

THE EFFECT OF CHANGES IN TEACHER-STUDENT RELATIONSHIP QUALITY
ON STUDENTS' TRAJECTORIES FOR INTERNALIZING BEHAVIORS

A Dissertation

by

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ABSTRACT

Internalizing problems are prevalent among school-aged children and have a significant negative impact on social and academic outcomes. Despite well-established evidence for the influence of teacher-student relationship quality on students' school adjustment, few studies have investigated whether intra-individual differences in internalizing symptom trajectory at a certain time point can be explained by children's relationships with their teachers.

The study's sample consisted of 746 ethnically diverse, academically at risk students recruited from one of three school districts in Texas. Annual assessments from grades 1 to 4 included peer sociometric ratings of teacher-student relationship quality and teacher ratings of child internalizing and externalizing symptoms. Latent growth modeling was utilized to examine between- and within-child associations between teacher-student relationship quality and children's internalizing symptoms using hypothesized models. Results suggest that high-quality relationships with teachers are associated with fewer internalizing behaviors in school, especially, among students with elevated internalizing symptoms. These findings are well-situated in the literature, which supports the teacher-student relationship as a developmental context that can benefit children's school adjustment. Findings have important implications for understanding the trajectories of internalizing symptoms in children and possible strategies for intervention.

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Internalizing behaviors are common among school-aged children and are associated with a wide array of negative outcomes. Internalizing symptoms include depressed mood, anxious reactions, social inhibition, withdrawn behaviors, and somatic symptoms. Although diagnosed as distinct conditions, childhood mood and anxiety disorders often have overlapping and co-occurring symptoms (Whitcomb & Merrell, 2013) and are frequently grouped together for research under the general domain of internalizing behaviors.

Existing literature provides consistent evidence that children with internalizing symptoms have a greater likelihood of experiencing social and academic problems (Schwartz, Gorman, Duong, & Nakamoto, 2008), which represent both a cause and consequence of children's emotional distress (Merrell, 2008). For instance, children experiencing internalizing problems tend to be less liked by peers (Verduin & Kendall, 2008), to be more frequently excluded (Gazelle & Ladd, 2003), to have lower social competence (Ladd, 1999; Beidel, Turner, & Morris, 1999), and to have higher rates of academic underachievement (Kessler, Foster, Saunders, & Stang, 1995). Children with early internalizing symptoms remain at increased risk for internalizing disorders throughout adolescence and into adulthood (Kovacs & Devlin, 1998), particularly children with earlier onset and greater symptom severity (Merrell, 2008).

Internalizing and externalizing behaviors are conceptualized as two broad categories by which children display emotional distress. Literature provides consistent evidence that various emotional and behavior problems often co-occur, such that children diagnosed with internalizing disorders are more likely to exhibit both other internalizing as well as externalizing disorders (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Both externalizing and internalizing problems are associated with negative emotionality (Lemery, Essex, & Smider, 2002) and may in fact both be characterized by deficits in children's self-regulation, specifically disinhibition (Krueger & Markon, 2006). Because of the overlap between externalizing and internalizing behaviors, it is important to statistically control for children's levels of externalizing problems.

Because childhood internalizing problems, particularly anxiety, often begin during the early school years, identification of processes and contextual factors in the school context by which early risk for internalizing problems is magnified or diminished is needed. The development and maintenance of internalizing problems involves interactions between child characteristics, such as physiological and behavioral stress reactivity (Essex, Armstrong, Burk, Goldsmith, & Boyce, 2011) and temperament (Ormel et al., 2005), and environmental experiences (Kendler, Neale, Kessler, Heath, & Eaves, 1992), notably children's social environment. For elementary-aged children, much of their day is spent in school; correspondingly, the majority of their social relationships and interactions occur in the school context. Within the school context, teachers engage in countless daily interactions with their students, which impact

students' behavior, motivation for learning, and relationships with peers. Thus, high-quality teacher relationships may provide one such supportive context for buffering students against risk for internalizing problems.

Importance of Teacher-Student Relationships

Teacher-student relationships, characterized as bidirectional and dynamic in nature, provide an important context for student psychological development across school experiences. A large body of research provides evidence for the positive short and long-term influence of warm, supportive relationships for a variety of student outcomes. Children's school adjustment is improved by positive relationships with teachers (e.g., Birch & Ladd, 1997; Hamre & Pianta, 2001; Pianta & Stuhlman, 2004). Positive teacher-student relationships have been found to predict children's engagement in the classroom, acceptance by peers, social skill development, and academic achievement (Hughes, Luo, Kwok, & Loyd, 2008; Meehan, Hughes, & Cavell, 2003; Berry & O'Connor, 2010; McCormick, O'Connor, Cappella, & McClowry, 2013). Students with a warm, supportive relationship with their teacher better develop the ability to recover from failure, take risks, and ask for help, as well as display resilience in the face of stress (Little & Kobak, 2003; Ahnert, Harwardt-Heinecke, Kappler, Eckstein-Madry, & Milatz, 2012). Warm teacher relationships contribute to children's development of emotional and behavioral self-regulation (Baker, Grant, & Morlock, 2008; Hamilton & Howes, 1992). Students who have relationships with teachers that are characterized by high levels of support and low levels of conflict experience beneficial effects beginning in the early grades and continuing through middle school (Hamre &

Pianta, 2001). Because students experience individual differences in typical levels of teacher support across elementary school, it is important to control for a student's mean level of teacher support when examining year-to-year fluctuations.

Theoretical Perspectives on Teacher-Student Relationship Quality

Conceptualizing the influence of the affective quality of teacher-student relationships, researchers have drawn from a range of theoretical perspectives, most notably attachment theory (Bowlby, 1980) and self-determination theory (Deci & Ryan, 1985, 1991; Ryan, 1995). These frameworks jointly contribute to our understanding of the mechanisms by which teacher-student relationships influence student behavioral as well as social-emotional and academic outcomes.

Attachment Theory

For preschool and elementary-age children, researchers have primarily used attachment theory to conceptualize the association between teacher-student relationships and student behavioral and emotional adjustment (Sabol & Pianta, 2012). From an attachment theory perspective, children are motivated to seek proximity to significant adults, who represent attachment figures, when they feel threatened or distressed (Bowlby, 1980). When a caregiver consistently and sensitively responds to a child's needs, the child feels safe and develops a mental representation, or internal working model, that adults will be available to meet his or her needs. Children with this positive, secure attachment learn that they are worthy of the care and attention they receive. Furthermore, their feelings of emotional security and psychological closeness with a caregiver foster adaptive skills for social development (Thompson, 2008), including

emotional regulation, the understanding of other's emotions and positive attribution of other's behaviors (Raikes & Thompson, 2006; Cassidy, Kirsh, Scolton, & Parke, 1996; Nachmias, Gunnar, Mangelsdorf, Parritz, & Buss, 1996). According to an attachment perspective, insecure attachment initiates pathways in early childhood that represent a risk factor for later internalizing problems (Weinfield, Sroufe, Egeland, & Carlson, 2008; Kochanska, 2001).

Building on well-established research with the mother-child relationship (Ainsworth, Blehar, Waters, & Wall, 1978), more recent research on the teacher-student relationship has used an extended attachment perspective to conceptualize how teachers provide children a source of security and support, particularly in the early years of school (Birch & Ladd, 1997; Pianta & Steinberg, 1992). Although theorists disagree as to how readily children's internal working models change (Thompson, 2008), they agree that subsequent social experiences, such as the dyadic teacher-student relationship, may influence students' internal working models. For instance, a supportive teacher may lead students with early insecure relationships to revise their internal working models, which in turn may positively influence future relationships and interactions (Sabol & Pianta, 2012). In support of this explanation, O'Connor, Collins, and Supplee (2012) found that teacher-student relationships mediated the effects of maternal attachment on internalizing and externalizing problems in grade 5. Furthermore, a secure student-teacher relationship is associated with children's ability to respond more calmly during adverse classroom experiences with teachers or peers (Little & Kobak, 2003). Within the classroom context, students who are better able to manage negative emotions, such as

anger and sadness, may establish more positive peer relationships (Denham et al., 2003) and adopt a generally more adaptive pattern of interactions and relationships with peers and teachers.

