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**TEACHER-STUDENT RELATIONSHIP QUALITY AND STUDENT RELATEDNESS  
AND ENGAGEMENT IN ELEMENTARY SCHOOL**

A Dissertation in  
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by  
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## ABSTRACT

Children's early classroom experiences are important to understanding their trajectory of school achievement. One important facet of such classroom experiences is children's relationship with their teacher. This paper applies Skinner and colleagues' (2008) self-system model of motivational development (*context* → *self* → *action*) in a sample of elementary school students (1<sup>st</sup>, 3<sup>rd</sup>, and 5<sup>th</sup> grade;  $N = 1,404$ , 49.9% girls) and teachers ( $N = 76$ ; 17% male) in the northeastern and midwestern U.S. Early-year peer perceptions of teacher-student relationship quality (*context*)—but not teachers' own reports of relationship quality—were associated with teachers' perception of student academic effort (*action*) over the course of the school year, but this association was not mediated by students' own perceptions of their closeness with their teacher (*self*). Implications for education research and future directions are discussed.

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## Chapter 1

### INTRODUCTION

Student academic engagement has long been a concern of educators and education researchers because high levels of engagement are linked to better academic performance (Finn & Rock, 1997; Jimerson, Campos, & Greif, 2003; Skinner, Pitzer, & Steele, 2016; Wigfield et al., 2015). Low levels of engagement (disengagement), conversely, are associated with worse academic performance and risk of dropout (Entwisle & Alexander, 1993; Janosz, Archambault, Morizot, & Pagani, 2008; Wang & Peck, 2013). Across middle childhood and early adolescence, the normative developmental decline in academic engagement (Fredricks & Eccles, 2002; Li & Lerner, 2011; Martin, 2009) has led to particular concern about the determinants of engagement and disengagement. Some research on disengagement has focused on the bidirectional associations between engagement and achievement (Galla et al., 2014; Reyes, Brackett, Rivers, White, & Salovey, 2012; Wang & Fredricks, 2014), which can result in either desirable dynamics (i.e., high achievement → increased engagement → higher achievement) or undesirable dynamics (low achievement → disengagement → lower achievement). More recently, researchers have described engagement as part of a larger dynamic of motivation, including a prominent role for students' sense of social relatedness to others in their classroom environment (Skinner, Furrer, Marchand, & Kindermann, 2008; Skinner et al., 2016).

Education theory and research reviews have highlighted the central role played by elementary school teachers in shaping students' sense of social relatedness and their overall social and academic adjustment (Gest & Rodkin, 2011; Gest, Madill, Zadzora, Miller, & Rodkin, 2014; Hughes, 2011; Hughes, Im, & Wehrly, 2014; Mashburn, Hamre, Downer, & Pianta, 2006).

Teachers who are emotionally supportive and who provide appropriate instructional support tend to have students who are more engaged with academic activity and more positive with their peers (NICHD ECCRN, 2002). Children's early relational experiences with their teacher are associated with trajectories of grades and work habits for years thereafter (Furrer, Skinner, & Pitzer, 2014; Hamre & Pianta, 2001). Positive emotional support from teachers also serves as a possible protective factor for students at risk of academic failure (Hamre & Pianta, 2005).

Overall, empirical research in this area suggests that a closer relationship with one's teacher and a sense of community or belonging in the classroom are associated with greater behavioral engagement (Furrer & Skinner, 2003; Hughes, 2011) and academic achievement (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). This is consistent with ecological perspectives that view teachers as leaders of the classroom social system and as active agents in shaping classroom relationships (Cairns & Cairns, 1994; Farmer, Lines, & Hamm, 2011; Gest et al., 2014; Gronlund, 1959; Rodkin & Gest, 2011). From this perspective, teachers may play an influential role in both social and cognitive domains of their students.

This dissertation contributes to the existing literature on teacher influences on academic engagement in three ways. First, this study integrates individual- and classroom-level indices of the teacher-student relationship as they inform students' sense of relatedness and engagement. By analyzing the teacher-student relationship at both the individual and classroom level, it is possible to examine whether a general classroom atmosphere of quality relationships contributes to individual engagement beyond what could be attributable to dyad-level relationship quality. Second, this dissertation employs multiple sources of information—and thus independent measurement—which will provide a stricter test of associations among constructs at different stages of the conceptual model. Finally, this dissertation examines how these phenomena change within the school year and across 1<sup>st</sup>, 3<sup>rd</sup>, and 5<sup>th</sup> grades, providing a uniquely broad perspective on possible developmental changes within the elementary grades. Findings will inform theoretical

perspectives on the role of teacher-student relationships in student adjustment and the relational conditions that support student engagement.

### **Student Academic Engagement: Conceptual and Operational Considerations**

Early literature defined student engagement as “the student’s psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote” (Newmann, 1992, p. 12). The field now tends to recognize student academic engagement as a higher-order construct, consisting of three dimensions: *behavioral*, *emotional/affective*, and *cognitive* engagement (Appleton, Christenson, & Furlong, 2008). Many studies include aspects of at least behavioral and emotional engagement (Lee, 2014). This multidimensionality of engagement in the literature provides both the opportunity to consider various aspects of students’ school experiences and the challenge of determining whether such distinctions differentially impact student outcomes.

#### **Behavioral engagement**

Broadly, behavioral engagement encompasses participation in the classroom and learning. Despite variations in terminology across researchers, two important dimensions of behavioral engagement appear consistently in the literature. *Academic engagement* includes behaviors “related directly to the learning process, [such as] attentiveness and completing assignments” (Finn & Zimmer, 2012, p. 102). *Social engagement* indicates a student’s ability to “follow written and unwritten classroom rules of behavior, [such as] interacting appropriately with teachers and peers, and not...disrupting the work of other students” (Finn & Zimmer, 2012, p. 102).

While these distinctions are instructive as to the variety of constructs that might be considered behavioral engagement, many studies' definitions blend across one or more of these dimensions. For example, in a review of literature on engagement, Lee (2014) defined behavioral engagement as effort and perseverance, operationalized as children's reports of "working hard, working despite difficulty, trying one's best...[and] putting forth one's best effort" (p. 179). Persistence and effortful engagement are common indices of behavioral engagement (e.g., Hughes, Luo, Kwok, & Loyd, 2008; Lee, 2014; Martin, 2007; Skinner et al., 2008). The Head Start REDI project operationalizes one aspect of learning engagement as teacher ratings of children's ability to follow rules and routines (e.g., Nix, Bierman, Domitrovich, & Gill, 2013). Studies may utilize child or teacher report to determine student engagement, though teacher ratings are more common in elementary school research.

### **Emotional or affective engagement**

Emotional engagement encompasses students' affective responses to the classroom, including interest, boredom, and anxiety associated with school and the process of learning (Connell & Wellborn, 1991). One facet of REDI's measure of learning engagement is an "enthusiasm for school" (Nix et al., 2013); Skinner and colleagues (2008) considered "satisfaction" and "pride" in their definition of emotional engagement. Other researchers have conceptualized emotional engagement to include a sense of belonging or being a vital part of school (Lee, 2014). Because emotional engagement, by definition, is experienced internally by the student, researchers tend to rely more heavily on child self-report to measure this phenomenon. The fact that teachers must rely on students' behavior to infer their affect likely accounts for the strong correlations between teacher ratings of behavioral and affective engagement (Skinner et al., 2008).

## **Cognitive engagement**

Cognitive engagement refers to psychological processes of school engagement. For example, Martin (2007) considers self-efficacy and a mastery orientation to learning as both being adaptive cognitive dimensions of engagement and motivation. Some researchers characterize it as involving learning strategies (Richardson & Newby, 2006). Skills such as working memory, attention control, and executive functioning are not themselves indicators of cognitive engagement, but they are thought to support it (e.g., Bierman et al., 2008; Marks, 2000).

In the broad literature on school engagement, individual studies use measures that blend elements of behavioral, affective, and cognitive engagement to varying degrees. Moreover, skills that support cognitive engagement (e.g., working memory, attention control, and executive functioning) are sometimes grouped together as components of “approaches to learning” (Bierman et al., 2008) but sometimes they are treated as facets of behavioral engagement (e.g., teacher ratings of attention and concentration on schoolwork; Skinner et al., 2008; Wu, Hughes, & Kwok, 2010). Such heterogeneity in measurement is consistent with the broad, multidimensional construct of engagement (Roorda, Koomen, Spilt, & Oort, 2011), but it requires researchers to be clear about what aspects of engagement are being studied. The present study focuses on behavioral engagement—particularly academic engagement—as reflected in teacher ratings of effort students directed toward their schoolwork.

## **Theoretical Frameworks**

A student’s relationship with his or her teacher has been recognized by educators and education researchers as a key context of development in elementary school. Several theoretical

perspectives inform hypotheses about processes linking teacher-student relationships to academic engagement and achievement.

### **Self-determination theory**

Self-determination theory posits that human beings have three fundamental psychological needs: autonomy, competence, and relatedness (Connell & Wellborn, 1991; Ryan & Deci, 2000). Intrinsic motivation is maximized when all three needs are met (Ryan & Deci, 2000). According to this theory, children whose three fundamental needs are met would be more engaged with school, expressing excitement for learning, paying attention, and participating in class. In contrast, children whose needs are not met would become disaffected with school, expressing boredom or a lack of enthusiasm about work and class (Connell & Wellborn, 1991).

Skinner and colleagues (2008) applied self-determination theory to the context of the classroom to develop a *self-system model of motivational development* (SSMMD). Student engagement in this model is conceptualized and measured in terms of engagement and disaffection, each of which has behavioral and emotional components. This reflects the assumption “that high-quality learning is the result of behaviors and emotions, such as exertion, persistence, interest, and enjoyment, that reflect a motivation to master the academic material” (Skinner et al., 2008, p. 766). Skinner and colleagues distinguish these *indicators* of engagement and disaffection, which are internal to the construct of engagement, from *facilitators* that are external, causal factors thought to influence engagement (Skinner et al., 2008; see also Sinclair, Christenson, Lehr, & Anderson, 2003).

In the SSMMD model, Skinner and colleagues outline four constructs that describe the process through which a classroom creates and maintains an engaged dynamic: context, self, action, and outcomes. A supportive classroom *context* is one in which a teacher provides both

relational support (e.g., warmth, responsiveness) and support for student autonomy (e.g., opportunities for students to direct their own learning). Such a supportive context promotes positive student *self*-perceptions of competence, autonomy and relatedness. With these three needs met, students demonstrate emotional and behavioral engagement (*action*), which in turn leads to more academic learning (*outcomes*). This model also posits feedback loops that reinforce predominant patterns (e.g., high levels of student engagement feedback to reinforce supportive teaching practices and positive self-perceptions). In contrast, a less supportive classroom undermines students' self-perceptions, leading to disaffection with learning (Skinner et al., 2008).

The SSMMD model asserts that students' self-perceptions can be distinguished from their classroom engagement. Self-system processes then are facilitators of engagement, relatively robust "personal resources" (or liabilities) that individuals create as a reaction to their experience of the social context. These self-system processes mediate the relationship between context (the teacher or classmates) and students' classroom engagement, such that features of the context influence how individual students feel about themselves—their perceptions of competence, autonomy, and relatedness—which in turn leads to greater engagement or disaffection (Skinner et al., 2008).

Skinner and colleagues' SSMMD model is noteworthy because it incorporates all three fundamental needs posited by self-determination theory, but in research on engagement during the elementary school years, the need for *relatedness* has received the most attention (Hughes, 2012a, 2012b). Klem and Connell (2004) utilized a reduced self-system process model in which experiences of relational support from the teacher (context) directly influence students' engagement (action) without the intermediary process of students' sense of relatedness or academic competence (self). The need for relatedness is defined as "the need to feel securely connected to the social surround and the need to experience oneself as worthy and capable of love and respect" (Connell & Wellborn, 1991, p. 51). In the context of school, perceived relatedness to



the teacher would refer to the feeling of being safe with, supported, and cared about by the teacher (Pianta, 2001). In this framework, the context is most appropriately measured through sources external to the child (e.g., through observations by peers, the teacher, or researchers). This is because children's self-reports of the context are, by definition, a part of the self-system processes that is thought to be *influenced by* the context. This leads to the situation where the external source and the child may respond to the same questions, but their responses are considered measures of "context" and "self," respectively. In the present study, the content of items used to tap relationship quality are very similar for teachers and for students (e.g., perceived trust in teacher, feelings of respect by teacher, other warm emotions), but the responses from teachers are treated as measures of "context" whereas the responses from students are treated as "self." In other words, the placement of such perceptions outside versus inside the individual is the critical distinction. Because individuals are active agents in directing their own development, self-reports play an important and distinct role in the conceptual model, regardless of the strength of their association with "objective" measures or others' perspectives.

### **Attachment theory**

Attachment theory has served as a key organizing framework in studies of the relational support provided by teachers in the elementary grades. According to Bowlby (1980), children have an innate psychobiological motivation to be close to significant others (to whom they become attached) when faced with novel situations that appear threatening. Children also possess a drive to explore their environment, through which they develop skills and acquire knowledge about the world, which promotes survival. The two needs (security in the face of uncertainty and exploration to learn and survive) are best met in "secure base behavior." Children who experience sensitive and responsive interactions with caregivers develop a sense of security and self-

confidence. Arend and colleagues (1979) demonstrated that infants of more responsive parents were more curious (exhibited more exploratory behavior) and better problem-solvers and cognitively competent in preschool. Such children's sense of security allows them to actively explore the environment, whereas exploration, "engagement" and learning would be inhibited when children feel insecure.

Education researchers have extended attachment theory from its parent-child relationship foundations to the teacher-child relationship. In the relational space of the elementary school classroom, the teacher serves a comparable physical and emotional role as a parent might in the home. According to this perspective, children create a mental reference or representation of the teacher-child relationship, drawing from their accumulated experiences with different teachers (Hughes, 2011; Pianta & Steinberg, 1992). If such a representation is of a secure relationship, the child would be more likely to actively explore and engage in classroom learning opportunities, taking academic or social "risks" such as speaking up in class or approaching classmates on the playground (Birch & Ladd, 1997). Following from Ainsworth's (1979) emphasis on the importance of sensitive-responsive caregiving as an antecedent of secure attachment, classroom researchers have focused on patterns of sensitive-responsive interactions day-to-day teacher-student interactions (Pianta & Steinberg, 1992). For example, the "Closeness" scale of the Student-Teacher Relationship Scale (Pianta, 2001) includes items such as "It is easy to be in tune with what this child is feeling," and "If this child is upset they will seek comfort from me." Attachment theory suggests that such sensitive-responsive teacher-student interactions should produce feelings of security in social relationships, reflected in student perceptions of social support available from the teacher and peers.

### **The elementary classroom: Proximal processes and setting effects**

From a bioecological perspective, children's regular social interactions in the classroom represent a *proximal process* contributing to the transmission of both knowledge and behavior from one individual to another (Bronfenbrenner & Morris, 1998). This applies both to student-teacher social interactions and student-peer interactions. For example, a child who regularly interacts with aggressive peers may come to act more aggressively himself (Prinstein, Brechwald, & Cohen, 2011). Extending this process to the teacher, Mikami and colleagues (2011) noted that teachers' warm, supportive interactions with students are associated with more positive peer interactions, perhaps because a positive interaction style is being modeled for students. These proximal processes are dependent on the broader classroom context, the person, and time, which "constrain and influence" the proximal processes (Curby, Rimm-Kaufman, & Ponitz, 2009).

