinger, 1999). In all models, Level 1 (time) included grade polynomials and the effect of semester to describe how outcomes varied across time. Level 1 also included several time-varying predictors that may impact adjustment (student's own peer-nominated aggression, number of group members) to explore the independent contribution of peer context to

adjustment. We centered grade at the 5th grade (Fall) assessment and we centered number of group members at five, which was the mean number of group members at that wave. We did not center peer-nominated aggression because it was already standardized, with 0 indicating average aggression. Level 2 (student) included gender (a time-invariant predictor).

To capture the time-varying effects of peer context, we used group-mean centering (Raudenbush & Bryk, 2002; also known as within-person centering, Singer & Willett, 2003): At each wave we subtracted students' own cross-time mean for group members' aggression from their group members' aggression score at that wave. The cross-time mean is a between-person effect, so we included it at Level 2. We refer to the between-person effect as *typical group* (girls: range = −0.51 to 0.89, $M = -0.13$, SD = 0.24; boys: range = −0.42 to 2.13, $M = 0.14$, SD = 0.37). A positive value for typical group indicates that a student typically had an aggressive peer context; a negative value indicates that a student typically had a non-aggressive peer context. The time-varying effect of group members' aggression is a within-person effect, so we included it at Level 1. We refer to the within-person effect as *current group* (girls: range = −1.34 to +2.68; boys: range = −2.31 to +4.78). A positive value for current group indicates that a student's peer context was more aggressive than his or her typical peer context; a negative value indicates that a student's peer context was less aggressive than his or her typical peer context.

Group-mean centering and the inclusion of the cross-time mean at Level 2 ensured that time-varying effects only reflected within-student variability across time, over and above any stable (unobserved) individual differences and allowed us to estimate how *changes* in peer context were related to *changes* in adjustment (see Dearing et al., 2006 and Jacobs et al., 2002; and Kim, McHale, Osgood, & Crouter, 2006for similar applications). Although this approach eliminates stable individual differences (whether measured or not) as potential alternative explanations, we cannot rule out reciprocal influence and influence from other time-varying predictors. A significant coefficient for current group, for example, could reflect the effect of students' current group on their behavior (socialization), or it could reflect the effect of students' behavior on which groups they decided to join (selection). Including a variable that describes a person's *prior* peer context diminishes the risk of reciprocal causation (Singer & Willett, 2003). We calculated *past group* by subtracting the cross-time means from students' group members' aggression at the immediately preceding wave.

For each outcome, we first estimated the unconditional means model (Model A), which estimates the average value of an outcome in the absence of any predictors. From this model, we computed the intraclass correlation coefficient (ICC), which is the variation in the intercept (between-student variation) divided by the total variation (variation in the intercept plus residual error variation). The ICC indicates the extent to which observations are correlated within a student: values close to 1 indicate high within-student correlations (i.e., most of the variation is between students). The ICC for each outcome was between 0.45 and 0.66, which suggests that there was

sufficient between student (i.e., Level 2) and within-student (i.e., Level 1) variability to justify adding predictor variables at both levels.

We next estimated an unconditional growth model for each outcome (Model B) with fixed and random effects of grade to explore whether growth occurred, and if so, whether it was best modeled as a linear or curvilinear effect of grade (centered at 5th grade). We also added a fixed effect of semester (Fall = 0) to capture any within-year patterns of growth or decline. In Model C for each outcome, we added controls for gender (girl = 0), cohort (youngest cohort = 0), and the time-varying effect of number of group members (M = 7.37, SD = 4.44). For all outcomes except aggression, we controlled for peer-nominated aggression to test the effect of the peer context variables over and above the effect of students' own aggression. We then estimated a full model (Model D), which included all of the peer context variables (i.e., typical, current, and past group members' aggression) and interactions between the peer context variables and gender. An example equation for the full model predicting aggression is given in Appendix A

In the final model, we only retained significant interaction terms, because including non-significant interactions can lead to increased standard errors (Aiken & West, 1991). To facilitate the interpretation of significant interactions, we plotted results for otherwise "typical" youth (i.e., Fall of 5th grade, average peer-nominated aggression, average number of group members). We plotted current group members' aggression on the *x*-axis and predicted values of the outcome on the *y*-axis. The predicted values were plotted for youth with low (1 SD below the mean; $Z \approx -0.35$) and high (1 SD above the mean $Z \approx 0.35$) typical group members' aggression.

For all models, we assessed the significance of random effects with restricted maximum likelihood (REML). When significant variation was present, we computed the range of scores in which 95% of the population was expected to fall. This range, calculated for each fixed effect as ± 1.96 SD of the corresponding random coefficient, describes the variation in scores across students. It should not be confused with confidence intervals that indicate *precision* of the coefficients (i.e., whether or not a coefficient is significantly different from zero).

Ideally, in a multilevel model the addition of random effects for time accounts for the patterns of variances and covariances across waves. However, a covariance structure for the residuals errors can be added to account for any remaining patterns (Hedeker & Gibbons, 2006). In two models, specifying a first order auto-regressive covariance structure, AR(1), improved model fit (i.e., significantly reduced REML deviance). The AR(1) parameter specifies the correlation between two adjacent waves; the correlation between other pairs of waves decreases exponentially as the time between the waves increases.

Changes in peer context as predictors of adolescents' adjustment

Below, we describe the results for each of the adjustment outcomes. Table 2 provides the results of Models B‑E for peer-nominated aggression. For the other outcomes, we describe the results of Models B‑D in the text and provide only the final model (Model E) in Table 3.

Table 2. Parameters estimates for fixed and random effects: peer nominated aggression.