Self-determination Theory

Providing another important framework for examining teacher-student relationships, self-determination theory posits that factors in children's social context contribute to their development of self-motivation, engagement, and psychological health (Ryan & Deci, 2000). According to self-determination theory, individuals have three basic psychological needs: competence, autonomy, and relatedness. Competence is fostered by structure (e.g., consistent consequences; Connell, 1990), autonomy by autonomy support (e.g., provision of choice; Deci & Ryan, 1985), and relatedness by the involvement of others (e.g., communication of interest in the individual; Connell, 1990). The extent to which these needs are met in a particular social context, such as a child's classroom context, determines the individual's level of engagement in that context, which subsequently impacts the individual's level of skills and abilities as well as psychological adjustment (Connell & Wellborn, 1991).

A large body of research with children in the school context has found that fulfillment of these basic psychological needs contributes to students' improved learning outcomes, including higher academic achievement, self-regulated learning, and psychological well-being (Niemic & Ryan, 2009). In addition to research that has examined outcomes of general school adjustment, research on internalizing symptoms supports this premise. For instance, a study with third and seventh-grade students in

Montreal found that greater student-rated need satisfaction (for autonomy, competence, and relatedness) in the school context was concurrently associated with lower student-rated depressive symptoms and predicted lower depressive symptoms 6 weeks later, controlling for gender, grade, and initial level of depressive symptoms (Véronneau, Koestner, & Abela, 2005).

Although teachers influence all aspects of the class context, teachers may be particularly important for fulfilling students' need for relatedness. In line with self-determination theory, research indicates that when teachers communicate enjoyment and interest in students, students are more engaged and motivated, which in turn lead to improved social and academic outcomes. For example, in sample of academically at-risk first grade students, Hughes and colleagues (2008) measured teacher support, student engagement, and academic achievement for three consecutive years and found that the effect of teacher support on academic achievement was mediated by its direct effect on students' effortful engagement (i.e., persistence, effort, attention), controlling for prior levels of all variables. Another study found that the effect of teacher support on students' peer acceptance was mediated by its effect on students' effortful and cooperative engagement (Hughes & Kwok, 2006). These studies suggest that supportive teacher-student relationships in first grade foster children's self-regulated learning and engagement, which leads to future academic success and positive relationships with teachers and peers. Thus, consistent with self-determination theory, teacher-student relationships have both direct and indirect effects on student social-emotional and academic adjustment.

Teacher-Student Relationships and Student Internalizing Behaviors

Both teachers and students bring their own expectations, experiences, and characteristics that influence the reciprocal and dynamic teacher-student relationship. Teachers' responses to children in their class vary based on their perceptions of children's behaviors and needs. In general, literature suggests that teachers are more likely to refer students with externalizing than internalizing problems for help, including more frequent referrals for special education testing (Layne, Bernstein, & March, 2006). Thus, children with internalizing problems may receive less external support. Recent research has examined the pattern of interactions between teachers and socially inhibited children, which is a somewhat overlapping construct to internalizing symptoms. Socially withdrawn children tend to have lower level of closeness with teachers than their peers (e.g., DeMulder, Denham, Schmidt & Mitchell, 2000), which was found to be associated with passive and withdrawn behaviors during interactions with teachers (e.g., Roorda, Koomen, Spilt, Thijs & Oort, 2013). When interacting with withdrawn/anxious students compared to their typical peers, teachers are more likely to initiate interactions (Evans & Biernert, 1992) and display more controlling and dominant behaviors (Roorda et al., 2013). Dominating teacher behaviors appear to have the opposite of the desired effect, eliciting further passivity and withdrawal in children (Evans & Biernert, 1992; Roorda et al., 2013). These findings suggest that, contrary to what may be a teacher's natural response, less directive teacher behaviors provide a more supportive context for withdrawn children.

Although teachers contribute to all students' academic and behavioral development, students with early emotional or behavioral problems are most influenced by the quality of the teacher-student relationship (Hamre & Pianta, 2001; Meehan, Hughes, & Cavell, 2003). Teachers' assuming the role of a supportive and caring figure may be particularly important for students who are sad, fearful, anxious or withdrawn. Across children's early school years, children who have difficulties regulating their emotions and behaviors are at increased risk of maintaining a stable pattern of maladaptive thoughts (e.g., negative attribution bias) and behaviors (e.g., social withdrawal). This finding suggests the importance of considering trajectories of student internalizing symptoms. Although developmental and epidemiological (e.g., Merikangas et al., 2010) research provides some evidence that children's level of internalizing symptoms have continuity over time, little research has examined internalizing problem trajectories over the early elementary years or investigated whether intra-individual differences in trajectory at a certain time point can be explained by children's relationships with their teachers. Because of the association of gender with teacher-student relationship quality and internalizing symptoms (Henricsson & Rydell, 2004; Baker, 2006), it is important to consider student gender as a covariate when examining the influence of teacher support on internalizing symptoms.

Trajectories of Internalizing Symptoms

A limited number of studies have examined the risk and protective factors in children's trajectories for internalizing symptoms. Research suggests that identifying trajectories versus measuring average levels of internalizing symptoms is important to

understanding contextual and developmental factors that influence children's internalizing symptoms. For instance, Booth-LaForce and Oxford (2008) identified 3 trajectory patterns of teacher-reported social withdrawal across grades 1 to 6 and found that students with an increasing trajectory (versus stable low and high decreasing trajectories) were more likely to experience future maladjustment (loneliness and peer exclusion). Furthermore, differences in internalizing trajectories are associated with varying levels of indices of social adjustment, including relationships in the school context. An Australian study with children ages 3 to 15 years identified 6 separate trajectories for internalizing symptoms for both boys and girls and found that recovery from elevated symptoms was associated with higher levels of social competence, positive parent and peer relationships, and school adjustment (Letcher, Smart, Sanson, & Toumbourou, 2009). Considering the well-established evidence for the influence of teacher-student relationship quality on students' school adjustment and findings of various trajectories of children's internalizing symptoms (i.e., differences in both level and rate of change of symptoms among children), it is surprising that studies have only recently examined the influence of teacher-student relationship quality on the trajectory of student internalizing symptoms.

Within-child Effect of Teacher Support

Recent studies have identified various individual trajectories of internalizing problems to examine processes that influence children's internalizing symptoms. Whereas between-child comparisons focus on associations between average teacher-student relationship quality and average levels of student outcomes (e.g., closer teacher-

student relationships are associated with fewer internalizing problems; Baker, 2006; Murray & Murray, 2004), within-child comparisons focus on whether *changes* in individual child functioning are associated with *changes* in teacher-student relationship quality. One major limitation of the between-child design is that omitted third variables (e.g., child temperament or social skills) may explain associations. Although studies with a between-child design often control for a range of relevant covariates, one cannot account for all possible variables that may confound the analysis. The within-child design reduces possible bias from child characteristics that remain constant across time, though the possibility of unobserved time-varying variables and reciprocally-related variables still limits the ability to draw causal conclusions. Two studies that have included within-child analyses are examined in further detail.

The first study utilized both within- and between-child designs to examine the association between teacher-student relationship quality and children's behavior problems across kindergarten to grade 5. Using a large, relatively low-risk NICHD longitudinal study sample, Maldonado-Carreño and Votruba-Drzal (2011) found that higher average teacher-child relationship quality predicted modestly lower average levels of mother and teacher-reported internalizing problems, above prior levels of internalizing symptoms and a number of covariates for relevant child, home, and school characteristics. In other words, between-child comparisons revealed that, on average, children with more positive teacher-student relationships had lower mother- and teacher-reported internalizing problems across elementary school. Furthermore, between-child comparisons found that *growth* in average levels of internalizing problems (mother- and

teacher-rated) was not predicted by average levels of teacher-student relationship quality. However, considering individual students' trajectories of internalizing behavior problems (within-child), results indicated that increasing trajectories of teacher-student relationship quality were associated with decreasing trajectories of teacher- and mother-reported internalizing problems across elementary school, above prior levels of internalizing problems and relevant covariates.

