Published in final edited form as:
Elem Sch J. 2011 September ; 112(1): 38–60. doi:10.1086/660686.

Longitudinal Effects of Teacher and Student Perceptions of Teacher-Student Relationship Qualities on Academic Adjustment

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Abstract

The shared and unique effects of teacher and student reports of teacher student relationship quality (TSRQ) in second and third grade on academic self views, behavioral engagement, and achievement the following year were investigated in a sample of 714 academically at-risk students. Teacher and student reports of teacher-student support and conflict showed low correspondence. As a block, teacher and student reports of TSRQ predicted all outcomes, above prior performance on that outcome and background variables. Student reports uniquely predicted school belonging, perceived academic competence, and math achievement. Teacher reports uniquely predicted behavioral engagement and child perceived academic competence. Teacher and student reports of the teacher-student relationship assess largely different constructs that predict different outcomes. Implications of findings for practice and research are discussed.

Longitudinal Effects of Teacher and Student Perceptions of Teacher-Student Relationship Qualities on Engagement and Achievement

An extensive body of research documents the developmental benefits of relationships with teachers that are characterized by high levels of support and low levels of conflict. Longitudinal studies find that a positive relationship with one's teacher predicts improvements in children's cooperative and effortful engagement in the classroom (Hughes, Cavell, & Jackson, 1999; Meehan, Hughes, & Cavell, 2003; Skinner, Zimmer-Gembeck, & Connell, 1998), peer acceptance (Hughes, Cavell, & Willson, 2001; Hughes & Kwok, 2006), and academic achievement (Hamre & Pianta, 2001; Hughes, Luo, Kwok, & Loyd, 2008). Conversely, students whose relationships with teachers are characterized by conflict are more likely to be retained in grade, to experience peer rejection, and to increase externalizing behaviors (Ladd, Birch, & Buhs, 1999; Pianta, Steinberg, & Rollins, 1995; Silver, Measelle, Armstrong, & Essex, 2005). The benefits of a supportive, low-conflict relationship with one's teacher are important from the earliest school years (Howes, Hamilton, & Matheson, 1994; Ladd et al., 1999) through adolescence (Ryan, Stiller, & Lynch, 1994; Wentzel, 1998). Importantly, teacher student relationships in the early grades predict long-term achievement, controlling for relevant child characteristics (Hamre & Pianta, 2001; O'Connor & McCartney, 2007).

Theoretical processes responsible for effects of teacher-student relationship

Researchers have drawn from multiple theories in postulating processes that explain an effect of TSRQ on children's academic motivation and achievement. Researchers drawing from attachment theory (Bowlby, 1980) assert that a warm and supportive teacher-student relationship may provide a child with a sense of felt security that promotes the child's free and active participation in classroom learning activities (Howes et al., 1994; Pianta, 1999). Consistent with such theorizing, among elementary children, felt emotional security with

one's teacher attenuates children's stress reactivity to negative teacher and peer events in the classroom (Little & Koback, 2003). Social motivation theorists (Connell & Wellborn, 1991; Furrer & Skinner, 2003) posit that children who experience social support from teachers will construct a positive sense of school membership and academic self concept that will promote greater effort and persistence as well as commitment to school rules and norms. In a short-term longitudinal study of children in grades 3–5, students' perceptions of teacher support predicted their liking for school and buffered children with externalizing problems from becoming disaffected with school (Gest, Domitrovich, & Welsh, 2005). In a three-year longitudinal study, an effect of teacher-reported TSRQ in first grade on academic achievement in third grade was mediated by students' engagement in the classroom in second grade (Hughes et al., 2008). Finally, pedagogical theory (Noddings, 1992) postulates that a close teacher-student relationship enables the teacher to provide more responsive and sensitive instruction. Consistent with this reasoning, teachers who are adept at creating a positive social-emotional climate provide more responsive instruction and better-organized classrooms (Hamre & Pianta, 2005; Mashburn et al., 2008; Urdan & Schoenfelder, 2006). Thus, multiple processes may explain the beneficial effects of TSRQ on students' school engagement and achievement.

Source of report on teacher-student relationship

The majority of research on TSRQ in the preschool and elementary grades has utilized teachers' reports of the relationship (Birch & Ladd, 1997, 1998; Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Hughes & Kwok, 2007; Pianta, & Howes, 2002; Meehan et al., 2003; Pianta et al., 1995; Saft & Pianta, 2001). After grade 3, student reports are more common (Murray & Greenberg, 2006; Ryan et al., 1994; Wentzel, 1998). The greater reliance on teacher reports of the relationship below age 8–10, relative to child reports, may be due to researchers' concerns regarding the reliability and validity of younger students' reports of the quality of their social relationships. The self-concepts of children younger than 8 years of age tend to be more global, or unidimensional, and reflect a positive rating bias, relative to more objective indices (Marsh, Craven, & Debus, 1991; Wigfield et al., 1997). By around third grade, children's reports of competence in different areas, including social competence, are more closely aligned with objective indices of competence (Cole et al., 2001; Wigfield et al., 1997). This shift to more realistic self-appraisals is presumably due to children's increasing ability to use social comparison cues in evaluating their competence (Kuklinski & Weinstein, 2001).

Teacher report of TSRQ—In developing teacher report measures of TSRQ, researchers have drawn from attachment theory (Pianta, 1999), social support theory (Hughes & Kwok, 2007) and self system models of motivation (Furrer & Skinner, 2003). Despite the diversity of theoretical frameworks, teacher report measures of TSRQ consistently identify a supportive dimension (i.e., close, warm, accepting) and a conflict dimension (Hughes & Kwok, 2007; Murray, Murray, & Waas, 2008; Pianta, 1992), with some measures identifying a third dimension of dependency (Pianta & Stuhlman, 2004) or intimacy (Hughes & Kwok, 2007). The dependency and intimacy dimensions are not consistently predictive of child outcomes (Hughes & Villarreal, 2008; Pianta et al., 1995).