Classrooms may also be conceptualized as social settings in which social processes exist "in the social and temporal space *among* individuals" (Tseng & Seidman, 2007; p. 219, emphasis added). From this perspective, there may be important differences between classrooms in processes that influence student outcomes. For example, there is evidence from two large-scale studies that between-classroom differences in peer group norms for behavior are associated with between-classroom differences in students' attitudes, as well as the subsequent social development of students from those classrooms (Kellam, Ling, Merisca, Brown & Ialongo, 1998; Stormshak et al., 1999). In the case of teacher-student relationships, it is possible that systematic differences between classrooms in the types of teacher-student relationships that exist may be associated with between-classroom differences in student engagement.

### **Empirical research on teacher-student relationship quality and student engagement**

A relatively small literature documents associations between classroom-level indices of teacher-student relationship and interaction patterns and students' academic engagement. Most of the extant research relies upon an observational measure—the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008)—to rate the quality of the teacher's interactions with classroom students considered as a whole. In one study, children in classrooms rated by observers as having a positive emotional climate were rated by teachers as more socially competent and self-regulated, engaged in more positive peer interactions, and academically competent (Wilson, Pianta, & Stuhlman, 2007). Other work by the CLASS developers demonstrated that an overall positive classroom climate is associated with improvements in children's academic performance and engagement across a school year (Hamre & Pianta, 2005; Ruzek et al., 2016). Other research groups have found that such classroom-level indices of a positive emotional climate are associated with higher levels of students' sense of relatedness with their teacher and classmates and higher levels of affective engagement (Madill, Gest, & Rodkin, 2014; O'Connor, Dearing, & Collins, 2011). Overall, these studies support the view that in classrooms where there are generally positive teacher-student interactions, levels of engagement are higher and show more positive changes over time.

A larger literature has focused on measures of teacher-student relationship quality at the level of dyads within the classroom. In general, multiple studies have found that supportive relationships between the student and his or her teacher and classmates are associated with multiple indicators of positive social and academic success in school throughout childhood (Davidson, Gest, & Welsh, 2010; Kindermann, 2007). Further, early feelings of connectedness with school and achievement motivation may persist over time (Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; Valeski & Stipek, 2001).

Hughes and colleagues have conducted the most systematic research on the impact of teacher-student relationship quality in elementary school (Hughes, 2011; Hughes, Gleason, & Zhang, 2005; Hughes & Kwok, 2007; Hughes, Zhang, & Hill, 2006; Spilt, Hughes, Wu, & Kwok, 2012). In their primary longitudinal study, 784 1<sup>st</sup> grade students who were at risk for literacy failure were followed for five years, though attrition resulted in sample sizes as low as 506 in some follow-up analyses. Assessments occurred in the spring of each school year. Measures included teacher reports of the teacher-student relationship and academic engagement; student reports of the teacher-student relationship, school belonging and academic self-efficacy; and peer sociometric nominations of classmates who “get along well with the teacher.”

Hughes (2011) examined the influence of teacher-student relationship quality, as reported by both the teacher and the student in 2<sup>nd</sup> and 3<sup>rd</sup> grade, on academic self-concept, school engagement, and achievement in the following year; analytic models controlled for baseline scores of the dependent variables. Inter-rater agreement of teacher-child closeness was fairly low, and teachers’ and children’s ratings of teacher-student relationship quality were not significantly related. In hierarchical linear models controlling for clustering of students within classrooms, Hughes documented that child-reported teacher-student relationship quality was predictive of subsequent child-reported school belonging and academic self-efficacy; and that teacher-reported teacher-student relationship quality significantly predicted later teacher-rated student engagement. A limitation of these findings is that significant predictive associations only existed within measurement source. It is not unexpected that a teacher might report a student as being more academically engaged if she perceives herself to have a positive relationship with that student—and that a child who perceives a positive relationship with his teacher in elementary school might also report being more engaged in the classroom.

A quality relationship with one’s teacher may be especially important for students facing additional risk factors for poor school outcomes. In a cross-sectional study of K–5<sup>th</sup> graders,

Baker (2006) found a protective effect for children with externalizing behavior problems, such that those with a closer, more positive relationship with their teacher had significantly better reading grades at the end of the year compared to similar peers who lacked a close relationship with their teacher. Students with learning problems who also had a close relationship with their teacher had better teacher-rated social and behavioral outcomes than peers with similarly high levels of academic problems who lacked a close relationship with their teacher (Baker, 2006).

Hughes and colleagues (2008, 2010) noted stronger effects for behaviorally and academically at-risk children and ethnic minority children compared to low-risk or ethnic majority children.

Very few studies have addressed both individual- and classroom-level indices of the student-teacher relationship simultaneously. Hughes and colleagues (2006) reported results from one such analysis of first graders into the next school year. After controlling for student gender and ethnic minority status and individual teacher support, in 2-level HLM analyses, Hughes and colleagues (2006) found that peer perceptions of individual teacher support significantly predicted students' teacher-rated learning engagement. This was a noteworthy finding because the source of the measure of teacher-student relationship (peers) was independent of the source of the measure of engagement (teacher). In the same analyses, classroom-level teacher support as reported by peers also uniquely predicted teacher-perceived learning engagement. In other words, in classrooms where more students perceived their peers to have positive relationships with the teacher, teachers reported higher levels of behavioral engagement. In these models, classroom-level teacher support did not moderate the association between individual teacher support and learning engagement (Hughes et al., 2006).

The study by Skinner and colleagues (2008), based on self-determination theory also found support for the role of teacher-student relationship quality in supporting academic engagement. In a sample of 805 4<sup>th</sup>–7<sup>th</sup> graders and their 53 teachers, Skinner and colleagues (2008) focused on the difference in students' engagement over the critical period of the transition

to middle school. Students reported on their sense of relatedness with their teacher and feelings of their behavioral and emotional engagement and disengagement. Both students and teachers reported on the quality of teacher support (including teacher warmth). Positive student academic engagement was predicted by quality of teacher support, though as expected the association was stronger within the same measurement source than between teacher-rated support and student-rated engagement (Skinner et al., 2008). When considered together, student perceptions of teacher support mediated the relationship between teacher-reported support and behavioral engagement, which supports the notion that teacher support influences students' engagement by changing how students perceive their relationship with their teacher.

### **Limitations of Existing Research**

#### **Developmental issues: Changes within and across elementary grades**

The majority of existing empirical research on teacher-student relationships has examined the association between teacher-student relationships in one school year and academic engagement in subsequent school years. Prior research has found moderate year-to-year stability of teacher-student relationship quality across the elementary grades (Hughes et al., 2008; Jerome, Hamre, & Pianta, 2009; O'Connor et al., 2011), likely reflecting the influences of both stable student characteristics and changing classroom contexts on teacher-student relationship quality over time. Relatively few studies have examined the impact of teacher-student relationships on student academic engagement within a single school year, so it remains unclear how quickly this phenomenon develops.

Similarly, empirical studies of developmental changes in student engagement have tended to focus on late elementary and middle school. Indeed, Skinner and colleagues (2008)

tested their self-system model of motivational development in the upper elementary grades. Turning to the smaller but more relevant body of studies on younger schoolchildren, Hughes and colleagues (2006, 2011) focused on the impact of teacher-student relationships in the early elementary grades. It is not clear whether teacher-student relationship quality has different impact on academic engagement for students at different grade levels. On the one hand, teachers are presumed to be especially important social figures for children in the early elementary grades (Pianta & Steinberg, 1992). On the other hand, a recent meta-analysis (Roorda et al., 2011) concluded that quality teacher-student relationships appear to be more strongly associated with students' school engagement at higher grade levels, although that analysis contrasted secondary grades to primary grades rather than later-vs.-early elementary grades. One possibility is that as the average quality of teacher-student relationships declines across the elementary school years (Baker, 2006; Jerome et al., 2009; O'Connor & McCartney, 2007), older students become more perceptive of and sensitive to the quality of their relationship with their teacher (Roorda et al., 2011). This may be due to the increasing academic demands as students transition into middle school, or students' own improved ability to discern the quality of their relationships. The current study examines within-year developmental change across the full range of elementary grades.

### **Classroom-level measurement of teacher-student relationships**

Research on teacher-student relationships at the classroom level usually takes one of two forms. Some studies calculate classroom-level scores by aggregating the reports of all of the students within a given classroom (e.g., Hughes et al., 2006, 2011). Other studies use a classroom observation measure (i.e., the CLASS) to characterize the overall quality of teacher-student *interactions*. The disadvantage of the observational approach is that it captures the general quality of interactions between the teacher and the “average student” in the classroom during a narrow



observation window (e.g., 90 minutes) and therefore may not be sensitive to broader—or specific, nuanced—relationship dynamics. To our knowledge, no other studies have examined both approaches to classroom-level measurement in the same analysis. In the current study, we adopt the first approach (aggregation of student reports) as a measure of student-teacher relationships, but we also consider an observational measure of teacher-student interaction quality as a covariate that may capture useful information about student-teacher interactions. More generally, only one study by Hughes examined the cross-level influence of a teacher’s overall relationship with her classroom *and* her relationship with individual students as it pertains to relatedness or engagement. The current study helps to integrate these two different research traditions by examining both levels of influence.

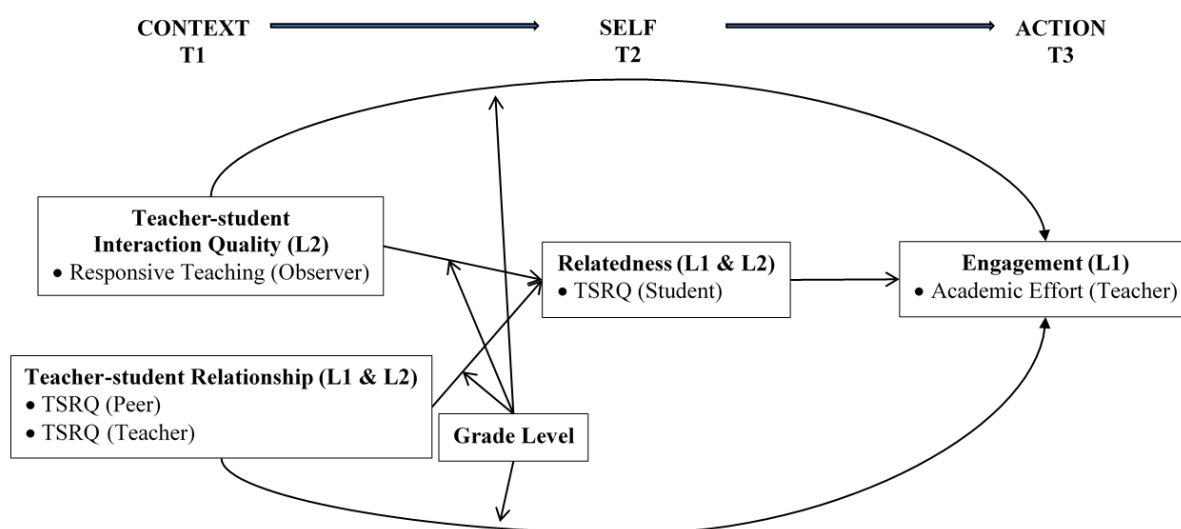
### **Nonindependence of measurement**

Existing research is often characterized by a lack of independence of measurement across independent and dependent variables. As a result, the strength of findings may be called into question, as shared source variance between measures of teacher-student relationship quality and outcomes of interest may contribute to results to an unknown degree. For example, Hughes and colleagues (2011) found that teacher-reported teacher-student relationship quality predicted changes in teacher-reported engagement. The present study contributes to the literature by including unique sources of variance—independent assessment—at different stages of the analytic model.

## The Present Study

This study examines associations among children's relationship quality with their teacher, their sense of relatedness in the classroom, and their academic engagement in a sample of elementary classrooms across a single academic year (see Figure 1 for conceptual model).

Specifically, this study has three aims.



*Figure 1.* Conceptual model demonstrating hypothesized impact of both individual- and classroom-level teacher-student relationship quality (TSRQ) on children's sense of relatedness and classroom engagement over one academic year (model adapted from Skinner and colleagues' (2008) self-system model of motivational development).

**Aim 1:** Determine whether children's experiences of teacher-student relationship quality (TSRQ) and teacher-student interaction quality early in the school year are associated with their classroom engagement over the course of the school year.

**Hypothesis 1a.** Peer-nominated TSRQ at both the individual level (L1) and classroom level (L2) early in the year will contribute to students' teacher-rated academic effort at the end of the school year, controlling for baseline effort.

**Hypothesis 1b.** Teacher-reported TSRQ at both the individual level (L1) and classroom level (L2) early in the year will contribute to students' teacher-rated academic effort at the end of the school year, controlling for baseline effort.

**Hypothesis 2.** After accounting for the effects of teacher-student relationship quality (Hypothesis 1), teacher-student interaction quality as measured by observer ratings (L2) early in the year will uniquely contribute to students' academic effort at the end of the year, controlling for baseline effort.

**Aim 2:** Apply Skinner and colleagues' conceptual model (2008) by examining whether students' perceived relatedness in the classroom mediates the associations between teacher-student relationship and interaction quality and classroom engagement.

**Hypothesis 3.** Students' self-reported teacher-child closeness at midyear will predict teacher-rated academic effort at the end of the school year, controlling for baseline effort.

**Hypothesis 4.** Students' self-reported teacher-child closeness will mediate the association between early teacher-rated and peer-nominated TSRQ and end-of-year academic effort, controlling for baseline.

**Hypothesis 5.** Students' self-reported teacher-child closeness will mediate the association between early observer-rated teacher-student interaction quality and end-of-year academic effort, controlling for baseline.

**Aim 3:** Explore grade-level differences in the associations among teacher-student relationship and interaction quality and students' sense of relatedness and classroom engagement.

**Hypothesis 6.** Teacher-student relationship quality and interaction quality will be more strongly associated with subsequent academic effort for students in 5<sup>th</sup> grade than for those in 1<sup>st</sup> or 3<sup>rd</sup> grade.

**Hypothesis 7.** The mediating influence of students' sense of relatedness on the association between teacher-student relationship quality and interaction quality and academic effort will be stronger in 5<sup>th</sup> grade than in 1<sup>st</sup> or 3<sup>rd</sup> grade.

## **Chapter 2**

### **METHOD**

The data were drawn from the Classroom Peer Ecologies Project (CPEP), a naturalistic study of teaching practices, peer relationships, and student outcomes. Data were collected over a 5-year span: Each year, a new set of classrooms was followed over the course of one academic year. School districts were selected from rural areas, small- to mid-sized cities, and urban areas in the Northeastern and Midwestern United States (Gest et al., 2014). All 1<sup>st</sup>, 3<sup>rd</sup>, and 5<sup>th</sup> grade teachers at participating schools were invited to participate in the study: Over 85% of teachers consented to participate. In participating classrooms, 83% of all students received informed parental consent to participate.