The second longitudinal study, which followed students from early childhood to grade 5 (O'Connor, Dearing, & Collins, 2011), identified 4 trajectories of internalizing behavior problems (Very Low, Low, Moderate, High) and four developmental trajectories of teacher-relationship quality (Poor-worsening, Poor-improving, Strong-worsening, and Strong) using a relatively low-risk sample (e.g., excluded mothers that did not speak English) from NICHD Study of Early Child Care and Youth Development. The results indicated no main effect associations between teacher-student relationship (combined teacher-rated conflict and closeness) trajectories and level of parent-rated internalizing problems. However, for children with elevated levels of internalizing symptoms in early childhood (age 54 months), high-quality teacher-student relationships buffered against future parent-reported internalizing problems. Specifically, among children with elevated early internalizing problems, children in the Strong teacher-student relationship group were less likely to have elevated internalizing symptoms in grade 5, whereas children in the Strong-worsening and Poor-worsening groups were more likely to have elevated internalizing symptoms. Consistent with an extended attachment perspective, this finding suggests that more vulnerable children, such as

those with early internalizing problems, are more dependent than their classmates on a teacher's attachment role, involving the provision of external support for emotion regulation. In addition, this study suggested that trajectories of teacher-student relationship quality rather than measures at one point in time may be important; specifically, decreasing teacher-student relationship quality may be particularly detrimental.

These two recent studies (Maldonado-Carreño & Votruba-Drzal, 2011; O'Connor et al., 2011) contributed to the literature by providing more stringent control against confounding variables that are constant across time through the use of within-child comparisons. Furthermore, the results extended earlier findings that improved teacher-student relationships may be beneficial beyond the kindergarten and early elementary school years. Though both studies benefited from large longitudinal samples from multiple cities in the United States, the generalizability of study findings was limited by the exclusion of some students with demographic characteristics that place them at higher risk for academic and social difficulties. With a sample at higher risk for poor school adjustment, teacher-student relationships may have a stronger role in attenuating risk. For instance, teacher support may be especially important for students who are at risk for poor school outcomes due to poverty. In a sample of sixth grade students from high poverty neighborhoods, Niehaus, Rudasill, and Rakes (2012) found a protective effect of student-perceived school support (i.e., the degree to which teachers care about students and students' sense of being supported) on academic outcomes. Specifically, students who reported smaller than average declines or growth in school

support across the sixth grade school year had higher academic achievement than students that reported larger declines (Niehaus et al., 2012).

Limitations to Existing Literature

Despite their contributions, the existing literature has several limitations. Most studies have relied on teacher ratings for both teacher support and student behavior problems (e.g., Baker et al., 2008), introducing possible bias due to a shared source. A few have included parent ratings of behavior problems (Pianta & Stuhlman, 2004; Maldonado-Carreño & Votruba-Drzal, 2011; O'Connor et al., 2011) to mitigate problems with shared-rater variance; however, parent perceptions are limited due to parents lacking direct observation by which to judge student emotional and behavioral functioning in the classroom. Because environmental factors influence children's social, emotional, and behavioral functioning (and variations by setting are particularly prominent for younger children), ratings from the context of interest are needed to accurately reflect child adjustment (Myers & Winters, 2002). In other words, individuals that directly observe students' classroom (e.g., classmates or teachers) would be most relevant to measuring school adjustment.

Peer Perceptions of Teacher Support

Research indicates that peers are valid informants regarding classmates' social behaviors, including teacher-student relationships. Peer ratings represent the combination of a number of individual student perspectives, which would suggest an advantage of increased reliability for this method. Peer ratings and nominations have been well-established as a means to assess children's social behavior (Hughes, 1990),

though few studies have directly assessed peer perceptions of children's teacher-student relationship quality (Hughes, Im, & Wehrly, 2013; Hughes, Cavell, & Willson, 2001; Hughes, Zhang, & Hill, 2006). Many existing studies rely on teacher-rated teacher-student relationship quality, which is limited due to the possibility of social desirability bias. Providing support for the use of peer reports, in a study that examined the child, teacher, and peer reports for teacher-student relationship quality, peer reports had the greatest trait variance and the smallest method variance (Li, Hughes, Kwok, & Hsu, 2012). Authors suggested that peer-reported teacher-student relationship quality, relative to the commonly used teacher-reported data, may prove particularly beneficial for longitudinal studies because peer ratings are less influenced by individual rater effects. Peer ratings of teacher-student relationship quality will be used in the current study.

Teacher Ratings of Student Internalizing Symptoms

Teacher ratings are commonly used to measure student internalizing behavior problems. Within the school context, teachers are afforded the opportunity to directly observe students in a variety of social and academic situations, and teachers have the advantage of the reference point of the student's peers in the same context that can be used to detect deviations from typical functioning. Self-report is typically considered preferable for detecting internalizing problems with older children and adolescents (Myers & Winters, 2002); however, literature supports that teacher report provides a valid source of information about internalizing behaviors that impact functioning for elementary-age students. In comparison with parents as raters, teachers are more sensitive to elementary-age students' self-perceived internalizing symptoms, as

demonstrated by higher and significant student-teacher correspondence in ratings of students' depression and anxiety (Messman & Koot, 2000).

CHAPTER II

THE PRESENT STUDY

Overall, existing literature establishes the basis for examining the influence teacher-student relationship quality on student internalizing behaviors. Limited research has examined these relationships across the early elementary grades using more recent methods for control (i.e., time-varying covariate) and to the best of the author's knowledge, no study has examined this research question using peer-rated teacher-student relationship quality.

The current study was designed to examine the trajectories of students' internalizing symptoms from grades 1 to 4 and to test the effect of peer-rated teacher-student relationship quality on teacher-reported student internalizing symptoms. The time period of grades 1 to 4 was selected because of the frequency of early concerns with children's internalizing symptoms, the importance of the formation of patterns in teacher-student interactions in early school years, and the need for research on internalizing symptoms and teacher-student relationships to extend beyond the preschool to grade 1 range. Building on and extending prior research, the current study examines the following: (1) Does teacher-student relationship quality in one year influence student internalizing behaviors in that year, controlling for the students' average trajectory of internalizing behaviors? (2) Does the effect of supportive teacher-student relationships differ for students with elevated internalizing behaviors, relative to students without elevated internalizing behaviors?

Hypotheses

Drawing from attachment theory (Belsky & Nezworski, 1988) and self-determination theory (Deci & Ryan, 1985), it is expected that the provision of warm and supportive relationships with a teacher in the early grades would be associated with lower internalizing behaviors in that year, relative to the student's own trajectory. Based on the notion that more vulnerable children rely more heavily on a teacher's attachment role (Verschuere & Koomen, 2012), students with elevated internalizing behaviors are expected to experience a greater benefit from positive teacher-student relationships.

Methods

Participants

Participants were drawn from a larger longitudinal study sample of 784 students attending one of three school districts (1 urban and 2 small cities) in southeast and central Texas. Children participating in the longitudinal study examining the impact of grade retention on academic achievement were recruited across two sequential cohorts in first grade during the fall of 2001 and 2002. Children were eligible to participate in the larger study if they scored below the median score for their school district on a state-approved, district-administered measure of literacy, spoke either English or Spanish, were not receiving special education services, and had not been previously retained in first grade. Details on the recruitment of the 784 participants are described in Hughes and Kwok (2006). No evidence of selective consent was found.

Of the larger sample of 784 children, 746 (95%) met the following criteria for participation in the current study: had data for each of the major variables (i.e., teacher

ratings of internalizing behaviors and peer sociometric ratings of teacher support) for at least one assessment wave. Measures of internalizing symptoms and teacher support were assessed in each year (Year 1 to Year 4). Based on a large number of demographic and school adjustment variables measured in first grade, no evidence of selective attrition was found.

Of the 746 participants in the current study, 388 (52%) were male, and the racial/ethnic composition was 38.2% Hispanic, 33.9% Caucasian, 22.7% African American, 3.5% Asian/Pacific Islander and 1.7% Other. The majority of participants were ages six (85.4%) or seven (13.3%) years upon entering the study ($M = 6.6$ years, $SD = 0.39$). Of the study sample, 108 students (14.5%) were enrolled in bilingual classes in first grade. On the basis of family income, 58.8% of participants were eligible for free or reduced lunch at Year 1. The highest educational level in the household was a high school certificate or below for 36.6% of participants at Year 1. Children's mean Broad Reading and Broad Math Woodcock Johnson III (Woodcock, McGrew, & Mather, 2001) achievement standard scores at Year 1 were 96.5 ($SD = 18.2$) and 100.8 ($SD = 14.3$), respectively. At year 1, children's mean full scale IQ score on the Universal Nonverbal Intelligence Test (UNIT; Bracken & McCallum, 1998) was 93.1 ($SD = 14.7$). In Year 1, participants were located in 199 different classrooms.