Teacher reports of relationship conflict and support are moderately negatively correlated (Hughes et al., 2008; Silver et al., 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 social competence and interest in school (Birch & Ladd, 1998; Hamre & Pianta, 2001; Murray et al., 2008; Palermo, Hanish, Martin, Fabes, & Reiser, 2007; Rey, Smith, Yoon, Somers, & Barnett, 2007). Additionally, teacher ratings of conflict are more stable across raters and

years than are teacher ratings of support or closeness (Hughes et al., 1999; Hughes et al., 2008; Gest et al., 2005; Pianta et al., 1995; Pianta & Stuhlman, 2004), suggesting that teacher perceptions of relationship conflict may be largely a reaction to children's behavioral challenges (Hughes et al., 2008; Silver et al., 2005). Correlations between observers' reports of conflict and support and teachers' reports of conflict and support provide evidence of the convergent and discriminant validity of teacher reports (Doumen, Verschueren, Koomen, and Buyse, 2008).

Student reports of TSRQ—Most child report measures of the teacher-student relationship have been based on conceptualization of social support as information indicating to the individual that he or she is valued and esteemed by others (Cobb, 1976; Weiss, 1974). Child measures of social support often assess different dimensions of support, including emotional support, instrumental support, and conflict (Dubow & Ullman, 1989; Furman & Buhrmester, 1985). Children in grades K-3 provide reliable reports of social support and distinguish between different provisions of support provided by different individuals (Buhrmester & Furman, 1987; Dubow & Tisak, 1989; Dubow, Tisak, Causey, Hryshko, 1991). Primary grade children's reports of social support are positively associated with child-reported well-being as well as others' reports of adjustment and objective measures of academic achievement (Dubow & Tisak, 1989).

Research on students' perceptions of the provision of support and conflict in relationships with their teachers is of specific relevance to the current study. Below grade 4, children's reports of social support and acceptance from their teachers show non-significant or significant but modest correspondence with teacher reports of support or closeness (Hughes et al., 1999; Mantzicopoulos & Neuharth-Pritchett, 2003; Murray et al., 2008). However, children and teachers show low to moderate agreement on the level of conflict in the relationship (Henriccson & Rydell, 2004), and child reports of conflict, but not support, are associated concurrently with teacher reports of externalizing behavior and academic achievement (Henricsson & Rydell, 2004; Mantzicopoulos, 2005; Mantzicopoulos & Neuharth-Pritchett, 2003). Not surprisingly, child reports of teacher-student support are more consistently associated with child-reports of adjustment than they are with indices of adjustment provided by other sources (Furrer & Skinner, 2003; Murray et al., 2008). Few studies have examined the prospective relationship between child perceptions of the teacher-student relationship and adjustment. In a sample of students in grades 3 to 5, a composite child report measure of social support from family, peers, and teachers predicted changes in teachers' ratings of students' social competence and students' grades (Dubow et al., 1991). In a sample of behaviorally at-risk second and third graders, child report of teacher support predicted lower levels of teacher-rated and peer-rated aggression over the next two years (Hughes et al., 1999).

Concordance between student and teacher reports of TSRQ

As noted above, studies that employ both teacher and student reports of TSRQ have generally found low correspondence across raters, especially in the elementary grades (Murray, et al., 2008; Rey et al., 2007). The low congruence across raters raises the question of whether student and teacher reports assess the same constructs and have similar effects on adjustment. In a concurrent study conducted with the same longitudinal sample when they were in grades 2 or 3, confirmatory factor analysis formally assessed source and trait effects of teacher, child, and peer ratings of TSRQ (Li, Hughes, Hsu, & Kwok, 2009). Specifically, the convergent and divergent validities of three sources (i.e., teacher, child, and peers) reporting on two traits (teacher student relationship support and child conduct problems) were assessed. Teachers and children reported on warmth using parallel version of the Network of Relationships Inventory (Furman & Buhrmester, 1985). Child conduct problems

were selected as the second trait, instead of teacher-student conflict. This decision was necessary because schools expressed concern with including a teacher-student conflict item in the peer assessment. However, teacher reports of teacher student conflict and child conduct problems demonstrate low distinctiveness (Palermo et al., 2007; Silver et al., 2005), as is the case for peer nominations (Doumen, Verschueren, Buyse, Germeijs, Luyckx, & Soenens, 2008). Results of the CFA found that peer reports accounted for the largest proportion of trait variance and non-significant method variance. Teacher reports accounted for a large proportion of trait variance and moderate method variance. Child reports accounted for the smallest proportion of trait variance and the largest method variance. The authors concluded that child and teacher reports of teacher-student support assess largely different constructs. Having established that teacher and child reports of TSRQ share little trait variance, the current study investigates whether child reports predict changes in children's academic adjustment.

Developmental significance of student report of TSRQ

Drawing from attachment theory, it is postulated that teachers and students construct mental representations of the relationship that guide their behavior and feelings in the relationship and interpretation of relationship events (Howes, Hamilton, & Matheson, 1994; Pianta, Hamre, & Stuhlman, 2003). These mental representations reflect each participant's own early care-giving experiences, prior experiences with similar partners (e.g., past relationships with other students or teachers), interactive behaviors and communication between the relational partners, and the broader context in which these interactive behaviors occur (Pianta et al., 2003). Whereas these models contribute to the stability in relationships formed with new partners, they are open to revision based new experiences (Cassidy, Kirsch, Scolton, & Parke, 1996; Richters & Waters, 1991).

Sarason, Pierce, and Sarason (1990) described mental representations of relationships as "individual characteristics that contribute to perceptions of social support *separate from what the environment actually offers* (italics added) at any particular time (p. 110)." According to this view, "perceptions of support tap both relationship-specific appraisals and relatively stable perceptions that others care for and value us" (Brock, Sarason, Sanghvi, & Gurung, 1998, p. 6). Perceptions of the relationship are "both reality-reflecting and reality-creating-not only for the individual himself or herself, but for relationship partners as well" (Bretherton and Munholland, 1999, p. 107). This reasoning has two important corollaries. First, teacher and child perceptions of the relationship are expected to differ, since their perceptions reflect their individual mental representations and other characteristics. Second, the student's perception of the teacher as accepting, trustworthy, and available, whether congruent with other sources of information on the relationship or not, might motivate the child to seek the teacher's assistance, rely on the teacher as a source of felt security, and seek to please the teacher.

