



Published in final edited form as:

Child Dev. 2016 March ; 87(2): 593–611. doi:10.1111/cdev.12477.

Teacher-Student Relationship and Peer Disliking and Liking across Grades 1–4

Jan N. Hughes, Ph.D. and

Texas A&M University, Department of Educational Psychology, 4225 TAMU, College Station, Tx 77843-4225, Phone: 979 862 1093

Myung Hee Im, Ph.D.

Texas A&M University, Department of Educational Psychology, 4225 TAMU, College Station, Tx 77843-4225, Phone: 979 862 1767

Jan N. Hughes: jannhughes@gmail.com; Myung Hee Im: myunghee.im@gamil.com

Abstract

Between-child and within-child effects of teacher-student warmth and conflict on children's peer-nominated disliking and liking across grades 1–4 (ages 6–10) were investigated in a sample of 746 ethnically diverse and academically at-risk children in Texas. Multi-level modeling controlled for time-invariant between-child differences while modeling the effect of time-varying TSR warmth and conflict on children's peer relatedness. Teachers reported on warmth and conflict. Peers reported on liking and disliking. Above between-child effects of average levels of teacher warmth and conflict on initial level and rate of change in liking and disliking and classroom teacher support, year-to-year changes in TSR conflict and warmth predicted intra-individual change in children's peer disliking but not peer liking.

Consistent with ecological and transactional models of development (Bronfenbrenner & Morris, 2006; Lerner, 1989), children's interactions with teachers and peers in the classroom context are considered proximal influences on their social, behavioral, and academic development (Hughes, 2012). Given that children's relationships with teachers and classmates are embedded in the same context, it is surprising that, until recently, research on the developmental significance of children's relationships with teachers and classmates has proceeded along separate lines of inquiry. An effect of teacher-student relationships on children's peer acceptance and peer reputations has been explained by social referencing theory (Hughes, Cavell, & Willson, 2001), which states that children rely on their observations of teachers' interactions with classmates in forming perceptions of classmates' attributes and likeability. An emerging literature documents effects of children's relationships with their teachers on their peer relationships (De Laet et al., 2014; Hughes & Chen, 2011; Hughes, Im, & Wehrly, 2014; Mercer & DeRosier, 2008).

Despite recent advances in our understanding of effects of the teacher-student relationship (TSR) on elementary children's peer relationships, important knowledge gaps remain. First, little is known about the differential effects of positive and negative dimensions of the

teacher-student relationship on different dimensions of peer relationships (e.g., peer liking and peer disliking). Yet peer liking and peer disliking have different antecedents and consequences for children's psychosocial and academic adjustment (Ladd, Kochenderfer-Ladd, Visconti, & Ettekal, 2012). Second, empirical research has yet to use between-child and within-child analyses to examine whether year-to-year changes in TSR predict year-to-year changes in children's peer relationships, above between-child differences in average TSR across years. Between-child and within-child analyses minimize the threat that unmeasured variables (e.g., children's stable dispositions for forming positive relationships with teachers) account for associations between TSR and peer relationships. Third, change in the magnitude of effects of TSR on children's peer relationships across the elementary years has received little research attention. To address these gaps, the present study employs between-child and within-child analyses to investigate the effects of year-to-year changes in two dimensions of TSR (warmth and conflict) across grades 1–4 on students' peer liking and disliking across these same 4 years.

Developmental Significance of Peer Liking and Peer Disliking

Research conducted over more than four decades has documented the importance of children's peer group liking and disliking to their psychosocial and academic development (Bierman, 2004; Hartup, 1983). The constructs of peer group liking and disliking refer to the valence of the collective sentiment of a student's peer group. In the elementary grades, peer liking and disliking are typically assessed via sociometric assessment procedures in which all children in a classroom or grade are asked to rate their level of liking for each classmate (from *dislike very much* to *like very much*) or to nominate classmates as *dislike* and as *like most*. When using nominations of like most and dislike, researchers often calculate an overall social preference score as the difference between the number of like most and dislike nominations (DeRosier & Thomas, 2003). Whether measured by nominations or by a mean rating of liking, higher levels of peer liking and lower levels of peer disliking predict decreased internalizing and externalizing problems, higher academic engagement and achievement, and greater subjective sense of well-being (Chen, Hughes, Kwok & Liew, 2010; Ladd, Kochenderfer, & Coleman, 1997; Ladd & Troop-Gordon, 2003), above the effects children's behavioral characteristics and other relevant covariates.

The use of like most and dislike nominations permits distinguishing between children who are actively disliked (i.e., receive many dislike nominations) and children who are low in peer liking (i.e., receive few nominations as like most or low average ratings of liking). Importantly, nominations of like most and dislike are only moderately negatively correlated (Landau, Milich, & Whitten, 1984). The distinction between being disliked and not being preferred by classmates is important because children who are disliked by their peers are at highest risk for serious long-term problems, including aggression, loneliness, school avoidance, and dropping out of school (Ladd et al., 2012). When peers dislike specific classmates, they tend to act in rejecting ways toward those children by ignoring, ridiculing, or excluding them from activities (Buhs & Ladd, 2001; Coie & Kupersmidt, 1983). Thus, peer group rejection may be more visible to others in a classroom than peer liking. Such exclusionary behavior from peers may, in turn, impede rejected children's access to interpersonal processes that facilitate growth in social and academic skills.

Consistent with the link between rejection and reduced access to social interaction, when children move from rejection toward acceptance across time they show corresponding improvements in classroom participation (Ladd, Herald-Brown, & Reiser, 2008). A history of chronic peer rejection across multiple elementary grades is especially detrimental to children's psychosocial and academic adjustment (Ladd & Troop-Gordon, 2003).

Effect of Teacher-Student Relationships on Peer Relationships

Both early experimental studies (White, Jones, & Sherman, 1998) and more recent naturalistic observational studies (Hughes et al., 2001; Hughes, Im, & Wehrly, 2014; Hughes & Kwok, 2006) provide evidence that a supportive and nonconflicted relationship with one's teacher predicts higher levels of peer acceptance and lower rejection. Whereas a student's opportunities to interact with each student in the classroom may be limited, students typically have many opportunities to observe teacher-student interactions with each classmate. Presumably, they use these observations to draw inferences about classmates' attributes, including their academic and social abilities, morality, and desirability as a friend (Hughes et al., 2001; White et al., 1998). Furthermore, these opportunities to observe teacher-student interactions are shared by all students in the classroom, which may contribute to a classroom consensus about children's attributes that defines children's rather stable reputations within the classroom. In turn, a child's peer reputation serves as a filter that influences classmates' interpretations of the child's behaviors, thereby contributing to stability in children's peer status (Hymel, 1986).

Consistent with social referencing theory, teacher-student support contributes to children's peer acceptance and peer reputations above the effects of child characteristics (Gest & Rodkin, 2011). Hughes and colleagues (2014) found that peer-nominations of teacher-student support in grade 4 predicted students' peer reputations for academic competence and peer acceptance, above students' levels of peer academic reputation and acceptance the prior year. Similarly, Chang et al. (2007) found that the teacher's preference for students influenced classmates' liking of the students relatively independently of classmates' own interactions with the students and biased classmates' evaluation of students' behaviors.

Children's relationship with their teacher may also influence their peer likeability and reputations indirectly via the direct effect of teacher-student interactions on students' engagement in the classroom. Several studies have documented an effect of TSR on children's cooperative engagement in the classroom (Roorda, Koomen, Spilt, and Oort, 2011). In turn, children who participate in classroom activities are better accepted by their peers (Ladd et al., 1997). Hughes and Kwok (2006) found that teacher support in first grade had an indirect effect on children's peer acceptance the following year via its direct effect on children's classroom engagement. Importantly, longitudinal investigations have also documented bi-directional effects between peer likeability and TSR (DeLaet et al., 2014; Hughes & Chen, 2011; Mercer & De Rosier, 2008). Bi-directional effects may be due to dynamic interactions between teacher-student and peer-student relationships, both of which influence students' positive classroom engagement (Hughes et al., 2008; Ladd, Birch, & Buhs, 1999).

Differential Effects of Teacher Warmth and Conflict on Peer Liking and Disliking

Teacher warmth versus conflict

In developing teacher-report measures of TSR, researchers have drawn from diverse theories. For example, the widely used Student Teacher Relationship Scale (STRS, Pianta, 2001) is based on attachment theory, whereas the Teacher Network of Relationships Inventory (Hughes & Kwok, 2007) is based on social support theory. Yet measures developed from different theoretical perspectives consistently identify a supportive dimension (e.g., close or warm) and a conflict dimension. Teacher reports of relationship conflict and support are only moderately negatively correlated (Hughes et al., 2008; Silver, Measelle, Armstrong, & Essex, 2005). Although each dimension is associated with school adjustment, teacher-rated conflict more consistently predicts academic outcomes and externalizing behaviors, whereas teacher-rated support more consistently predicts interest in school and social competence (Hughes, 2011; Pianta & Stuhlman, 2004; Silver et al., 2005). Additionally, teacher ratings of conflict are more stable across raters and years than are teacher ratings of support (Spilt et al., 2012). Researchers have suggested that the greater stability for conflict is due to teacher-student conflict being driven more by child behavior than is the case for teacher-child closeness or warmth (Silver et al., 2005). Support and conflict also show different developmental trends, with closeness and warmth declining across grades 1–5 and conflict remaining stable or increasing (Spilt et al., 2012).