	Model B		Model C		Model D (Full model)		Model E (Final model)	
	RC	SE	RC	SE	RC	SE	RC	SE
Fixed effects								
Intercept	0.02	0.04	−0.17*	0.07	−0.01	0.07	0.07	0.11
Level 1								
Grade – 5	−0.00	0.02	−0.01	0.03	−0.02	0.02	−0.02	0.02
$(\text{Grade} - 5)^2$	−0.00	0.01	−0.00	0.01				
Semester (Fall = 0)	−0.00	0.03	−0.00	0.03	−0.00	0.03	−0.00	0.03
Cohort (youngest = 0)			0.02	0.05	0.02	0.04	−0.02	0.04
# Group members			0.01	0.00	0.00	0.00	0.00	0.00
Current group					0.30***	0.07	0.24***	0.04
Past group					0.08	0.07	0.08*	0.04
Gender × current group					−0.05	0.09		
Gender × past group					−0.01	0.09		
Typical group × current group					−0.06	0.10		
Typical group × past group					0.02	0.10		
Level 2								
Gender (girl = 0)			0.30***	0.07	0.03	0.08	−0.04	0.08
typical group					1.12***	0.22	0.98***	0.11
Typical group × gender					−0.20	0.26		
		Variance components						
Random effects		Model B		Model C		Model D (Full model)		Model D (Final model)
Level 1	0.41***	0.01	0.41***	0.01	0.39***	0.01	0.39***	0.01
Level 2								
Intercept	0.54***	0.05	0.51***	0.05	0.41***	0.04	0.41***	0.04
Linear change	0.05***	0.01	0.05***	0.01	0.03***	0.01	0.03***	0.01
Quadratic change	0.01*	0.00	0.01*	0.00				
Current group					0.09**	0.03	0.09**	0.03

Past group					0.10**	0.04	0.10**	0.04

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

Note. Covariance parameters were estimated and are available upon request.

Table 3. Final parameter estimates for fixed and random effects: social preference, victimization, and self-worth.

	Social preference		Victimization		Self-worth	
	RC	SE	RC	SE	RC	SE
Fixed effect						
Intercept	−0.15	0.08	−4.13***	0.50	−0.48***	0.03
Level 1						
Grade – 5	−0.02	0.02	−0.47*	0.20	0.01	0.01
(Grade – 5)^2					−0.01	0.01
Semester (fall = 0)	−0.00	0.02	−0.46*	0.18	−0.03**	0.01
Cohort (youngest = 0)	−0.01	0.05	−0.30	0.27	0.00	0.02
Peer-nominated aggression	−0.18***	0.02	0.31*	0.13	−0.01	0.01
# Group members	0.01*	0.00	−0.03	0.03	0.00*	0.00
Current group	0.09**	0.03	0.06	0.20	−0.02†	0.01
Past group	−0.03	0.03	0.22	0.19	0.01	0.01
Level 2						
Gender (girl = 0)	0.11	0.08	1.67***	0.46	0.07*	0.03
Typical group	−0.46†	0.23	3.53**	1.28	−0.18*	0.09
Typical group × gender	0.91***	0.28	−5.07***	1.48	0.19†	0.11
	Variance components					
Random effects		Social Preference		Victimization		Self-worth
Level 1	0.36***	0.02			0.06***	0.00
Level 2						
Intercept	0.44***	0.04	5.94***	1.38	0.07***	0.01
Linear change	0.03***	0.01	0.79*	0.37	0.01***	0.00
Quadratic change					0.00†	0.00
AR(1)	0.27***	0.04			0.15**	0.05

† p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001.

Note. Covariance parameters were estimated and are available upon request.

Adjustment outcome: aggression

Peer-nominated aggression was standardized, so average aggression was essentially zero in the unconditional means model (Model A; γ_{00} = 0.01, t = 0.26, *ns*). There was, however, significant variation in average aggression, 95% CI [−1.41, 1.43]; even though average aggression was zero across students, some students were generally low aggressive (intercepts < 0) and other students

were generally aggressive (intercepts > 0). Just over half of the variation in aggression was between people (ICC = 0.53), thus even though aggression is often considered to be a highly stable individual characteristic, over 40% of the observed variation in aggression was due to within-student variation.

Because we standardized aggression within grade, there were also no fixed linear or quadratic changes in aggression across grades (Table 2, Model B); however, adding random linear and quadratic effects of grade improved model fit, REML deviance difference ($df = 5$) > 56, $p < 0.001$, so the fixed effects of grade were retained. The fixed effect of semester was not significant ($\gamma_{30} = -0.00$, $t = -0.03$, *ns*), but we retained it as a control variable. When we added the other control variables (Model C), there was no significant effect of cohort ($\gamma_{02} = 0.02$, $t = 0.40$, *ns*) or number of group members ($\gamma_{40} = 0.01$, $t = 1.42$, *ns*). There was a significant effect of gender ($\gamma_{01} = 0.30$, $t = 4.06$, $p < 0.001$): boys were significantly more aggressive than girls. In the full model (Model D), adding random effects for current group and past group significantly improved model fit, REML deviance difference ($df = 9$) > 34, $p < 0.001$. Once these random effects were added, the random quadratic effect of grade no longer improved model fit, so we removed it from the model. There were no significant cohort by peer context interactions, so we also removed these interactions from the final model.

In the final model (Table 2, Model E), typical group was a significant predictor of aggression ($\gamma_{03} = 0.98$,$t = 8.61$, $p < 0.001$): on average, youth who typically had an aggressive group context were more aggressive than youth who typically had a low aggressive group context. Current group was a significant time-varying predictor of aggression: increases and decreases in group members' aggression paralleled increases and decreases in aggression ($\gamma_{50} = 0.24$, $t = 6.37$, $p < 0.001$). The significant random effect of current group indicated that the size and direction of this effect varied across students, 95% CI [−0.35, 0.83]. Past group was also a reliable predictor of aggression ($\gamma_{60} = 0.08$, $t = 2.02$, $p < 0.05$): youth were slightly more aggressive when their *past* group was more aggressive than usual. Again, there was significant variation in this effect across students, 95% CI [−0.54, 0.70].