As is typical in longitudinal studies, not all participants had complete data on study variables. The overall level of missingness for all study variables was 20.0%. The level of missingness for study variables ranged from 9% for Year 1 teacher-rated

variables to 30% for Year 4 teacher-rated variables (see Table A-1). Attrition analyses were consistent with the assumption that data were missing at random.

Assessment Overview

Assessments were conducted annually (Year 1 to Year 4), beginning when participants were in first grade (Year 1). Baseline measures of study variables were collected in Year 1. Teacher questionnaires, which included ratings of student internalizing and externalizing symptoms, were administered each spring. Teachers received \$25 for completing and returning the questionnaires. The teacher with whom the child spent the most time completed the questionnaire. Additionally, classmates' sociometric ratings of teacher-student relationships were collected in the spring annually. Finally, parent educational attainment was collected from parent questionnaires in the spring of Year 1. Parents or guardians received a \$25 incentive for completing and returning the questionnaire.

Measures

Teacher-rated internalizing and externalizing behaviors. Student internalizing (*INT*) and externalizing (\overline{EXT}) behaviors were measured using teacher ratings on the Emotional Symptoms and Conduct Problems scales of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997; see Appendix B for items). The SDQ is a commonly used and well-validated screener that has been utilized by the National Institute of Mental Health to assess children's and adolescents' emotional and behavioral problems in large-scale national surveys (e.g., Bourdon, Goodman, Rae, Simpson, &

Koretz, 2005; Kessler et al., 2009). Research using the current study's sample provides evidence of good reliability and validity for the SDQ (Hill & Hughes, 2007).

The SDQ scales are correlated with more lengthy measures of questionnaires of child behavior problems, such as the Child Behavior Checklist (Achenbach, 1991); the Emotional Symptoms and Conduct Problems scales of the SDQ correspond to the CBCL Internalizing and Externalizing scales, respectively (Goodman & Scott, 1999). Teachers marked each item on the SDQ using a 0 to 2 scale, indicating *not true*, *somewhat true*, or *certainly true*. Cronbach's alpha for the 5-item Emotional Symptoms scale across Years 1 through 4 ranged from .69 to .79. Cronbach's alpha for the 5-item Conduct Problems scale over Years 1 through 4 ranged from .82 to .83. The mean of teacher-rated student externalizing behaviors across Year 1 to 4 (\overline{EXT}) was created by calculating the mean Conduct Problems scale score for each student across Years 1 to 4.

Peer-rated teacher-student relationship quality. Teacher-student relationship quality (*TSREL*) was assessed using peer sociometric procedures with each student's classmates (Masten, Morison, & Pelligrini, 1985). In individual interviews, child participants were asked to name classmates who best fit each of several behavioral descriptors. Students were asked to nominate classmates that had warm teacher-student relationships (i.e., "Some kids get along well with their teachers. They like to talk to their teachers, and their teachers enjoy spending time with them."). Although only children with written parent consent provided nominations, all children in the class were eligible to be nominated for each descriptor. Children could name as few or as many classmates as they wanted for each descriptor. A child's peer nomination score for each

item was obtained by summing all nomination received and standardizing the score within the classroom. Because reliable and valid sociometric data can be collected using the unlimited nomination approach when as few as 40% of children in a classroom participate (Terry 1999, 2000), sociometric scores were computed only for students located in classrooms in which at least 40% of classmates participated in the sociometric assessment. The mean rate of classmate participation in sociometric administrations was 63.5%, 69.5%, 74.1%, 70.5%, for years 1 to 4, respectively, and the median number of children in a classroom providing nominations at years 1 to 4 was 11, 13, 13, and 13, respectively. The \overline{TSREL} variable was created by calculating each student's mean teacher-student relationship score across Years 1 to 4, and then subtracting the mean teacher-student relationship score for all students in the sample (i.e., centering around the sample mean).

Time. A *TIME* variable was created to represent each time period of data observations in the current study. For the current study, *TIME* represented four time periods, including first grade (Year 1) through fourth grade (Year 4). The *TIME* variable was centered at first grade (Year 1) so that *TIME* zero represents the first grade measurement period. This permits the interpretation of the Level 1 (between-child) intercept as the average initial status in internalizing symptoms when all other conditional predictors are zero.

Parent educational attainment and gender. Parent educational attainment was measured using a parent questionnaire that asked parents to indicate the highest level of education of any adult in the household. Educational attainment was coded on an 8-point

scale (1 = elementary school; 4 = GED; and 8 = PhD or equivalent). Gender (*GENDER*) was attained based on school records.

Multiple Imputation

Not all participants had complete data on the 4 covariates or on the variables used in the latent growth models. Of the original sample of 784 students, 9%, 19%, 28%, and 30% of participants had incomplete data for the teacher-rated internalizing symptoms at Year 1 to 4, respectively. For peer sociometric ratings of teacher support, rates of missingness at Year 1 to 4 were 20%, 22%, 17%, and 23%, respectively.

Multiple imputation is an increasingly common statistical method that handles missing data by filling in missing values with a set of plausible scores prior to analysis (Enders, 2011). A multiple imputation analysis can be implemented through three phases: (a) an imputation phase, (b) an analysis phase, and (c) an averaging phase. All procedures were performed in SAS (v.9.3). First, 20 data sets were imputed with 10 auxiliary variables using the PROC MI routine. The auxiliary variables were included in the imputation phase to reduce bias in estimation bias due to missingness and to improve power due to missingness as recommended by Collins, Schafer, & Kam (2001). The number of imputed data sets selected for the current study was 20, following the recommendation by Graham, Olchowski, and Gilreath (2007). A total of 10 variables were used as auxiliary variables: peer-rated student internalizing symptoms (Year 1 to 4), teacher-rated student-teacher relationship quality (Years 1 to 4), student reading achievement score, and student age. These variables were selected due to evidence in prior research that they are associated with student-teacher relationships or student internalizing

symptoms. When possible, an alternative source to the one used in the other study variables was used, and a variety of sources of data were utilized. The 10 variables were assessed with peer sociometric procedures (student internalizing symptoms), teacher questionnaires (student-teacher warmth), direct child tests (reading achievement score), and school records (student age).

Second, multilevel analysis (i.e., repeated measures nested within individual) was used on each complete set of data with the PROC MIXED routine.

Finally, following Rubin's (1987) rule, a single set of final results was created by averaging 20 sets of parameter estimates and standard errors using the PROC MIANALYZE routine.

Analytic Approach

Descriptive and correlational analyses were conducted using SPSS v.21. Latent growth modeling (LGM) was employed in SAS (v. 9.3) for the following purposes: 1) to describe the average trajectories for children's internalizing symptoms across the elementary school years, 2) to investigate the influence of mean level of teacher support (between-child predictor) on children's internalizing symptoms trajectories, 3) to investigate the patterns of association between time-varying teacher-student relationship quality (within-child predictor) and children's internalizing symptoms, and 4) to examine whether the quality of teacher-student relationships (within-child predictor) differentially influences children with elevated internalizing symptoms.

First, in order to examine children's internalizing symptoms trajectories, LGM was used with two growth factors. The first growth factor was the intercept of child

internalizing symptoms, which specifies the estimated mean level of child internalizing symptoms at Year 1. The second growth factor was the linear slope of internalizing symptoms, which specifies the linear growth or decline of child internalizing symptoms across Years 1 to 4.

Second, in order to examine the influence of mean teacher-student relationship quality (between-child predictor) on children's internalizing symptoms, the estimated mean teacher support score (from all children and across all assessment years) was included as a covariate. The mean teacher-student relationship quality variable was created by calculating the mean teacher-student relationship score for each student across Years 1 to 4 and then centering around the sample mean.

Third, in order to examine the influence of teacher-student relationship quality on child internalizing symptoms, the teacher-student relationship quality score was centered around the child's mean score (i.e., person-centered). Centering within child allows the analysis of year-to-year variation from the child's own average level. The influence of teacher-student relationship quality on year to year fluctuations in child internalizing symptoms was tested using LGM with teacher-student relationship quality as a time-varying covariate.