A majority of the longitudinal studies of the effect of TSR on changes in peer relationships have analyzed overall TSR rather than separate dimensions of support and conflict (Hughes & Chen, 2011; Leflot et al., 2011; Mercer & DeRosier, 2008). The use of an overall measure of relationship quality does not permit disaggregating the effects of support and conflict on students' peer relationships. The importance of analyzing both positive and negative dimensions of the teacher-student relationship is demonstrated in a cross-lag study by De Laet et al. (2014) examining the reciprocal effects of student-reported teacher support and conflict on peer liking (i.e., mean rating of liking) and peer perceived popularity (i.e., peer nominations as “most popular in your class”). These researchers found that teacher support and conflict predicted different dimensions of peer relatedness; perceived teacher support (but not conflict) predicted increases in peer liking, whereas perceived teacher conflict (but not support) predicted increases in perceived popularity and peer-rated aggression. Clearly more research is needed on the possible differential effects of teacher support and conflict on children's liking and disliking.

Peer disliking vs peer liking

TSR may affect children's disliking more so than their peer liking. This reasoning is based on the premise that when students nominate children whom they “like very much”, they are expressing their personal preference for specific classmates. Such personal preferences are often reciprocated and are based, in large part, on shared characteristics (ethnicity, SES, academic orientation) and greater opportunities for interaction (e.g., play on the same soccer team or live in the same neighborhood) (Berndt, 1999). On the other hand, children's perceptions of “disliking” a student may reflect not only dyadic antipathy but also a group

phenomenon by which shared observations of negative or low supportive teacher-student interactions contribute to a group consensus of who is disliked (Hughes, 2012). In the current study, peer liking and disliking scores were only moderately correlated ($r = -.37$), suggesting that peer evaluations of disliking and liking are not just opposite ends of a continuum.

A concurrent study with second grade students (McAuliffe, Hubbard, & Romano, 2009) suggests the importance of investigating the impact of both teacher support and conflict on children's peer liking and disliking. Specifically, observed teacher negative behavior was more strongly associated with peer disliking than peer liking. Both teacher-reported preference for children and observed interactions with students mediated the effect of child aggression and prosocial behavior on peer disliking (but not liking). The authors concluded that "children are more likely to use the teacher's behavior as a guide when evaluating whether or not they dislike a peer than whether or not they like a peer" (p. 675). The present study extends these findings by investigating the differential effects of *changes* in teacher-reported warmth and conflict on *changes* in peer disliking and liking.

Advantages of Between and Within Research Designs

The longitudinal studies reviewed above document between-child associations between levels of TSR and students' peer likeability. Between-child effects tell us whether differences between children in levels of TSR are associated, on average, with differences between children in peer acceptance and rejection (i.e., Do children with more supportive relationships with teachers tend to have higher levels of peer likeability?). Within-child effects describe intra-individual changes in peer acceptance and rejection associated with intra-individual changes in levels of teacher support.

One methodological benefit of between- and within-child designs is the better control for unobserved, relatively stable child characteristics that influence children's relationships with both teachers and peers, thereby reducing omitted variable bias (Shadish, Cook, & Campbell, 2002). This benefit is important because many of the same child characteristics associated with children's relationships with teachers also predict their relationships with peers, including self-regulatory skills, academic achievement, and a prosocial orientation (Birch & Ladd, 1998; Gleason, Kwok, & Hughes, 2007; Mercer & DeRosier, 2008). It is important to note that within-child analyses cannot rule out the threat of omitted time-varying factors or reciprocal causation.

Most longitudinal studies of the effect of TSR on peer relationships have employed cross-lag models to investigate the cross-year effects of TSR on peer likeability, above the autoregressive effects of peer likeability (De Laet et al., 2014; Mercer & DeRosier, 2008). Because one might expect that a child's relationship with a teacher in a given year and a particular classroom context would influence the child's classroom behavior and peer interactions more in that classroom than in the next year's classroom, cross-lag studies may minimize the effect of TSR on classroom peer relationships. Although elementary students typically change teachers each year, they interact with many of the same classmates as in the previous year, which may bolster cross-year effects of peer versus teacher relationships.

Based on this reasoning, the current study investigates whether year-to-year changes in teacher-student warmth and conflict across grades 1 to 4 are associated with corresponding year-to-year changes in children's peer disliking and peer liking, above children's average level of TSR across the four years.

Classroom Level Teacher Support

The metaphor of the invisible hand (Farmer, Lines, & Hamm, 2011) refers to the impact of teachers' everyday interactions in the classroom, including instructional and non-instructional interactions, on the classroom social structure. Individual teacher-student relationships are embedded in classrooms that differ on many dimensions, including classroom level of teacher support. For example, in a study of first grade classrooms, Buyse, Verschueren, Verachtert, and Van Damme (2009) found that both dyadic support and classroom support predicted students' psychosocial adjustment. In a study of elementary classrooms, children had a greater possibility of changing their social preference from the beginning to the end of a school year when their teachers demonstrated more positive relationships with all students (Mikami, Griggs, Reuland, & Gregoary, 2012). Finally, a cross-sectional study with the same longitudinal sample as the current study (Hughes et al., 2014) found that peer-nominated teacher-student support aggregated at the classroom level (i.e., normative teacher-student support) predicted first grade children's peer acceptance and classroom engagement, above the child's individual level of teacher-student support. Based on these findings, the current study also controls for time-varying levels of classroom teacher normative support.

Developmental Changes in Effect of TSR on Peer Likeability

Cross-lag studies with elementary students have produced inconsistent but generally negative findings regarding a diminution of the effects of TSR on peer relationships and classroom engagement with increasing age,(DeLaet et al., 2011; Mercer & DeRosier, 2008). The present study tests the equivalence of the effect of intra-individual changes in teacher-student warmth and conflict on intra-individual change in students' peer acceptance and conflict across Grade 1 to 4, controlling for between-child differences in average TSR across these grades.

Current Study

The current study examines effects of TSR on peer relatedness in an ethnically diverse and predominantly low-income sample of children who were identified at entrance to first grade as having below average literacy skills (see Participants). Children with below average literacy skills in the early grades are at heightened risk for low academic, social, and behavioral outcomes throughout their school careers (Perry, Donohue, & Weinstein, 2007). Both economic adversity and low academic skills are associated with lower quality relationships with peers and teachers (Ladd et al., 1999). Furthermore, children with economic and academic risks may be particularly susceptible to the effects of variations in classroom levels of teacher social support on their social and academic functioning (Baker, 2006; Hamre & Pianta, 2005). The current sample is an important one for investigating

effects of elementary children's relationships with their teachers on their peer liking and disliking. A finding of intra-individual effects of TSR on peer liking and disliking in the current sample would suggest that a supportive relationship with one's teacher buffers academically at-risk children from chronic peer rejection.

To the authors' knowledge, the current study is the first to employ a between- and within-child design to investigate the effects of TSR on children's peer relatedness. Specifically, we employ multi-level modeling to control for all time-invariant, between-child differences (measured and unmeasured) that may confound for the association between TSR and peer relatedness while modeling the effects of time-varying individual TSR, above time-varying teacher normative support. We also explored possible gender differences in the effects of TSR on peer liking and disliking. Because prior studies have found that associations between TSR and peer status are comparable across gender (Hughes et al., 2001; Leflot et al., 2014), we did not expect gender moderation.

Research Hypotheses

In consideration of theory and accumulating evidence, we test the following hypotheses. First, we expect that the average levels of TSR warmth and conflict across grades 1 to 4 (between-child variable) predict children's initial average levels of peer liking and disliking. Second, we expect that above and beyond these between-child effects of TSR on children's initial levels of peer relatedness and rate of change in peer relatedness, year-to-year changes in TSR conflict and warmth will predict year-to-year changes in peer liking and disliking (i.e., within-child change), above the effect classroom teacher normative support. Third, based on the aforementioned theoretical and empirical findings, we expect more consistent effects of both TSR warmth and conflict on peer disliking than on peer liking. We also investigate developmental changes in the strength of the within-child effect of TSR warmth and conflict on peer liking and disliking as well as gender moderation of the between and within-child effects of TSR. Based on limited studies and inconsistent findings with respect to developmental shifts and gender moderation of effects of TSR on peer relationships, these analyses are exploratory.

Method

Participants

The 746 participants were drawn from a sample of 784 students recruited in the fall of 2000 or 2001 into a longitudinal study (N=784) when they were in Grade 1. The 784 students were enrolled in one of three school districts (one urban and two small city districts) in Texas and were selected into the study on the basis of scoring below the median for their school district on a district-administered test of literacy administered in the spring of kindergarten or the fall of Grade 1. Each school district used a different test of early literacy, selected from a list of measures of early literacy approved by the Texas Education Agency. Scores were standardized within each school district. School District A (student population = 13,558) had an ethnic distribution of 38% Euro-American, 37% Latino/Hispanic, 25% African American, and fewer than 1% other. District B (student population = 24,429) had an ethnic distribution of 35% Euro-American, 30% Latino/Hispanic, 30% African American,

and 5% other. District C (student population = 7,424) had an ethnic distribution of 67% Euro-American, 12% Latino/Hispanic, 12% African American, and 9% other. Additional inclusionary criteria included speaking English or Spanish, not receiving special education services other than speech and language services, and not having been previously retained in grade 1. No evidence of selective recruitment into the longitudinal study was found. Details on the recruitment of the full sample of 784 participants are reported Hughes and Kwok, 2007).

As with most longitudinal studies that cover multiple years, not all participants had complete data at each assessment wave. The 746 participants in the current study were selected on the basis of having data on the measure of TSR and peer sociometric data for at least one of the four assessment waves. The 746 students did not differ from the 38 students on a range of demographic variables including gender, ethnicity, economic adversity, and district literacy scores. Of the 746 participants, 364 (48.8%) had data for all four waves, 228 (30.6%) had data for 3 waves, 82 (11.0%), had data for 2 waves, and 72 (9.7%) had data for 1 wave. Table 1 reports the percentage of missing data by time period.