Adjustment outcome: peer social preference

Because we standardized social preference within classroom and grade, average social preference was essentially 0 (Model A: $\gamma_{00} = 0.01$, $t = 0.19$, *ns*), but there was significant variation in average social preference, 95% CI [−1.48, 1.50]. Just under two-thirds of the variation in social preference (ICC = 0.63) was between people. In Model B, the fixed linear effect of grade, fixed quadratic effect of grade and semester were not significant (all $|\gamma| < 0.01$, *ns*), but there was significant variation across students in the random linear effect of grade, 95% CI [−0.49, 0.48], and in the random quadratic effect of grade, 95% CI [−0.14, 0.14]. Social preference was similar across cohorts ($\gamma_{02} = -0.00$, $t = -0.40$, *ns*) and there were no

significant cohort by peer context interactions, so we removed these interactions from the model. In Model C, students had higher social preference when they had many group members ($\gamma_{40} = 0.01$, $t = 3.33$,$p < 0.05$) and when they were viewed as non-aggressive by their peers ($\gamma_{70} = -0.17$, $t = -8.50$, $p < 0.001$). Because social preference was standardized within grade, the main effect of gender was not significant. Adding an AR(1) covariance structure to the error terms significantly improved model fit. Once the AR(1) structure was added, the random quadratic effect of grade no longer improved model fit, so we removed it from the final model.

In the final model (Table 3, Column 1), typical group predicted social preference ($\gamma_{03} = -0.46$, $t = -1.95$,$p = 0.05$), but this association was qualified by a significant interaction with gender ($\gamma_{04} = 0.91$, $t = 3.31$,$p < 0.001$): Girls who were typically in aggressive groups (Fig. 2: dashed grey line) had the lowest average social preference, considerably lower than girls who were typically in low aggressive groups (solid grey line). By contrast, boys who were typically in aggressive groups (dashed black line) had the *highest*average social preference, considerably higher than boys who were typically in low aggressive groups (solid black line). In addition, increases and decreases in current group were significantly associated with increases and decreases in social preference ($\gamma_{50} = 0.09$, $t = 3.26$, $p < 0.01$); both girls and boys had higher preference when their *current* group was more aggressive than usual (slight positive slope for all lines). Past group was not a significant predictor of social preference ($\gamma_{60} = -0.03$, $t = -0.92$, *ns*).

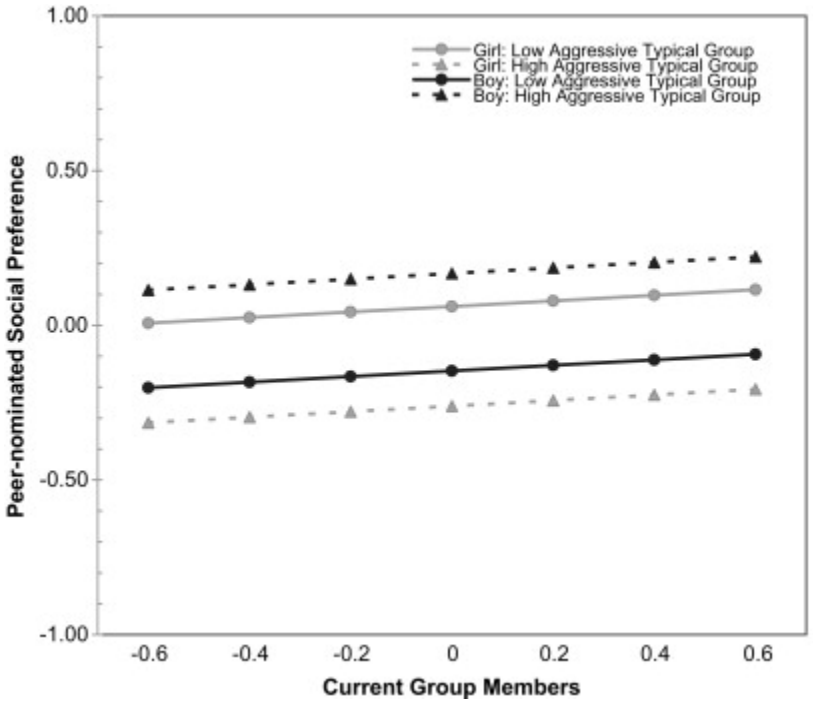

Fig. 2. Predicted peer-nominated social preference as a function of typical group, current group, and gender. Plots are for average youth ($Z_{\text{aggression}} = 0$; $n_{\text{group members}} = 5$) in the youngest cohort in the fall of 5th grade.

Adjustment outcome: peer victimization

On average, rates of victimization were low (Model A: $\gamma_0 = -3.94$, $t = -15.87$, $p < 0.001$), but there was significant random variation in the average rate of victimization: the average probability of victimization was 0.02, 95% CI [0, 0.12]. Two-thirds of the variation in victimization (ICC = 0.66) was between people. In Model B, victimization decreased across grade ($\gamma_{10} = -0.51$, $t = -2.43$, $p < 0.05$) and decreased from the fall to spring semester ($\gamma_{30} = -0.48$, $t = -2.67$, $p < 0.01$). There was also significant variation across students in the random linear effect of grade, 95% CI [−2.04, 1.02]. Neither the fixed nor random quadratic effects of grade were significant. In Model C, victimization was similar across cohorts ($\gamma_{02} = -0.26$,$t = -0.96$, *ns*) and similar for youth with different numbers of group members ($\gamma_{40} = -0.04$, $t = -1.33$, *ns*). Students who were viewed by their peers as aggressive ($\gamma_{70} = 0.28$, $t = 2.83$, $p < 0.05$) and boys ($\gamma_{01} = 1.83$,$t = 4.07$, $p < 0.001$) were more likely to be victimized.