To account for dependency among the observations, a two-level multilevel analysis (i.e., repeated measures nested within students) with the PROC Mixed routine in SAS (v.9.3) was utilized. The Restricted Maximum Likelihood (REML) estimation method was used for estimating all the models.

The following equations represent the Level-1 and Level-2 specifications for the model of the trajectory of student internalizing symptoms:

Level-1 (repeated measures):

$$Y_{ti} = \pi_{0i} + \pi_{1i}(TIME_{ti}) + \pi_{2i}(TSREL_{ti} - \overline{TSREL_i}) + e_{ti} \quad (1)$$

At level 1, repeated measures of teacher-student relationship quality were included as predictors of student internalizing symptoms to test within-child associations. In equation 1, outcome Y_{ti} represents the internalizing symptoms score of student i at time t . As described above, the time variable ($TIME$) was centered at Year 1 (grade 1). The term, π_{0i} , represents the predicted value of the outcome variable Y (internalizing symptoms score) for student i at Year 1. The term, π_{1i} , represents the average conditional linear growth rate in internalizing symptoms. The term, π_{2i} , represents the within-child association between internalizing symptoms (INT) and child-centered teacher-student relationship quality ($TSREL - \overline{TSREL}$). The within-child teacher-student relationship quality score was centered around the child's mean score across Year 1 to 4 (i.e., \overline{TSREL}). The random error term, e_{ti} , is assumed to be normally distributed with variance equal to σ^2 , which captures the within-student variation.

Level-2 (students):

$$\begin{aligned}
 \pi_{oi} &= \beta_{00} + \beta_{01}(\overline{TSREL}_i) + \beta_{02}(PEDUC_i) + \beta_{03}(GENDER_i) + \beta_{04}(\overline{EXT}_i) + U_{oi} \\
 \pi_{1i} &= \beta_{10} + U_{1i} \\
 \pi_{2i} &= \beta_{20}
 \end{aligned} \tag{2}$$

At level 2 (see equation 2), the term, π_{oi} , represents the predicted value of the outcome variable Y (internalizing symptoms score) for student i at Year 1. The term, β_{00} , represents the intercept, which is the predicted value of the outcome variable Y (internalizing symptoms score) for student i at Year 1 (grade 1), after controlling for within- and between-child effects and relevant covariates. The term, β_{01} , represents the between-child effects of mean peer-rated teacher support (\overline{TSREL}), controlling for within-child effects and relevant covariates. The terms, β_{02} , β_{03} , and β_{04} represent the between-child effects of the covariates parent education ($PEDUC$), gender ($GENDER$), and mean externalizing symptoms (\overline{EXT}), respectively, after controlling other covariates in the model. The error term U_{oi} represents the intercept variation. The term, β_{10} , represents the average conditional linear growth rate ($TIME$) in internalizing symptoms, after controlling for other variables in the model. The error term U_{1i} represents the slope variation. The term, β_{20} , represents the within-child association between internalizing symptoms (INT) and teacher-student relationship quality ($TSREL - \overline{TSREL}$), after controlling for between-child effects and relevant covariates.

Results

Descriptive statistics, including the means and standard deviations, were conducted for the complete raw data sample and are displayed in Table A-1. All study variables were analyzed for outliers and for properties of their distribution. No outliers were identified according to analysis of the frequencies and distributions of study variables (Barnett & Lewis, 1994). No variables had values for skewness or kurtosis that were outside of acceptable levels for the planned analyses, according to the cutoff values of 2 for skewness and 7 for kurtosis (West & Finch, 1997).

Correlations for Raw Data (Prior to Imputation)

The zero-order correlations and descriptive data (means and standard deviations) for all variables used in the model are displayed for the raw data (prior to imputation) in Table A-1. For teacher-rated internalizing symptoms, the children's mean item scores remain low across years 1 to 4 and vary little between years (means range from 0.346 to 0.389, *SDs* range from 0.394 to 0.451). Similarly, the low mean levels of teacher-rated externalizing symptoms across years 1 to 4 (means range from 0.343 to 0.362, *SDs* from 0.465 to 0.492) indicate that teachers typically perceived low levels of externalizing symptoms in students in the current study's sample.

Gender effects on internalizing symptoms and teacher support. Gender effects on peer-rated teacher support were found in the expected direction, with girls rated by classmates as receiving more teacher support ($p < .05$, see Table A-1). As shown in Table A-1, child gender was not significantly associated with teacher-rated

internalizing symptoms, suggesting that on average teachers tend to rate both genders similarly on levels of internalizing symptoms during grades 1 to 4.

Stability of internalizing symptoms and teacher support. Teacher-rated internalizing symptoms exhibited statistically significant but low 1-year stability (mean $r = .228$, range from $r = .192$ to $.248$, $p < .05$), and peer-rated teacher support exhibited moderate 1-year stability (mean $r = .416$, range from $r = .415$ to $.418$, $p < .05$).

Within-wave correlation of internalizing symptoms and teacher support. Within assessment years, peer-rated teacher support was negatively related with teacher-rated internalizing symptoms ($p < .05$, see Table A-1). This finding suggests that, without controlling for prior year's levels or other variables, students who are perceived by their peers as having less supportive relationships are rated by their teachers as having more internalizing symptoms.

Parent education. Zero-order correlations indicate that, without controlling for prior year's levels or relevant covariates, higher parent education was related to lower internalizing symptoms at Year 3 but no statistically significant relationships were found at any of the other years (see Table A-1).

Correlations Among Analysis Variables for Imputed Data

The zero-order correlations among analysis variables using the 20 imputed data sets are displayed in Table A-2. Results from the raw data and the imputed data are very similar. Table A-2 also includes the mean level of peer-rated teacher support and the mean level of teacher-rated externalizing symptoms across years 1 to 4. As was the case for the nonimputed data, higher teacher support in a given year was related to lower

internalizing symptoms, not controlling for any other variables. In contrast, students' mean peer-rated teacher support across the 4 study years was significantly and positively correlated with teacher-rated internalizing symptoms, not accounting for any other variables (ranging from $r = 0.201$ to 0.250 , $p < .05$). This suggests that teacher support averaged across 4 years tended to be higher for students with higher internalizing symptoms, without controlling for other variables.

Results of Hypothesized Models

Unconditional model: Trajectories of internalizing symptoms across years 1-4. Analyses began by examining the initial levels and trajectories of change in children's internalizing symptoms in an unconditional model containing only the time variable (*TIME*). Results of the unconditional model indicated the intercept parameter $\beta_{00} = 0.359$ ($SE = .014$), $p < .05$, indicating that the estimated mean level of internalizing symptoms for the average child at Year 1 in the sample. The slope parameter of the unconditional model (Time; $\beta_{10} = .003$ ($SE = .007$), $p = .664$) suggests that the average linear growth or decline in internalizing symptoms did not significantly vary across Years 1 to 4.

Hypothesized model: Trajectories of internalizing symptoms across years 1-4. Next, the predictors and covariates were included in the hypothesized model, and results are displayed in Table A-3. The intercept (β_{00}) parameter for the hypothesized model shows that the predicted internalizing symptoms score for student i at Year 1 (grade 1) is $\beta_{00} = 0.327$ ($SE = .034$), $p < .001$, after controlling for within- and between-child effects and relevant covariates. The parameter for time (β_{10}) indicates a positive but not statistically significant average conditional linear growth in internalizing symptoms

was found across Years 1 to 4, $\beta_{10} = 0.003$ ($SE = 0.007$), $p = .727$, after controlling for other variables in the model.

Hypothesized model: Between-child analyses. The results of the between-child analyses of the relationship between average teacher-student relationship quality (\overline{TSREL}), and trajectories of internalizing symptoms are found in Table A-3. Results indicate no significant association between mean teacher-student relationship quality (\overline{TSREL}), and average ratings of student internalizing symptoms at Year 1, $\beta_{01} = -0.026$ ($SE = 0.017$), $p = 0.137$, controlling for within-child effects and relevant covariates. These findings fail to support the hypothesis that more positive teacher-student relationships are associated with lower average internalizing symptoms.