In first grade, these 746 participants (52% male) were 6.57 years of age ($SD = 0.39$); 61.1% were economically disadvantaged based on income eligibility for free or reduced lunch, and 42.8% of parents' highest level of educational attainment was a high school diploma or less. The ethnic composition of the sample was 33.9% Euro-American, 38.2% Latino/Hispanic (of which 36.8% were enrolled in bilingual education at baseline), 22.7% African American, and 5.9% other (i.e., Asian, Native American, or Pacific Islander).

The number of teachers (199, 269, 280, and 331 at year 1, 2, 3, and 4, respectively) and schools (35, 47, 48, and 73 at year 1, 2, 3, and 4, respectively) involved each year increased over time due to the increasing dispersion of students across schools and classrooms. From year 1 to 4, most teachers were female (93.8% to 98.2%) and White (77.3% to 82.4%); 13.4% to 16.3% of teachers were Hispanic, and 1.9% to 4.2% were African American. From year 1 to 4, there were 3.2% to 7.9% teachers with less than one year of experience, 16.8% to 25.6% with 1 to 3 years, 9.5% to 23.9% with 4 to 6 years, 7.6% to 11.9% with 7 to 9 years, 4.3% to 9.4% with 10 to 12 years, and 35% to 48% with more than 12 years of experience.

Instruments

In March of each year, teachers were mailed a questionnaire packet for each study participant. This packet included measures of the teacher's perception of student-teacher warmth and conflict. Teachers received compensation for completing and returning the questionnaires.

Peer sociometric data were obtained via individual interviews conducted by members of the research staff at school (usually in the back of the class) between February and May of each year. Because reliable and valid sociometric data can be collected using the unlimited nomination approach when as few as 40% of children in a classroom participate (Terry, 2000), sociometric scores were computed only for children located in classrooms in which more than 40% of classmates participated in the sociometric assessment. The mean rate of

classmate participation in sociometric administrations was .65 (range .40 to .95), and the median number of children in a classroom providing ratings and nominations was 12. Although only children with written parent consent provided ratings and nominations, all children in the class were rated and eligible for nomination. Elementary children's peer nomination scores derived from procedures similar to those used in this study are stable over periods from six weeks to four years and associated with concurrent and future behavior and adjustment (Hughes, 1990).

Peer liking and peer disliking—To prevent potential negative effects of the sociometric procedures and minimize the opportunity for children to discuss their responses with classmates, the individual interviews were conducted at a time that was not immediately followed by lunch or recess, and children were asked not to discuss their answers with classmates. First the interviewer read the names of all the children in the classroom to prompt the child to think about each classmate. Next, the interviewer asked each child to name all the children in their classrooms whom they *like the most*. If the child hesitated after naming one or two children, the interviewer prompted the child by asking “Is there anyone else in your class whom you like the most?” A child's liking score was the total number of nominations received as *like most*, divided by the number of raters in the classroom.

To avoid asking children to nominate classmates they “dislike”, a rating scale was employed. Specifically, as the interviewer named each child in the classroom, she asked the child to point to one of five faces ranging from a sad face (1 = *don't like at all*) to a happy face (5 = *like very much*). Following the procedure recommended by Asher and Dodge (1986), a rating of “1” was considered equivalent to a *dislike* nomination score. A child's dislike score was the total number of ratings of “1” received, divided by the number of raters in the classroom. Asher and Dodge demonstrated that peer dislike scores obtained from this rating procedure correlated .93 with scores obtained by asking students to nominate classmates whom they dislike.

Teacher-student warmth and conflict—The 22-item Teacher Relationship Inventory (TRI; Hughes et al., 2001) is based on the Network of Relationships Inventory (NRI; Buhrmester & Furman, 1985), a child-report measure of relationship quality. Items on the NRI were modified so that teachers report on their relationships with students on a 5-point Likert scale (*not at all true to very true*). Confirmatory factor analysis (Wu & Hughes, 2014) indicates that the TNRI assesses three relationship dimensions: Warmth (e.g., I enjoy being with this child; This child gives me many opportunities to praise him or her), Intimacy (e.g., This child talks to me about things he/she doesn't want others to know), and Conflict (e.g., This child and I often argue or get upset with each other; I often need to discipline this child). Due to the high correlation between Intimacy and Warmth, these items are sometimes combined into a Support score. The TNRI has demonstrated good internal consistency and construct and predictive validity in grades 1–5, with Warmth/Support scores and Conflict scores associated in the expected direction with peer acceptance, behavioral engagement, reading and math achievement, and aggression (Meehan, Hughes & Cavell, 2003; Hughes et al., 2008; Hughes, 2011; Hughes et al., 2012). The TNRI has demonstrated good convergent

and discriminant validity with both child and classmates' reports of TSR and child externalizing problems (Li, Hughes, Kwok & Hsu, 2012).

Only Warmth and Conflict scores were analyzed, based on low and inconsistent associations between scores on the Intimacy factor and measures of student adjustment (Wu & Hughes, 2014). We tested longitudinal measurement invariance of the TNRI Warmth and Conflict across years 1–4 as well as gender invariance at each year. Results are reported in table 2. The TNRI Warmth and Conflict scales demonstrated both metric and scalar invariance across time and gender, indicating that TNRI scores have similar meaning across these ages for boys and for girls. More detailed information regarding measurement invariance testing for TNRI is provided in the section on data analysis procedures. The average internal consistency reliabilities for the current sample across the 4 years were .95 (range=.95 to .96) for Warmth and .92 (range= .91 to .92) for Conflict.

Classroom normative teacher support—In the individual sociometric interviews, children were asked to nominate as many classmates as they liked who met the following behavioral descriptor of experiencing a supportive relationship with the teacher: “These children get along well with the teacher; they like to talk to their teacher, and their teacher enjoys spending time with them.” A child’s teacher support score was the total number of nominations received divided by the number of raters in the classroom. Classroom normative teacher support was calculated by computing the mean of the individual scores across the classroom.

Between level covariates—Four between-child covariates assessed at year 1 were included in the analyses based on their association with peer likeability: gender, socioeconomic status (SES), literacy skills, and externalizing behaviors. Girls, higher SES children, higher achieving students, and children with low levels of externalizing problems enjoy higher peer acceptance (Chen, Rubin, & Li, 1997; Ladd et al., 1999). SES was calculated as the mean of the standardized scores for highest educational level of any adult in the household (ranging from 1 to 5, with higher levels indicating higher levels) and economic adversity status (0 and 1; with 1 indicating income eligible for free or reduced lunch). Academic achievement was assessed by children’s scores on a school-administered test of literacy skills at the beginning of first grade. A measure of externalizing problems was calculated as the mean of three standardized scores: parent-reported and teacher-reported scores on the 5-item Conduct Problems scale of the Strengths and Difficulties Questionnaire (example items: Often fights with other children or bullies them; Often lies or cheats) (Goodman, 2001) and the proportion of classmates who nominated the child as meeting a behavioral descriptor of an aggressive child (i.e., “starts fights, says mean things, or hits others”). The three scores were significantly correlated with each other (mean correlations across time for pairs of raters were 0.45 for teacher-parent, 0.51 for teacher-peer, and 0.32 for peer-parent). Because districts used different literacy measures, these scores were standardized within each school district, based on all students.

Data Analysis Procedures

Measurement Invariance Testing

Table 2 presents the model fit indices of measurement invariance tests. We investigated the measurement invariance of the TNRI measure across time (year 1, 2, 3, and 4) and student gender. Following the sequence of tests of measurement invariance (Meredith, 1993; Millsap & Cham, 2012), we tested configural, metric, and scalar invariance models using χ^2 difference test (at $\alpha = 0.05$) and the examination of significant differences of the RMSEA (change > 0.015 ; Chen, 2007) between the two nested invariance models. The null hypothesis of the χ^2 difference test is that the more restricted invariance model (e.g., metric) fits the data equally well as the less restricted invariance model (e.g., configural). Given that the sensitivity of the χ^2 difference test to sample size, we also examined significant differences on this test with an examination of the RMSEA. A small change in the RMSEA between the more restricted and less restricted invariance models supports retention of the more restricted invariance model (Chen, 2007). We tested the longitudinal invariance of the TNRI measure across three assessment years (year 1, 2, 3, and 4) for TSR warmth and conflict in Panel A and B in Model A, respectively. We also tested invariance of students' gender for TSR Warmth and Conflict in Panel A and B in Model B, respectively. Model B). The test results suggested that TNRI has the same measurement structure across years 1 to 4 in males and females students at each year.

Multiple Imputation

Multiple imputation handles missing data by filling in missing values with a set of plausible scores prior to analysis for multi-level data (Enders, 2011). We implemented a multiple imputation procedure through three phases: (a) an imputation phase, (b) an analysis phase, and (c) an averaging phase. All procedures were performed in SAS (v.9.3). First, we employed the multiple imputation routine available in PROC MI routine for generating imputed data sets. We imputed 20 data sets, following the recommendation by Graham, Olchowski, and Gilreath (2007), with 18 auxiliary variables. To reduce bias in estimation and to improve power, 18 auxiliary variables were included in the imputation phase: the average level of peer nominations for student-teacher support, aggression, prosocial behavior, hyperactivity, and trouble across Year 1 to 4, the average level of teacher-rated student's behavioral engagement, achievement, conduct problems, prosocial behavior, hyperactivity, and peer problems across Year 1 to 4, student's average level of reading and math achievement scores across year 1 to 4, social economic status (SES), gender, and ethnicity. These variables were selected due to evidence in prior research that they are associated with student-teacher relationships or peer relationships. Second, with 20 complete data sets, using the PROC MIXED routine, we performed analyses on each set and obtained 20 sets of parameter estimates and standard errors. Finally, following Rubin's (1987) rule, we created a single set of final results by averaging 20 sets of parameter estimates and standard errors using the PROC MIANALYZE routine.