### **Participants**

The present study includes 1,404 students (50.1% boys) and 76 teachers (17% male) assessed during Years 4 and 5 of the project. Analyses were restricted to these two years because Year 1 involved pilot data collection and Years 2 and 3 involved a reduced set of questions that did not include measures of peer-nominated teacher-student relationship quality. The present analytic sample also excluded classrooms in which (a) teachers changed mid-year ( $n = 7$ ), (b) there were fewer than 10 participating students ( $n = 5$ ), or (c) the student participation rate was less than 70% ( $n = 25$ ). At least 10 participants in a classroom and an overall participation rate of 70% or greater was desirable because valid indices of peer-nominated behavior depend on a sufficient number and proportion of peers participating.

The sample was ethnically and economically diverse. The largest student ethnic group was non-Hispanic Caucasian (44%), followed by African American/Black (33.2%), Hispanic/Latinx (12.1%), students who identified as multiethnic (7.5%), and Asian/Pacific Islander (3.5%). On average, classrooms were 58% ethnic minority (classroom  $SD = 19%$ , range 15%–100%). Overall, 62% of all students were eligible for free or reduced-price lunch (classroom  $SD = 32%$ , range 0%–100%). Teachers were on average 38 years old ( $SD = 10.5$ , range 24–60) and had 11 years of teaching experience ( $SD = 8.1$ , range 1–35). Forty-nine percent of teachers had earned a master's degree.

## Procedures

All procedures followed the American Psychological Association guidelines for ethical research and were approved by the universities' IRB. After obtaining principal buy-in at a school, the study was introduced by the research team to teachers and, if they agreed to participate, consent forms were then sent home to parents. Children who had parent permission to participate provided oral assent (1<sup>st</sup> grade) or written assent (3<sup>rd</sup> and 5<sup>th</sup> grade) prior to taking the survey. Students without parental consent or who did not provide assent were able to work quietly on educational activity packets provided by the researchers, or on their own work at the teacher's discretion. Assessments occurred at three time points: within six weeks of the first day of school (T1/baseline), approximately two months later (T2), and within the last month of the school year (T3). At each assessment wave, students completed surveys in school, teachers completed online surveys, and observers visited the classroom to code teacher-student interaction patterns.

First-grade students were interviewed individually by a research assistant who indicated children's responses on the paper survey. In 3<sup>rd</sup> and 5<sup>th</sup> grade classrooms, children completed a written survey during a classroom (group) administration by a lead research assistant

accompanied by several assistants available to answer children's questions and assist slower readers. Individual interviews for 1<sup>st</sup> grade participants required approximately 20–25 minutes per child, and group-administered surveys typically lasted 30–45 minutes per classroom. Around the same time as the student surveys were administered, teachers completed a survey for each participating student in their class. Trained research associates observed the classroom around the same time—though not the same day—as student surveys were administered, and rated teacher-child interactions.

## Measures

### **Teacher-student relationship quality: Peer report**

Students were asked to nominate classmates who (a) “[get] along well with the teacher” and (b) “[have] a hard time getting along with the teacher.” For each prompt, students could nominate as few or as many classmates as they wished. The class roster was read aloud to 1<sup>st</sup> graders, who then nominated peers aloud. Class rosters were provided for 3<sup>rd</sup> and 5<sup>th</sup> graders to circle names. For each student, the total number of nominations received for each prompt was tallied and turned into a proportion score by dividing by the number of participating children in the classroom. As expected, student scores for “gets along well with the teacher” and “has a hard time getting along with the teacher” were moderately and negatively correlated ( $r_{11} = -.51, p < .01$ ). Proportion scores for “has a hard time getting along” were subtracted from proportion scores for “gets along well” to create a single index of *peer-nominated TSRQ*. This procedure is analogous to the standard procedure for arriving at a single peer social preference score by subtracting “liked least” from “liked most” nominations. As such, a score of peer-nominated TSRQ closer to 1.0 indicated greater peer consensus that a student had a good relationship with

his or her teacher, while a score closer to -1.0 indicated greater peer consensus that a student did not have a good relationship with his or her teacher. The peer-nominated TSRQ index demonstrated moderately strong stability from Time 1 to Time 3 (1<sup>st</sup> grade  $r_{1,3} = .68$ , 3<sup>rd</sup> grade  $r_{1,3} = .75$ , 5<sup>th</sup> grade  $r_{1,3} = .77$ ;  $p < .01$ ). A classroom-aggregate score was also created. Descriptive statistics are provided in Table 1.

### **Teacher-student relationship quality: Teacher report**

Teachers rated their perceived closeness with each participating student on three 5-point Likert scale items (1 = *Never*, 5 = *Always*) derived from Pianta's Student-Teacher Relationship Scale (STRS; Pianta, 2001). Items were as follows: "Student avoids contact with me," "Student trusts me," and "Student feels that I respect him/her". The 3-item composite (with "avoids contact" reverse-scored) was internally consistent ( $\alpha_{t1} = .83$ ) and moderately stable across the school year ( $r_{1,3} = .59$ ,  $p < .01$ ). This 3-item composite score served as the measure of *teacher-reported TSRQ*.

### **Teacher-student relationship quality: Observer rating**

*Observer-rated teacher-student interaction quality* was assessed using the Classroom Assessment Scoring System (CLASS K-3; Pianta et al., 2008). Pairs of trained research assistants observed each classroom for four consecutive cycles of 15-20 minutes and, for each cycle, rated the quality of teacher-child interaction (1 = *low*, 7 = *high*) on 10 dimensions: positive climate, negative climate, teacher sensitivity, regard for student perspectives, behavior management, productivity, instructional learning formats, concept development, quality of feedback, and language modeling. For each dimension, a summary score was calculated for each observer as the



average across the four cycles. Inter-rater agreement for each dimension was acceptable: ICCs ranged from .75 to .91. In accordance with previous work (Hamre, Hatfield, Pianta, & Jamil, 2014; Jones, Molano, Brown, & Aber, 2013; Madill, Gest, & Rodkin, 2014), a bifactor solution for the CLASS was specified using structural equation modeling in R, resulting in a general factor of Responsive Teaching that was heavily weighted by scores on positive climate, teacher sensitivity and regard for student perspectives. This index was moderately stable across assessment waves ( $r_{1,3} = .51, p < .01$ ) and was used as the final index of observer-rated teacher-student interaction quality.

### **Perceived relatedness: Student report**

*Teacher-child closeness* was conceptualized as the degree to which each student perceived a warm, caring relationship with his or her teacher. Five items were adapted for student self-report from the Closeness subscale of the Student-Teacher Relationship Scale (Pianta, 2001; “My teacher is kind to me,” “I trust my teacher,” “I like being around my teacher,” “I feel safe when my teacher is around,” “My teacher respects me”). Students responded to these items using a 5-point Likert scale (1 = *Never*, 3 = *Sometimes*, 5 = *Always*.) At all grade levels, these 5 items formed an internally consistent scale: 1<sup>st</sup> grade  $\alpha_{t2} = .73$ , 3<sup>rd</sup> grade  $\alpha_{t2} = .89$ , 5<sup>th</sup> grade  $\alpha_{t2} = .89$ . Most children reported positive relationships with their teachers, resulting in a negatively skewed distribution of this scale, and this was corrected with a logarithmic transformation.

### **Teacher-rated student engagement: Academic effort**

Teachers provided an index of individual student engagement. For each participating student, teachers responded to items on a 5-point Likert scale (1 = *Never*, 5 = *Often or Always*).

*Academic effort* consisted of 4 items indicating students' behavioral engagement in the classroom: "tries hard at school," "shows poor effort," "works hard," and "does the best he/she can at schoolwork." All items were scored so that higher scores reflected higher effort. The composite score was internally consistent and stable across the school year ( $\alpha_3 = .94$ ;  $r_{1,3} = .75$ ,  $p < .01$ ).

### **Control variables**

Several important covariates were also collected from school administrative records, teacher survey, or calculated from extant data: child gender, ethnicity, and eligibility for free or reduced-price lunch; classroom gender composition, classroom ethnic composition, classroom proportion free/reduced price lunch eligible, class size, and grade level. Descriptive statistics for these indices are provided in Table 1.

## Chapter 3

### RESULTS

#### Data Preparation

##### Data transformations

All variables were examined and met guidelines for normality (see West, Finch, & Curran, 1995), with one exception. Most children—particularly 1<sup>st</sup> graders—reported positive relationships with their teachers (student-reported teacher-child closeness), which resulted in a negatively skewed distribution of the scale ( $M_{t2} = 4.42$ ,  $SD_{t2} = 0.83$ ,  $skewness_{t2} = -1.86$ ,  $skewness_{1st\ grade} = -2.68$ ); this was corrected with a logarithmic transformation.

##### Centering and dummy coding

Gender was dichotomously coded (0 = male, 1 = female). Free or reduced-price lunch eligibility and ethnic minority status were dummy-coded. Level 1 measures that were not dummy-coded were classroom mean centered. Level 2 measures that were not dummy-coded were grand mean centered.

## Analytic Plan

### Aim 1

Estimates of the association of TSRQ with student academic effort at the end of the year, controlling for beginning of the year academic effort were calculated using a series of two-level hierarchical linear growth models to account for the nesting of children within their classrooms in SAS PROC MIXED (Tabachnick & Fidell, 2007; West, Welch, & Galecki, 2007). School ( $n = 16$ ) was not modeled as an additional level in the hierarchical models because (a) our theoretical interest is at the classroom level (as opposed to that of the school); and (b) prior research suggests that most contextual influences are much stronger at the classroom level, especially in elementary grades where students spend the majority of their time within the same classroom unit. Accordingly, in these models Level 1 represents individual-level characteristics of the student and Level 2 represents characteristics of the classroom. Fixed effects for school were included as dummy codes. In the context of these models, “change” refers to upward or downward deviation from the level expected, after adjusting for baseline levels of the outcome variable and all other covariates in the model.

The equations with peer-nominated TSRQ predicting teacher-rated effort are as follows:

**Level 1:**  $Effort_{ij} = \beta_{0j} + \beta_{1j}PN-TSRQ_{ij} + \beta_{2j}BaselineEffort_{ij} + \beta_{3j}Gender_{ij} + \beta_{4j}EthnicMinority_{ij} + \beta_{5j}FRPL-eligible_{ij} + e_{ij}$

**Level 2:**  $\beta_{0j} = \gamma_{00} + \gamma_{01}PN-TSRQ_j + \gamma_{02}ProportionFemale_j + \gamma_{03}ProportionMinority_j + \gamma_{04}ProportionFRPL-eligible_j + \gamma_{05}ClassSize_j + \gamma_{06}GradeLevel_j + \gamma_{07}ResponsiveTeaching_j + \gamma_{08}School_j + \mu_{0j}$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

The general equation of the full model was:

$$Effort_{ij} = \beta_{0j} + \beta_1 * TSRQ_{ij} + \beta_m * Relatedness_{ij} + \beta_j * [Level 1 Covariates]_{ij} + \beta_j * [Level 2 Covariates]_{ij} + e_{ij} + \mu_{ij}$$

Accordingly, the intercept may be interpreted as the expected level of teacher-rated effort for a 5<sup>th</sup> grade non-Hispanic Caucasian boy with average peer-nominated TSRQ compared to his classmates in a classroom with average scores on the classroom covariates.

### **Aim 2**

Teacher-student relationship quality at T1 measured two ways (peer-nominated and teacher-reported) predicted end-of-year teacher-rated academic effort across the school year, controlling for Time 1 effort. Each measure of the hypothesized Relatedness mediator was then added separately to test which indices explained that association. To test the statistical significance of those mediated effects, the indirect effect would be calculated as the product of  $a$  (T2 Relatedness regressed on T1 TSRQ) and  $b$  (T3 Effort regressed on T2 Relatedness) pathways. The proportion mediated would be calculated by  $\frac{ab}{(ab + c')}$ , where  $c'$  is the indirect path to Effort in the final model.

### **Aim 3**

To examine developmental differences in students' experience of TSRQ as it relates to their sense of Relatedness and teachers' perception of academic effort, an interaction term of grade X predictor was added to each of the models previously described.

### **Inclusion of covariates**

Variables capturing basic demographic information about students (gender, ethnic minority status, free or reduced-price lunch [FRPL] eligibility) and classroom composition (proportion of classroom female, ethnic minority, FRPL-eligible; class size) were included in all models as controls. It was important to control for gender because girls tend to report higher levels of relatedness to adults and tend to be rated by their teachers as being more engaged in the classroom compared to their male peers (Goodenow, 1993). Prior analyses of these data (Gest et al., 2014) revealed weak negative associations between class size and classroom social environment; we controlled for class size based on the possibility that overall levels of student engagement may be lower in larger classes due to decreased opportunities for 1:1 interaction with the teacher. We controlled for FRPL status as a proxy measure of parents' level of education, which may in turn be a marker for a variety of family influences on academic engagement.

### **Preliminary Analyses**

Descriptive statistics are reported in Table 1. On average, teachers reported moderately high levels of academic effort in their students ( $M_{t1} = 3.88$ ,  $SD_{t1} = 0.95$ ), which decreased slightly over the course of the year (see Table 1). This pattern is consistent across grade levels, though teachers in earlier grades on average reported slightly greater effort in their students compared to teachers in later grades (see Table 1). Teachers reported high levels of perceived closeness with students on average ( $M_{t2} = 4.19$ ,  $SD_{t2} = 0.82$ ).

Inter-item correlations are reported in Table 2. At baseline, the two indices of TSRQ (peer-nominated and teacher-rated) were modestly correlated with each other ( $r = .37$ ,  $p < .001$ ), and this relationship grew stronger over time ( $r_{t2} = .42$ ,  $r_{t3} = .47$ ;  $p < .001$ ). Both indices of TSRQ

were slightly correlated with observer-rated responsive teaching at baseline ( $r = .11, p < .001$ ). Responsive teaching was slightly correlated with teacher-rated effort at baseline ( $r = .13, p < .001$ ) and end of year ( $r = .17, p < .001$ ). Correlations among peer-nominated TSRQ and other peer nomination indices and teacher-rated effort at baseline and end of year are presented in Table 3. Peer-nominated TSRQ was associated as expected with other peer dimensions. Students perceived by their peers as having a good relationship with the teacher were also perceived as more prosocial ( $r_{11} = .75, p < .001$ ), less aggressive ( $r_{11} = -.73, p < .001$ ), and a more desirable playmate (social preference;  $r_{11} = .48, p < .001$ ). Peer-nominated TSRQ was more strongly associated with teacher-rated effort ( $r_{11} = .50; r_{13} = .46, p < .001$ ) than all other peer nomination items, with the exception of academic reputation ( $r = .52, p < .001$ ).

### **Unconditional means models**

The Wald test in the unconditional means models indicated significant variance between classrooms for the teacher relationship context (teacher-rated and peer-nominated), student relatedness (self-rated), and student engagement (teacher-rated effort); this indicates that classrooms differed significantly in teacher, peer, and student perceptions of teacher-student relationship quality. The unconditional model for teacher-reported TSRQ indicated that 24.7% of the variance was between classrooms. 12.8% of the variance was between classrooms for peer-nominated TSRQ. For student-rated teacher-child closeness, 13.3% of the variance was between classrooms. Finally, for teacher-rated academic effort, 13.8% of the variance was between classrooms.