The results for covariates are also included in Table A-3. Interestingly, results indicate that higher mean teacher-rated externalizing symptoms (\overline{EXT}) are associated with higher teacher-rated internalizing symptoms at Year 1, $\beta_{04} = 0.227$ ($SE = 0.028$), $p < 0.001$, controlling for within-child effects and relevant covariates. A significant between-child effect was also found for gender ($\beta_{03} = -0.066$ ($SE = 0.023$), $p < 0.01$) but not for parent education level ($\beta_{02} = -0.003$ ($SE = 0.005$), $p = 0.513$).

Hypothesized model: Within-child analyses. Associations between the child-centered, time-varying measure of teacher-student relationship quality ($TSREL - \overline{TSREL}$) and within-child changes in internalizing symptoms are found in Table A-3. Results indicated the hypothesized relationship of time-varying teacher-student relationship quality with the student internalizing symptoms was statistically significant, $\beta_{20} = -0.048$ ($SE = .015$), $p < 0.001$, after controlling for between-child effects and

relevant covariates. This suggests that year-to-year fluctuations in teacher-student relationship quality are associated with changes in students' internalizing symptoms, with closer teacher-student relationships associated with fewer student internalizing symptoms. It is important to note that in addition to controlling for relevant demographic variables (i.e., gender, parent education), this model controlled for the average levels (across years 1 to 4) of students' teacher support and externalizing symptoms.

Hypothesized model for students with high versus average internalizing symptoms. Next, analyses tested whether children with elevated versus average levels of teacher-rated internalizing symptoms experienced the hypothesized influence of teacher support. The same model (described by equations 1 and 2) was tested separately for students with high and students with average internalizing symptoms. After visual inspection of the spread of the data, students were classified as having elevated symptoms (value = 1) if their average teacher-rated internalizing symptoms was above the median and average (value = 0) if below the median. Similar prior studies using community samples have grouped children into elevated internalizing symptom groups based on above-average levels of internalizing behaviors or fitting within one of the highest trajectory classes for internalizing behaviors (e.g., O'Connor et al., 2011; Letcher et al., 2009), as opposed to using a clinical cut-off of standard score of internalizing symptoms. The average ($n = 384$) group constituted 51.5% of the sample and the elevated ($n = 362$) group constituted 48.5% of the sample. The mean internalizing symptoms score for the elevated group was 0.145 ($SD = 0.105$) and for the average group was 0.595 ($SD = 0.244$).

Results (see Table A-4) indicated that the hypothesized within-child relationship between time-varying student teacher relationship quality and student internalizing symptoms was found in the high ($\beta_{20} = -0.084$ ($SE = 0.026$), $p < 0.01$) but not the average ($\beta_{20} = -0.018$ ($SE = 0.016$), $p = 0.263$) internalizing symptoms groups of students. The mean peer-rated teacher support (\overline{TSREL} ; between-child predictor) was not statistically significantly related to internalizing symptoms in either the high or average groups. In both the average ($\beta_{04} = 0.094$ ($SE = 0.029$), $p < 0.01$) and elevated symptoms group ($\beta_{04} = 0.130$ ($SE = 0.034$), $p < 0.001$), the mean teacher-rated externalizing symptoms (\overline{EXT}) was related to higher student internalizing symptoms.

Supplementary analysis: Mean externalizing symptoms removed from the hypothesized model. A supplementary analysis was conducted because of the failure to find expected between-child effects for mean teacher support and internalizing symptoms (i.e., hypothesized ameliorating role of supportive teachers) when controlling for mean externalizing symptoms (\overline{EXT}), within-child effects, and covariates variables. Interestingly, mean externalizing symptoms was found to be a statistically significant between-child predictor in the hypothesized model (see Table A-3). As seen in Table A-1, externalizing symptoms are modestly correlated (mean $r = .289$) concurrently with internalizing symptoms, and therefore, the inclusion of externalizing symptoms as a control may account for variance that is also attributable to internalizing symptoms (ie., high shared variance). Therefore, mean teacher-rated externalizing symptoms (\overline{EXT}) was removed from the model for the supplementary analysis.

With mean externalizing symptoms removed from the model (see Table A-5), mean peer-rated teacher support (\overline{TSREL}), became significant as a between-child predictor, such that on average children with higher mean peer-rated teacher support had lower teacher-rated internalizing symptoms at Year 1, $\beta_{01} = -0.066$ ($SE = 0.017$), $p < 0.001$, controlling for within-child effects and relevant covariates. Regarding within-child effects, results indicated the hypothesized relationship of time-varying teacher-student relationship quality with the student internalizing symptoms was statistically significant, $\beta_{20} = -0.048$ ($SE = .015$), $p < 0.001$, after controlling for between-child effects and relevant covariates. For covariates, a statistically significant effect was found for both gender ($\beta_{03} = -0.055$ ($SE = 0.024$), $p < 0.05$) and for parent education level ($\beta_{02} = -0.011$ ($SE = 0.005$), $p < .05$).

Discussion

The overall purpose of the current study was to examine the influence of changes in student-teacher relationship quality on student's internalizing symptoms. One of the main findings is that year-to-year fluctuations in peer-rated teacher-student relationship quality are associated with changes in teacher-reported student internalizing symptoms. In line with attachment theory (Belsky & Nezworski, 1988) and self-determination theory (Deci & Ryan, 1985), the provision of supportive teacher relationships during the elementary grades is associated with lower internalizing symptoms, relative to the student's own trajectory. In general, high-quality relationships with teachers appear to support children's behavioral and emotional adjustment in school and in particular, appear to be beneficial for students with elevated internalizing symptoms. These

findings are well-situated in the literature, which supports the teacher-student relationship as a developmental context that can benefit children's school adjustment (e.g., Baker et al., 2008; Verschueren & Koomen, 2012). Findings have important implications for understanding the trajectories of internalizing symptoms in children, particularly for those most at risk (for academic problems; also elevated internalizing symptoms).

Between-child Effects

Results indicated that the hypothesized between-child effects that more positive teacher-student relationships are associated with lower average internalizing symptoms, controlling for within-child effects and relevant covariates, was found only when average externalizing symptoms was removed as a covariate from the model (in the supplementary analysis). This finding, taken with the finding of modest concurrent correlation between externalizing and internalizing symptoms scores, suggests that the inclusion of externalizing symptoms as a control may account for variance that is also attributable to internalizing symptoms (ie., high shared variance). Therefore, despite the initial finding of no such independent effect of peer-rated teacher support on teacher-rated internalizing symptoms (above the effect of teacher-rated externalizing symptoms on teacher-rated internalizing symptoms), results suggest that students with higher average peer-rated teacher support (across elementary grades) tended to have fewer internalizing symptoms. It is important to note that this finding is strengthened by the design of the model, which controls for within-child effects and relevant covariates. The finding of a between-child association of teacher-student relationship quality and lower

internalizing symptoms (when average externalizing symptoms is removed as a covariate) is consistent with a prior study with a similar design (Maldonado-Carreño & Votruba-Drzal, 2011). Furthermore, results from the current study highlights the importance of considering the overlap and differential effects of teacher support on children's internalizing and externalizing symptoms.

Within-child Effects

The current study's results support the hypothesized relationship of time-varying teacher-student relationship quality with student internalizing symptoms. Findings (using the full sample) suggest that year-to-year fluctuations in teacher-student relationship quality are associated with changes in students' internalizing symptoms; specifically, closer teacher-student relationships are associated with fewer student internalizing symptoms. In fact, the ameliorating influence of teacher support appears to be statistically significant only for students with elevated internalizing problems. When the sample was divided into average and elevated internalizing symptoms groups, results indicated that only the elevated internalizing symptoms group demonstrated the within-child relationship between teacher support and student internalizing symptoms. This finding corresponds to the idea that more vulnerable children benefit more from a teacher's role as an attachment figure (Verschuere & Koomen, 2012), whereas students with healthier emotional and behavioral adjustment are less dependent on teacher support for emotion regulation. The finding of differential, more pronounced effects of teacher support for children with increased levels of internalizing behaviors is consistent with prior studies (O'Connor et al., 2011; Baker et al., 2008). The current study's

findings are particularly noteworthy given that effects for teacher support are found above and beyond demographic variables as well as the average levels (across years 1 to 4) of students' teacher support and externalizing symptoms.