In the final model (Table 3, Column 2), typical group predicted the probability of victimization ($\gamma_{03} = 3.53$,$t = 2.75$, $p < 0.01$), but this association was qualified by an interaction with gender ($\gamma_{04} = -5.07$, $t = -3.43$,$p < 0.001$): Girls who were typically in aggressive groups (Fig. 3: dashed grey line) were on average more likely to be victimized than girls who were typically in low aggressive groups (solid grey line). By contrast, boys who were typically in low aggressive groups (solid black line) had the *highest* rates of victimization whereas boys who were typically in aggressive groups (dashed black line) were much less likely to be victimized. Changes in current ($\gamma_{50} = 0.06$, $t = 0.29$, *ns*) and past group ($\gamma_{60} = 0.22$, $t = 1.16$, *ns*) were not significantly associated with changes in victimization.

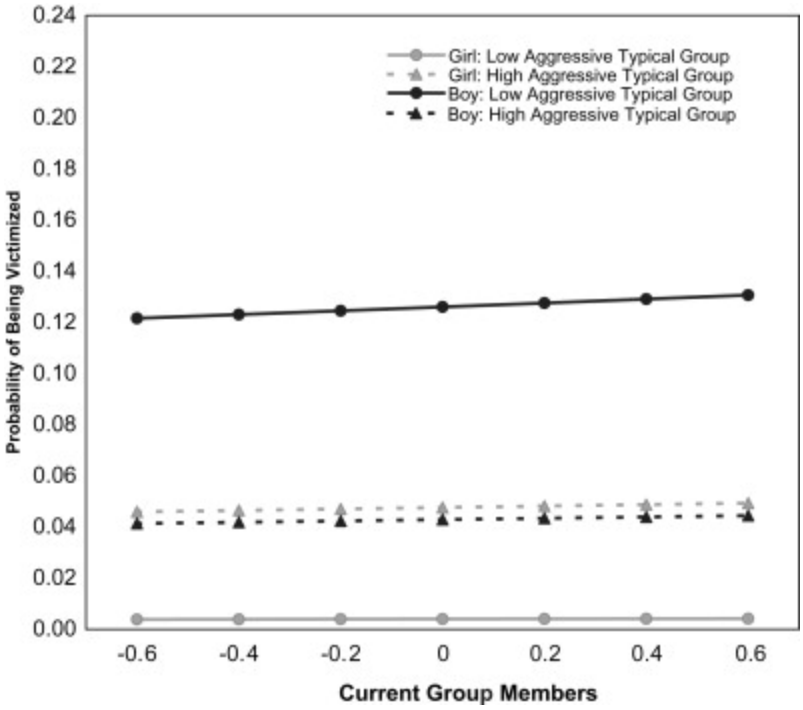

Fig. 3. Predicted peer-nominated victimization as a function of typical group, current group, and gender. Plots are for average youth ($Z_{\text{aggression}} = 0$; $n_{\text{group members}} = 5$) in the youngest cohort in the fall of 5th grade.

Adjustment outcome: self-worth

Average self-worth was high (Model A: $\gamma_0 = -0.45$, $t = -32.38$, $p < 0.001$), or 3.43 out of 4 on the untransformed scale, 95% CI [2.38, 4]. About half of the variation in self-worth (ICC = 0.47) was between people. In Model B, there was a small trend for self-worth to increase linearly across grade ($\gamma_{10} = 0.02$,$t = 1.75$, $p = 0.08$), and there was significant random variation in both the linear, 95% CI [−0.18, 0.22], and quadratic, 95% CI [−0.09, 0.08] effects of grade. In Model C, adolescent-reported self-worth was similar across cohorts ($\gamma_{02} = 0.00$, $t = 0.20$, *ns*). A small positive trend for number of group members ($\gamma_{40} = 0.003$,$t = 1.84$, $p = 0.07$) indicated that students had slightly higher self-worth when they had many group members. A small trend for gender ($\gamma_{01} = 0.05$, $t = 1.86$, $p = 0.06$) indicated that boys had slightly higher self-worth than girls. There was no significant association between peer-nominated aggression and self-worth ($\gamma_{70} = -0.01$, $t = -1.44$, *ns*)

In the final model, typical group also significantly predicted self-worth ($\gamma_{03} = -0.18$, $t = -2.05$, $p < 0.05$;Table 3, Column 3). As with preference and victimization, however, this association was qualified by a marginal interaction with gender ($\gamma_{04} = 0.19$, $t = 1.83$, $p = 0.07$): Girls who were typically in aggressive groups (Fig. 4: dashed grey line) had the lowest self-worth. There were no differences among girls who were typically in low aggressive groups (solid

grey line) and boys who were typically in aggressive (dashed grey line) or low aggressive groups (solid black line). There was a trend for changes in current group to be negatively associated with changes in self-worth ($\gamma_{50} = -0.02$, $t = -1.72$, $p = 0.09$); both girls and boys had lower self-worth when their current group was more aggressive than usual (slight negative slope for all lines). Past group did not significantly predict adolescent self-worth ($\gamma_{60} = 0.01$, $t = 0.41$, *ns*).