Empirical studies support the view that student perceptions of support are developmentally consequential (Dubois & Tisak, 1989). Adolescents' perceptions of social support predict improvement in psychosocial adjustment, even when these perceptions are not consistent with more objective data (Kessler & McLeod, 1985; McElhaney, Antonishak, & Allen, 2008). These findings have led researchers to conclude that perceived support may be as important to students' adjustment as enacted support (Murray et al., 2008). Studies with elementary students report positive concurrent associations between students' perceptions of teacher support and their sense of attachment to, liking for, and involvement in school (Gest et al., 2005; Murray et al., 2008; Rey et al., 2007;). Although research on the effect of perceptions of teacher support on academic self efficacy is lacking, prospective studies document that elementary students' perceptions of positive peer relationships at school

predict improved perceptions of academic competence (Flook, Repetti, & Ullman, 2005; Guay, Boivin, & Hodges, 1999).

An extensive body of research emanating from social cognitive theory (Bandura, 1986) indicates that children do better and are more motivated to seek challenging tasks and to persistent in the face of challenges when they believe that they are capable of accomplishing these tasks (for reviews see Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Denissen, Zarrett, & Eccles, 2007; Pajares, 1996). Importantly, associations between perceptions of competence and teacher-rated engagement are evident in students as young as first grade (Hughes & Zhang, 2007; Valeski & Stipek, 2001). Empirical research also reports prospective associations between students' sense of positive social relatedness at school and academic engagement and achievement (Anderman, 1999; Furrer & Skinner, 2003).

Study purpose and hypotheses

The primary purpose of the current study is to prospectively investigate the contributions of teacher and student perceptions of teacher student relationship support and conflict to student academic self views, behavioral engagement, and achievement, above prior levels of these outcomes. Ours is the first study to prospectively investigate the effect of elementary students' perceptions of TSRQ on academically relevant outcomes. Based on the premise that teacher and student reports assess substantially different constructs, we expect each makes non-redundant contributions to outcomes. Consistent with previous research reporting that student but not teacher perceptions of the relationship are associated with student self-views, we expect only student perceptions of the relationship will predict changes in student sense of belonging and perceived academic competence. We expect teacher and student perceptions of the relationship will make non-redundant contributions to the prediction of behavioral engagement and academic achievement.

Academically-at risk sample—We pursue these purposes within a racially and ethnically diverse sample of academically at-risk third graders. Participants were selected into the larger longitudinal study on the basis of scoring below their school district's median score on a test of literacy at entrance to first grade (see participant section). Children who enter school with relatively low levels of academic readiness skills are at risk for continued academic underachievement and academic failure (Alexander, Entwisle, & Horsey, 1997; Finn, 1989). Minority and low income children are more likely to enter first grade with lower levels of academic readiness skills, relative to other children (Evans, 2004; Stipek, 1997). Furthermore, many of these children continue along low performance pathways throughout their school careers (National Center for Education Statistics, 2007). The quality of at-risk students' relationships with teachers may play a role in deflecting at-risk students from negative outcomes. Consistent with this view, positive teacher-student relationships appears to buffer students at-risk for school failure due to a number of risk factors including racial/ethnic minority status or low parental education (Burchinal et al., 2002; Hamre & Pianta, 2005; Meehan et al., 2003), less optimal home environments (Burchinal et al., 2002; Copeland-Mitchell, Denham, & DeMulder, 1997; Hughes et al., 1999), and poorer self-control (Brody, Dorsey, Forehand, & Armistead, 2002; Buyse, Verschueren, Douman, Van Damme, & Maes, 2008; Liew, Chen, & Hughes, 2010; Silver et al., 2005). Thus, the current sample represents a population of considerable concern to educators interested in narrowing ethnic/racial and income achievement gaps and preventing school failure.

Past research has documented associations between family background and cognitive variables and measures of teacher student relationship quality (Hughes & Kwok, 2007; Saft & Pianta, 2001). These same variables often predict school adjustment outcomes. Therefore we examine the associations between these variables and both measures of TSRQ and

measures of adjustment to determine if these variables should be included as covariates in the analyses. Because 24% of students in this longitudinal sample had been retained in grade, we also included retention status as a covariate.

Methods

Participants

Participants were drawn from a larger sample of 784 children participating in a longitudinal study examining the impact of grade retention on academic achievement. Participants for the longitudinal study were recruited from three school districts in Texas (one urban and two small city) across two sequential cohorts in first-grade during the fall of 2001 and 2002. Children were eligible to participate in the larger longitudinal study if they scored below the median score for their school district on a state approved, district-administered measure of literacy, spoke either English or Spanish, were not receiving special education services other than speech and language, and had not been previously retained in first grade. Details on recruitment of the 784 participants are reported in Hughes and Kwok, 2006). No evidence of selective consent for participation in the larger longitudinal study was found.

Of the 784 recruited children, 714 (91%) met the following criteria for the current study: were active at Year 4, enrolled in public school within 200 miles of one of the recruitment schools, and had data on at least one study variable. Measures of TSRQ were collected in Years 3 and 4 and outcomes were assessed in Years 2 and 4 (table 1). At Year 3, these students were located in 47 schools in 319 classrooms (range = 1–12; Mean = 2.24; SD = 1.66). Due to some students being retained in grade between years 1 and 3, 479 (76%) were in grade 3 and 149 (24%) were in grade 2 (i.e., had been retained in grade once). No evidence of selective attrition was found, based on a large number of demographic and school adjustment variables measured in first grade.