Contributions to Current Literature

This study makes several important contributions to the existing literature. The current study adds to the body of recent studies that examine both within- and between-child effects (Maldonado-Carreño & Votruba-Drzal, 2011; O'Connor et al., 2011) of teacher-student relationship quality on internalizing symptoms, providing strong controls for confounding variables. The current study utilized multiple sources for reports of measures within the school context and more specifically, is the first study, to the author's knowledge, to utilize peer sociometric ratings of teacher-relationship quality for examining trajectories of internalizing symptoms. When compared with teacher and child report, peer reports of teacher-rated teacher-student relationship quality have the advantage of increased reliability due to the use of multiple respondents (Li, Hughes, Kwok, & Hsu, 2012). Additionally, this study utilized a sample that was at risk for academic problems, a population with limited research on internalizing trajectories but one that is critical to study because teachers may be especially important for managing their problems with school adjustment (Niehaus et al., 2012). In addition, this study builds on prior studies that have suggested the ameliorating influence of teacher-student relationship quality that is specific to children with elevated internalizing symptoms (O'Connor et al., 2011). Furthermore, the current study design contributes to the

literature by accounting for differing levels of externalizing behavior problems to more clearly address specific internalizing problems.

Limitations

This study has several limitations. As with all studies of internalizing problems, the measurement of internal distress using an observer's report is a limitation. The current study relies on teachers to observe student behaviors (e.g., crying; clinging to adults) and affect (e.g., fearful; sad). Because teacher- and self-report of elementary-age children's internalizing symptoms have low correspondence (e.g., Koskelainen, Sourander, & Kaljonen, 2000), a study utilizing both informants would provide a more complete picture. The current study's use of peer-report of teacher-student relationship quality is a strength of the design by providing a classroom perspective on teacher-student relationships. Because peer-report of teacher-student relationship quality may substantially differ from children's self-report (Li et al., 2012), future research will benefit from utilizing a combination of self-, peer-, and teacher-reported measures of school relationships as well as emotional and behavioral problems.

Despite the strength of the current study's within-child design, which reduces possible bias from child characteristics that remain constant across time, the possibility of unobserved time-varying variables and reciprocally-related variables remains and limits the ability to draw causal conclusions. In addition, the current study created a categorical variable for high and average internalizing symptoms using a median split. Although this provides beneficial insights into the behavior of students with somewhat elevated symptoms, future study would benefit from dividing the sample to identify

children with clinically significant internalizing symptoms. Results from the current study for students with elevated internalizing symptoms must be considered as elevated rather than children with internalizing disorders or clinically significant symptomology.

Also, the current study's selection criteria required that participants score below the median on a district early reading test. Because this sample was at risk for reading problems, one may expect students to be more reliant than higher-achieving peers on teacher support for school adjustment. Thus, results may not generalize to students who begin first grade with average or above-average literacy skills. However, because pertinent studies in the current literature cite having low-risk samples as a limitation (e.g., Maldonado-Carreño & Votruba-Drzal, 2011; O'Connor et al., 2011), the current study fills an important gap in the literature.

CHAPTER III

CONCLUSIONS

This study is one of the first to utilize a longitudinal between- and within-child design to examine internalizing symptom trajectories and the influence of time-varying teacher support. The findings were consistent with prior findings that supportive teacher-student relationships ameliorate emotional and behavioral adjustment of elementary students.

Implication for Future Research and Practice

Evidence from this study suggests an association between teacher support and student school adjustment. Findings of within-child effects of time-varying teacher-student relationship quality on internalizing symptoms provide strong evidence of the importance of teacher support, above a child's innate tendencies as well as demographic characteristics. Despite the strength of the current study's design, the limitations to drawing causal conclusions (described above) suggests that further study that addresses the direction of the relationship between child internalizing problems and teacher-student relationship quality will be important. For example, studying the effects of interventions designed to improve teacher-student relationship quality on internalizing symptoms would contribute to our understanding of directionality. Indeed, experimental studies could enhance our understanding of teacher behaviors that improve teacher-student relationships and improve our knowledge of the dynamic, bi-directional patterns of teacher-student interactions.

Children's perceptions and expectations influence the teacher-student relationship. Consideration of the child's own perception of his or her relationship with a teacher will be important to consider in future studies. Researchers have suggested that children's social information processing is a possible mechanism that explains the influence of teacher-student relationship quality on behavior problems (e.g., O'Connor et al., 2011). The current study utilized peer perceptions of teacher-student relationship quality. Although the current study's use of peer report eliminates the problem of source effects (ie., not teacher-rated for both predictor and outcome as any many prior studies) and provides scores based on a classroom perspective (ie., multiple peers within a classroom) for each child's teacher support score, future study will benefit from utilizing the self-report of student's with internalizing problems as well as examining the possible influence of children's social information processing. For instance, it is possible that supportive teacher relationships are only helpful or are most helpful when students with internalizing symptoms have a self-perception of the relationship as such.

Children with internalizing problems are not a unitary group, and in fact, co-morbid externalizing problems are common (Costello et al., 2003). Academic and social problems are also more frequent in students with internalizing problems (Kessler et al., 1995; Ladd, 1999). Although the current study accounted for children's externalizing symptoms (ie., included average externalizing symptoms as a covariate in the model), much remains unknown as to the influence of co-morbid externalizing problems. Future research should further explore subgroups of students with emotional-behavioral problems in school in order to provide a more nuanced understanding of how teacher

support is associated with school adjustment outcomes for students with co-occurring problems and/or co-morbid conditions. This research will be helpful in designing effective and targeted interventions for students with high risk of poor school outcomes.

The current study adds to the body of literature suggesting that teacher-student relationships are an important developmental context, which may be harnessed to alter maladaptive trajectories of student behavioral and emotional problems. Ultimately, this line of research aims to understand how teachers may provide effective interventions within the classroom that improve outcomes for students at risk for internalizing problems. Notably, evidence from this study suggests that teacher support is even more influential for students with elevated internalizing symptoms. Though much remains unknown regarding the dynamic processes in teacher-student relationships, teacher education and inservice training could provide teachers with information regarding the importance of relational aspects of their role in students' adjustment. In line with recent intervention studies (Roorda et al., 2013), future research should continue to examine effective techniques and strategies to improving teacher-student relationship quality to improve students behavioral trajectories and school adjustment.

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APPENDIX A

TABLES

Table A-1
Zero-order Correlations and Descriptive Statistics for Raw Data (Prior to Imputation)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Correlations</i>														
1 Child's Gender	-													
2 Parent Education Attainment	-.001	-												
3 Teacher-rated Internalizing Behaviors Year 1	-.020	-.057	-											
4 Teacher-rated Internalizing Behaviors Year 2	-.060	.015	.248*	-										
5 Teacher-rated Internalizing Behaviors Year 3	-.013	-.192*	.217*	.192*	-									
6 Teacher-rated Internalizing Behaviors Year 4	.047	.002	.244*	.195*	.245*	-								
7 Peer-rated Teacher Support Year 1	-.268*	-.028	-.104*	-.081	-.054	-.050	-							
8 Peer-rated Teacher Support Year 2	-.334*	.006	-.083	-.101*	-.122*	-.049	.418*	-						
9 Peer-rated Teacher Support Year 3	-.345*	.069	-.005	-.096*	-.114*	-.081	.357*	.415*	-					
10 Peer-rated Teacher Support Year 4	-.434*	.049	-.061	-.099*	-.050	-.156*	.346*	.424*	.416*	-				
11 Teacher-rated Externalizing Behaviors Year 1	.201*	-.175*	.272*	.147*	.131*	.165*	-.267*	-.293*	-.219*	-.260*	-			
12 Teacher-rated Externalizing Behaviors Year 2	.143*	-.155*	.148*	.308*	.134*	.179*	-.187*	-.267*	-.224*	-.267*	.599*	-		
13 Teacher-rated Externalizing Behaviors Year 3	.170*	-.197*	.142*	.139*	.263*	.151*	-.142*	-.273*	-.229*	-.267*	.533*	.569*	-	
14 Teacher-rated Externalizing Behaviors Year 4	.207*	-.160*	.144*	.136*	.161*	.313*	-.141*	-.267*	-.260*	-.230*	.554*	.610*	.620*	-
<i>Descriptive Statistics</i>														
N	746	563	681	607	540	520	600	582	619	575	679	605	540	520
Mean	0.520	5.513	0.374	0.347	0.346	0.380	-0.118	-0.140	-0.177	-0.176	0.362	0.362	0.345	0.343
SD	0.500	2.419	0.419	0.404	0.394	0.451	0.910	0.896	0.828	0.893	0.472	0.492	0.465	0.471
% Missing	0%	25%	9%	19%	28%	30%	20%	22%	17%	23%	9%	19%	28%	30%

Note. * $p < .05$.