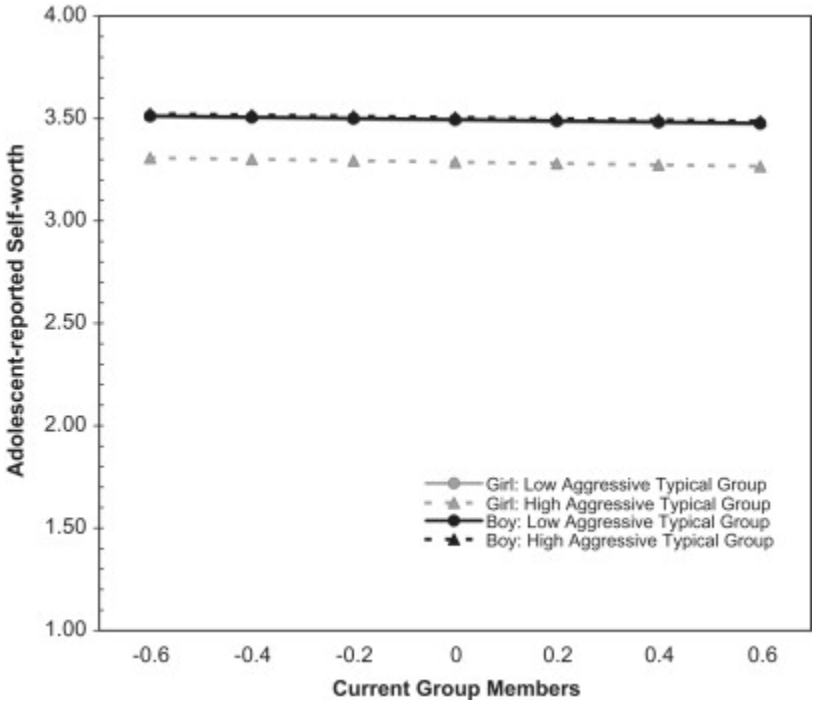

Fig. 4. Predicted adolescent-reported self-worth as a function of typical group, current group, and gender. Plots are for average youth ($Z_{\text{aggression}} = 0$; $n_{\text{group members}} = 5$) in the youngest cohort in the fall of 5th grade.

Discussion

In the current study, we build on previous research that has begun to establish the heterotypic consequences of affiliating with aggressive peers (e.g., Brendgen et al., 2000, Hanish et al., 2005, Hodges et al., 1999, Mrug et al., 2004 and Salmivalli et al., 1997) by considering the unique contributions of typical, current, and past peer context to adjustment across multiple developmental domains. Stable individual differences in typical peer context often predicted adjustment, but *changes* in peer context did predict small*changes* in adjustment for several outcomes. We also explored the extent to which gender moderated these associations and found that the tendency to affiliate with aggressive peers predicted strikingly different patterns of adjustment for girls and boys. Typically being in aggressive groups predicted negative adjustment (lower social preference and self-worth, higher victimization) for girls, but neutral (self-worth) or positive adjustment (higher social preference, lower victimization) for boys.

Aggressive peers and adjustment: gender differences

Our results are consistent with a large literature indicating that girls and boys experience their peer contexts differently (Rose & Rudolph, 2006). Girls were less likely than boys to affiliate with aggressive peers, but girls who were typically in aggressive groups were at a developmental disadvantage. After controlling for their own aggression and peer network size, girls who were viewed by peers as typically "hanging around" with aggressive peers were more disliked, were more likely to be victimized, and had lower self-worth than girls who were typically in low aggressive groups.

Typically affiliating with aggressive peers may be harmful for girls for several reasons. To the extent that the direct forms of aggression measured in the current study are less common among girls, there may be particularly strong social sanctions against the formation of groups of aggressive girls. This is consistent with our finding that girls who are typically in such groups experience more rejection than we would expect from their own levels of aggression, suggesting a "negative halo" effect (Hymel et al., 1990). The higher levels of victimization among girls in aggressive groups could reflect hostility from girls in other groups, but it could also reflect internal group dynamics: either negative reciprocity or the rigid enforcement of status hierarchies could lead to cycles of aggression and victimization within aggressive groups.

Just as with girls, affiliating with aggressive peers predicted higher aggression for boys. However, the best adjustment (highest social preference, lowest victimization) occurred for boys who typically affiliated with aggressive groups. The positive developmental correlates of hanging around with aggressive groups underscores that direct aggression has both a higher base-rate and a very different social meaning for girls and for boys. Our findings provide another perspective on the social power of "tough" boys who are both aggressive and popular (Farmer et al., 2003 and Rodkin et al., 2000): boys had higher social preference and were less likely to be victimized if they hung around with relatively aggressive groups. These results are further consistent with a growing body of literature that finds that some forms of aggression are associated with positive adaptation (e.g., Hawley et al., 2007).

It is also noteworthy that there were no reliable gender differences with respect to current or past peer affiliations, suggesting that the role of deviations from the typical peer context was similar for both boys and girls. For example, affiliating with more aggressive peers than usual at the current wave was modestly associated with higher aggression, higher social preference, and lower self-worth for boys and girls. It is possible that only girls who typically experience an aggressive peer context are negatively affected by their affiliations, whereas smaller changes in the peer context may play less of a role in shaping girls' adjustment.

Capturing the peer context with a multilevel modeling (MLM) framework

Multiple approaches can be used for capturing the peer context, including dynamic social network models (Kiuru et al., 2010, Ojanen et al., 2010 and Snijders et al., 2007) and the actor-

partner interdependence model (van Dulmen & Goncy, 2010). The present results highlight some of the potential benefits of using an MLM strategy to address questions about peer influence. Given that peer contexts have some continuity (e.g., Dishion et al., 1997 and Neckerman, 1996) the peer context at any point in time can be conceptualized as reflecting two components: an adolescent's typical (or average) peer context and his or her *deviation* from that typical peer context at that particular time. OLS regression "bundles" these conceptually distinct components into a single parameter estimate, whereas MLM offers the possibility of separating them into two parameters (Singer & Willett, 2003). By doing so, we were able to test whether stable individual differences in typical peer context predicted stable individual differences in adjustment (between-person effects) and whether the unique features of an adolescent's peer context at one time paralleled changes in adjustment (within-person effects). The answers to these two propositions were not always the same. Girls who typically affiliated with aggressive peers had lower adjustment across multiple domains compared to girls who typically affiliated with non-aggressive peers. In addition, currently affiliating with more aggressive peers than usual predicted higher aggression and social preference, and lower self-worth for all youth and affiliating with more aggressive peers than usual at the past wave predicted small increases in aggression for all youth.