Of these 714 participants, 379 (53%) were male, and the racial/ethnic composition was 34% White, 38% Hispanic, 23% African American, and 5% Other. At entrance to first grade, children's mean age was 6.58 (SD = .39) years. Children's mean score for intelligence at entrance to first grade, as measured with the Universal Nonverbal Intelligence Test (Bracken & McCallum, 1998) was 92.92 (SD = 14.51). Based on family income, 66% of participants were eligible for free or reduced lunch in Year 1. For 34.8%, the highest educational level in the household was a high school certificate or less. The 319 Year 3 teachers were overwhelmingly female (95%) and Caucasian (82% Caucasian; 14% Hispanic, 2% African American, and 2% Other) and had taught for an average of 4.05 years (SD = 1.74).

Not all participants had complete data. The overall level of missingness for all study variables was 14.8%. All participants had complete demographic variables. Level of missingness for study variables ranged from 6% for Year 3 child report variables to 29% for Year 4 teacher-rated variables. Because attrition analyses were consistent with the assumption that data were missing at random, to address the missingness, we analyzed the model using the full information maximum likelihood (FIML) method under Mplus (Mùthen and Mùthen, 2008) which applies the expectation maximization algorithm.

Assessment Overview

Each year data were collected from teachers (questionnaires) and children (interviews and standardized achievement testing). Teachers received compensation for completing and returning questionnaires, which were administered in the Spring. Research staff individually administered tests of reading and math achievement and interviewed students during each academic year. Students responded orally to interview questions. If children or their parents spoke any Spanish, students were individually administered the Woodcock-Munoz

Language Test (Woodcock & Munoz-Sandoval, 1993) by bilingual (English/Spanish) examiners to determine the child's language proficiency in English and Spanish. All measures were administered in the language in which the student demonstrated greater language proficiency. If the student demonstrated equal or greater language proficiency in English for three consecutive years, subsequent tests were administered in English. Child assessments occurred between October and May of each year with the stipulation that at least 8 months separated each annual child assessments. Bilingual staff administered these interviews to students enrolled in bilingual classes.

Measures

Child ratings of teacher-student relationship—The Network of Relationships Inventory (NRI; Furman and Buhrmester, 1985) is a structured interview that asks children to rate persons in their social network with respect to six types of social support (affection, admiration, intimacy, satisfaction, nurturance, and reliable alliance) and conflict. It is based on Robert Weiss's (1974) theory of the provision of social support. Children were asked to indicate on a 5-point Likert-type scale their level of support (16 items) or conflict (6 items) in their relationships with their teacher. An exploratory factor analysis on a randomly selected half (392) of third-grade participants from the two cohorts of the larger study suggested three factors: Warmth (10 items), Intimacy (6 items), and Conflict (6 items). Results of confirmatory factor analysis on the other half of participants found that the three-factor model provided an adequate fit for the data, $\chi^2(202) = 306.552$, $p < .001$, comparative fit index (CFI) = .949, root-mean-square error of approximation (RMSEA) = .040, standardized root mean square residual (SRMR) = .057. Composite scores were created for each latent factor: alphas for Warmth, Intimacy, and Conflict were .87, .80, and .79, respectively. Example Warmth items include "How much does your teacher like or love you?", "How satisfied are you with your relationship with your teacher?" and "How much does your teacher treat you like you're admired and respected?" Example Intimacy items include "How much do you talk to your teacher about things that you don't want others to know?" Example Conflict items include "How much does this teacher punish you?" and "How much do you and your teacher disagree and quarrel?" The Warmth scale was selected as the measure of relationship support, as it best captures teacher provision of social support and is more consistently related to measures of child adjustment than is the Intimacy scale (Hughes & Villarreal, 2008). Only the Warmth and Conflict scales were used for the current study.

Teacher ratings of teacher-student relationship—The 22 items on the child version of the NRI were modified so that teachers report on a 5-point scale their provision of the same six types of social support and conflict in their relationships with individual students. Exploratory and confirmatory factor analysis (Hughes et al., 2008) identified three factors: Warmth (13 items), Intimacy (3 items) and Conflict (6 items). Composite scores were created for each latent factor. Internal consistencies for the current sample were .96 (Warmth), .86 (Intimacy), and .91 (Conflict). Example Warmth Scale items include "I enjoy being with this child"; This child gives me many opportunities to praise him or her"; "I find I am able to nurture this child". An example Intimacy items is "This child talks to me about things he/she doesn't want others to know." Example Conflict items are "This child and I often argue or get upset with each other" and "I often need to discipline this child." Only the Warmth and Conflict scales were used for the current study. The teacher report NRI has demonstrated good predictive validity (Meehan, et al., 2003; Hughes & Kwok, 2006; 2007).

Teacher-rated behavioral engagement—Teachers rated students' classroom engagement with an 11-item questionnaire. Items were adapted from both the teacher and the student ratings of students' engagement (Connell & Wellborn, 1991; Skinner et al.,

1998). Items assess effort, persistence, concentration, and interest. Example items include: Tries hard to do well in school, concentrates on doing work, tries to look busy (reverse scored), and participates in class discussion. Teachers were asked to indicate the extent to which each statement was true of their student on a 1 (Not true at all) to 4 (Very true) scale. These 11 items demonstrate good factorial validity (Chen, Hughes, Liew, and Kwok, 2009) and internal consistency (alpha = .93 for the current sample).

School Belonging—Study participants completed the Psychological Sense of School Membership Scale (Goodenow, 1993) by indicating their agreement on a 5-point Likert-type scale to 18 items that assess students' perceived acceptance, feelings of inclusion, respect, and encouragement for participation. Higher school membership scores are associated with greater school attendance, higher grades, more positive self-concept, greater time spent on homework, and better social-emotional adjustment (Goodenow, 1993; Hagborg, 1998). The alpha for the current sample was .85.