Cross-Classified Model Analyses

Repeated measures are nested within students. Students are not strictly nested within classrooms; rather students and classrooms are crossed (i.e., students change classrooms

each year). Therefore, we utilized two-level cross-classified modeling (Rasbash and Browne, 2001) for estimating all the models. First, we tested an unconditional cross-classified model to examine the trajectory (i.e., intercept and slope) of peer liking and disliking (i.e., outcomes) across Years 1 to 4. Second, we tested cross-classified models that included the effect of the average level of teacher-student warmth and conflict (\overline{TSR}_i ; TSR warmth and conflict) across year 1 to 4, as a *between-child* predictor, and time-varying TSR warmth and conflict, on the initial average level of the outcome (intercept) and on the rate of growth or decline in the outcome across the same assessment years (slope). We controlled for four child covariates (i.e., child's gender and year 1 measures of SES, literacy skills, and externalizing behavior) and one time-varying classroom level covariate (classroom level normative teacher-student support). In this same cross-classified model, we also examined time-varying TSR warmth and conflict, as a *within-child* predictor, on the trajectory of the outcome. Finally, we investigated whether gender moderated the relationship between the predictors (i.e., between- and within-child effect of TSR warmth and conflict) and the outcomes (i.e., peer liking and disliking).

We employed two centering strategies in these models. First, we created the between-child TSR scores (\overline{TSR}_i ; between-child predictor) by centering the average score of TSR across Years 1 to 4 on the mean for the sample (i.e., grand mean centering). We also centered the other variables at the between-level (i.e., \overline{Gender}_i , \overline{SES}_i , and $\overline{Achieve}_i$, and $\overline{Exteranlizing}_i$) in the analyses so that the intercept represents the adjusted means of the peer liking and disliking for the average participant in the sample at year 1. This grand mean centering is important for a meaningful interpretation of the intercept. Second, we created the within-child TSR score ($TSR_{t(ic)} - \overline{TSR}_{(ic)}$; within-child predictor) by centering around the child's own mean score (i.e., person-centering), that is, subtracting the average value of a child's TSR across Years 1 to 4 ($\overline{TSR}_{(ic)}$) from the value of the child's TSR for each year ($TSR_{t(ic)}$). Person-centering removes between-child information from the variable (Enders & Tofghi, 2007). These two centering strategies allowed us to simultaneously estimate the within child effect (i.e., association between intraindividual changes in TSR and intraindividual change in the peer outcome (i.e., liking or disliking), as well as the between child effect (i.e., association between children's average TSR across years and the initial level and rate of growth of the peer outcome).

The equations representing the Level-1 (repeated measures) and Level-2 (where students and classrooms are crossed with each other), specifications for the cross-classified models of the peer liking and disliking are as follows:

Level -1(repeated measures, within-level):

$$Y_{(ic)} = \pi_{0(ic)} + \pi_{1(ic)}(Time) + \pi_{2(ic)}(TSR_{t(ic)} - \overline{TSR}_{(ic)}; Warmth or Conflict) + e_{t(ic)} \quad (3)$$

Level - 2 (students and classroom, between-level):

$$\pi_{0(ic)} = \beta_{00} + \beta_{01} (\overline{TSR}_i; \text{Warmth or Conflict}) + \beta_{02} (Gender_i) + \beta_{03} (\overline{SES}_i) + \beta_{04} (\overline{Achieve}_i) + \beta_{05} (\overline{Externalizing}_i) + \beta_{06} (classroom\ level\ TSR_c) \\ \pi_{1(ic)} = \beta_{10} + \beta_{11} (\overline{TSR}_i; \text{Warmth or Conflict}) * (Time) + u_{1i}; \quad \pi_{2(ic)} = \beta_{20}$$

where $Y_{t(ic)}$ is the peer liking/ disliking score measured at time t when student i is in classroom c . Adopting the notation of Rasbash and Browne (2001), the parenthesis was inserted around the pair of cross-classified factors that are represented by subscript i and c . The time variable ($Time$) was centered at Year 1. For the fixed effects, β_{00} represents the average level of the outcome for the average student in the sample at Year 1 (i.e., Intercept, which is the estimate when all the centered predictors and covariates are equal to zero). β_{10} represents the average conditional linear rate of growth or decline ($Time$ or Slope) in peer liking and disliking across Year 1 to 4, after controlling for other variables in the model. The between-child effect (β_{01}) represents the effect of average levels of teacher-student warmth and conflict (\overline{TSR}_i) on levels of peer liking and peer disliking (Intercept) while β_{11} represents the effect average levels of teacher-student warmth and conflict on rate of growth or decline (Slope) in the peer liking and disliking, controlling for within-child effects and relevant covariates. For the between-child effect of the covariates, β_{02} , β_{03} , β_{04} , and β_{05} represent effect of the gender ($Gender_i$), SES (\overline{SES}_i), achievement ($\overline{Achieve}_i$), and externalizing problem score ($\overline{Externalizing}_i$), respectively, at year 1, after controlling other variables in the model. The within-child effect of the predictor, β_{20} represents the *within-child association* between year-to-year change in teacher-student warmth and conflict ($TSR_{t(ic)} - \overline{TSR}_{(ic)}$) and peer liking and disliking across years 1 to 4, controlling for between-child effects and relevant covariates. The between-classroom effect, β_{06} (*classroom level TSR_c*) represents the association between the normative teacher-student support each year and peer liking and disliking at each year, controlling for between-child effects and relevant child covariates.

For the random effects, at Level-1, the residual term e_{it} is assumed to be normally distributed with the residual variance equal to σ^2 , which captures the within-student variation. At Level-2, the residual term u_{0i} and u_{1i} are assumed to be normally distributed with variance equal to τ_{00} and τ_{11} which captures the variation in between-student intercept and slope, respectively. v_{0c} are assumed to be normally distributed with variance equal to τ_{22} captures the variation in between-classroom effect.

Results

Descriptive Statistics and Correlations

Table 1 depicts descriptive statistics, including the zero-order correlations, the means, and standard deviations for measures of liking, disliking, teacher warmth, and teacher conflict within and across times using the raw data sample (before imputation). All study variables were analyzed for outliers and for properties of their distribution. No outliers were identified according to analysis of the frequencies and distributions of study variables (Barnett & Lewis, 1994). No variables had values for skewness or kurtosis that were outside of acceptable levels for the planned analyses, according to the cutoff values of 2 for skewness

and 7 for kurtosis (West & Finch, 1997). Teacher warmth and conflict were correlated in expected directions with peer liking and disliking at each assessment year. The average one-year stability for teacher warmth and teacher conflict was .38 and .57, respectively. Liking and disliking scores had an average one-year stability of .37 and .35, respectively. The average within-year correlation between warmth and conflict was $-.62$, whereas the correlation between average warmth and average conflict was $-.73$. The higher correlation for the average warmth and conflict scores than within-year correlations for these variables is likely due to the fact that average levels reflect children's stable dispositions for warmth and conflict with teachers, whereas within year associations also reflect unique aspects of children's dyadic relationships with teachers. A specific teacher-child relationship reflects characteristics of the child, the specific teacher, and the setting.

With respect to covariates, teachers reported significantly greater warmth and less conflict in relationships with girls at each year (r between being male and mean warmth and conflict across the 4 years = $-.22$ and $.27$, respectively) and with students with higher levels of year 1 literacy achievement (r between achievement and mean warmth and conflict = $.20$ and $-.16$, respectively), but SES had low or non-significant correlations with mean warmth and conflict. Year 1 externalizing behavior was significantly and negatively correlated with teacher warmth and positively correlated with teacher conflict each year (r between Year 1 externalizing problems and mean warmth and conflict = $-.54$ and $.70$, respectively). Year 1 externalizing behavior was also significantly and negatively correlated with peer liking at each year (range = $-.15$ to $-.24$) and positively correlated with peer disliking at each year (range = $.22$ to $.42$).

Unconditional Hypothesized Model

We first examined the intraclass correlation coefficients (ICCs) at the classroom level at each year for each outcome to determine whether the effect of classroom level covariate should be considered in the analysis. The ICC was s 0.31, 0.29, 0.24, and 0.24 at year 1, 2, 3, and 4, respectively for peer liking and 0.11, 0.15, 0.28, and 0.26 at year 1, 2, 3, and 4, respectively peer disliking. Using unconditional cross-classified models, we then examined the initial average level (intercept) and the rate of linear change (slope) in students' peer liking and disliking across Years 1 to 4. The parameter estimates are based on the averaged parameter estimates across 20 imputed data sets (Rubin, 1997). It should be noted that PROC MIANALYZE routine in SAS does not provide the significance (p value) of the averaged estimates for the random effects. For the fixed effect, on average, the intercept (β_{00}) was 0.136 ($SE = 0.005$), $p < .001$ for peer liking and $\beta_{00} = 0.097$ ($SE = 0.004$), $p < .001$ for peer disliking, indicating that the average proportion of nominations of peer liking and disliking in the classroom were 13.6% and 9.7%, respectively, for the average female child at Year 1. The slope was $\beta_{10} = 0.010$ ($SE = .002$), $p < .001$ for peer liking and $\beta_{10} = 0.006$ ($SE = .002$), $p = .002$ for peer disliking, indicating that on average, student's liking and disliking toward their peers increased across years 1 to 4.

For the random effect, at the within-child level, the random error, e_{ij} was 0.007 (53%) and 0.006 (56%) for peer liking and disliking, respectively. At the between-child level, the variance of the intercept, τ_{00} and slope, τ_{11} was 0.003 (26%) and 0.0002 (2%), respectively,

for peer liking and 0.003 (28%) and 0.0002 (2%), respectively, for peer disliking. For the between-classroom level, τ_{11} was 0.002 (19%) and 0.001 (14%) for peer liking and disliking, respectively.