By separating within- and between-person effects, we allowed for the possibility that within-person effects would drive the association between peer context and adjustment. Instead, past and current peer affiliations only modestly predicted adjustment and between-person effects tended to be more common and more robust than within-person effects. The interpretation of between-person effects, however, is ambiguous: they can reflect both selection and on-going influence (e.g., maintenance or cumulative effects). Our results suggest that studies relying on OLS regression may overestimate the strength of peer influence, by interpreting a parameter that combines between- and within-person effects as only reflecting influence.

The large number of reliable between-person effects could be interpreted in several ways. First, we could conclude that between-person effects possess the same methodological weaknesses as cross-sectional associations (i.e., the only alternative explanations that our model controls for are time-invariant predictors) and be tempted to pay little attention to these effects. We argued above, however, that between-person effects can reflect socialization, in addition to selection processes, so ignoring them would underestimate influence. Second, we could conclude that theories emphasizing peer influence need to be revised. Such a conclusion, however, would be inconsistent with the significant (albeit modest) effects of past peer affiliations that we found for aggression as well as with evidence from ethnographic (e.g., Adler & Adler, 1998) and intervention (e.g., Dishion, McCord, & Poulin, 1999) studies that peers are influential. In addition, although past peer affiliations (within-person lagged effects) provide a relatively pure test of influence that leads to change over time, they may be overly stringent. Lagged effects only estimate influence that matches the time lag exactly and thus they underestimate influence that occurs over shorter or longer intervals. Finally, we could conclude that future research must

explore research designs that would tease apart the meaning of between-person effects and better capture the time intervals over which influence occurs. We argue for this conclusion below.

Past research on peer influence has generally used one of two approaches: either a micro-analytic framework in which students' interactions are coded on a moment-by-moment basis or a macro-analytic framework in which longitudinal assessments are conducted once or twice a school year. The first approach generally averages moment-by-moment interactions to create a single score for each student to represent the general peer context and the second approach, the one we used here, is insensitive to short-term influence processes. Each approach has shed light on different dimensions of peer influence (i.e., the processes through which influence can occur and the long-term implications of affiliating with deviant peers), but neither approach allows us to capture how short-term (daily, weekly, or monthly) deviations in peer context are associated with deviations in adjustment. Using an MLM strategy with more frequent information about adolescents' affiliations and their own adjustment could help to disentangle effects that have previously been indistinguishable from between-person effects.

Limitations & future directions

The current study is the first to examine the independent contributions of typical, current, and past peer context to several domains of adjustment across multiple grades; nonetheless it has several design limitations. First, generalizability is limited by our focus on a single school. If school norms support aggression, the association between affiliating with aggressive peers and adjustment may be different; and in schools where peers are less familiar with each other due to high enrollment turnover or the convergence of multiple feeder schools, peer reputations may not be linked to peers' aggression. Second, community-based relationships may be more salient than in-school relationships for antisocial youth (Dishion et al., 1995); however, by focusing on a stable, relatively isolated community in which almost all youth attend a single elementary and middle school, we likely sampled the majority of adolescents' closest peers. Finally, we focused on groups of youth in the same class (elementary school) and grade (middle school) who "hang out together a lot." It is possible that within-grade peers in elementary school and across-grade peers in middle school may also be influential. It is also possible that as youth get older, their romantic partners will become more influential (Aikins, Simon, & Prinstein, 2010).

A major task for future research is to clarify the conditions under which relationships between aggressive and non-aggressive youth exacerbate, or ameliorate, problem behavior and impact adjustment. We focused on the average aggression of student's group members, however average scores are based on the questionable assumption that peers are equally important and that youth are equally susceptible to the effects of having aggressive peers. Future research should explore potential moderators of peer influence, including features of the peer network structure (e.g., density, centralization), peers' characteristics (e.g., popular), and individual factors that could increase vulnerability to influence (e.g., aggression, social status).

Given the overall pattern of results, which often varied by gender, future research should also explore whether the association between peer context and adjustment depends on the type of aggression used by peers. Aggression can take several forms (e.g., overt, social) and serve multiple functions (e.g., instrumental, reactive), and these combine to differentially impact individual adaptation (e.g., Card and Little, 2007, Crick and Grotpeter, 1995 and Prinstein and Cillessen, 2003). The association between these different types of aggression and children's adaptation changes over age; during adolescence, physical aggression becomes less predictive of negative sociometric status whereas relational aggression becomes increasingly predictive of lower sociometric status but higher perceived popularity (Cillessen & Mayeux, 2004). It is likely that as the base rates, targets, and consequences of these different types of aggression vary by gender and age so will the association between affiliating with aggressive peers and adaptation. In pursuing this work, it will also be important to explore whether the results are consistent across informants. In the current study, we used peer reports of aggression, so we could not disentangle whether the effects were primarily driven by students' reputations or by their actual aggressive behavior.

In sum, our findings support three general observations. First, just as developmental models of aggression consider a broad range of cascading consequences, developmental models of peer influence should consider a broad range of potential consequences of affiliating with aggressive peers. Second, the diverging correlates of affiliating with aggressive peers for girls and boys underscores the need to further explore gender differences in the salience of aggression, the form and function of aggression, and the role of aggression in peer relationship processes. Finally, there is a need for future research designs to disentangle between-person and within-person effects, so as to better understand the role of selection and influence processes in shaping adjustment. Pursuing these questions will allow us to develop more differentiated models to capture the peer context and its impact on adolescents' current and future adjustment.

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Appendix. Supplementary data

http://www.sciencedirect.com/science/article/pii/S0140197110001077

References

Adler, P. A., & Adler, P. (1998). Peer power: Preadolescent culture and identity. New Brunswick, NJ: RutgersUniversity Press.

Aiken, L. S., & West, S. G. (1991). Multiple regression: Testing and interpreting interactions. Thousand Oaks, CA: Sage.