Child-rated academic self efficacy—Children's perceived reading and math competencies were assessed with the Competence Beliefs and Subjective Task Values Questionnaire (Wigfield et al., 1997). The math and reading scales consist of 5 items each. Specifically children were asked how good they were at in that domain, how good they were relative to the other things they do, how good they were relative to other children, how well they expected to do in the future in that domain, and how good they thought they would be at learning something new in that domain. We followed Eccles, Wigfield, Harold, and Blumenfeld's (1993) recommendation to provide graphic representation of the response scale for younger children. Specifically, children were asked respond by pointing on a thermometer numbered 0 to 30. The end point and midpoint of each scale were also labeled with a verbal descriptor of the meaning of that scale point (e.g., the number 1 was labeled with the words "not at all good," or "one of the worst) the number 15 was labeled with the words "ok," and the number 30 would be labeled with the words "very good" or "one of the best"). Scores on the reading and math competence are associated in expected directions with students' actual achievement, demographic variables, and student attitudes toward achievement (Wigfield et al.). The internal consistency for the Reading and Math scales were .82 and .83, respectively, for our sample.

Academic achievement—The WJ-III Tests of Achievement (Woodcock, McGrew, & Mather, 2001) is an individually administered measure of academic achievement for individuals 2 years of age to adulthood. The WJ-III Broad Reading W Scores (letter-word identification, reading fluency, passage comprehension subtests) and the WJ-III Broad Math W Scores (calculations, math fluency, and math calculation skills subtests) were used. Because W scores are based on the Rasch measurement model, yielding an equal interval scale, they are well-suited for the analysis of longitudinal change. Research has demonstrated the reliability and construct validity of scores on the WJ-III and its predecessor (Woodcock & Johnson, 1989; Woodcock et al., 2001).

The Batería Woodcock-Muñoz: Pruebas de aprovechamiento – Revisada (Woodcock & Muñoz-Sandoval, 1996) is the comparable Spanish version of the Woodcock-Johnson Tests of Achievement—Revised (WJ-R; Woodcock & Johnson, 1989), the precursor of the WJ-III. If children or their parents spoke any Spanish, children were administered the Woodcock-Munoz Language Test (Woodcock & Munoz-Sandoval, 1993) to determine the child's language proficiency in English and Spanish and selection of either the WJ-III or the Bateria-R. The Woodcock Compuscore (Woodcock & Munoz-Sandoval, 2001) program yields scores for the Bateria-R that are comparable to scores on the WJ-R. The Broad Reading and Broad Mathematics W Scores were used in this study.

Child IQ, Familial Economic Background, and Year 2 Baseline Scores

Information about children's IQ, familial economic adversity, and Year 1 baseline scores were collected as factors that might be associated with the other variables in the study. Each measure is described below.

Cognitive ability (IQ)—Children were individually tested at school at 1st grade with the Universal Nonverbal Intelligence Test (UNIT; Bracken & McCallum, 1998). The UNIT is a nationally standardized non-verbal measurement of the general intelligence and cognitive abilities of children and adolescents. The UNIT assesses general intelligence by measuring complex memory and reasoning abilities using culturally and linguistically universal hand and body gestures rather than receptive or expressive language. We used the Abbreviated version of the UNIT that yields a full scale IQ which is highly correlated with scores obtained with the full battery (r=.91) and has demonstrated good test-retest and internal consistency reliabilities as well as construct validity (Hooper, 2003; Bracken & McCallum, 1998).

Economic adversity and retention status—Children's eligibility for free or reduced lunch at 1st grade was used as an indicator of children's economic adversity (coded as a dichotomous variable). Information on eligibility was provided by school records and based on children's family income. Each year the schools provided information on students' grade placement.

Baseline score measures—Year 2 baseline scores for academic self-efficacy, school belonging, behavioral engagement, and achievement were obtained using the same or a developmentally appropriate and comparable measure as those used for Year 4. Academic self-efficacy was assessed with the Scholastic Competence Scale of the Pictorial scale of Perceived Competence and Social Acceptance for Young Children (Harter & Pike, 1981, 1984). Classroom engagement was assessed with a 10-item teacher-report scale (alpha = . 95.) that has been equated to the Year 4 measure of teacher-rated engagement and that has good evidence of predictive validity (Hughes et al., 2008). School belonging was assessed in individual interviews in which children are asked to indicate how they feel in response to four questions about how much they like school (e.g., "How much do you like to go to school?") and feel supported by their teacher (e.g., "How much does your teacher say nice things to you?") by pointing to one of 5 circles graduated in size and representing from "a little bit" (1) to "a lot" (5). An additional item asks children to indicate how they feel when at school by pointing to one of five faces ranging from "sad all the time" to "happy all the time." The internal consistency of the 5 items for our sample was .61. Achievement was assessed with the same measure as used at Year 4.

Results

Descriptive and correlational analyses

All study variables were analyzed for outliers and for distributional properties. Using West and Finch (1997) criteria, no outliers were identified and values for skewness and kurtosis for all variables were within the acceptable limits for the planned analyses.

Predictor variables—Table 2 reports means and standard deviations for predictor variables and their inter-correlations. Dummy variables were created for Gender (0= female; 1 = male), economic adversity (0= not adversity; 1 = adversity) and retention status (0 = never retained; 1 = retained). On average, teachers and children report relatively high levels of warmth (3.94 and 3.60, respectively) and low levels of conflict (1.79 and 1.77, respectively). Gender, economic adversity, IQ, and retention status were correlated in the

expected direction for measures of TSRQ and for measures of outcomes. Based on these results, these variables were entered as covariates in the regression analyses reported below.

Concordance among raters—The inter-correlations between teacher and child reports of the teacher-student relationship in year 3 are contained in the upper left quadrant of Table 2. Examining within-source relations, teachers' reports of support and conflict are moderately and negatively correlated (r = −.56). Children's reports of support are only modestly related to child reports of conflict (−.14). Teachers' and children's ratings of support are not statistically significantly related. However, teachers' and children's ratings of conflict are moderately and positively correlated (.43), and children's ratings of conflict are modestly and negatively related to teachers' ratings of support (−.25). Teachers and children agree only on the level of conflict in their relationship, and children who perceive conflict in the relationship are perceived by teachers as lower in relationship support.