Table 1  
*Descriptive Statistics*

	Baseline			Time 2			Time 3		
	M	(SD)	Range	M	(SD)	Range	M	(SD)	Range
<i>Individual-level Characteristics (N = 1404)</i>									
Peer-nominated TSRQ	.35	(.35)	-.95–1	.31	(.38)	-.89–1	.31	(.40)	-1–1
1 <sup>st</sup> grade	.25	(.25)	-.82–.86	.31	(.30)	-.60–1	.35	(.31)	-.83–1
3 <sup>rd</sup> grade	.43	(.35)	-.75–1	.35	(.39)	-.79–1	.33	(.41)	-.94–1
5 <sup>th</sup> grade	.34	(.40)	-.95–1	.27	(.41)	-.89–1	.25	(.43)	-1–1
Teacher-rated TSRQ	4.21	(0.79)	1–5	4.19	(0.82)	1–5	4.12	(0.85)	1–5
1 <sup>st</sup> grade	4.35	(0.71)	2–5	4.33	(0.80)	1–5	4.17	(0.78)	2–5
3 <sup>rd</sup> grade	4.26	(0.76)	1.67–5	4.24	(0.77)	1.67–5	4.19	(0.84)	1.67–5
5 <sup>th</sup> grade	4.07	(0.85)	1–5	4.05	(0.86)	1.33–5	4.01	(0.90)	1–5
Student-rated teacher-child closeness	4.51	(0.74)	1–5	4.42	(0.83)	1–5	4.40	(0.88)	1–5
1 <sup>st</sup> grade	4.66	(0.58)	1.4–5	4.64	(0.65)	1–5	4.67	(0.57)	1–5
3 <sup>rd</sup> grade	4.55	(0.75)	1–5	4.44	(0.86)	1–5	4.46	(0.87)	1–5
5 <sup>th</sup> grade	4.35	(0.80)	1–5	4.23	(0.89)	1–5	4.15	(0.99)	1–5
Teacher-rated academic effort	3.88	(0.95)	1.2–5	3.87	(0.97)	1–5	3.81	(1.00)	1–5
1 <sup>st</sup> grade	4.05	(0.88)	1.2–5	4.06	(0.90)	1–5	3.98	(0.92)	1–5
3 <sup>rd</sup> grade	3.84	(0.94)	1–5	3.83	(0.96)	1–5	3.80	(0.96)	1–5
5 <sup>th</sup> grade	3.79	(0.99)	1–5	3.77	(1.00)	1–5	3.70	(1.07)	1–5
Gender (female)	49.9%								
Ethnic minority	56.3%								
FRPL-eligible	61.9%								
<i>Classroom-level Characteristics (N = 76)</i>									
Peer-nominated TSRQ	0.34	(0.15)	.03–.64	0.31	(0.17)	-.05–.64	0.30	(0.15)	-.07–.60
Teacher-rated TSRQ	4.21	(0.44)	3.22–5	4.20	(0.48)	3–5	4.11	(0.53)	2.8–4.98
Student-rated teacher-child closeness	4.51	(0.30)	3.8–4.9	4.42	(0.36)	3.2–4.9	4.41	(0.42)	3–4.9
Observer-rated responsive teaching (rescaled from bifactor solution)	4.69	(1.20)	1.1–6.5	4.76	(1.23)	.82–6.8	4.75	(1.25)	.32–6.7
1 <sup>st</sup> grade	4.77	(1.28)	1.1–6.1	4.65	(1.37)	.82–6.3	4.95	(1.11)	2.5–6.6
3 <sup>rd</sup> grade	4.54	(0.97)	2.5–6.2	4.98	(0.96)	2.8–6.6	4.73	(1.08)	2.5–6.7
5 <sup>th</sup> grade	4.77	(1.35)	1.8–6.5	4.63	(1.35)	1.1–6.8	4.60	(1.54)	.32–6.7
Proportion female	.49	(.09)	.27–.65						
Proportion ethnic minority	.58	(.19)	.16–.95						
Proportion FRPL-eligible	.63	(.33)	0–1.00						
Class size	21	(2.9)	13–28						
1 <sup>st</sup> grade	20	(3.0)	15–26						
3 <sup>rd</sup> grade	20	(2.8)	13–25						
5 <sup>th</sup> grade	22	(2.5)	17–28						



Table 2

*Inter-item Correlations*

		Baseline					Time 2					Time 3				
		1.	2.	3.	4.	5.	1.	2.	3.	4.	5.	1.	2.	3.	4.	5.
<b>Baseline</b>	1. Peer-nominated TSRQ															
	2. Teacher-rated TSRQ	.37														
	3. Observer-rated responsive teaching	.11	.11													
	4. Student-rated teacher-child closeness	.26	.27	.12												
	5. Teacher-rated effort	.50	.59	.13	.25											
<b>Time 2</b>	1. Peer-nominated TSRQ	.79	.41	.15	.29	.55										
	2. Teacher-rated TSRQ	.37	.66	.21	.25	.49	.42									
	3. Observer-rated responsive teaching	.16	.18	.62	.13	.15	.16	.27								
	4. Student-rated teacher-child closeness	.25	.27	.14	.60	.27	.33	.27	.15							
	5. Teacher-rated effort	.49	.50	.20	.26	.79	.55	.58	.22	.28						
<b>Time 3</b>	1. Peer-nominated TSRQ	.74	.39	.13	.24	.53	.81	.46	.14	.29	.56					
	2. Teacher-rated TSRQ	.33	.60	.17	.25	.47	.39	.71	.23	.26	.51	.47				
	3. Observer-rated responsive teaching	.16	.16	.60	.19	.12	.20	.21	.57	.19	.19	.18	.18			
	4. Student-rated teacher-child closeness	.20	.20	.11	.47	.20	.24	.22	.13	.60	.24	.32	.25	.16		
	5. Teacher-rated effort	.46	.48	.17	.23	.75	.53	.54	.21	.26	.83	.59	.59	.16	.27	

Note. All correlations significant to  $p < .001$

Table 3

*Inter-item Correlations: Comparing Peer Nomination Items with Teacher-rated Effort*

<b>Peer-nominated Indices</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>	<b>4.</b>	<b>Teacher-rated Effort (Baseline)</b>	<b>Teacher-rated Effort (T3)</b>
1. Peer-nominated TSRQ					.50	.46
2. Prosocial behavior	.75				.43	.41
3. Aggressive behavior	-.73	-.50			-.46	-.43
4. Social preference	.48	.57	-.37		.39	.36
5. Academic reputation	.64	.67	-.41	.58	.52	.52

*Note.* All correlations significant to  $p < .001$

## **Aim 1: Predicting Academic Effort from Early Teacher-student Relationship Quality**

### **Peer-nominated TSRQ**

Teacher-rated academic effort at T3 was significantly predicted by individual-level peer-nominated TSRQ ( $B = 0.52$ ,  $SE = 0.09$ ,  $p < .001$ ) but not by classroom-level peer-nominated TSRQ ( $p = .79$ ). That is, individual students who were perceived as having a better relationship with their teacher were perceived by their teacher to exhibit more academic effort over the year beyond their early perceived effort. The cross-level interaction of individual- and classroom-level peer-nominated TSRQ was not significantly associated with end-of-year teacher-rated academic effort ( $p = .45$ ; see model 1e).

### **Teacher-rated TSRQ**

Teacher-rated academic effort at T3 was not significantly predicted by either individual-level or classroom-level teacher-rated TSRQ at baseline. Consequently, this measure of the teacher-relationship context was not considered in further analyses.

### **Observer-rated teacher-student interaction quality**

Independently or as a covariate, baseline observer-rated Responsive Teaching was not a significant predictor of teacher-rated effort over the school year (see Table 4, model 1c).

Table 4

*Predicting End-of-year Teacher-rated Academic Effort from Peer-nominated TSRQ, Controlling for T1 Effort (Unstand. est.)*

	Model 1a		Model 1b		Model 1c		Model 1d		Model 1e	
	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)
<i>Intercept</i>	1.21***	(0.16)	1.22***	(0.15)	1.21***	(0.16)	1.22***	(0.16)	1.22***	(0.16)
<i>Level 1</i>										
Peer-nominated TSRQ	<b>0.45**</b>	<b>(0.07)</b>	<b>0.52**</b>	<b>(0.09)</b>	<b>0.52*</b>	<b>(0.07)</b>	<b>0.52**</b>	<b>(0.09)</b>	<b>0.46**</b>	<b>(0.07)</b>
T1 Teacher-rated Effort	0.67**	(0.03)	0.67**	(0.03)	0.67**	(0.03)	0.67**	(0.03)	0.62**	(0.03)
Gender	0.07+	(0.04)	0.07+	(0.04)	0.07+	(0.04)	0.07+	(0.04)	0.07+	(0.04)
Ethnic Minority	-0.01	(0.04)	-0.02	(0.04)	-0.01	(0.04)	-0.01	(0.04)	-0.01	(0.04)
FRPL-eligible	-0.07+	(0.04)	-0.08+	(0.04)	-0.07+	(0.04)	-0.07+	(0.04)	-0.08+	(0.04)
<i>Level 2</i>										
Peer-nominated TSRQ	<b>-0.06</b>	<b>(0.21)</b>	<b>-0.28</b>	<b>(0.26)</b>	<b>-0.06</b>	<b>(0.21)</b>	<b>-0.30</b>	<b>(0.26)</b>	<b>-0.05</b>	<b>(0.22)</b>
Responsive Teaching					0.01	(0.03)	0.01	(0.04)	-0.01	(0.03)
Proportion Female	0.34	(0.43)	0.37	(0.42)	0.32	(0.42)	0.35	(0.41)	0.33	(0.42)
Proportion Minority	-0.04	(0.20)	-0.02	(0.20)	-0.03	(0.21)	-0.01	(0.21)	-0.04	(0.21)
Proportion FRPL-eligible	0.16	(0.21)	0.08	(0.22)	0.16	(0.21)	0.09	(0.22)	0.15	(0.21)
Class size	-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)
<i>Interactions</i>										
L1 pnTSRQ X L2 pnTSRQ <sup>a</sup>									-0.58	(0.45)
1 <sup>st</sup> Grade X L1 pnTSRQ			0.04	(0.15)			0.04	(0.15)		
3 <sup>rd</sup> Grade X L1 pnTSRQ			-0.20	(0.13)			-0.20	(0.13)		
1 <sup>st</sup> Grade X L2 pnTSRQ			0.97	(0.47)			0.97	(0.47)		
3 <sup>rd</sup> Grade X L2 pnTSRQ			0.05	(0.47)			0.05	(0.47)		

\*\* $p < .01$ , \* $p < .05$ , + $p < .10$ ; <sup>a</sup>pnTSRQ = peer-nominated TSRQ

*Note.* Primary predictor of interest bolded. 5<sup>th</sup> grade is reference category. All models included fixed effect for grade and dummy codes for school.

**Grade level differences**

Grade was not significantly associated with end-of-year teacher-rated effort and did not moderate the relationship between TSRQ and effort (see Table 4, models 1b and 1d).

**Aim 2: Testing Mediation Pathway among Early TSRQ, Midyear Relatedness, and End-of-Year Academic Effort****Predicting relatedness at midyear from early teacher-student relationship quality**

Individual-level peer-nominated TSRQ at the beginning of the year was significantly associated with midyear student-perceived relatedness, controlling for baseline relatedness (i.e., student-rated teacher-child closeness;  $B = 0.28$ ,  $SE = 0.07$ ,  $p < .01$ ; see Table 5). Classroom-level peer-nominated TSRQ at the beginning of the year was not significantly associated with student-rated teacher-child closeness at midyear, controlling for baseline. Ethnic minority students experienced a slight decline in their perceptions of teacher-child closeness at midyear ( $B = -0.07$ ,  $SE = 0.03$ ,  $p < .05$ ).

Table 5

*Predicting Student-perceived Relatedness at T2 (Controlling for T1) from Peer-nominated TSRQ at T1*

	Model 2a		Model 2b		Model 2c		Model 2d	
	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)
<i>Intercept</i>	1.65***	(0.21)	1.61***	(0.21)	1.63***	(0.21)	1.61***	(0.21)
<i>Level 1</i>								
Peer-nominated TSRQ	<b>0.28**</b>	<b>(0.07)</b>	<b>0.26**</b>	<b>(0.09)</b>	<b>0.28**</b>	<b>(0.07)</b>	<b>0.26**</b>	<b>(0.09)</b>
T1 Student-rated Relatedness	0.61**	(0.04)	0.61**	(0.04)	0.61**	(0.04)	0.61**	(0.04)
Gender	-0.04	(0.05)	-0.04	(0.05)	-0.04	(0.05)	-0.05	(0.05)
Ethnic Minority	-0.07*	(0.03)	-0.07*	(0.03)	-0.07*	(0.03)	-0.07*	(0.03)
FRPL-eligible	0.06	(0.04)	0.06	(0.04)	0.06	(0.04)	0.06	(0.04)
<i>Level 2</i>								
Responsive Teaching					0.05	(0.03)	0.05	(0.03)
Peer-nominated TSRQ	<b>0.54*</b>	<b>(0.22)</b>	<b>0.45</b>	<b>(0.30)</b>	<b>0.52*</b>	<b>(0.22)</b>	<b>0.45</b>	<b>(0.30)</b>
Proportion Female	0.78	(0.42)	0.69+	(0.39)	0.68+	(0.40)	0.69+	(0.39)
Proportion Ethnic Minority	0.25	(0.21)	0.29	(0.19)	0.27	(0.20)	0.29	(0.19)
Proportion FRPL-eligible	-0.53**	(0.14)	-0.58**	(0.14)	-0.53**	(0.14)	-0.58**	(0.14)
Class size	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
<i>Interactions</i>								
1 <sup>st</sup> Grade X L1 pnTSRQ			0.32	(0.22)			0.33	(0.22)
3 <sup>rd</sup> Grade X L1 pnTSRQ			-0.02	(0.13)			-0.02	(0.13)
1 <sup>st</sup> Grade X L2 pnTSRQ			0.51	(0.48)			0.51	(0.48)
3 <sup>rd</sup> Grade X L2 pnTSRQ			-0.22	(0.41)			-0.22	(0.41)

\*\*\* $p < .01$ , \*\* $p < .05$ , \* $p < .10$

*Note.* Primary predictor of interest bolded. 5<sup>th</sup> grade is reference category. All models included fixed effect for grade and dummy codes for school.

**Predicting end-of-year academic effort from midyear relatedness**

Individual-level student-perceived teacher-child closeness at Time 2 was not significantly associated with teacher ratings of academic effort at the end of the school year (see Table 6). In full models, classroom-level aggregates of the same index were also nonsignificant. Additional potential indices of relatedness outside of the proposed analysis—though similarly nonsignificant—were explored in post-hoc analyses in Appendix B.