Aikins, J.W., Simon, V. A., & Prinstein, M. J. (2010). Romantic partner selection and socialization of young adolescents' behavior problems and substance use. Journal of Adolescence, 33(6), 813–826.

Atlas, R. S., & Pepler, D. J. (1998). Observations of bullying in the classroom. Journal of Educational Research, 92, 86–99.

Bierman, K. L. (2004). Peer rejection: Developmental processes and intervention strategies. New York: Guilford Press.

Boivin, M., & Hymel, S. (1997). Peer experiences and social self-perceptions: A sequential model. Developmental Psychology, 33, 135–145.

Boivin, M., & Vitaro, F. (1995). The impact of peer relationships on aggression in childhood: Inhibition through coercion or promotion through peer support.

In J. McCord (Ed.), Coercion and punishment in long-term perspectives (pp. 183–197). New York: CambridgeUniversity Press.

Brendgen, M., Vitaro, F., & Bukowski, W. M. (2000). Deviant friends and early adolescents' emotional and behavioral adjustment. Journal of Research on Adolescence, 10, 173–189.

Cairns, R. B., & Cairns, B. D. (1994). Lifelines and risks: Pathways of youth in our time. New York: CambridgeUniversity Press.

Cairns, R. B., Cairns, B. D., Neckerman, H. J., Gest, S. D., & Gariepy, J. L. (1988). Social networks and aggressive behavior: Peer support or peer rejection? Developmental Psychology, 24, 815–823.

Cairns, R. B., Leung, M. C., Buchanan, L., & Cairns, B. D. (1995). Friendships and social networks in childhood and adolescence: Fluidity, reliability, and interrelations. Child Development, 66, 1330–1345.

Card, N. A., & Little, T. D. (2007). Differential relations of instrumental and reactive aggression with maladjustment: Does adaptivity depend on function? In P. H. Hawley, T. D. Little, & P. C. Rodkin (Eds.), Aggression and adaptation: The bright side of bad behavior (pp. 1–29) Mahwah, N.J.: Lawrence Erlbaum Associates Publishers.

Caspi, A., Elder, G. H., & Bem, D. J. (1987). Moving against the world: Life-course patterns f explosive children. Developmental Psychobiology, 23, 308–313.

Cillessen, A. H. N., & Mayeux, L. (2004). From censure to reinforcement: Developmental changes in the association between aggression and social status. Child Development, 75, 147–163.

Coie, J. D., & Dodge, K. A. (1998). Aggression and antisocial behavior. In W. Damon, & N. Eisenberg (Eds.), Social, emotional, and Personality development. Handbook of child psychology, Vol. 3 (pp. 55–99). New York: Wiley.

Coie, J. D., Dodge, K. A., & Coppotelli, H. (1982). Dimensions and types of social status: A cross-age perspective. Developmental Psychology, 18, 557–570.

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

Dearing, E., McCartney, K., & Taylor, B. A. (2006). Within-child associations between family income and externalizing and internalizing problems. Developmental Psychology, 42, 237–252.

Dishion, T. J. (2000). Cross-setting consistency in early adolescent psychopathology: Deviant friendships and problem behavior sequelae. Journal of Personality, 68, 1109–1126.

Dishion, T. J., Andrews, D. W., & Crosby, L. (1995). Antisocial boys and their friends in early adolescence: Relationship characteristics, quality, and interactional process. Child Development, 66, 139–151.

Dishion, T. J., Eddy, M., Haas, E., Li, F., & Spracklen, K. M. (1997). Friendships and violent behavior during adolescence. Social Development, 6, 207–223.

Dishion, T. J., McCord, J., & Poulin, F. (1999). When interventions harm: Peer groups and problem behavior. American Psychologist, 54, 755–764.

Elliott, D. S., Huizinga, D., & Ageton, S. S. (1985). Explaining delinquency and drug abuse. Beverly Hills, CA: Sage Publications.

Espelage, D. L., Holt, M. K., & Henkel, R. R. (2003). Examination of peer-group contextual effects on aggression during early adolescence. Child Development, 74, 205–220.

Farmer, T. W., Estell, D. B., Bishop, J. L., O'Neal, K. K., & Cairns, B. D. (2003). Rejected bullies or popular leaders? The social relations of aggressive subtypes of rural African American early adolescents. Developmental Psychology, 39, 992–1004.

Farmer, T. W., & Rodkin, P. C. (1996). Antisocial and prosocial correlates of classroom social positions: The social network centrality perspective. Social Development, 5(2), 174–188.

Gest, S. D., Farmer, T. W., Cairns, B. D., & Xie, H. (2003). Identifying children's peer social networks in school classrooms: Links between peer reports and observed interactions. Social Development, 12, 513–529.

Gest, S. D., Moody, J., & Rulison, K. (2007). Density or distinction? The roles of data structure and group detection methods in describing adolescent peer groups. Journal of Social Structure, 8.

Hanish, L. D., Martin, C. L., Fabes, R. A., Leonard, S., & Herzog, M. (2005). Exposure to externalizing peers in early childhood: Homophily and peer contagion processes. Journal of Abnormal Child Psychology, 33, 267–281.

Harter, S. (1982). The perceived competence scale for children. Child Development, 61, 89–97.

Hawley, P. H. (2003). Prosocial and coercive configurations of resource control in early adolescence: A case for the well-adapted Machiavellian. Merrill-Palmer Quarterly, 49, 279–309.

Hawley, P. H., Little, T. D., & Rodkin, P. C. (2007). Aggression and adaptation: The bright side of bad behavior. Mahwah, N.J.: Lawrence Erlbaum Associates Publishers.

Hedeker, D., & Gibbons, R. D. (2006). Longitudinal data analysis. Hoboken, N.J.: John Wiley & Sons, Inc.