Table A-2
Correlations Among the Analysis Variables for Imputed Data

	1	2	3	4	5	6	7	8	9	10	11	12
1 Child's Gender												
2 Parent Education Attainment	.000	-										
3 Teacher-rated Internalizing Behaviors Year 1	-.022*	-.054*	-									
4 Teacher-rated Internalizing Behaviors Year 2	-.067*	-.005	.223*	-								
5 Teacher-rated Internalizing Behaviors Year 3	-.027*	-.202*	.228*	.207*	-							
6 Teacher-rated Internalizing Behaviors Year 4	.048*	-.013	.237*	.193*	.248*	-						
7 Peer-rated Teacher Support Year 1	.095*	-.024*	-.079*	.005	.030*	.006	-					
8 Peer-rated Teacher Support Year 2	.011	-.025*	-.029*	-.035*	-.048*	.036*	-.319*	-				
9 Peer-rated Teacher Support Year 3	.035*	.017*	.097*	.025*	-.023*	.063*	-.326*	-.340*	-			
10 Peer-rated Teacher Support Year 4	-.139*	.031*	.010	.005	.041*	-.104*	-.341*	-.332*	-.343*	-		
11 Mean Peer-rated Teacher Support Year 1-4	.198*	-.218*	.201*	.228*	.210*	.250*	.043*	-.064*	.052*	-.031*	-	
12 Mean Teacher-rated Externalizing Symptoms Year 1-4	-.437*	.036*	-.059*	-.080*	-.109*	-.094*	.021*	.028*	-.100*	.051*	-.345*	-

Note. * $p < .05$.

Table A-3

Effects of Teacher Support on Student Internalizing Behaviors Controlling for Student Externalizing Behaviors Across Grades 1 to 4

Parameter	Estimate	(SE)	<i>p value</i>
Intercept (β_{00})	0.327	0.034	<.001
Between-child			
Mean Peer-rated Teacher Support (β_{01})	-0.026	0.017	0.137
Covariates			
Parent Education Attainment (β_{02})	-0.003	0.005	0.513
Gender (β_{03})	-0.066	0.023	0.005
Mean Teacher-rated Externalizing Behaviors (β_{04})	0.227	0.028	<.001
Within-child			
Peer-rated Teacher Support (β_{20})	-0.048	0.015	0.001
Time (β_{10})	0.003	0.007	0.727

Table A-4

Effect of Teacher Support on Internalizing Behaviors for Students with Elevated versus Average Teacher-Rated Internalizing Behaviors

Parameter	Elevated			Average		
	Estimate	(SE)	<i>p value</i>	Estimate	(SE)	<i>p value</i>
Intercept (β_{00})	0.513	0.045	<.001	0.178	0.027	<.001
Between-child						
Mean Peer-rated Teacher Support (β_{01})	-0.027	0.024	0.267	-0.015	0.015	0.310
Covariates						
Parent Education Attainment (β_{02})	0.001	0.006	0.872	-0.003	0.003	0.397
Gender (β_{03})	-0.044	0.032	0.163	-0.029	0.019	0.124
Mean Teacher-rated Externalizing Behaviors (β_{04})	0.130	0.034	<.001	0.094	0.029	0.001
Within-child						
Peer-rated Teacher Support (β_{20})	-0.084	0.026	0.001	-0.018	0.016	0.263
Time (β_{10})	0.001	0.013	0.915	0.004	0.008	0.641

Table A-5

Effects of Teacher Support on Student Internalizing Behaviors Across Grades 1 to 4 Without Controlling for Externalizing Behaviors

Parameter	Estimate	(SE)	<i>p value</i>
Intercept (β_{00})	0.445	0.032	<.001
Between-child			
Mean Peer-rated Teacher Support (β_{01})	-0.066	0.017	<.001
Covariates			
Parent Education Attainment (β_{02})	-0.011	0.005	0.021
Gender (β_{03})	-0.055	0.024	0.023
Within-child			
Peer-rated Teacher Support (β_{20})	-0.048	0.015	0.001
Time (β_{10})	0.003	0.007	0.727

APPENDIX B

STRENGTH AND DIFFICULTIES QUESTIONNAIRE ITEMS

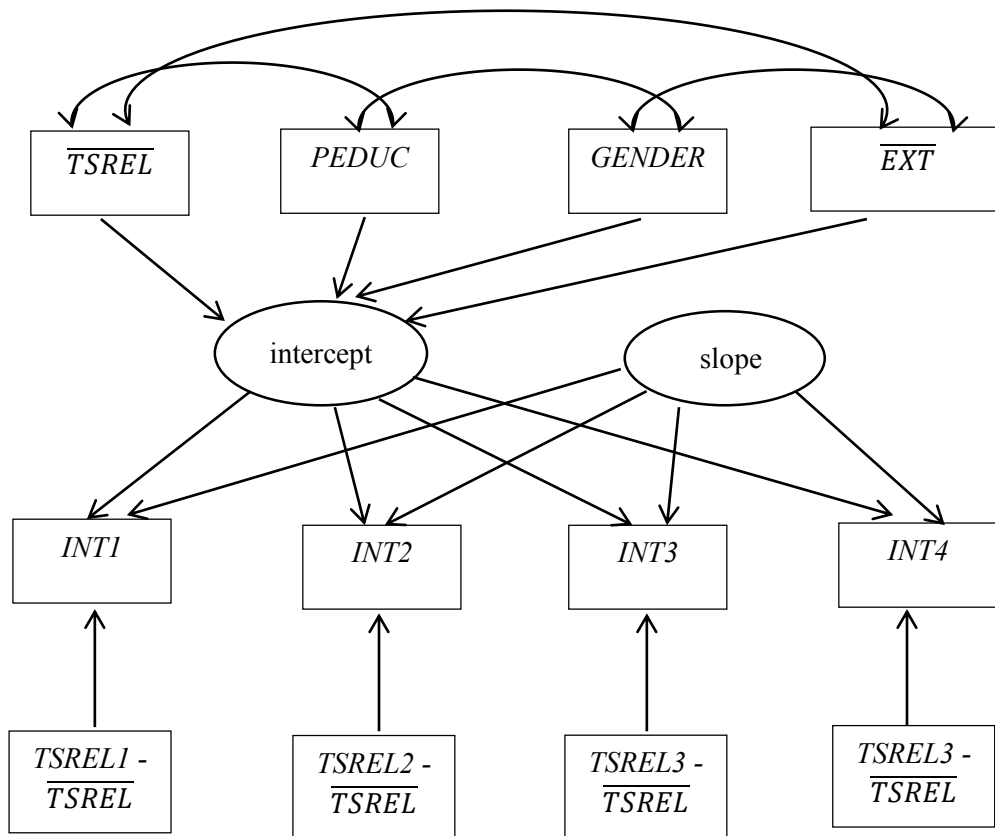
IN CURRENT STUDY

Items	
<i>Emotional Symptoms Scale</i>	
1	Often complains of headaches, stomachaches or sickness
2	Many worries or often seems worried
3	Often unhappy, down-hearted or tearful
4	Nervous or clingy in new situations, easily loses confidence
5	Many fears, easily scared
<i>Conduct Problems Scale</i>	
1	Often loses temper
2	(R) Generally well behaved, usually does what adults request
3	Often fights with other children or bullies them
4	Often lies or cheats
5	Steals from home, school, or elsewhere

Note. (R) indicates reverse-scored items. Teachers were asked to indicate the degree to which each of the statements applied to each student using a 3-point scale (0 = not true; 1 = somewhat true; 2 = certainly true; adapted from Goodman, 1997).

APPENDIX C

HYPOTHESIZED LATENT GROWTH MODEL WITH TIME-VARYING TEACHER-STUDENT RELATIONSHIP QUALITY



Note. INT = teacher-rated internalizing behaviors; $TSREL$ = peer-rated teacher-student relationship quality; \overline{TSREL} = mean peer-rated teacher support; $PEDUC$ = parent educational attainment; \overline{EXT} = mean teacher-rated externalizing behaviors