Table 6

*Predicting End-of-year Teacher-rated Academic Effort (Controlling for T1) from Student-rated Relatedness*

	<b>Model 3a</b>		<b>Model 3b</b>		<b>Model 3c</b>		<b>Model 3d</b>	
	<b>Estimate</b>	<b>(SE)</b>	<b>Estimate</b>	<b>(SE)</b>	<b>Estimate</b>	<b>(SE)</b>	<b>Estimate</b>	<b>(SE)</b>
<i>Intercept</i>	0.91***	(0.16)	0.91***	(0.16)	0.93***	(0.16)	0.91***	(0.14)
<i>Level 1</i>								
Student-rated Teacher-child Closeness	<b>0.03</b>	<b>(0.02)</b>	<b>0.04</b>	<b>(0.03)</b>	<b>0.03</b>	<b>(0.02)</b>	<b>0.04</b>	<b>(0.03)</b>
T1 Effort	0.75	(0.03)	0.75**	(0.03)	0.75**	(0.03)	0.75**	(0.03)
Gender	0.11**	(0.04)	0.11**	(0.04)	0.11**	(0.04)	0.11**	(0.04)
Ethnic Minority	-0.04	(0.04)	-0.04	(0.04)	-0.04	(0.04)	-0.04	(0.04)
FRPL-eligible	-0.09*	(0.04)	-0.08*	(0.04)	-0.09*	(0.04)	-0.08*	(0.04)
<i>Level 2</i>								
Responsive Teaching					-0.02	(0.04)	-0.002	(0.04)
Student-rated Teacher-child Closeness	<b>0.23*</b>	<b>(0.09)</b>	<b>0.08</b>	<b>(0.07)</b>	<b>0.24*</b>	<b>(0.10)</b>	<b>0.08</b>	<b>(0.10)</b>
Proportion Female	0.18	(0.41)	0.21	(0.40)	0.21	(0.42)	0.22	(0.42)
Proportion Ethnic Minority	-0.02	(0.22)	0.09	(0.21)	-0.04	(0.22)	-0.04	(0.22)
Proportion FRPL-eligible	0.41+	(0.23)	0.46*	(0.21)	0.43+	(0.24)	0.46*	(0.24)
Class size	-0.02+	(0.01)	-0.02*	(0.01)	-0.02+	(0.01)	-0.02*	(0.01)
<i>Interactions</i>								
1 <sup>st</sup> Grade X L1 srTCC <sup>a</sup>			-0.06	(0.05)			-0.06	(0.05)
3 <sup>rd</sup> Grade X L1 srTCC			0.05	(0.05)			-0.05	(0.05)
1 <sup>st</sup> Grade X L2 srTCC			0.62	(0.38)			0.62	(0.38)
3 <sup>rd</sup> Grade X L2 srTCC			0.35*	(0.12)			0.35*	(0.13)

\*\*\* $p < .01$ , \*\* $p < .05$ , + $p < .10$ ; <sup>a</sup>srTCC = student-rated teacher-child closeness

*Note.* Primary predictor of interest bolded. 5<sup>th</sup> grade is reference category. All models included fixed effect for grade and dummy codes for school.



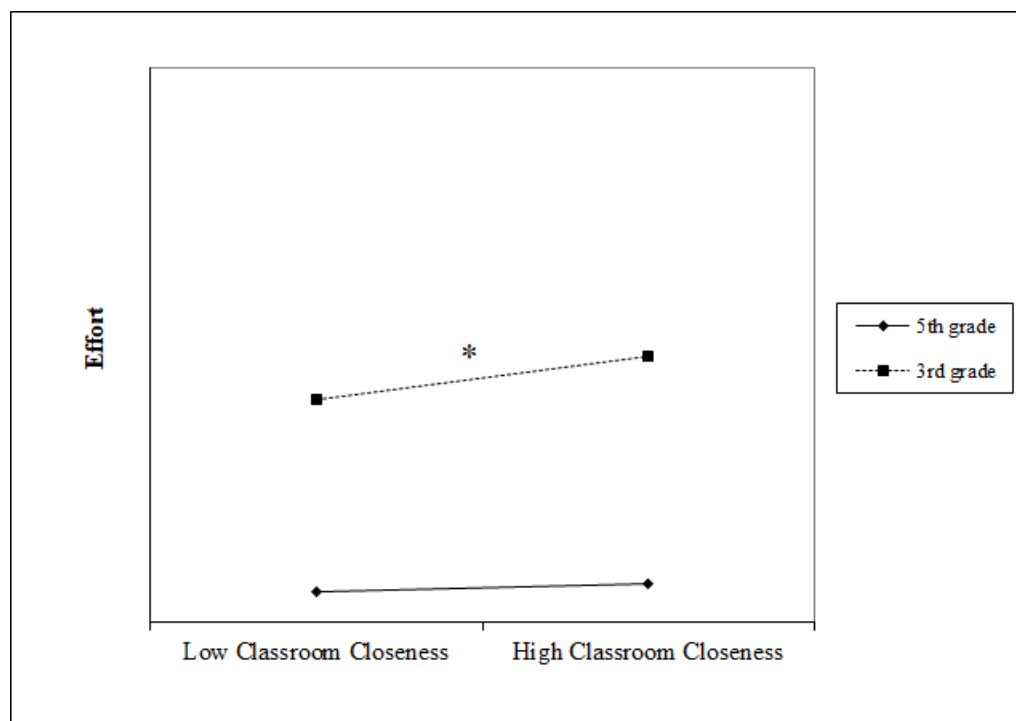
### **Testing mediation of TSRQ, relatedness, and academic effort**

Contrary to expectation, student-perceived teacher-child closeness did not mediate the relationship between peer-nominated TSRQ and teacher-rated Effort. Post-hoc analyses testing mediation with additional indices of relatedness are presented in Appendix B.

### **Aim 3: Exploring Grade Level Differences in the Relationship among TSRQ, Relatedness, and Academic Effort**

Grade level was not a significant moderator of individual-level indices in any model. When models were run separately for each grade level, results remained nonsignificant. In examining the estimates without regard for p-value (due to the increased risk of Type II error associated with smaller grade-level sample sizes), no clear trend of grade-level differences emerged.

Grade level significantly moderated the relationship between classroom levels of student-rated teacher-child closeness at midyear and teacher-rated academic effort at the end of the year ( $B = 0.35$ ,  $SE = 0.13$ ,  $p < .05$ ). Third-grade classrooms with higher levels of student-rated teacher-child closeness saw an increase in teacher-rated effort compared to 5<sup>th</sup> grade classrooms (see Figure 2).



*Figure 2.* Significant moderation of grade by student-rated teacher-child closeness in predicting end-of-year teacher-rated academic effort.

## Chapter 4

### DISCUSSION

This dissertation applied Skinner and colleagues' self-system model of motivational development in a sample of 1<sup>st</sup>, 3<sup>rd</sup>, and 5<sup>th</sup> grade elementary classrooms and extended previous research by (a) establishing independence of measurement at each construct and timepoint in the model, (b) focusing on changes within a single academic year, and (c) comparing effects across multiple grade levels. A strength of the study design was the independence of measurement among our constructs of interest. While previous studies of TSRQ, relatedness, and engagement have relied mostly on single or two reporters (e.g., teacher and student, peers and teacher), this study captured teacher-student interaction quality from independent observers, teacher-student relationship quality from both peer and teacher report, student relatedness from student report, and finally academic effort from teacher report. It was hypothesized that peer-nominated and teacher-rated teacher-student relationship quality (TSRQ) and observer-rated teacher-student interaction quality would be positively associated with students' teacher-rated academic effort at the end of the year, controlling for their baseline effort. It was also expected that student-rated teacher-child closeness would mediate that positive relationship between TSRQ and academic effort. Finally, these relationships were expected to be significantly different by grade level (i.e., TSRQ would be more strongly associated with end-of-year academic effort for 5<sup>th</sup> graders compared to 1<sup>st</sup> and 3<sup>rd</sup> graders).

Early-year *teacher-rated* TSRQ was not significantly associated with end-of-year teacher-rated academic effort or midyear student-rated teacher-child closeness, controlling for their respective baselines. Early-year observer-rated teacher-student interaction quality did not

significantly contribute to end-of-year academic effort or midyear teacher-child closeness, controlling for their respective baselines. In contrast, early-year peer-nominated TSRQ significantly predicted both end-of-year teacher-rated academic effort and midyear student-rated teacher-child closeness, controlling for their respective baselines. Contrary to hypotheses, this association was not mediated by student perceptions of relatedness. Grade level was not a significant predictor of these relationships.

### **Teacher-student Relationship Quality (TSRQ), Teacher-student Interaction Quality, and Academic Effort**

Early year peer-nominated TSRQ significantly predicted change in teacher-reported academic effort over the school year. The more positively peers viewed individuals' TSRQ, the more likely teachers were to rate positively their academic effort over the course of the school year. The cross-level interaction between individual and classroom levels of peer-nominated TSRQ was not statistically significant, but the pattern of results suggested that peer perceptions of individual teacher-student relationships was more important in predicting change in teacher-rated effort. We first discuss the individual-level TSRQ and then classroom-level TSRQ and teacher-student interaction quality.

#### **Individual-level TSRQ**

Students who were perceived by their peers as having a more positive relationship with the teacher—"gets along well with the teacher" vs. "has trouble getting along with the teacher"—were more likely to report greater closeness with their teacher at midyear and were rated by teachers as displaying greater academic effort over the course of the school year. Peers are indeed

aware of relational dynamics (i.e., the quality of teachers' relationships with individual students) in the classroom. This awareness is relevant within even the first few months of the school year.

Independent of (and despite) the student's and teacher's own self-perceptions of that relationship, those early peer perceptions of TSRQ predict how teachers' perceptions of student academic engagement (effort) change over the school year. Of note, teachers' own report of relationship quality was not strongly correlated with peer perception at the same point in time. This suggests, consistent with the argument that peers are uniquely situated to judge classmates' behavior (e.g., Rubin, Bukowski, & Parker, 1998), that the peer group's ability to observe numerous teacher-student interactions, many times per day, under a variety of conditions (e.g., informal conversation, academic instruction during desk work and in large group, behavioral correction/praise during transition times) gives peers the opportunity to observe both overt and subtle indicators by the teacher as to his or her relationship with individual students. Therefore, it is important for teachers to be aware that students attuned to variations in the quality of teacher-student relationships, independent of the overall classroom climate he or she fosters. Some caution is necessary in interpreting the stronger predictive power for the peer-nominated measure of TSRQ compared to teacher-rated TSRQ due to differences in the wording of items in the two measures. Specifically, the wording of the questions for the peer nomination measure ("gets along well" / "has a hard time getting along" with the teacher) encourages students to make a broad interpretation of overall relationship quality without defining what "getting along" means.

In contrast, the items rated by teachers focus more specifically on issues of trust, avoidance, and respect (student trusts me, student avoids me, student feels I respect them). These differences could in part explain why we found stronger predictive power for the peer perceptions compared to that of the teacher: Peers are able to aggregate a variety of observations into a broader concept of "getting along well" compared to teachers being asked to rate their beliefs

about specific internal processes of each student. Future work could explore this by adding a comparable general question for teachers about how well they get along with a given student.

### **Robustness checks**

A series of post-hoc analyses included additional baseline measures of peer reputation and teacher-rated behavior to determine whether the apparent effects of peer-nominated TSRQ could be interpreted more parsimoniously as a reflection of other dimensions of positive peer reputation or behavior. One set of models (see Appendix A, Table A1) included *peer-nominated* dimensions of prosocial behavior, aggressive behavior, social preference, and peer academic reputation (PAR). In all models in which peer-nominated TSRQ was paired with a single other dimension of peer reputation, its association with change in teacher-rated effort remained statistically significant; and even when all four of these additional dimensions of peer reputation were added to the same model, peer-nominated TSRQ retained a marginally significant ( $p < .10$ ) unique association with teacher-rated effort. A second set of models (see Appendix B, Table B1) included *teacher ratings* of aggressive behavior, prosocial behavior, and an index of “social dominance”. Adding baseline measures of these other teacher-rated dimensions to the model (whether singly or in combination) did not diminish the statistical association between peer-nominated TSRQ and teacher-rated effort. Taken together, these analyses lead to the conclusion that change in teacher perception of effort is not merely an artifact of a tendency to view a student positively.

### **Classroom-level TSRQ and teacher-student interaction quality**

At the classroom level (Level 2), teacher-student relationship quality was not significantly associated with teacher-rated student effort over the school year. Teacher-student interaction quality—operationalized as the observer-rated Responsive Teaching dimension of the CLASS bifactor solution—did not contribute statistically to the present analyses.

### **Student Relatedness and TSRQ**

At both the individual level and classroom level, early peer-nominated TSRQ was significantly associated with midyear student-reported teacher-child closeness. Students who were perceived by their peers as getting along well with their teacher self-reported greater feelings of teacher-child closeness at midyear, even controlling for their baseline reports.

### **Student Relatedness and Effort**

Students' perceived relatedness, as operationalized by student-rated teacher-child closeness, did not significantly predict change in teacher-rated academic effort. Consequently, the relationship between teacher-student relationship quality and academic effort was not mediated by students' relatedness. While others have noted relatedness mediates teacher-student relationship quality and academic effort (Hughes, 2011; Hughes et al., 2014; Skinner et al., 2008), those associations were observed over the course of several school years. It is possible that this process takes longer than a single academic year to develop.

### **Student characteristics**

Another possible explanation for the absence of a mediating relationship in this study is additional student-level variables for which the study did not account. Students' *objective academic ability* may moderate our constructs of interest. For example, Hughes (2011) found a significant, long-term mediating relationship among teacher-student relationship quality, student relatedness, and student engagement, but all study participants were below the 50<sup>th</sup> percentile in literacy in their district. It was surmised that, unlike their more academically capable peers, academically at-risk students might be more dependent on the quality of their relationship with their teacher for academic success (Hughes, 2011). The current study did not differentiate by student ability level—rather, this sample included all general education classrooms and students willing to participate from the elementary schools recruited, and the demographic and academic information we captured did not include indices of students' objective academic standing across the school year.

### **Teacher characteristics**

A small but growing literature has noted that ethnic mismatch between teachers and students is associated with more negative TSRQ (den Brok & Levy, 2005; Kesner, 2000; Murray, Murray, & Waas, 2008; Murray, Waas, & Murray, 2008; Saft & Pianta, 2001; Thijs, Westhof, & Koomen, 2012; Wright, Gottfried, & Le, 2017). In particular, it is possible that teacher-reported TSRQ was not a significant predictor of change in effort (as was hypothesized) because *teacher ethnicity* could not be accounted for in analyses.

Teacher job stress and *burnout* are negatively associated with TSRQ (Yoon, 2002) in addition to teachers' instruction and classroom management abilities (Brown, Jones, LaRusso, &



Aber, 2010). The potentially reciprocal nature between teacher stress and TSRQ (Spilt, Koomen, & Thijs, 2011) is more reason to include such measures of teacher characteristics in future research.

### **Other Indices of TSRQ**

In considering teacher-student relationship quality, other studies (Hamre & Pianta, 2001; Hughes, Cavell, & Wilson, 2001; Hughes, Wu, Kwok, Villareal, & Johnson, 2012; Spilt et al., 2012) also measured teacher-student *conflict*. This study did not account for conflict in either the teacher or child report survey. Peer-nominated TSRQ—as calculated as a difference score between perceptions of getting along well and not getting along well—was a significant predictor of change in effort; therefore, it is possible that one could similarly expect teacher-student conflict to better clarify both teacher’s and children’s perceptions of their relationship quality. While overall levels of conflict would likely be low in early elementary school samples, it is possible that for a subgroup of students who have high conflict or controversial (high reported conflict and high reported closeness) relationships with their teacher would find their sense of relatedness and academic engagement disproportionately affected compared to their peers.