Hodges, E. V. E., Boivin, M., Vitaro, F., & Bukowski, W. M. (1999). The power of friendship: Protection against an escalating cycle of peer victimization. Developmental Psychology, 35, 94–101.

Hymel, S.,Wagner, E., & Butler, L. J. (1990). Reputational bias: View from the peer group. In S. R. Asher, & J. D. Coie (Eds.), Peer rejection in childhood (pp. 156–186). New York: CambridgeUniversity Press.

Jacobs, J. E., Lanza, S., Osgood, D. W., Eccles, J., & Wigfield, A. (2002). Changes in children's self-competence and values: Gender and domain differences across grades one through twelve. Child Development, 73, 509–527.

Kandel, D. B. (1978). Homophily, selection, and socialization in adolescent friendships. American Journal of Sociology, 84, 427–436.

Kenny, D. A., & Harackiewicz, J. M. (1979). Cross-lagged panel correlation: Practice and promise. Journal of Applied Psychology, 64, 372–379.

Kim, J. Y., McHale, S. M., Osgood, D. W., & Crouter, A. C. (2006). Longitudinal course and family correlates of sibling relationships from childhood through adolescence. Child Development, 77, 1746–1761.

Kindermann, T. A. (1993). Natural peer groups as contexts for individual development: The case of children's motivation in school. Developmental Psychology, 29, 970–977.

Kiuru, N., Burk, W., Laursen, B., Salmela-Aro, K., & Nurmi, J.-E. (2010). Pressure to drink but not to smoke: Disentangling selection and socialization in adolescent friendship networks and peer groups. Journal of Adolescence, 33(6), 801–812.

LaFontana, K. M., & Cillessen, A. H. N. (2002). Children's perceptions of popular and unpopular peers: A multimethod assessment. Developmental Psychology, 38, 635–647.

Maccoby, E. E. (1998). The two sexes: Growing up apart, coming together. Cambridge, MA: Belknap Press/Harvard University Press.

Masten, A. S., Coatsworth, J. D., Neemann, J., Gest, S. D., Tellegen, A., & Garmezy, N. (1995). The structure and coherence of competence from childhood through adolescence. Child Development, 66, 1635–1659.

Masten, A. S., Roisman, G. I., Long, J. D., Burt, K. B., Obradovic, J., Riley, J. R., et al. (2005). Developmental cascades: Linking academic achievement and externalizing and internalizing symptoms over 20 Years. Developmental Psychology, 41, 733–746.

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. Psychological Review, 100, 674–701.

Mrug, S., Hoza, B., & Bukowski, W. M. (2004). Choosing or being chosen by aggressive–disruptive peers: Do they contribute to children's externalizing and internalizing problems? Journal of Abnormal Child Psychology, 32, 53–65.

Neckerman, H. J. (1996). The stability of social groups in childhood and adolescence: The role of the classroom social environment. Social Development, 5, 131–145.

Ojanen, T., Sijtsema, J. J., Hawley, P. H., & Little, T. D. (2010). Intrinsic and extrinsic motivation in early adolescents' friendship development: Friendship selection, influence, and prospective friendship quality. Journal of Adolescence, 33(6), 837–851.

Olweus, D. (1979). Stability of aggressive reaction patterns in males: A review. Psychological Bulletin, 86, 852–875.

Parker, J. G., & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk? Psychological Bulletin, 102, 357–389.

Parkhurst, J. T., & Hopmeyer, A. (1998). Sociometric popularity and peer perceived popularity: Two distinct dimensions of peer status. Journal of Early Adolescence, 18, 125–144.

Perry, D. G., Kusel, S. J., & Perry, L. C. (1988). Victims of peer aggression. Developmental Psychology, 24, 807–814.

Prinstein, M. J., & Cillessen, A. H. N. (2003). Aggression associated with high levels of peer status. Merrill-Palmer Quarterly, 49, 310–342.

Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models (2nd ed.). NewburyPark, CA: Sage.

Rodkin, P. C., Farmer, T. W., Pearl, R., & Van Acker, R. (2000). Heterogeneity of popular boys: Antisocial and prosocial configurations. Developmental Psychology, 36, 14–24.

Rose, A. J., & Rudolph, K. D. (2006). A review of sex differences in peer relationship processes: Potential trade-offs for the emotional and behavioral development of girls and boys. Psychological Bulletin, 132, 98–131.

Rutter, M. (1989). Pathways from childhood to adult life. Child Psychology and Psychiatry, 30, 23–51.

Salmivalli, C., Huttunen, A., & Lagerspetz, K. M. J. (1997). Peer networks and bullying in schools. Scandinavian Journal of Psychology, 38, 305–312.

Singer, J. D., & Willett, J. B. (2003). Applied longitudinal data analysis: Modeling change and event occurrence. New York: Oxford University Press.

Snijders, T. A. B., Steglich, C. E. G., & Schweinberger, M. (2007). Modeling the co-evolution of networks and behavior. In K. van Montfort, H. Oud, & A. Satorra (Eds.), Longitudinal models in the behavioral and related sciences. Mahwah, NJ: Lawrence Erlbaum.

Stormshak, E. A., Bierman, K. L., Bruschi, C., Dodge, K. A., & Coie, K. A. (1999). The relation between behavior problems and peer preference in different classroom contexts. Child Development, 70, 169–182.

van Dulmen, M., & Goncy, E. A. (2010). Extending the actor-partner interdependence model to include cross-informant data. Journal of Adolescence, 33(6), 869–877.

Wolfinger, R. D. (1999). Fitting nonlinear mixed models with the new NLMIXED procedure. In Proceedings of the 24th SAS_ user group international conference. Miami Beach, FL.

Wright, J. C., Giammarino, M., & Parad, H. W. (1986). Social status in small groups: Individual-group similarity and the social “misfit”. Journal of Personality and Social Psychology, 50, 523–536.