Between-child Effect of Teacher-Student Warmth and Conflict

Table 3 presents the pooled unstandardized parameter estimates of testing between- and within-child effects of teacher-student warmth and conflict (TSR) on peer liking and disliking across 20 imputed data sets. To test the between-child effect of TSR (\overline{TSR}_i warmth and conflict, β_{01}), we used the average teacher-student warmth and conflict scores across years 1 to 4 as a time-invariant predictor at the between-level in the models. We controlled for within-level TSR and the four child level covariates ($Gender_i$, \overline{SES}_i , $\overline{Achieve}_i$, $\overline{Externalizing}_i$), and the classroom-level covariate (*classroom level TSR_c*). As shown in Panel A in Table 3, for peer liking, the between-child effect of TSR warmth was positive ($\beta_{01} = 0.036$ ($SE = 0.007$), $p < .001$; $d = .22^1$), whereas the between-child effect of TSR conflict was negative ($\beta_{01} = -0.019$ ($SE = 0.006$), $p = .002$; $d = .13^1$). For peer disliking in Panel B, the between-child effect of TSR warmth was negative ($\beta_{01} = -0.031$ ($SE = 0.006$; $d = .25^1$) whereas the between child effect of TSR conflict was positive ($\beta_{01} = 0.023$ ($SE = 0.005$); $d = .18^1$). Results indicate that students with higher average levels of teacher warmth have higher average levels of peer liking and lower average level of peer disliking. Also, students with higher average levels of teacher-student conflict have higher average levels of peer disliking and lower average level of peer liking. We also tested whether children with different levels of average TSR scores across 4 years experienced differential rates of growth or decline in peer liking and disliking across the same assessment years (β_{10}) and found no effect.

The results for covariates are also presented in Table 3 for peer liking in Panel A and peer disliking in Panel B. In these models, we controlled for within- and between-child effects and the others covariates. For the effect of gender ($Gender_i$, β_{02}), for warmth and conflict models, we found that boys showed a higher average level of peer liking. No gender differences were found for peer disliking.

In addition, higher average level of SES (\overline{SES}_i , β_{03}) and higher average level of achievement ($\overline{Achieve}_i$, β_{04}), and lower level of externalizing problems ($\overline{Externalizing}_i$, β_{05}) were associated with higher average level of both peer liking and peer disliking, controlling for within- and between-child effects of TSR, between-classroom effects of TSR, and the other individual level covariates. For the between-classroom effect, higher level of classroom-level normative teacher-student support (*classroom level TSR_c*, β_{06}) at each year was positively associated with the level of peer liking and was negatively associate with peer disliking, controlling for within- and between-child effects of TSR and the other covariates.

¹For the significant effects, standardized effect sizes were computed using the following equation (Hedges, 2007),

$$\delta_{\beta} = \frac{\beta}{\sqrt{\sigma^2 + \sqrt{\tau_{00}} + \sqrt{\tau_{11}}}, \text{ where } \delta_{\beta} \text{ measures the standard effect size which is roughly the same metric as Cohen's } d.$$

Within-child Effect of Teacher-Student Warmth and Conflict

To test the within-child effects of TSR warmth and conflict ($TSR_{t(ic)} - \overline{TSR_{(ic)}}$ warmth and conflict, β_{10}), we used the year-to-year change in TSR (i.e., warmth or conflict score) as a time-varying predictor at the within-level in the models. First, we tested whether the magnitude of the effect varied across time (i.e., $Time \times (TSR_{t(ic)} - \overline{TSR_{(ic)}})$). The results were not significant for liking (for Warmth and Conflict estimate = -0.004 (SE=0.004); $p=.3908$ and 0.002 (SE=0.004); $p=.5977$, respectively) or disliking (for Warmth and Conflict estimate = -0.008 (SE=0.004); $p=.8229$ and 0.006 (SE=0.004); $p=.1313$, respectively). Thus, we constrained the magnitude of the within-child effect of TSR warmth and conflict on liking and disliking to be equivalent across years.

We found a significant within-child effect TSR warmth and conflict only for peer disliking. Specifically, the within-child effect for warmth was negative ($\beta_{20} = -0.013$ (SE = .003), $p < 0.001$; $d = .11^1$), and the within child effect for conflict was positive ($\beta_{20} = 0.008$ (SE = .003), $p = 0.018$; $d = .07^1$), controlling for between-child effects of TSR, between-classroom effect of TSR and the other covariates. Thus, within-child improvements in warmth and decreases in conflict each predicted declines in peer disliking.

Gender Moderation Effect

Finally, we tested whether male and female students differ in the relationship between the within- and between-child TSR predictors (i.e., warmth and conflict) and peer liking and disliking by including two interaction terms with gender (i.e., for interaction with the within-child effect ($TSR_{t(ic)} - \overline{TSR_{(ic)}} \times Gender$); for interaction with the between-child effect ($\overline{TSR_i} \times Gender$) in the previous models. No significant gender moderation effects were found.

Discussion

Changes in Warmth and Conflict and Liking and Disliking across Time

It is interesting that teacher warmth and peer liking and disliking have comparable and relatively low levels of stability, compared to teacher conflict. These findings suggest that teacher warmth and peer likeability often change markedly from year to year (and classroom to classroom). The unconditional trajectories for peer liking and disliking were positive, indicating that with increasing grades classmates nominate a larger proportion of students as *like most* and as *dislike*. Because most longitudinal studies of peer sociometric nominations report scores that have been standardized within classrooms, little research has reported growth or decline in peer liking and disliking. The gain in liking and disliking scores across years may be due to students' increasing awareness of and interest in peer group status with age.

Teacher-Student Warmth and Conflict and Children's Peer Relationships

As expected, the average level of teacher reported warmth and conflict with students across the four years predicted students' initial peer liking and disliking, above the effects of gender, SES, externalizing behaviors, and achievement. Children's average level of warmth

and conflict in their relationships with teachers across the elementary grades likely reflect stable child predispositions for establishing agreeable and harmonious relationships with those in their social milieu, as well as effects of the reputation that a child has acquired in school that is carried over from teacher to teacher. Thus, between-child associations of TSR and children's liking and disliking may be explained, in part, by these stable child characteristics, which may also explain why the average level of TSR did not predict *rate of change* in peer disliking and liking.

Importantly, above and beyond these between-child effects of TSR warmth and conflict on children's trajectories of peer liking and disliking, as well as year-to-year changes in classroom teacher normative support, year-to-year changes in TSR warmth and conflict predicted year-to-year changes in children's *disliking* but not *peer liking*. As children move into classrooms in which teachers report providing higher warmth and lower conflict in their relationships with them, children are less disliked. Because this study is the first to simultaneously estimate between-child and within-child effects of TSR on peer relationships, it provides the strongest evidence to date of an effect of teacher warmth and conflict on children's peer disliking.

The finding that both warmth and conflict have significant effects on between-child differences in peer liking and disliking and on intraindividual change in peer disliking is likely due to their high correlation. What these two scales share in common likely drive their associations with peer likeability. The standardized effects for warmth and conflict at the between level were small (for peer liking) to moderate (for peer disliking) and the within-child effects of warmth and conflict on disliking were small. The small within-year effects are meaningful because they are above and beyond the effects of children's average warmth and conflict and behavioral and demographic covariates and time-varying normative teacher support. Furthermore, the positive effect of having a supportive relationship with one's teacher in a given year on one's peer disliking may accumulate over years, resulting in a much larger total effect.

Greater Effect of TSR on Disliking than Liking

As expected based on theory and empirical findings (McAuliffe and Hubbard, 2009; Mikami, Gregory, Allen, Pianta, & Lun, 2011), teacher conflict and warmth had a greater effect on peer disliking than peer liking. Peer nominations of *like most* may reflect friendship status, which is a dyadic relationship based in large part on perceived similarities. Conversely, peer ratings of 1 (sad face accompanied by label *don't like at all*) may reflect students' evaluations of peer's attributes and likeability based on the child's reputation within the peer group as disliked. Children's reputations as rejected are resistant to change, even when their behavior improves (Hymel, Wagner, & Butler, 1990). This phenomenon has been explained by a negative bias in interpreting the behavior of disliked peers, resulting in greater blame for negative behavior and less credit for positive behavior performed by disliked than by liked peers (Hymel, 1986).

Results suggest that supportive teacher interactions with children may reduce the stigmatizing effects of rejection. Consistent with this interpretation, in an experimental study with first and second grade students (White et al., 1998), teacher praise increased peers'

positive perceptions of rejected children but had no effect on perceptions of children with neutral or positive peer reputations. The authors suggested teacher praise to rejected students reduced the effects of negative filters by which children interpret disliked children's behaviors.

Teacher Normative Support

Whereas a within child effect of individual, teacher-reported TSR support and conflict was found only for peer disliking, a within child effect of normative levels of peer-nominations of teacher-support was found only for peer liking. When students in a classroom perceive that the teacher likes and enjoys more students, they may model this inclusiveness in their liking for classmate peers.

Gender Differences

Consistent with prior research, teachers report more warmth and less conflict in relationships with girls than with boys. Consistent with prior research (Hughes et al., 2001; De Laet et al. 2014), the between-child and within-child effects of teacher warmth and teacher conflict on peer relatedness were similar for girls and boys. That is, even though boys' relationships with teachers are characterized by less warmth and more conflict, boys benefit as much from a supportive relationship with their teacher as do girls.