### **Grade-level Differences in TSRQ, Relatedness, and Engagement**

The present analyses identified only one significant difference in outcome by grade level: Compared to 5<sup>th</sup> grade classrooms, in 3<sup>rd</sup> grade classrooms student relatedness at midyear was a strong predictor of teacher perceptions of student effort at the end of the year. This relationship was not observed to be significantly different for 1<sup>st</sup> graders. Overall, it is possible that these constructs (relationship quality, student relatedness, student engagement) and their interplay are

conceptualized by participants differently depending on grade level. It is clear that these indices remain relatively important to students and their academic experience across elementary school. While previous research in this area has highlighted the importance of early teacher relationship quality for students, it is also evident that TSRQ is no less important for students at the end of elementary school.

### **Teacher Perceptions of Academic Effort**

This study conceptualized student engagement as measured by teachers' perception of the student over the course of the school year. The question may be raised whether the observed significant change in teacher perceptions of student effort represents (a) change in student behavior (due to the association with peer perceptions of the teacher-student relationship or another unobserved construct) or (b) a recalibration of the teacher's perception of student behavior. It seems unlikely that the observed robust, significant relationship between *peer* perceptions of teacher-student relationship quality and teacher perceptions of student effort would reflect only a change in the teacher's internal processes. The extant body of literature has demonstrated this process over the course of several school years, which suggests that teachers' adjustment of their own expectations of students does not fully explain the observed relationship. Further, if this study's observations *were* the result of teacher recalibration, the end result for student academic experience might be the same. Teacher perceptions of student effort and ability can and do drive learning opportunities for students, as well as more objective indicators of academic success. If TSRQ is associated with teachers' recalibration of their own expectations and perceptions of their students' effort, consequences for students' experience of school might be comparable. To further illuminate this question, future work could consider exploring mediation pathways featuring internal cognitive processes of the teacher.

## **Implications for Practice**

### **Generalizability of findings**

In the present sample, schools all served Kindergarten through at least 5<sup>th</sup> grade in the same building. This is representative of the most common elementary school compositions in the states from which our sample is drawn (56–61%,  $M = 58%$ ) and nationally (63%) (NCES, 2018). Our sample actually overrepresented male elementary school teachers compared to national averages (17% vs. 11%; McFarland et al., 2018). The present sample is limited to students who remained with one primary classroom teacher (excepting special subjects or extracurriculars) for the entire year; as national estimates do not make it clear how many elementary students have more than one teacher/classroom across the school day, the magnitude of this limitation is unknown.

### **Teacher as influencer**

Previous literature has highlighted teachers' ability to serve as reference for and influence peer perceptions of their classmates in other realms, such as social status, peer relationship dynamics, and academic reputation (Farmer et al., 2011; Hendrickx, Mainhard, Boor-Klip, & Brekelmans, 2017; Hughes & Im, 2016; Mikami et al., 2013; Wang, Leary, Taylor, & DeRosier, 2016). Is it possible for teachers similarly to affect how peers perceive their relationship with individual students, which in turn might help students be more academically engaged?

## **Limitations and Considerations for Future Research**

This study is not without limitations. It is not possible to draw definitive conclusions about causal relations based on observational, correlational data (Cook & Campbell, 1979). Even within the framework of a naturalistic study, there are considerations that future studies should address.

### **Timing of measurement**

“Baseline” assessments of teacher-student relationship and interaction quality occurred within the first six weeks of the academic year. Given the practical considerations of school scheduling and obtaining teacher and parent consent for participation in research, this certainly meets threshold for “early” in the course of a 180-day school year. It remains possible, however, that the earliest assessment time point misses change in classroom dynamics already occurring. Teacher-student interaction quality, as measured by observer rating using the CLASS, was likely already well-established by the teacher much earlier than six weeks into the year, and possibly already influenced the classroom climate prior to our measurement. Future studies might endeavor to capture teacher-student relationship and interaction quality earlier in the school year and more frequently, the better to understand the impact of “first impressions” among teachers, peers, and students as well as within-year change.

Conversely, it is also possible that teachers may not yet have a strong sense of their relationship quality with each individual student in their classroom only six weeks into the school year. While the overall classroom climate (i.e., teacher-student interaction quality) a teacher seeks to engender may be established quickly and relatively consistently across school years (e.g.,

Curby, Grimm, & Pianta, 2010), individual relationships may take more time to develop accurately such that they can predict later, disparate perceptions. Perhaps teachers are only accurate in their perception of student relationship quality for the extremes in their classroom. That is, with fewer days of interaction and fewer opportunities for one-on-one time early in the year, teachers themselves may only be able to rate accurately those students with whom they really “click” or those with whom they have greater conflict. Peers, on the other hand, have more opportunity to observe subtle cues from teachers’ interactions with students.

### **Measurement of teacher and child characteristics**

Future work should consider additional teacher, student, or school characteristics that may moderate the relationships among teacher-student relationship quality, student relatedness, and student engagement observed herein, as well as those that were expected to be observed were not. In addition to teacher ethnicity and burden/overwhelm symptoms, student academic ability, as measured by report card grades and standardized test scores where available, should be captured at multiple timepoints. As it has been posited that TSRQ more acutely influences children with learning difficulties (academic risk hypothesis; Hamre & Pianta, 2001), future work should include measures of such student characteristics to better understand under what circumstances and for which children TSRQ may be more important to their academic engagement.

### **Summary and Conclusion**

The current research advanced understanding of teacher-student relationships, as viewed through the lens of peer perception, and their association with students’ classroom engagement.

Peers in elementary school do seem to have an understanding of the teacher-student relationship, and that perception does predict teachers' ratings of student academic effort over the course of an academic year. This dissertation addressed limitations in previous research by utilizing multiple reporters (teachers, peers, individual students, and independent observers) to examine elementary school children's experiences of the teacher-student relationship, relatedness, and engagement in the classroom. According to the self-system model of motivational development (SSMMD), we expected to see a significant relationship between students' perceived relatedness and teachers' perceived student effort, and that relatedness would mediate the relationship between teacher-student relationship quality and student effort. This mediator was not significant in our sample. We did note a robust, persistent relationship between peer perceptions of teacher-student relationship quality and change in teacher perceptions of student effort. This highlights the importance of elementary classroom teachers for their social and emotional support of students, in addition to academic instruction.

## References

- Ainsworth, M. D. S. (1979). Infant-mother attachment. *American Psychologist, 34*, 932–937. doi: 10.1037/0003-066X.34.10.932
- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45*, 369–386. doi: 10.1002/pits.20303
- Arend, R., Gove, F. L., & Sroufe, L. A. (1979). Continuity of individual adaptation from infancy to kindergarten: A predictive study of ego-resiliency and curiosity in preschoolers. *Child Development, 50*, 950–959. doi: 10.2307/1129319
- Baker, J. A. (2006). Contributions of teacher-child relationships to positive school adjustment during elementary school. *Journal of School Psychology, 44*, 211–229. doi: 10.1016/j.jsp.2006.02.002
- Battistich, V., Solomon, D., Kim, D., Watson, M., & Schaps, E. (1995). Schools as communities, poverty levels of student populations, and students' attitudes, motives, and performance: A multilevel analysis. *American Educational Research Journal, 32*(3), 627–658. doi: 10.3102/00028312032003627
- Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., Blair, C., Nelson, K. E., & Gill, S. (2008). Promoting academic and social-emotional school readiness: The Head Start REDI Program. *Child Development, 79*, 1802–1817. doi: 10.1111/j.1467-8624.2008.01227.x
- Birch, S. H., & Ladd, G. W. (1997). The teacher-child relationship and children's early school adjustment. *Journal of School Psychology, 35*, 61–79.
- Bowlby, J. (1980). *Attachment and loss (Vol. 3)*. New York: Basic Books.

- Bronfenbrenner, U., & Morris, P. (1998). The ecology of developmental processes. In W. Damon (Series Ed.) & R. M. Lerner (Vol. Ed.), *Handbook of child psychology* (Vol. 1; pp. 993–1028). New York: John Wiley & Sons.
- Brown, J. L., Jones, S. M., LaRusso, M. D., & Aber, J. L. (2010). Improving classroom quality: Teacher influences and experimental impacts of the 4Rs Program. *Journal of Educational Psychology, 102*, 153–167. doi: 10.1037/a0018160
- Cairns, R. B., & Cairns, B. D. (1994). *Lifelines and risks: Pathways of youth in our time*. New York: Cambridge University Press.
- Catalano, R. F., Haggerty, K. P., Oesterle, S., Fleming, C. B., & Hawkins, J. D. (2004). The importance of bonding to school for healthy development: Findings from the Social Development Research Group. *Journal of School Health, 74*(7), 252–261. doi: 10.1111/j.1746-1561.2004.tb08281.x
- Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In M. R. Gunnar & L. A. Sroufe (Eds.), *Self processes and development* (pp. 43–77). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cook, T. D., & Campbell, D. T. (1979). The design and conduct of true experiments and quasi-experiments in field settings. In R. T. Mowday & R. M. Steers (Eds.), *Reproduced in part in Research in Organizations: Issues and Controversies*. Santa Monica, CA: Goodyear Publishing.
- Curby, T. W., Grimm, K. J., & Pianta, R. C. (2010). Stability and change in early childhood classroom interactions during the first two hours of a day. *Early Childhood Research Quarterly, 25*, 373–384. doi: 10.1016/j.ecresq.2010.02.004
- Curby, T. W., Rimm-Kaufman, S. E., & Ponitz, C. C. (2009). Teacher–child interactions and children’s achievement trajectories across kindergarten and first grade. *Journal of Educational Psychology, 101*, 912–925. doi: 10.1037/a0016647



- Davidson, A. J., Gest, S. D., & Welsh, J. A. (2010). Relatedness with teachers and peers during early adolescence: An integrated variable-oriented and person-oriented approach. *Journal of School Psychology, 48*, 483–510. doi: 10.1016/j.jsp.2010.08.002
- den Brok, P. & Levy, J. (2005). Teacher-student relationships in multicultural classes: Reviewing the past, preparing the future. *International Journal of Educational Research, 43*, 72–88. doi: 10.1016/j.ijer.2006.03.007
- Entwisle, D. R., & Alexander, K. L. (1993). Entry into schools: The beginning school transition and educational stratification in the United States. *Annual Review of Sociology, 19*, 401–423. doi: 10.1146/annurev.so.19.080193.002153
- Farmer, T. W., Lines, M. M., & Hamm, J. V. (2011). Revealing the invisible hand: The role of teachers in children's peer experiences. *Journal of Applied Developmental Psychology, 32*, 247–256. doi: 10.1016/j.appdev.2011.04.006
- Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of Applied Psychology, 82*, 221–234. doi: 10.1037/0021-9010.82.2.221
- Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 97–131). New York: Springer.
- Fredricks, J. A., & Eccles, J. S. (2002). Children's competence and value beliefs from childhood to adolescence: Growth trajectories in two "male-typed" domains. *Journal of Developmental Psychology, 38*, 519–533. doi: 10.1037/0012-1649.38.4.519
- Furrer, C. J., Skinner, E. A., & Pitzer, J. R. (2014). The influence of teacher and peer relationships on students' classroom engagement and everyday motivational resilience. *National Society for the Study of Education, 113*, 101–123.

- Galla, B. M., Wood, J. J., Tsukayama, Har, K., Chiu, A. W., & Langer, D. A. (2014). Changes in children's self-competence and values: Gender and domain differences across grades one through twelve. *Child Development, 73*, 509–527. doi: 10.1016/j.jsp.2014.04.001
- Gest, S. D., Madill, R. A., Zadzora, K. M., Miller, A. M., & Rodkin, P. C. (2014). Teacher management of elementary classroom social dynamics: Associations with changes in student adjustment. *Journal of Emotional and Behavioral Disorders, 22*, 107–118. doi: 10.1177/1063426613512677
- Gest, S. D., & Rodkin, P. C. (2011). Teaching practices and elementary classroom peer ecologies. *Journal of Applied Developmental Psychology, 32*, 288–296. doi: 10.1016/j.appdev.2011.02.004
- Goodenow, C. (1993). Classroom belonging among early adolescent students: Relationships to motivation and achievement. *Journal of Early Adolescence, 13*, 21 – 43.
- Gronlund, N. E. (1959). *Sociometry in the classroom*. New York: Harper & Brothers.
- Hamre, B., Hatfield, B., Pianta, R., & Jamil, F. (2014). Evidence for general and domain-specific elements of teacher-child interactions: Associations with preschool children's development. *Child Development, 85*, 1257–1274. doi: 10.1111/cdev.12184
- Hamre, B. K., & Pianta, R. C. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development, 72*, 625–638. doi: 10.1111/1467-8624.00301
- Hamre, B. K., & Pianta, R. C. (2005). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development, 76*, 949–967. doi: 0009-3920/2005/7605-0001
- Hawkins, J. D., Catalano, R. F., Morrison, D. M., O'Donnell, J., Abbott, R. D., & Day, L. E. (1992). The Seattle Social Development Project: Effects of the first four years on protective factors and problem behaviors. In J. McCord, & R. Ernest (Eds.), *Preventing*

*antisocial behavior: Interventions from birth through adolescence* (pp. 139–161). New York: Guilford Press.

Hendrickx, M. H. G., Mainhard, T., Boor-Klip, H. J., & Brekelmans, M. (2017). Teacher liking as an affective filter for the association between student behavior and peer status.

*Contemporary Educational Psychology*, *49*, 250–262. doi:

10.1016/j.cedpsych.2017.03.004

Hughes, J. N. (2011). Longitudinal effects of teacher and student perceptions of teacher-student relationship qualities on academic adjustment. *Elementary School Journal*, *112*, 38–60.

doi: 10.1086/660686

Hughes, J. N. (2012a). Teachers as managers of students' peer context. In A. M. Ryan & G. W. Ladd (Eds.), *Peer relationships and adjustment at school* (pp.189–218). Charlotte, NC:

Information Age Publishing.

Hughes, J. N. (2012b). Teacher-student relationships and school adjustment: Progress and remaining challenges. *Attachment & Human Development*, *14*, 319–327. doi:

10.1080/14616734.2012.672288

Hughes, J. N., Cavell, T. A., & Wilson, V. (2001). Further support for the significance of the quality of teacher-child relationships. *Journal of School Psychology*, *29*, 281–301.

