Predicting Trajectories of Students’ Achievement Beliefs and Perceptions of Relational Support from Classroom Tight-knittedness

Kathleen Zadzora¹, Scott D. Gest², & Philip C. Rodkin ²
¹Pennsylvania State University  ²University of Illinois at Urbana-Champaign

Introduction
- A small-but-growing body of empirical literature suggests that children thrive in emotionally cohesive, egaliatarian classrooms (Ahn, Garandeau, & Rodkin, 2010; Henry et al., 2000).
- One distinct feature of peer networks is tight-knittedness, or the extent to which a classroom is characterized by richly interconnected, positive (rather than negative) social ties among children.
- High-quality relational support is associated with children’s academic adjustment and performance (Davidson, Gest, & Welch, 2010; Pianta & Stuhlman, 2004), development of social skills (Demaray & Malecki, 2002), and inhibition of antisocial behaviors (Meehan et al., 2003).
- Students who report having a greater affinity for school and effort to be engaged in schoolwork tend to perform better in school (Catalano et al., 2004) and persist in academic engagement later (Valeski & Stipek, 2001).

Objectives and Hypotheses
- Examine whether between-classroom differences in tight-knittedness are associated with changes in individual students’ perceptions of relational support from teachers and peers, expression of achievement motivation and feelings about school, and aggressive behavior.
- classroom tight-knittedness with richly interconnected positive social ties will have students who: report increasing levels of perceived relational support from teachers and peers over the school year, increased achievement motivation, and display decreased aggression.
- Further explore significant intercepts (students’ starting points) from multilevel models using propensity score matching to compare classrooms that are similar but for their degree of tight-knittedness.

Participants
- Students (N=1681, 52% male) from 94 classrooms in 1st, 3rd, and 5th grade (n=34, 26, and 34, respectively).
- Site One: Schools in small cities in the Midwestern U.S., with significant racial/ethnic and economic diversity (43% African American, 8% Asian, 3% Hispanic, 56% low-income).
- Site Two: Rural area in the northeastern U.S., over 97% European American, with 35% classified as economically disadvantaged.

Procedure
- Participants were surveyed 3 times: (a) during the first 3–5 weeks of the school year, (b) approximately 8 weeks later, and (c) near the end of the academic year. Surveys were completed in individual interview (1st grade) or by written survey in a classroom administration (3rd and 5th grade).
- Students nominated classmates on 20 items: traditional indices of friendship, sociometric status (liking, disliking), perceived popularity (popular, cool), and aggression.
- Students also rated their achievement-related beliefs and perceptions of relational support using 5-point Likert scales.

Measures
- Achievement-related Beliefs
- Academic Striving - Expressions of a desire and active efforts to achieve (6 items, α=.75, α=.77; e.g., I work hard at school).
- Intrinsic Motivation - Statements of affective enjoyment of school and academic work (8 items, α=.83, α=.85; e.g., Schoolwork is interesting to me).

- Perceived Relational Support
- Teacher-child Closeness - Feelings of a warm, caring relationship with the teacher (7 items, α=.82, α=.81, α=.83; e.g., My teacher is kind to me; see Pianta, 2001).
- Sense of Peer Community - Perceptions of classroom peers as a supportive and caring community (5 items, α=.82, α=.85, α=.85; e.g., Kids in my classroom help each other; see Battistich et al., 1995).

- Peer-nominated Behavior
- Aggression - Proportion of nominations received related to aggressive behavior (2 items, t1=-.81, t2=-.78, t3=-.83; e.g., This student starts fights).

- Classroom Tight-knittedness
- Density - Sum of all ties existing in the classroom divided by the total number of possible ties that could exist (see Wasserman & Faust, 1994).
- Reciprocity - Proportion of all sent ties (A names B) that were reciprocated (B names A).

- Patterns of positive sentiments reflected in peer nominations for friendship, liking most, and popularity, aggregated into a single index (γ2008=.86, r2004=.77).
- Patterns of negative sentiments reflected in peer nominations for liking least and unpopular, aggregated into a single index (γ2008=.75, r2004=.59).
- The ratio index of positive to negative sentiment in the classroom.

Methods
- Longitudinal multilevel models (time nested within student nested within classroom) tested the influence of classroom tight-knittedness on changes across the school year in achievement-related beliefs, perceived relational support, and aggression.
- Post-hoc propensity score matching and average causal estimation was used to explore the significant intercepts (i.e., where students started) found in the longitudinal MLM results.
- Created binary “treatment” indicators for “high” classroom tight-knittedness.
- Included 20 characteristics as potential confounds, including teacher demographics, average student and family demographics, etc.
- For each predictor variable, propensity scores were computed by regressing the treatment indicator on potential confounds.
- Each treated classroom matched with a control classroom with a similar propensity score.

Results
- The long-term goal of this research effort is to test long-standing presumptions about the features of peer networks that are associated with positive student social-cognitions, and then to identify teaching practices that may be causally related to any such peer network features.
- Reciprocity of sentiment in the classroom was not significantly associated with changes in student perceptions or behavior, possibly due to the lower incidence of reciprocal (as compared with unreciprocal) nominations.
- Future analyses will explore the longitudinal outcomes of other peer network features (e.g., norm salience for prosocial or aggressive behavior, classroom status hierarchy).

Discussion
- Post-hoc Analyses: Propensity Score Matching
  In replicated analyses with a matched sample...
  - Most of the previous findings dropped out of significance.
  - Classroom-student associations may be due to baseline student characteristics.
  - Classroom contexts impact children almost immediately.

Table 1. Classroom Network Tight-knittedness as Predictors of Trajectories of Student Adjustment (Unstandardized Coefficients)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Teacher Closeness</th>
<th>Peer Community</th>
<th>Academic Striving</th>
<th>Intrinsic Motivation</th>
<th>Aggressive Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Sentiment</td>
<td>Density</td>
<td>.59** (.30)</td>
<td>.03 (.17)</td>
<td>.64* (.32)</td>
<td>.02 (.15)</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>.28 (.33)</td>
<td>-.12 (.21)</td>
<td>.11 (.35)</td>
<td>-.16 (.15)</td>
<td>.06 (.38)</td>
</tr>
<tr>
<td>Negative Sentiment</td>
<td>Density</td>
<td>-.38 (.44)</td>
<td>-.21 (.26)</td>
<td>-.125** (.45)</td>
<td>-.26 (.21)</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>.02 (.42)</td>
<td>-.37 (.25)</td>
<td>.49 (.44)</td>
<td>-.33 (.22)</td>
<td>.44 (.49)</td>
</tr>
</tbody>
</table>

| Ratio | Pos/Neg | .12 (.05) | .01 (.03) | .20** (.05) | .02 (.03) | .11 (.07) | .05 (.03) | .56* (.10) | .03 (.06) | -.04** (.01) | .01 (.01) |

Note: Models include covariates for gender, grade, proportion of class female, class size, proportion of class FPL eligible, and school. Coefficients for the Intercept estimate indicate differences in starting value for the DV as a function of the predictor at Time 1. The coefficients for the Time*Predicator interaction indicate the degree to which the linear rate of change in the DV (from T1-T3) varies as a function of the T1 predator. 

*p < .10;  †p < .05;  ‡p < .01

This research was funded by the WT Grant Foundation, the Spencer Foundation, and the Institute of Education Sciences (award numbers R305B090007 and R305A100344).