Developmental Changes

The within-child associations of teacher-student warmth and conflict and children's peer liking and disliking are of similar magnitude across grades 1–4. At the fourth measurement wave, students were, on average, between 10 and 11 years of age, and all students were attending elementary schools. The onset of adolescence marks a reduction in students' reliance on teachers for social support and an increase in sensitivity to the influence of one's peers (Berndt, 1999). Thus, results may have differed had the study extended into the middle school grades.

Study Limitations and future directions

Study findings need to be considered in light of several limitations. First, because the sample was selected on the basis of educational risk in first grade, future studies with non-select samples are necessary to determine if these results generalize to samples including the full range of achievement. Future studies are needed to replicate these findings with low risk samples. Second, although the study controlled for time-varying levels of teacher normative support, other potential time-varying confounds such as teacher stress or classroom management should be investigated. Additionally, moderating and mediating effects of classroom variable on the effect of TSR on peer status would provide a more complete understanding of how and under what conditions teacher-student relationships influence peer relationships. For example, high levels of TSR liking may not lead to lower levels of disliking in classrooms with low average teacher normative support. Third, it is important to note that the study design does not take into account potential reciprocal effects (i.e., the effect of year-to-year changes in peer disliking and liking on year-to-year changes in teacher warmth and conflict). TSR and peer relationships likely form part of a dynamic system of

reciprocal influences (De Laet et al., 2014; Mercer & DeRosier, 2008). A fourth limitation is the lack of observational measures of teacher warmth and conflict. The availability of observed teacher-student interactions would assist in identifying specific teacher-student interactions that contribute to children's peer relatedness. Finally, the current study does not assess teacher characteristics such as empathy or attunement to peer relationships that may account for the effect of TSR on children's disliking.

Implications of study findings

Results suggest that improved teacher-student relationships can mitigate the effect of stable child behavioral dispositions on children's peer rejection. Given the strong adverse effects of chronic peer rejection on children's academic and psychosocial outcomes, including delinquency, school dropout, and depression (Bierman, 2004), findings underscore the need for policies and practices that assist teachers in developing supportive relationships with all students and especially with those students whose behavioral dispositions place them at risk for peer rejection. It is understandable that teachers report conflict with children who exhibit problem behaviors and create disruption in the classroom. However, some teachers are able to see beyond a child's problem behaviors and provide emotional support to the child (Hamre et al., 2007), which may contribute to greater between-teacher variability in warmth than in conflict.

A number of recent studies suggest that teacher-focused interventions can assist teachers in forming more supportive and less conflictual relationships with children who have poor behavioral compliance (Spilt, Koomen, & Thijs, 2012). Of particular relevance are results from a recent randomized trial of a classroom intervention that targeted teachers' positive interactions with children with challenging behavior (i.e., ADHD) as a means of improving their peer acceptance (Mikami et al., 2013). The intervention encouraged teachers to develop positive, one-on-one relationships with all children, but especially children with poor compliance to classroom rules and to communicate "to the child and to peers that the teacher valued and enjoyed interacting with the child." (p. 105). Teachers were also instructed to provide corrective feedback privately and to publically praise children for strengths unrelated to behavior, to identify commonalities between students to foster friendships, and to set up collaborative activities. Children with ADHD improved more in the intervention condition than in the standard condition on peer sociometric ratings of liking and number of reciprocated friendships. Whereas the Mikami et al. study suggests the benefits of positive teacher-student interactions on children's peer status, praise is not always interpreted positively by classmates. McAuliffe et al. (2009) found that above the effect of children's prosocial behaviors, observed teacher praise predicted lower levels of peer liking, perhaps due to the attributions classmates make in response to teacher praise (Graham & Barker, 1990). The communication of valuing and respect for students is certainly more complex than praising students' performance.

In conclusion, this study demonstrates that supportive (low conflict, high warmth) relationships with teachers may reduce the risk of peer rejection, above children's stable characteristics that place them at risk for poor relationships with teachers. This finding is consistent with the view that classrooms are important contexts for children's social as well

as their academic development and suggests the need for a greater emphasis in teacher preparation and professional development programs on building positive relationships with all students.

References

- Asher SR, Dodge KA. Identifying children who are rejected by their peers. *Developmental Psychology*. 1986; 22:444–449.10.1037/0012-1649.22.4.444
- Baker JA. Contributions of teacher-child relationships to positive school adjustment during elementary school. *Journal of School Psychology*. 2006; 44:211–229.10.1016/j.jsp.2006.02.002
- Barnett, V.; Lewis, T. *Outliers in statistical data*. Vol. 3. New York: Wiley; 1994.
- Berndt TJ. Friends' influence on students' adjustment to school. *Educational Psychologist*. 1999; 34:15–28.
- Bierman, KL. *Understanding and treating peer rejection*. NY, NY: Guilford Press; 2004.
- Birch SH, Ladd GW. Children's interpersonal behaviors and the teacher-child relationship. *Developmental Psychology*. 1998; 34:934–946.10.1037/0012-1649.34.5.934 [PubMed: 9779740]
- Bronfenbrenner, U.; Morris, PA. The bioecological model of human development. In: Bronson, MB., editor. *Self-regulation in early childhood: Nature and nurture*. Vol. 2000. New York, NY: Guilford Press; 2006. p. 793-828.
- Buhs ES, Ladd GW. Peer rejection as an antecedent of young children's school adjustment: An examination of mediating process. *Developmental Psychology*. 2001; 37:550–560.10.1037/0012-1649.37.4.550 [PubMed: 11444490]
- Buyse E, Verschueren K, Verachert P, Van Damme J. Predicting school adjustment in early elementary school: Impact of teacher-child relationship quality and relational classroom climate. *The Elementary School Journal*. 2009; 110:119–141.10.1086/605768
- Chang L, Liu H, Fung KY, Wang Y, Wen Z, Li H, Farver JM. The mediating and moderating effects of teacher preference on the relations between students' social behaviors and peer acceptance. *Merrill-Palmer Quarterly*. 2007; 53:603–630.10.1353/mpq.2008.0006
- Chen Q, Hughes JN, Kwok O, Liew J. Joint Contributions of Peer Acceptance and Peer Academic Reputation to Achievement in Academically At Risk Children: Mediating Processes. *Journal of Applied Developmental Psychology*. 2010; 31:448–459. [PubMed: 21113406]
- Chen XY, Rubin KH, Li D. Relation between academic achievement and social adjustment: Evidence from Chinese children. *Developmental Psychology*. 1997; 33:518–525.10.1037/0012-1649.33.3.518 [PubMed: 9149930]
- Coie JD, Kupersmidt JB. A behavioral analysis of emerging social status in boys' groups. *Child Development*. 1983; 54:1400–1416.10.2307/1129803
- Cole DA, Maxwell SE, Martin JM. Reflected self-appraisals: Strength and structure of the relation of teacher, peer, and parent ratings to children's self-perceived competencies. *Journal of Educational Psychology*. 1997; 89:55–70.10.1037/0022-0663.89.1.55
- De Laet S, Doumen S, Vervoort E, Colpin H, Van Leeuwen K, Goossens L, Verschueren K. Transactional links between teacher-child relationship quality and perceived versus sociometric popularity: A three-wave longitudinal study. *Child Development*. 2014; 85:1647–1662. [PubMed: 24397289]
- DeRosier ME, Thomas JM. Strengthening sociometric prediction: Scientific advances in the assessment of children's peer relations. *Child Development*. 2003; 74:1379–1392.10.1111/1467-8624.00613 [PubMed: 14552404]
- Enders CK. Analyzing longitudinal data with missing values. *Rehabilitation Psychology*. 2011; 56:267–288.10.1037/a0025579 [PubMed: 21967118]
- Enders CK, Tofighi D. Centering predictor variables in cross-sectional multilevel models: a new look at an old issue. *Psychological Methods*. 2007; 12:121.10.1037/1082-989X.12.2.121 [PubMed: 17563168]
- Farmer TW, Lines MM, Hamm JV. Revealing the invisible hand: The role of teachers in children's peer experiences. *Journal of Applied Developmental Psychology*. 2011; 32:247–256.