Hughes, J. N., & Chen, Q. (2011). Reciprocal effects of student-teacher and student-peer relatedness: Effects on academic self efficacy. *Journal of Applied Developmental Psychology*, *32*, 278–287. doi: 10.1016/j.appdev.2010.03.005

10.1016/j.appdev.2010.03.005

Hughes, J. N., Gleason, K. A., & Zhang, D. (2005). Relationship influences on teachers' perceptions of academic competence in academically at-risk minority and majority first grade students. *Journal of School Psychology*, *43*, 303–320. doi:

10.1016/j.jsp.2005.07.001

- Hughes, J. N., & Im, M. H. (2016). Teacher-student relationship and peer disliking and liking across grades 1–4. *Child Development, 87*, 593–611. doi: 10.1111/cdev.12477
- Hughes, J. N., Im, M. H., & Wehrly, S. E. (2014). Effect of peer nominations of teacher-student support at individual and classroom levels on social and academic outcomes. *Journal of School Psychology, 52*, 309–322. doi: 10.1016/j.jsp.2013.12.004
- Hughes, J. N., & Kwok, O.-M. (2007). Influence of student–teacher and parent–teacher relationships on lower achieving readers’ engagement and achievement in the primary grades. *Journal of Educational Psychology, 99*, 39–51. doi: 10.1037/0022-0663.99.1.39
- Hughes, J. N., Luo, W., Kwok, O.-M., & Loyd, L. K. (2008). Teacher-student support, effortful engagement, and achievement: A 3-year longitudinal study. *Journal of Educational Psychology, 100*, 1–14. doi: 10.1037/0022-0663.100.1.1
- Hughes, J. N., Wu, J.-Y., Kwok, O.-M., Villarreal, V., & Johnson, A. Y. (2012). Indirect effects of child reports of teacher-student relationship on achievement. *Journal of Educational Psychology, 104*, 350–365. doi: 10.1037/a0026339
- Hughes, J. N., & Zhang, D. (2007). Effects of the structure of classmates’ perceptions of peers’ academic abilities on children’s perceived cognitive competence, peer acceptance, and engagement. *Contemporary Educational Psychology, 32*, 400–419. doi: 10.1016/j.cedpsych.2005.12.003
- Hughes, J. N., Zhang, D., & Hill, C. R. (2006). Peer assessments of normative and individual teacher–student support predict social acceptance and engagement among low-achieving children. *Journal of School Psychology, 43*, 447–463. doi: 10.1016/j.jsp.2005.10.002
- Janosz, M., Archambault, I., Morizot, J., & Pagani, L. S. (2008). School engagement trajectories and their differential predictive relations to dropout. *Journal of Social Issues, 64*, 21–40. doi: 10.1111/j.1540-4560.2008.00546.x

- Jerome, E. M., Hamre, B. K., & Pianta, R. C. (2009). Teacher-child relationships from kindergarten to sixth grade: Early childhood predictors of teacher-perceived conflict and closeness. *Social Development, 18*, 915–945. doi: 10.1111/j.1467-9507.2008.00508.x
- Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Toward an understanding of definitions and measures of school engagement and related terms. *Contemporary School Psychology, 8*, 7–27. doi: 10.1007/BF03340893
- Jones, S. M., Molano, A., Brown, J. L., & Aber, J. L. (2013). Reconceptualizing the CLASS framework in elementary schools: Domain specific links to teacher and child outcomes. In B. Hatfield (Chair), *Domain-general and domain-specific associations of the Classroom Assessment Scoring System to children's development from preschool to fifth grade*. Paper presented at the Society for Research in Child Development, Seattle, WA.
- Kellam, S., Ling, X., Merisca, R., Brown, C. B., & Ialongo, N. (1998). The effects of the level of aggression in the first grade classroom on the course and malleability of aggressive behavior into middle school. *Development and Psychopathology, 10*, 165–185.
- Kesner, J. E. (2000). Teacher characteristics and the quality of child-teacher relationships. *Journal of School Psychology, 38*(2), 133–149.
- Kindermann, T. A. (2007). Effects of naturally existing peer groups on changes in academic engagement in a cohort of sixth graders. *Child Development, 78*, 1186–1203. doi: 10.1111/j.1467-8624.2007.01060.x
- Klem, A. M., & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health, 74*, 262–273. doi: 10.1111/j.1746-1561.2004.tb08283.x
- Lee, J. S. (2014). The relationship between student engagement and academic performance: Is it a myth or reality? *Journal of Educational Research, 107*, 117–185. doi: 10.1080/00220671.2013.807491

- Li, Y., Hughes, J. N., Kwok, O.-M., & Hsu, H.-Y. (2012). Evidence of convergent and discriminant validity of child, teacher, and peer reports of teacher-student support. *Psychological Assessment, 24*, 54–65. doi: 10.1037/a0024481
- Li, Y., & Lerner, R. M. (2011). Trajectories of school engagement during adolescence: Implications for grades, depression, delinquency, and substance use. *Developmental Psychology, 47*, 233–247. doi: 10.1037/a0021307
- Liew, J., Chen, Q., & Hughes, J. N. (2010). Child effortful control, teacher-student relationships, and achievement in academically at-risk children: Additive and interactive effects. *Early Childhood Research Quarterly, 25*, 51–64. doi: 10.106/j.ecresq.2009.07.005
- Madill, R. A., Gest, S. D., & Rodkin, P. C. (2014). Students' perceptions of relatedness in the classroom: The roles of emotionally supportive teacher-child interactions, children's aggressive-disruptive behaviors, and peer social preference. *School Psychology Review, 43*, 86–105.
- Martin, A. J. (2007). Examining a multidimensional model of student motivation and engagement using a construct validation approach. *British Journal of Educational Psychology, 77*, 413–440. doi: 10.1348/000709906X118036
- Martin, A. J. (2009). Motivation and engagement across the academic life span: A developmental construct validity study of elementary school, high school, and university/college students. *Educational and Psychological Measurement, 69*, 794–824. doi: 10.1177/0013164409332214
- Mashburn, A. J., Hamre, B. K., Downer, J. T., & Pianta, R. C. (2006). Teacher and classroom characteristics associated with teachers' ratings of prekindergartners' relationships and behaviors. *Journal of Psychoeducational Assessment, 24*, 367–380. doi: 10.1177/0734282906290594

- McFarland, J., Hussar, B., Wang, X., Zhang, J., Wang, K., Rathbun, A...Bullock Mann, F. (2018). *The condition of education 2018* (NCES 2018-144). U.S. Department of Education, Washington DC: National Center for Educational Statistics. Retrieved from <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2018144>
- Meehan, B. T., Hughes, J. N., & Cavell, T. A. (2003). Teacher-student relationships as compensatory resources for aggressive children. *Child Development, 74*, 1145–1157. doi: 10.1111/1467-8624.00598
- Mikami, A. Y., Gregory, A., Allen, J. P., Pianta, R. C., & Lun, J. (2011). Effects of a teacher professional development intervention on peer relationships in secondary classrooms. *School Psychology Review, 40*, 36–385.
- Mikami, A. Y., Griggs, M. S., Lerner, M. D., Emeh, C. C., Reuland, M. M., Jack, A., & Anthony, M. R. (2013). A randomized trial of a classroom intervention to increase peers' social inclusion of children with Attention-Deficit/Hyperactivity Disorder. *Journal of Consulting and Clinical Psychology, 81*, 100–112. doi: 10.1037/a0029654
- Murray, C. & Greenberg, M. T. (2000). Children's relationships with teachers and bonds with school: An investigation of patterns and correlates in middle childhood. *Journal of School Psychology, 38*, 423–445.
- Murray, C., Murray, K. M., & Waas, G. A. (2008). Child and teacher reports of teacher–student relationships: Concordance of perspectives and associations with school adjustment in urban kindergarten classrooms. *Journal of Applied Developmental Psychology, 29*(1), 49–61. doi: 10.1016/j.appdev.2007.10.006
- Murray, C., Waas, G. A., & Murray, K. M. (2008). Child race and gender as moderators of the association between teacher-child relationships and school adjustment. *Psychology in the Schools, 45*(6), 562–578. 10.1002/pits.20324

- Newmann, F. M. (1992). *Student engagement and achievement in American secondary schools*. New York: Teachers College Press.
- NICHD Early Child Care Research Network. (2002). The relation of global first-grade classroom environment to structural classroom features and teacher and student behaviors. *Elementary School Journal, 102*, 367–387.
- Nix, R. L., Bierman, K. L., Domitrovich, C. E., & Gill, S. (2013). Promoting children's social-emotional skills in preschool can enhance academic and behavioral functioning in kindergarten: Findings from Head Start REDI. *Early Education and Development, 24*, 1000–1019. doi: 10.1080/10409289.2013.825565
- O'Connor, E. E., Dearing, E., & Collins, B. A. (2011). Teacher-child relationship and behavior problem trajectories in elementary school. *American Educational Research Journal, 48*, 120–162. doi: 10.3102/0002831210365008
- O'Connor, E., & McCartney, K. (2007). Examining teacher-child relationships and achievement as part of an ecological model of development. *American Educational Research Journal, 44*, 340–369. doi: 10.3102/0002831207302172
- Pianta, R. C. (2001). *Student-Teacher Relationship Scale—Short Form*. Lutz, FL: Psychological Assessment Resources.
- Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *The Classroom Assessment Scoring System (CLASS)*. Baltimore: Brookes Publishing.
- Pianta, R. C., & Steinberg, M. (1992). Teacher-child relationships and the process of adjusting to school. *New Directions for Child Development, 57*, 61–80. doi: 10.1002/cd.23219925706
- Prinstein, M. J., Brechwald, W. A., & Cohen, G. L. (2011). Susceptibility to peer influence: Using a performance-based measure to identify adolescent males at heightened risk for deviant peer socialization. *Developmental Psychology, 47*, 1167–1172. doi: 10.1037/a0023274



- Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., & Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *Journal of Educational Psychology, 104*, 700–712. doi: 10.1037/a0027268
- Richardson, J. C., & Newby, T. (2006). The role of students' cognitive engagement in online learning. *The American Journal of Distance Education, 20*(1), 23–37. doi: 10.1207/s15389286ajde2001\_3
- Rodkin, P. C., & Gest, S. D. (2011). Teaching practices, classroom peer ecologies, and bullying behaviors among schoolchildren. In D. Espelage & S. Swearer (Eds.), *Bullying in North American schools* (2nd Ed.). New York: Routledge, Taylor, Francis.
- Roorda, D. L., Koomen, H. M. Y., Spilt, J. L., & Oort, F. J. (2011). The influence of affective teacher-student relationships on students' school engagement and achievement: A meta-analytic approach. *Review of Educational Research, 81*, 493–529. doi: 10.3102/0034654311421793
- Rubin, K. H., Bukowski, W. M., & Parker, J. G. (1998). Peer interactions, relationships and groups. In W. Damon (Ed.), *Handbook of child psychology* (Vol. 3, pp. 619–700). New York: Wiley.
- Rulison, K. L., Feinberg, M., Gest, S. D., & Osgood, D. W. (2015). Diffusion of intervention effects: The impact of a family-based substance use prevention program on friends of participants. *Journal of Adolescent Health, 57*, 433–440. doi: 10.1016/j.jadohealth.2015.06.007
- Ruzek, E. A., Hafen, C. A., Allen, J. P., Gregory, A., Mikami, A. Y., & Pianta, R. C. (2016). How teacher emotional support motivates students: The mediating roles of perceived peer relatedness, autonomy support, and competence. *Learning and Instruction, 42*, 95–103. doi: 10.1016/j.learninstruc.2016.01.004

- Ryan, A. M. (2000). Peer groups as a context for the socialization of adolescents' motivation, engagement, and achievement in school. *Educational Psychologist, 35*(2), 101–111. doi: 10.1207/S15326985EP3502\_4
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78. doi: 10.1037/0003-066X.55.1.68
- Saft, E. W., & Pianta, R. C. (2001). Teachers' perceptions of their relationships with students: Effects of child age, gender, and ethnicity of teachers and children. *School Psychology Quarterly, 16*(2), 125–141. doi: 10.1521/scpq.16.2.125.18698
- Sinclair, M. F., Christenson, S. L., Lehr, C. A., & Anderson, A. R. (2003). Facilitating school engagement: Lessons learned from Check & Connect longitudinal studies. *California School Psychologist, 8*, 29–41.
- Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology, 100*, 765–781. doi: 10.1037/a0012840
- Skinner, E. A., Pitzer, J. R., & Steele, J. S. (2016). Can student engagement serve as a motivational resource for academic coping, persistence, and learning during late elementary and early middle school? *Developmental Psychology, 52*, 2099–2117. doi: 10.1037/dev0000232
- Split, J. L., Hughes, J. N., Wu, J.-Y., Kwok, O.-M. (2012). Dynamics of teacher-student relationships: Stability and change across elementary school and the influence on children's academic success. *Child Development, 83*, 1180–1195. doi: 10.1111/j.1467-8624.2012.01761.x

- Spilt, J. L., Koomen, H. M. Y., & Thijs, J. T. (2011). Teacher wellbeing: The importance of teacher-student relationships. *Educational Psychology Review*, *23*, 457–477. doi: 10.1007/s10648-011-9170-y
- Stormshak, E. A., Bierman, K. L., Bruschi, C., Dodge, K. A., Coie, J. D., & CPPRG (1999). The relation between behavior problems and peer preference in different classroom contexts. *Child Development*, *70*, 169–182. doi: 10.1111/1467-8624.00013
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics (5<sup>th</sup> Ed.)*. Boston: Allyn and Bacon.
- Thijs, J., Westhof, S., & Koomen, H. (2011). Ethnic incongruence and the student-teacher relationship: The perspective of ethnic majority teachers. *Journal of School Psychology*, *50*, 257–273. doi: 10.1016/j.jsp.2011.09.004
- Tseng, V., & Seidman, E. (2007). A systems framework for understanding social settings. *American Journal of Community Psychology*, *39*, 217–228. doi: 10.1007/s10464-007-9101-8
- U.S. Department of Education, National Center for Education Statistics (NCES), Common Core of Data (CCD). (2018). *Public elementary/secondary school universe survey, 2016–2017*. Accessed from [https://nces.ed.gov/programs/digest/d18/tables\\_dt18\\_216.75](https://nces.ed.gov/programs/digest/d18/tables_dt18_216.75)
- Valeski, T. N., & Stipek, D. J. (2001). Young children's feelings about school. *Child Development*, *72*(4), 1198–1213. doi: 10.1111/1467-8624.00342
- Valiente, C., Lemery-Chalfant, K., Swanson, J., & Reiser, M. (2008). Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *Journal of Educational Psychology*, *100*, 67–77. doi: 10.1037/0022-0663.100.1.67

- Wang, M.-T., & Fredricks, J. (2014). The reciprocal links between school engagement, youth problem behaviors, and school dropout during adolescence. *Child Development, 85*, 722–737. doi: 10.1111/cdev.12138
- Wang, F., Leary, K. A., Taylor, L. C., & DeRosier, M. E. (2016). Peer and teacher preference, student-teacher relationships, student ethnicity, and peer victimization in elementary school. *Psychology in the Schools, 53*, 488. doi: 10.1002/pits.21922
- Wang, M.-T., & Peck, S. C. (2013). Adolescent educational success and mental health vary across school engagement profiles. *Developmental Psychology, 49*, 1266–1276. doi: 10.1037/a0030028
- West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 56–75). Thousand Oaks, CA, Sage Publications, Inc.
- West, B. T., Welch, K. B., & Galecki, A. T. (2007). *Linear mixed models: A practical guide using statistical software*. Boca Raton, FL: Chapman & Hall.
- Wigfield, A., Eccles, J. S., Fredricks, J. A., Simpkins, S., Roeser, R., & Schiefele, U. (2015). Development of achievement motivation and engagement. In R. M. Lerner (Series Ed.) & M. Lamb (Volume Ed.), *Handbook of child psychology and developmental science, 7<sup>th</sup> ed. Vol. 3: Socioemotional processes* (pp. 657–700). New York: Wiley. doi: 10.1002/9781118963418.childpsy316
- Wilson, H. K., Pianta, R. C., & Stuhlman, M. (2007). Typical classroom experiences in first grade: The role of classroom climate and functional risk in the development of social competencies. *The Elementary School Journal, 108*(2), 81–96. doi: 10.1086/525548