Year 4 adjustment measures—Table 3 reports means and standard deviations for Year 4 adjustment variables and their inter-correlations. Generally, correlations are in the expected direction. Children's academic self efficacy for reading is modestly correlated with reading achievement (.28) and, to a lesser extent, with math achievement (.09). Children's academic self efficacy for math is significantly correlated with math achievement but not reading achievement. These results support the construct validity of the measure of academic self efficacy.

Bivariate correlations between relationship variables and year 4 outcomes—The second column of table 4 reports the bivariate, or zero-order correlations, between the predictors and outcomes in the regression analyses. All statistically significant bivariate correlations between measures of the relationship and adjustment are in the expected direction (table 4, model 2). Teacher reports of support and conflict in Year 3 predict teacher-rated engagement as well as reading and math achievement. Additionally teacher support is positively associated with math self efficacy and sense of school belonging, and teacher reported conflict is negatively associated with sense of belonging. Child reports of support are only predictive of other child reports; however, child reports of conflict are predictive of reading and math achievement, as well as belonging and teacher-rated engagement.

Regression Analyses

To account for the dependency among the observations (students) within clusters (classrooms), analyses were conducted using the complex analysis feature in Mplus (v.5.0, Muthén & Muthén, 2008), which accounts for the nested structure of the data by adjusting the standard errors of the estimated coefficients. Year 4 classroom was the cluster variable. There were 385 classrooms (students per classroom ranged from 1–9; M = 1.85, SD = 1.39).

Five separate hierarchical multiple regression analyses investigated the effects of teacher and student reports of relationship support and conflict in Year 3 on each of the five Year 4 outcome measures. In each analysis the Year 2 measure of the outcome, sex, IQ, economic adversity status, and retention status were entered in Model 1. Teacher and student perceived TSRQ scores were entered in Model 2. To determine if the associations between TSRQ variables and adjustment were similar for girls and boys, interaction terms were created for sex and each measure of relationship quality as described by Aiken and West (1991). Because no interaction term was statistically significant, they were dropped from the analyses. Results of regression analyses are reported in tables 4–5.

Child reported psychological engagement (Table 4)—Above baseline performance and child background variables, as a block, measures of TSRQ account for a statistically significant increment in R_{sq}. The relationship measures account for between 3.2% and 7.4% additional variance in year 4 outcomes. For school belonging, only child reports made a unique (nonshared) contribution, whereas both teacher and child reports made unique contributions to math and reading self efficacy. However, the effect for teacher report of conflict was in the opposite direction expected for reading self efficacy. An examination of the bivariate correlations among the predictors and between the predictors and reading self efficacy suggests that this unexpected effect is due to comorbidity among the predictors (Tzelgov & Henik, 1991). Child reports of both support and conflict contributed to school belonging, whereas only child reports of support uniquely predicted math and reading self efficacy.

Behavioral Engagement (Table 5)—As a block, measures of TSRQ account for a statistically significant increment in explained variance in Year 4 behavioral engagement, above baseline performance and demographic covariates ($R^{sq}_{change} = .056$ $p < .001$). Only teacher reports of support and conflict made unique contribution to changes in teacher-rated engagement.

Math and Reading Achievement (Table 5)—As a block, measures of TSRQ predicted both reading achievement ($R^{sq}_{change} = .011$, $p < .05$), and math achievement $R^{sq}_{change} = .008$, $p < .05$), above baseline performance and covariates. No source of report uniquely predicted reading achievement; only child report of conflict uniquely predicted math achievement ($\beta = -.59$, $p = .06$; 1 tail $p = .03$).

Discussion

This is the first longitudinal study to examine the shared and unique contributions of teacher and student perceptions of TSRQ to student psychological and behavioral engagement and achievement. We were specifically interested in the combined and unique effects of teacher and child perceptions of relational support and conflict on changes in outcomes. We were also interested in the distinctiveness of teacher and student reports of support and conflict.

Distinctiveness of teacher and student reported support and conflict

Teacher reports of relational support and conflict are more highly correlated with each other (i.e., show less independence) than are child reports of relational support and conflict. Students appear to organize their perceptions of teacher support and conflict differently than do teachers. These findings are consistent with those obtained with a sample of kindergarten teachers (Murray et al., 2008). It may be difficult for teachers to provide support to children who require high levels of teacher correction. Conversely, children's perceptions of relational support are less dependent on their perceptions of relational conflict. That is, children who perceive high levels of conflict in their relationships with teachers may also perceive the teacher as emotionally supportive and as liking the student. Because perceptions of the relationship reflect each individual's mental representations of relationships, differences in how perceptions are organized are not unexpected.

As reported in Li et al. (2009), teacher and students do not agree in perceptions of support but agree moderately in perceptions of relationship conflict. This finding is consistent with previous research finding stronger cross-rater agreement for conflict than for support (Doumen, Verschueren, Koomen, and Buyse, 2008). The greater consensus for conflict may be due to the fact that the conflict items refer to more easily observed interactions than is the case with the support items. Consistent with previous research (Henricsson & Rydell, 2004;

Murray et al., 2008), even though children's reports of teacher support are not correlated with teachers' reports of support, children's report of support are negatively correlated with teachers' ratings of conflict. When teachers report conflict in the relationship, children are more likely to perceive higher conflict and lower levels of support. Relative to perceptions of conflict, teacher and student perceptions of support may assess their internal models of relationships, shaped by their relationship histories, as well as specific interactions with a specific partner. Perhaps students who perceive the teacher as emotionally available respond to the teacher in ways that mitigate conflict.