- Finch JF, West SG. The investigation of personality structure: Statistical models. *Journal of Research in Personality*. 1997; 31(4):439–485.
- Furman W, Buhrmester D. Children's perceptions of the personal relationships in their social networks. *Developmental Psychology*. 1985; 21:1016–1024. [10.1037//0012-1649.21.6.1016](https://doi.org/10.1037//0012-1649.21.6.1016)
- Gest SD, Rodkin PC. Teaching practices and elementary classroom peer ecologies. *Journal of Applied Developmental Psychology*. 2011; 32:288–296. [10.1016/j.appdev.2011.02.004](https://doi.org/10.1016/j.appdev.2011.02.004)
- Gleason KA, Kwok O, Hughes JN. The short-term effect of grade retention on peer relations and academic performance of at-risk first graders. *The Elementary School Journal*. 2007; 107:327–340. [PubMed: 20431696]
- Goldstein SE, Davis-Kean P, Eccles JS. Parents, peers, and problem behavior: A longitudinal investigation of the impact of relationship perceptions and characteristics on the development of adolescent problem behavior. *Developmental Psychology*. 2005; 41:401–413. [10.1037/0012-1649.41.2.401](https://doi.org/10.1037/0012-1649.41.2.401) [PubMed: 15769195]
- Goodman R. Psychometric properties of the Strengths and Difficulties Questionnaire. *Journal of Child Psychology and Psychiatry*. 2001; 40:791–799. [10.1097/00004583-200111000-00015](https://doi.org/10.1097/00004583-200111000-00015) [PubMed: 10433412]
- Graham S, Barker GP. The down side of help: An attributional-developmental analysis of helping behavior as a low-ability cue. *Journal of Educational Psychology*. 1990; 82:7–14. [10.1037/0022-0663.82.1.7](https://doi.org/10.1037/0022-0663.82.1.7)
- Graham JW, Olchowski AE, Gilreath TD. How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science*. 2007; 8:206–213. [10.1007/s11121-007-0070-9](https://doi.org/10.1007/s11121-007-0070-9) [PubMed: 17549635]
- Hamre BK, Pianta RC. Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*. 2001; 72:625–638. [10.1111/1467-8624.00301](https://doi.org/10.1111/1467-8624.00301) [PubMed: 11333089]
- Hamre BK, Pianta RC. Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development*. 2005; 76:949–967. doi:[http://dx.doi.org/10.1111/j.1467-8624.2005.00889.x](https://doi.org/10.1111/j.1467-8624.2005.00889.x). [PubMed: 16149994]
- Hartup, WW. Peer relations. In: Hetherington, EM.; Mussen, PH., editors. *Handbook of child psychology: Vol. 4. Socialization, personality, and social development*. New York: Wiley; 1983. p. 104-196.
- Hedges LV. Effect sizes in cluster-randomized designs. *Journal of Educational and Behavioral Statistics*. 2007; 32(4):341–370.
- Hughes JN. Longitudinal effects of teacher and student perceptions of teacher-student relationship qualities on academic adjustment. *Elementary School Journal*. 2011; 112:38–60. doi:[http://dx.doi.org/10.1086/660686](https://doi.org/10.1086/660686). [PubMed: 21984843]
- Hughes, JN. Teachers as managers of students' peer context. In: Ryan, A.; Ladd, GL., editors. *Peer relationships and adjustment at school*. Charlotte, NC: Information Age Publishing; 2012. p. 189-218.
- Hughes JN, Cavell TA, Willson V. Further support for the developmental significance of the quality of the teacher-student relationship. *Journal of School Psychology*. 2001; 39:289–301. doi:[http://dx.doi.org/10.1016/S0022-4405\(01\)00074-7](https://doi.org/10.1016/S0022-4405(01)00074-7).
- Hughes JN, Chen Q. Reciprocal effects of student-teacher and student-peer relatedness: Effects on academic self efficacy. *Journal of Applied Developmental Psychology*. 2011; 32:278–287. [10.1016/j.appdev.2010.03.005](https://doi.org/10.1016/j.appdev.2010.03.005) [PubMed: 21927528]
- Hughes JN, Im M, Wehrly SE. Effect of peer nominations of teacher-student support at individual and classroom levels on social and academic outcomes. *Journal of School Psychology*. 2014; 52:309–322. doi: doi.org/10.1016/j.jsp.2013.12.004. [PubMed: 24930822]
- Hughes JN, Kwok O. Classroom engagement mediates the effect of teacher-student support on elementary students' peer acceptance: A prospective analysis. *Journal of School Psychology*. 2006; 43:465–480. [10.1016/j.jsp.2005.10.001](https://doi.org/10.1016/j.jsp.2005.10.001) [PubMed: 20431706]
- Hughes JN, Kwok O. The influence of student-teacher and parent-teacher relationships on lower achieving readers' engagement and achievement in the primary grades. *Journal of Educational Psychology*. 2007; 99:39–51. [10.1037/0022-0663.99.1.39](https://doi.org/10.1037/0022-0663.99.1.39) [PubMed: 18084625]

- Hughes JN, Luo W, Kwok O, Loyd L. Teacher-student support, effortful engagement, and achievement: A three year longitudinal study. *Journal of Educational Psychology*. 2008; 100:1–14.10.1037/0022-0663.100.1.1 [PubMed: 19578558]
- Hughes JN, Zhang D, Hill CR. Peer Assessments of Normative and Individual Teacher-Student Support Predict Social Acceptance and Engagement Among Low- Achieving Children. *Journal of School Psychology*. 2006; 43:447–463.10.1016/j.jsp.2005.10.002 [PubMed: 20411044]
- Hymel S. Interpretations of peer behavior: Affective bias in childhood and adolescence. *Child Development*. 1986; 57:431–445.
- Hymel, S.; Wagner, E.; Butler, LJ. Peer rejection in childhood. Cambridge University Press; New York, NY: 1990. Reputational bias: View from the peer group; p. 156-186.
- Kiuru N, Poikkeus AM, Lerkkanen MK, Pakarinen E, Siekkinen M, Ahonen T, Nurmi JE. Teacher-perceived supportive classroom climate protects against detrimental impact of reading disability risk on peer rejection. *Learning and Instruction*. 2012; 22:331–339.10.1016/j.jsp.2012.07.001
- Ladd GW, Birch SH, Buhs ES. Children's social and scholastic lives in kindergarten: Related spheres of influence? *Child Development*. 1999; 70:1373–1400. [PubMed: 10621962]
- Ladd GW, Herald-Brown S, Reiser M. Does chronic classroom peer rejection predict the development of children's classroom participation during the grade school years? *Child Development*. 2008; 79:1001–1015.10.1111/j.1467-8624.2008.01172.x [PubMed: 18717903]
- Ladd GW, Kochenderfer BJ, Coleman CC. Classroom peer acceptance, friendship, and victimization: Distinct relation systems that contribute uniquely to children's school adjustment? *Child Development*. 1997; 68:1181–1197.10.2307/1132300 [PubMed: 9418233]
- Ladd, GW.; Kochenderfer-Ladd, B.; Visconti, KJ.; Ettekal, I. Peer relationships and adjustment at school. IAP Information Age Publishing; Charlotte, NC: 2012. Classroom peer relations and children's social and scholastic development: Risk factors and resources; p. 11-49.
- Ladd GW, Troop-Gordon W. The role of chronic peer difficulties in the development of children's psychological adjustment problems. *Child Development*. 2003; 74:1344–1367. doi:<http://dx.doi.org/10.1111/1467-8624.00611>. [PubMed: 14552402]
- Landau S, Milich R, Whitten P. A comparison of teacher and peer assessment of social status. *Journal of Clinical Child Psychology*. 1984; 13:44–49.
- Lerner, RM. Developmental contextualism and the life-span view of person-context interaction. In: Bornstein, MH.; Bruner, JS., editors. *Interaction in human development*. Crosscurrents in contemporary psychology. Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc; 1989. p. 217-239.
- Li Y, Hughes JN, Kwok O, Hsu H. Evidence of convergent and divergent validity of child, teacher, and peer reports of teacher-student support. *Psychological Assessment*. 2012.10.1037/a0024481
- Maccoby EE. Gender and relationships: A developmental account. *American Psychologist*. 1990; 45:513–520. [PubMed: 2186679]
- Maldonado-Carreño C, Votruba-Drzal E. Teacher-child relationships and the development of academic and behavioral skills during elementary school: A within- and between-child analysis. *Child Development*. 2011; 82:601–616.10.1111/j.1467-8624.2010.01533.x [PubMed: 21410918]
- McAuliffe MD, Hubbard JA, Romano LJ. The role of teacher cognition and behavior in children's peer relations. *Journal of Abnormal Child Psychology*. 2009; 37:665–677.10.1007/s10802-009-9305-5 [PubMed: 19214736]
- Meehan BT, Hughes JN, Cavell TA. Teacher-student relationships as compensatory resources for aggressive children. *Child Development*. 2003; 74:1145–1157.10.1111/1467-8624.00598 [PubMed: 12938710]
- Mercer SH, DeRosier ME. Teacher preference, peer rejection, and student aggression: A prospective study of transactional influence and independent contributions to emotional adjustment and grades. *Journal of School Psychology*. 2008; 46:661–687. doi:<http://dx.doi.org/10.1016/j.jsp.2008.06.006>. [PubMed: 19083378]
- Mikami AY, Gregory A, Allen JP, Pianta RC, Lun J. Effects of a teacher professional development intervention on peer relationships in secondary classrooms. *School Psychology Review*. 2011; 40:367–385. [PubMed: 22736890]

- Perry KE, Donohue KM, Weinstein RS. Teaching practices and the promotion of achievement and adjustment in first grade. *Journal of School Psychology*. 2007; 45:269–292.10.1016/j.jsp.2007.02.005
- Pianta, RC. *Student-Teacher Relationship Scale: Professional manual*. Lutz, FL: Psychological Assessment Resources; 2001.
- Portilla XA, Ballard PJ, Adler NE, Boyce WT, Obradovi J. An integrative view of school functioning: Transactions between self-regulation, school engagement, and teacher-child relationship quality. *Child Development*. 2014; 85:1915–1931. [PubMed: 24916608]
- Rasbash, J.; Browne, WJ. Modelling non-hierarchical structures. In: Leyland, AH.; Goldstein, H., editors. *Multilevel modelling of health statistics*. Chichester, UK: Wiley; 2001. p. 93-105.
- Roorda DL, Koomen HMY, Spilt JL, Oort FJ. The influence of affective teacher-student relationships on students' school engagement and achievement: A meta-analytic approach. *Review of Educational Research*. 2011; 81:493–529.
- Rubin, DB. *Multiple imputation for nonresponse in surveys*. New York, NY: Wiley; 1987.
- SAS Institute Inc. *SAS/STAT 9.1 User's guide*. Cary, NC: SAS Institute Inc; 2004.
- Shadish, WR.; Cook, TD.; Campbell, DT. *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton-Mifflin; 2002.
- Silver RB, Measelle JR, Armstrong JM, Essex MJ. Trajectories of classroom externalizing behavior: Contributions of child characteristics, family characteristics, and the teacher-child relationship during the school transition. *Journal of School Psychology*. 2005; 43:39–60.
- Spilt JL, Hughes JN, *Wu JY, Kwok O. Dynamics of teacher-student relationships: stability and change across elementary school and the influence on children's academic success. *Child Development*. 2012; 83:1117–1463.10.1111/j.1467-8624.2012.01761.x
- Spilt JL, Koomen HMY, Thijs JT, Van der Leij A. Supporting teachers' relationships with disruptive children: The potential of relationship-focused reflection. *Attachment & Human Development*. 2012; 14:305–318.10.1080/14616734.2012.672286 [PubMed: 22537526]
- Taylor AR, Trickett PK. Teacher preference and children's sociometric status in the classroom. *Merrill-Palmer Quarterly*. 1989; 35:343–361.
- Terry, R. Recent advances in measurement theory and the use of sociometric techniques. In: Cillessen, AHN.; Bukowski, WM., editors. *Recent advances in the measurement of acceptance and rejection in the peer system: New directions for child and adolescent development*. San Francisco, CA: Jossey-Bass; 2000. p. 27-53.
- White KJ, Jones K, Sherman MD. Reputation information and teacher feedback: Their influences on children's perceptions of behavior problem peers. *Journal of Social and Clinical Psychology*. 1998; 17:11–37.
- Wu J, Hughes JN. Teacher network of relationships inventory: Measurement invariance of academically at-risk students across ages 6 to 15. *School Psychology Quarterly*. 2014.10.1037/spq0000063