- Wright, A., Gottfried, M. A., & Le, V.-N. (2017). A kindergarten teacher like me: The role of student-teacher race in social-emotional development. *American Educational Research Journal, 54*, 785 – 1015. doi: 10.3102/0002831216635733
- Wu, J.-Y., Hughes, J. N., & Kwok, O.-M. (2010). Teacher student relationship quality type in elementary grades: Effects on trajectories for achievement and engagement. *Journal of School Psychology, 48*, 357–387. doi: 10.1016/j.jsp.2010.06.004
- Yoon, J. S. (2002). Teacher characteristics as predictors of teacher-student relationships: Stress, negative affect, and self-efficacy. *Social Behavior and Personality, 30*(5), 485–493. doi: 10.2224/sbp.2002.30.5.485

## Appendix A

### Robustness Checks of Peer-nominated TSRQ's Predictive Value on Change in Academic Effort

A possible alternate explanation of the primary finding is that the construct of peer-nominated TSRQ is merely a proxy for being well-liked or considered “good” by classmates. These post-hoc robustness checks included several peer-nomination items known to be associated with the predictor of interest:

#### Other covariates: Peer report

In addition to the peer nomination items described above in Chapter 2, participants nominated peers on indices of *aggressive* (aggregate of 4 items) and *prosocial* behavior (aggregate of 2 items), and those with whom they *like most* and *like least* to play. *Peer-nominated social preference* was calculated for each child as the difference between “like most” and “like least” nomination proportion scores. *Academic reputation* was calculated for each child as the difference between “good at reading, knows the right answer when the teacher asks a question” and “not good at reading, doesn’t know the right answer when the teacher asks a question” nomination proportion scores.

Presented in Table A1, the following results are for the level 1 (individual-level) indices; the corresponding level 2 variables were also examined but none were significant. Peer-nominated prosocial behavior, while strongly correlated with peer-nominated TSRQ ( $r_{11} = .75, p < .001$ ) and a strong predictor of effort in its own right ( $B = 0.60, SE = 0.18, p < .001$ ), reduced but did not fully absorb the unique contribution of peer-nominated TSRQ ( $B = 0.24, SE = 0.09, p$

< .05). Aggressive behavior was significantly and inversely correlated with peer-nominated TSRQ ( $r_{t1} = -.73, p < .001$ ), and when added to the model did not significantly predict effort or reduce the association between TSRQ and effort ( $B = 0.52, SE = 0.12, p < .001$ ). Social preference was moderately correlated with peer-nominated TSRQ ( $r_{t1} = .48, p < .001$ ); when added to the model, social preference did not significantly predict change in teacher-rated academic effort ( $p < .10$ ) and absorbed only 15% of the variance explained by peer-nominated TSRQ ( $B = 0.38, SE = 0.08, p < .01$ ).

#### **Other covariates: Teacher report**

To address the possibility that teachers have an overall tendency to rate some students more positively than others in general, an index of overall *teacher-rated positive attribution* was added. The teacher-rated positive attribution index was constructed as an aggregate of 6 items representing teachers' perceptions of each participating student's social (popular with girls, popular with boys, has a lot of friends) and physical (good at sports, wins, physically strong) dominance among classmates. The composite was internally consistent ( $\alpha_{t1} = .84$ ) and stable across the school year ( $r_{1,3} = .77, p < .01$ ).

When added to the model (see Table A2), teachers' perception of student prosocial behavior was also a strong predictor of their perception of change in teacher-rated student effort ( $B = 0.36, SE = 0.02, p < .001$ ) and absorbed about half of the variance of peer-nominated TSRQ ( $B = 0.22, SE = 0.07, p < .001$ ). Teachers' perception of their students' social dominance was also a significant predictor of effort ( $B = 0.19, SE = 0.04, p < .001$ ) but did not detract from the predictive value of peer-nominated TSRQ ( $B = 0.43, SE = 0.07, p < .001$ ). When added to the model, teachers' perception of students' aggressive behavior (reverse-scored) was a significant

predictor of change in student effort ( $B = 0.32$ ,  $SE = 0.03$ ,  $p < .001$ ), and the predictive value of peer-nominated TSRQ did not change ( $B = 0.48$ ,  $SE = 0.08$ ,  $p < .001$ ).

## **Conclusion**

Peer-nominated TSRQ is not a proxy for social preference, perceptions of students' aggressive or prosocial behavior, or peer academic reputation. When added as covariates to the model as described in Chapter 3, prosocial behavior and academic reputation reduced but did not erase the estimate of peer-nominated TSRQ. Only through oversaturation of the model (i.e., adding multiple peer nomination covariates at once; see Model 6 of Table A1) could we "erase" the significant relationship between peer-nominated TSRQ and teacher-rated academic effort. Further, teacher-rated effort is not a proxy for how much that teacher thinks well of the student in general. That is, a teacher's overall tendency to rate a student positively (or negatively) does not fully explain or significantly reduce the influence of peer-nominated TSRQ on the change in that teacher's perception of student academic effort.



Table A1

*Predicting Teacher-rated Effort at End of Year, Controlling for Additional Peer-nomination Items and Effort at Baseline*

Peer Nom		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
		Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)
<i>TSRQ</i>	L1	0.45***	(0.07)	0.23*	(0.09)	0.52***	(0.12)	0.38***	(0.08)	0.21**	(0.07)	0.15+	(0.089)
	L2	-0.43*	(0.18)	-0.26	(0.29)	-0.81*	(0.27)	-0.46+	(0.25)	-0.41	(0.29)	-0.32	(0.34)
<i>Prosocial</i>	L1			0.62**	(0.18)							0.25	(0.18)
	L2			-0.64	(0.40)							-0.46	(0.42)
<i>Aggressive</i>	L1					0.19	(0.28)						
	L2					-1.43+	(0.75)						
<i>Social Preference</i>	L1							0.20*	(0.10)			-0.07	(0.09)
	L2							-0.02	(0.32)			0.28	(0.32)
<i>Academic Reputation</i>	L1									0.51***	(0.09)	0.50***	(0.09)
	L2									-0.12	(0.36)	-0.10	(0.35)

\*\*\* $p < .0001$ , \*\* $p < .01$ , \* $p < .05$ , + $p < .10$

*Note.* All models include the full set of covariates as specified in Table 4: student gender, ethnic minority status, and FRPL eligibility status (all at L1); proportion of class female, proportion of class ethnic minority, proportion of class FRPL-eligible, class size, responsive teaching (L2); and school.

Table A2

*Predicting Teacher-rated Effort at End of Year Controlling for Other Teacher-report Items and Effort at Baseline*

Peer Nom		Model 1		Model 2		Model 3		Model 4		Model 5	
		Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)
<i>TSRQ</i>	L1	0.45***	(0.07)	0.48***	(0.08)	0.46**	(0.08)	0.45***	(0.07)	0.48***	(0.09)
	L2	-0.43*	(0.18)	-0.54*	(0.22)	-0.55*	(0.21)	-0.65**	(0.21)	-0.57**	(0.21)
<i>Aggressive (rev score)</i>											
	L1			-0.01	(0.04)					-0.02	(0.03)
	L2			0.11	(0.09)					-0.01	(0.12)
<i>Prosocial</i>											
	L1					0.02	(0.04)			0.02	(0.04)
	L2					0.19	(0.08)			0.20	(0.11)
<i>Social Dominance</i>											
	L1							0.11***	(0.03)	0.13***	(0.04)
	L2							0.12	(0.11)	0.02	(0.13)

\*\*\* $p < .0001$ , \*\* $p < .01$ , \* $p < .05$

*Note.* All models include the full set of covariates as specified in Table 4: student gender, ethnic minority status, and FRPL eligibility status (all at L1); proportion of class female, proportion of class ethnic minority, proportion of class FRPL-eligible, class size, and responsive teaching (L2); and school.

## Appendix B

### Post-Hoc Analyses of Other Indices of Perceived Relatedness and Their Mediating Influence on the Relationship between TSRQ and Academic Effort

As our primary mediator of interest—student-rated teacher-child closeness—was nonsignificant, we tested several other potential indices of “relatedness”: student-reported sense of peer community and student-reported school bonding. Following a similar strategy of Rulison and colleagues (2015), sequential multilevel models examining these potential mediators are presented in Table B1.

#### Other measures of perceived relatedness: Student report

Students’ *sense of peer community* was conceptualized as the degree to which the student perceived classmates as supportive and caring. Items were adapted from the Sense of Community Scale (Battistich, Solomon, Kim, Watson, & Schaps, 1995). Students responded to 5 items (e.g., Kids in my classroom treat each other with respect) on a 5-point Likert scale (1 = *Never*, 3 = *Sometimes*, 5 = *Always*). At all grade levels, the 5-item scale was internally consistent: 1<sup>st</sup> grade  $\alpha_{12} = .80$ , 3<sup>rd</sup> grade  $\alpha_{12} = .87$ , 5<sup>th</sup> grade  $\alpha_{12} = .88$ . An aggregate score was used in analyses. *Student-rated school bonding* was derived from items adapted from measures of student bonding and motivation (Hawkins et al., 2001; Murray & Greenberg, 2000; Ryan, 2000) and included 8 items assessing students’ general feelings of relatedness toward school and achievement ( $\alpha_{12} = .89$ ,  $r_{1,3} = .55$ ,  $p < .01$ , e.g., “I feel like I really belong at school,” “I like going to school”).

## Results

Student-rated sense of peer community was only associated with change in teacher-rated effort at the trend level ( $B = -0.04$ ,  $SE = 0.02$ ,  $p = .06$ ) and was not significantly associated with Time 1 peer-nominated TSRQ. Student-rated school bonding was significantly predicted by Time 1 peer-nominated TSRQ ( $B = 0.20$ ,  $SE = 0.08$ ,  $p < .01$ ), but it did not predict change in teacher-reported effort.

## Conclusion

In this sample, the relationship between peer-nominated TSRQ and change in teacher-rated effort is also not mediated by students' sense of relatedness among their peers in the classroom or their general feeling of belonging at or bonding with school.

Table B1

*Mediation via Indices of Relatedness (Unstandardized estimates)*

	Model A		Model B		Model C	
	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)
<i>Intercept</i>	1.45**	(0.17)	1.21**	(0.16)	1.31**	(0.20)
<i>Individual-level (L1)</i>						
Peer-nominated TSRQ <sub>(T1)</sub>	0.45**	(0.07)	0.47**	(0.07)	0.46**	(0.08)
Student-rated sense of peer community <sub>(T2)</sub>			-0.03	(0.02)		
Student-rated school bonding <sub>(T2)</sub>					0.04	(0.03)
<i>Classroom-level (L2)</i>						
Peer-nominated TSRQ aggregate <sub>(T1)</sub>	-0.52*	(0.22)	-0.63*	(0.24)	-0.64**	(0.23)
Student-rated sense of peer community agg. <sub>(T2)</sub>			0.48**	(0.15)		
Student-rated school bonding agg. <sub>(T2)</sub>					0.004	(0.16)

\*\* $p < .01$ , \* $p < .05$ , + $p < .10$

*Note.* All models include baseline of the predictor of interest and the full set of covariates as specified in Table 4: student gender, ethnic minority status, and FRPL eligibility status (all at L1) and proportion of class female, proportion of class ethnic minority, proportion of class FRPL-eligible, class size, and responsive teaching (L2)

## Vita

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#### EDUCATION

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- 2019      **Pennsylvania State University**  
*Ph.D. Human Development and Family Studies*
- 2007      **New York University**  
*M.A. Educational Psychology*
- 2005      **University of Notre Dame**  
*B.A. Psychology and Anthropology, Minor in Music*

#### SELECTED RESEARCH EXPERIENCE

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- 2017–present      Research Project Manager, *Safe and Healthy Communities Initiative* (co-PIs Jennie G. Noll & Katelyn M. Guastaferrro)
- 2009–2017      Graduate Research Assistant, *Classroom Peer Ecologies Project* (co-PIs Scott D. Gest & Philip C. Rodkin; funded by the Institute of Education Sciences, Spencer Foundation, and William T. Grant Foundation)
- 2009–2014      Training Interdisciplinary Education Scientists (TIES) Predoctoral Research Fellowship (funded by the Institute of Education Sciences)
- 2007–2009      Project Coordinator, *Chicago School Readiness Project* (PI C. Cybele Raver; funded by NICHD, Spencer Foundation, and William T. Grant Foundation)
- 2006–2007      Field Research Assistant, *New York City Study of Social and Literacy Development* (PI J. Lawrence Aber, co-Is Joshua L. Brown & Stephanie M. Jones; funded by IES as part of national Social and Character Development program evaluation)

#### SELECTED TEACHING EXPERIENCE

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- 2014–2017      **Lab Instructor**, *HDFS 312: Empirical Inquiry*
- 2015–2016      **Teaching Assistant**, *HDFS 311: Introduction to Interventions*, *HDFS 453: Family Participation and Involvement in Child Services*

#### AWARDS AND HONORS

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- 2016      Harold F. Martin Graduate Assistant Outstanding Teaching Award
- 2009–2010      Hintz Graduate Education Enhancement Fellowship

#### SELECTED PAPERS AND PRESENTATIONS

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- Braun, S. S., **Zadzora, K. M.**, Miller, A. M., & Gest, S. D. (2019). Predicting elementary teachers' efforts to manage social dynamics from teacher characteristics and the early year peer ecology. *Social Psychology of Education, 22*, 795–817. doi: 10.1007/s11218-019-09503-8
- Gest, S. D., Madill, R. A., **Zadzora, K. M.**, Miller, A. M., & Rodkin, P. C. (2014). Teacher management of elementary classroom social dynamics: Associations with changes in student adjustment. *Journal of Educational and Behavioral Disorders, 22*, 107–118. doi:10.1177/1063426613512677
- Zadzora, K. M.**, Braun, S., & Gest, S. D. (2015). Teacher perspectives on managing social relationships and student perceptions of relatedness in the elementary classroom. In K. Granger (Chair), *The interplay between student-teacher relationships, peer ecologies, and classroom experiences*. Paper symposium presented at the Biennial Meeting of the Society for Research in Child Development, Philadelphia, PA.
- Zadzora, K.**, Gest, S. D., Madill, R. A., & Rodkin, P. C. (2014). Teacher perspectives on managing social relationships in the elementary classroom. In S. D. Gest (Chair), *Teacher-student interaction patterns: Integrating models of instructional and social dynamics in the classroom*. Paper symposium presented at the Annual Meeting of the American Education Research Association, Philadelphia, PA.