Shared and Unique Effects

Measures of TSRQ resulted in statistically significant improvements in academic self views, behavioral engagement, and achievement. Effects were stronger for measures of self-views and engagement than for measures of achievement. The most likely explanation for the smaller effect on achievement is the strong stability of reading and math achievement after grade 3 (Miles & Stipek, 2006). In our study, prior performance accounted for 56% and 64% of the variance in year 4 math and reading, respectively. Although the effect of measures of TSRQ on achievement was small, we would argue that small effects may be developmentally consequential for several reasons. First, when one controls for a number of variables that work synergistically to influence development, as we did, effect sizes may underestimate the causal impact of a variable (National Institute of Child Health and Human Development EECRN, 2005). Second, in health research, small effects have often been the basis for formulation of public policies (Phillips, McCartney, & Scarr, 1987). Third, small changes in achievement might cascade into big effects on children's developmental trajectories, as happens frequently in nature, where small perturbations in one part of the system lead to large effects in other parts of the system (Gleick, 1987). Also, the effect of TSRQ on psychological engagement may have "sleeper" effects, showing up later in a student's school career. For example, students who have greater confidence in their math ability may be more likely to take more challenging math classes when they reach middle school, which may have a sizeable effect on their eventual math achievement. As is the case for peer rejection (Ladd & Troop-Gordon, 2003), effects of TSRQ may be cumulative such that chronic high conflict, relative to inconsistent conflict, may have a larger impact on achievement trajectories.

Of particular interest to the current study was the unique effect of child and teacher perceptions of the relationship, above prior performance and background variables. Child reports of TSRQ uniquely predicted changes in children's perceived academic competencies, sense of school belonging, and math achievement. Because extensive research documents an effect of children's academic competency beliefs on achievement trajectories (Bandura et al., 1996), these findings suggest that children's perceptions of support, whether congruent with others' reports or not, have implications for their academic adjustment. Children who perceive their teachers as offering warmth, acceptance, and self-esteem validation are more likely to perceive themselves as academically capable and as belonging to school. Presumably, such a positive school identity promotes commitment to school and motivated engagement in learning (Furrer & Skinner, 2003). One year may be too short a period of time for TSRQ to effect achievement via academic self views. Future research, with a minimum of three waves of data, is necessary to rigorously test such a meditational model (Cole & Maxwell, 2003).

The strongest effects of child reports of TSRQ were found for child self views (i.e., sense of belonging and perceived academic competence). Some of the shared variance between child perceptions of TSRQ and child self-views may be due to source effects (i.e., child reports on both). However, such a source effect, or reporting bias, would be expected to affect the

baseline measurement of academic self views, too. Thus it is unlikely that the effect of child perceptions of TSRQ on *changes* in academic self views is due solely to source effects.

Although the bivariate, or zero-order, correlations between child perceived conflict and Year 4 teacher report of behavioral engagement and reading and math achievement were statistically significant, in the context of the full model child reported conflict did not predict engagement or reading achievement and only marginally predicted math achievement. One explanation for the weak effects of child reported conflict on these variables is that children's reports of conflict are largely redundant with teacher reports of the relationship. To investigate this explanation, we analyzed the effects of child perceptions or support and conflict without including teacher reports in the regressions. The effect of child reports on teacher engagement and reading and math achievement, above prior performance and other covariates, was statistically significant for each outcome (for behavior engagement beta = −.139, $p < .01$; for math achievement beta = −.074, $p < .01$, for reading achievement beta = −.071, $p < .01$). With respect to the engagement, because different teachers rated engagement each year and teacher ratings demonstrate only moderate consistency across teachers (Achenbach, 1991), a lack of measurement consistency could also contribute to the failure to find a unique effect of child reports of the relationship on engagement.

Limitations and future research

In interpreting study findings, it is important to keep in mind that study participants were selected into this longitudinal study on the basis of entering first grade with literacy scores that fell in the below the 50th percentile for their school district. Students who are academically at-risk may be more dependent on the quality of the teacher-student relationship than are students who are more academically capable. Thus, these findings may not generalize to higher achieving samples. Findings do suggest that teacher and student reports of TSRQ buffer academically at-risk students from school failure.

Implications

The finding that measures of TSRQ predicted changes in children's engagement and achievement offers strong support for the importance of developing pre-service and in-service policies and interventions to assist teachers in building supportive, low conflict relationships with students. Recognizing that teachers may have more control over their ability to offer social support than to decrease conflict, which may be more child-driven, professional development efforts should focus on the positive side of the relationship equation. Surprisingly, few studies have rigorously evaluated programs that aim to improve teachers' abilities to provide students more positive and supportive learning contexts. The PATHS curriculum (Kusché & Greenberg, 1995), a rigorously evaluated teacher-delivered curriculum, has been found to be efficacious in improving the social-emotional climate of classrooms and students' prosocial and on-task behaviors (Conduct Problems Prevention Research Group, 1999; Domitrovich, Cortes & Greenberg, 2007). Recent research suggests that professional development efforts that are sustained over time, embedded in teachers' classrooms, and provide mentors or coaches who provide context-embedded feedback and emotional support can improve teacher-student interactions (Landry, Anthony, Swank, & Monseque-Bailey,2009; Pianta, Mashburn, Downer, Hamre, & Justice, 2008).

Study results strongly suggest that a reliance only on teacher report, a common practice in the literature, provides an incomplete picture of the teacher-student relationship. The finding that children's perceptions of TSRQ are predictive of changes in engagement and achievement is consistent with social-cognitive perspectives on the effects of the teacher-student relationship on students. When children perceive social support in the forms of affection, admiration, satisfaction, and strength of alliance, they develop academically-

relevant self-views that promote motivated engagement in learning. Thus child reports of relationship quality, even though they have relatively little overlap with teacher and peer reports, have consequences for children's academic self-views and achievement. These findings echo those of others (Kessler & McLeod, 1985; McElhaney, et al., 2008) who find that individuals' reports of social support are consistently related to positive outcomes, even if they are not congruent with more objective indices of support.