Table 1

Correlations and Descriptive Statistics among Analysis Variables (N=746)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>Correlations</i>																				
1 PeerLike1	-																			
2 PeerLike2	.40	-																		
3 PeerLike3	.29	.35	-																	
4 PeerLike4	.29	.27	.35	-																
5 PeerDislike1	-.30	-.23	-.25	-.29	-															
6 PeerDislike2	-.26	-.32	-.25	-.23	.32	-														
7 PeerDislike3	-.21	-.16	-.35	-.23	.27	.37	-													
8 PeerDislike4	-.24	-.23	-.23	-.33	.27	.35	.36	-												
9 TSRwarmth1	.22	.17	.19	.21	-.32	-.30	-.16	-.21	-											
10 TSRwarmth2	.12	.14	.19	.12	-.23	-.25	-.22	-.24	.42	-										
11 TSRwarmth3	.15	.07	.21	.12	-.17	-.18	-.25	-.20	.28	.37	-									
12 TSRwarmth4	.19	.16	.18	.18	-.20	-.23	-.20	-.30	.25	.32	.35	-								
13 TSRconflict1	-.16	-.17	-.17	-.18	.33	.29	.20	.25	-.65	-.38	-.31	-.32	-							
14 TSRconflict2	-.19	-.16	-.18	-.13	.27	.28	.27	.25	-.44	-.66	-.39	-.36	.56	-						
15 TSRconflict3	-.14	-.11	-.14	-.15	.19	.20	.20	.19	-.38	-.37	-.55	-.42	.52	.55	-					
16 TSRconflict4	-.14	-.13	-.23	-.14	.30	.27	.27	.31	-.34	-.44	-.42	-.59	.50	.58	.61	-				
17 ClassTSRsup1	.21	.13	.09	.10	-.10	-.04	-.08	-.12	.18	.06	-.01	.11	-.09	-.04	-.06	-.03	-			
18 ClassTSRsup2	.09	.18	-.04	.00	.00	-.06	-.05	.05	-.02	.03	-.02	-.02	.04	-.06	-.01	.01	-.06	-		
19 ClassTSRsup3	-.01	-.10	.10	.04	-.03	.03	-.06	-.10	-.02	.06	.07	.09	-.02	-.06	-.06	-.15	.07	-.14	-	
20 ClassTSRsup4	.06	.00	.12	.23	-.12	-.09	-.17	-.13	.11	.00	.01	.06	-.09	-.03	.02	-.06	.01	-.01	.07	-
<i>Descriptive Statistics</i>																				
Mean	.14	.15	.16	.16	.09	.11	.12	.11	.402	3.93	3.95	3.90	1.88	1.83	1.78	1.74	.20	.20	.21	.22
SD	.12	.12	.12	.12	.09	.10	.10	.11	.79	.84	.84	.88	1.02	1.00	.94	.91	.08	.08	.08	.13
Missing (%)	20	22	17	23	20	22	17	23	10	18	28	30	9	18	28	30	20	22	23	23

Note. TSR is teacher-rated teacher-student relationship quality at individual level. ClassTSRsup is classroom level normative teacher support. Number at the end of each variable indicates the year period when the variable was measured. The correlations are bivariate correlations based on listwise deletion. Underscored correlations are significant at $p < .05$.

Table 2

TNRI Warmth and Conflict Model Fit Indices of Measurement Invariance Tests

Model	Panel A: TNRI Warmth				Panel B: TNRI Conflict			
	$\chi^2(df)$	Compare	$\chi^2(df)$	<i>p</i>	RMSEA	Compare	$\chi^2(df)$	<i>p</i>
(A) Invariance Across Time (Years 1 to 4)								
Configural	2045.56(1171)		0.032	419.55(198)		0.039		
Metric	2131.29(1207)	Configural	85.734(36)	< 0.001	0.032	462.95(213)	Configural	43.40(15) < 0.001
Scalar	2229.69(1246)	Metric	98.401(39)	< 0.001	0.033	568.86(231)	Metric	105.90(18) < 0.001
(B) Invariance Across Students' Gender								
Year 1								
Configural	349.81(118)		0.077	35.54(12)		0.076		
Metric	370.36(130)	Configural	20.55(12)	0.06	0.075	39.48(17)	Configural	3.94(5) 0.56
Scalar	376.61(142)	Metric	6.24(12)	0.90	0.071	47.37(22)	Metric	7.89(5) 0.16
Year 2								
Configural	325.29(118)		0.078	25.15(12)		0.060		
Metric	342.47(130)	Configural	17.18(12)	0.14	0.075	29.96(17)	Configural	4.82(5) 0.44
Scalar	365.22(142)	Metric	22.74(12)	0.03	0.074	43.08(22)	Metric	13.11(5) 0.02
Year 3								
Configural	248.28(118)		0.064	21.93(12)		0.055		
Metric	267.46(130)	Configural	19.18(12)	0.08	0.063	22.95(17)	Configural	1.02(5) 0.96
Scalar	285.39(142)	Metric	17.92(12)	0.12	0.061	31.38(22)	Metric	8.42(5) 0.13
Year 4								
Configural	314.85(118)		0.080	25.62(12)		0.066		
Metric	334.45(130)	Configural	19.59(12)	0.08	0.078	32.62(17)	Configural	6.99(5) 0.22
Scalar	355.31(142)	Metric	20.86(12)	0.05	0.076	43.32(22)	Metric	10.70(5) 0.06

Note. RMSEA is root-mean-square error of approximation. Following the sequence of tests of measurement invariance (Meredith, 1993; Millsap & Cham, 2012), we tested configural, metric, and scalar invariance models using χ^2 difference test (at $\alpha = 0.05$) and the examination of significant differences of the RMSEA (change > 0.015 ; Chen, 2007) between the two nested invariance models.

Table 3

Average Parameter Estimates for Between- and Within-Child Effect of TSR and Between Classroom Effect on Peer Liking and Disliking across Year 1 to 4 from 20 Imputed Data using Cross-Classified Modeling

Parameter	Panel A: Peer Liking				Panel B: Peer Disliking				
	TSR Warmth		TSR Conflict		TSR Warmth		TSR Conflict		
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	
Between-Child Effect									
<i>Intercept</i>									
Intercept (β_{00})	0.134	0.006	<.0001	0.136	0.006	<.0001	0.098	0.005	<.0001
Average TSR (β_{01})	0.031	0.007	<.0001	-0.019	0.006	0.002	-0.031	0.006	<.0001
Gender_Male (β_{01})	0.018	0.006	0.002	0.017	0.006	0.003	-0.006	0.005	0.137
SES1 (β_{03})	0.007	0.003	0.046	0.007	0.003	0.037	-0.011	0.003	<.0001
Achievement1 (β_{04})	0.017	0.005	0.000	0.020	0.005	<.0001	-0.007	0.004	0.012
Externalizing1 (β_{05})	-0.015	0.004	0.000	-0.015	0.005	0.001	0.026	0.003	<.0001
<i>Slope</i>									
Time (β_{10})	0.010	0.002	<.0001	0.010	0.002	<.0001	0.006	0.002	0.002
Average TSR (β_{11})	0.003	0.003	0.387	0.000	0.002	0.854	-0.003	0.003	0.240
Within-Child Effect									
Change in TSR (β_{20})	0.007	0.004	0.075	0.000	0.004	0.984	-0.013	0.003	<.0001
Between-Classroom Effect									
ClassroomTSR(β_{06})	0.015	0.003	<.0001	0.016	0.003	<.0001	-0.002	0.002	0.317
Random Effect									
u_{0i} (τ_{00})		Estimate	%	Estimate	%	Estimate	%	Estimate	%
		0.0025	21%	0.0027	22%	0.0013	16%	0.0014	16%
u_{1i} (τ_{11})		0.0002	1%	0.0002	1%	0.0001	2%	0.0002	2%
v_{0c} (τ_{22})		0.0023	19%	0.0022	18%	0.0015	18%	0.0015	17%
Residual (σ^2)		0.0069	59%	0.0069	58%	0.0055	65%	0.0056	65%

Note. TSR is teacher-rated teacher-student relationship quality. Intercept is the initial average level of outcome. Slope is the rate of growth or decline in outcome across year 1 to 4. SES1 is a children's mean score based on highest parent education level and free or reduced lunch status at year 1. Achievement1 is scores on test of literacy skills at year 1. Externalizing1 is level of conduct problems at year 1. Classroom TSR is a classroom normative teacher support. For random effect, τ_{00} and τ_{11} is the variation in intercept and slope among students. For random effect, τ_{00} , τ_{11} , τ_{22} , and e_{ij} capture the variation in between-child intercept, between-child slope, the variation in within-child, and the variation in between-classroom effect.