Acknowledgments

This research was supported in part by a grant to Jan N. Hughes from the National Institute of Child Health and Human Development (5 R01 HD39367-02). Correspondence concerning this article should be addressed to Jan Hughes, 4225 TAMU, College Station, TX. 77840-4225, jhughes@tamu.edu.

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Table 1

Assessment Overview

Construct	Year 1	Year 2	Year 3	Year 4
TSRQ				
T-Support			X	
T-Conflict			X	
C-Support			X	
C-Conflict			X	
Gender	X			
IQ	X			
Free Lunch	X			
Retention Status			X	
Dependent variables				
Belonging		X		X
Math self efficacy		X		X
Reading self efficacy		X		X
T-Engagement		X		X
Math achievement		X		X
Reading achievement		X		X

T = Teacher; C = Child

Table 2

Correlations and descriptive statistics for predictor variables

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	T Sup Y3													
2	T Conf Y3	**−0.56**												
3	C Sup Y3	0.08	*−0.09*											
4	C Conf Y3	**−0.25**	**0.43**	**−0.14**										
5	WJ Read Y2	0.08	**−0.12**	−0.01	**−0.16**									
6	WJ Math Y2	**0.14**	**−0.16**	*−0.08*	**−0.20**	**0.37**								
7	Cog Com Y2	0.08	−0.03	**0.16**	−0.07	**0.11**	*0.10*							
8	Belong Y2	0.08	*−0.09*	**0.31**	**−0.12**	−0.05	*−0.10*	**0.31**						
9	T-Eng Y2	**0.40**	**−0.42**	−0.02	**−0.26**	**0.28**	**0.27**	**0.14**	*0.10*					
10	Gender	**−0.17**	**0.27**	**−0.24**	**0.22**	*−0.08*	0.06	−0.02	**−0.23**	**−0.22**				
11	IQ	*0.11*	**−0.16**	*−0.10*	**−0.12**	**0.23**	**0.29**	0.02	*−0.09*	**0.22**	0.05			
12	Adversity	−0.03	**0.12**	**0.10**	**0.13**	**−0.13**	**−0.33**	0.05	**0.12**	**−0.12**	0.02	**−0.18**		
13	Retention	−0.02	*−0.10*	0.01	**−0.11**	**0.48**	**0.33**	0.02	−0.04	*0.10*	−0.06	**0.17**	**−0.13**	
	Mean	3.94	1.79	3.60	1.77	461.34	475.70	3.48	4.11	3.37	0.53	92.92	0.63	.24
	SD	0.85	0.95	0.87	0.77	22.30	11.03	0.45	0.75	1.06	0.50	14.51	0.48	.43

Note: numbers in bold are significant at p<.01; numbers in italics are significant at p<.05.

Y3 = Year 3; Y2 = Year 2; T = teacher; C = child, Sup = Support; Conf = conflict; Cog Com = Cognitive Competence; Belong = Sense of Belonging; Eng = Engagement; WJ = Woodcock Johnson III

Table 3

Correlations and descriptives for Year 4 outcomes

		1	2	3	4	5	7
1	WJ Read						
2	WJ Math	**0.58**					
3	Reading SE	**0.28**	*0.09*				
4	Math SE	−0.02	**0.17**	**0.31**			
5	School Belonging	0.03	0.04	**0.24**	**0.29**		
6	T-Eng	**0.24**	**0.30**	0.07	**0.13**	**0.17**	
	Mean	488.34	496.22	21.42	22.32	3.87	3.36
	SD	18.69	10.56	5.87	6.06	0.66	0.78

Note: numbers in bold are significant at p<.01; numbers in italics are significant at p<.05.

T = teacher; SE = Self efficacy; Eng = Behavioral engagement; WJ = Woodcock Johnson III.

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Table 4

Regression results for Year 4 academic self views

	Belonging			Math Self Efficacy			Reading Self Efficacy		
	β	**r**	**R^2 Δ**	**β**	**r**	**R^2 Δ**	**β**	**r**	**R^2 Δ**
MODEL 1									
Year 2 outcome	.183***	.27***		.141**	.20***		.201***	.23***	
Gender	.017	−.11**		.129**	.07		−.057	−.06	
Free lunch	.030	.06		.024	.05		−.028	.01	
IQ	−.037	−.05		.086*	.07		.020	−.00	
Retained	.033	.04		.075	.08*		.056	.06	
			.078***			.055***			.057**
MODEL 2									
T support	.077	.13**		.142**	.12**		.113*	.06	
T-Conflict	.041	−.11*		.094	−.01		.205***	.06	
C-Support	.191***	.28***		.192***	.20***		.083*	.14**	
C-Conflict	−.184***	−.22***		−.077	−.08		−.094	−.07	
			.074***			.044***			.032**

* p <.05

** p <.01

*** p<.001 .

T = teacher; C = child.

β coefficients are from full model after all variables are entered

Table 5

Regression results for Year 4 behavioral engagement and achievement

	T-Engagement			Math			Read		
	β	**r**	**R^2 Δ**	**β**	**r**	**R^2 Δ**	**β**	**r**	**R^2 Δ**
MODEL 1									
Year 2 outcome	.300***	.10*		.616***	.72***		.767***	.79***	
Gender	−.080*	−.22***		.003	.02		−.022	−.10*	
Free lunch	.003	−.08		−.027	−.29***		−.073***	−.21***	
IQ	.076	.18***		.121***	.34***		.079**	.28***	
Retained	.023	−.01		−.139***	−.38***		.056	−.32***	
			.249**			.561***			.637***
MODEL 2									
T support	.141**	.39***		.038	.15***		.045	.15***	
T-Conflict	−.141*	−.43***		−.014	−.17***		−.049	−.18***	
C-Support	−.055	.01		.032	−.02		.002	−.01	
C-Conflict	−.078	−.28***		−.059rr†	−.24***		−.040	−.23***	
			.056***			.008*			.011*

* p <.05

** p <.01

*** p<.001.

† p = .06

T = teacher; C = child. β coefficients are from full model after all variables are entered.