STUDENT-TEACHER RELATIONSHIP AS A MODERATOR OF THE RELATION BETWEEN CLASSROOM BEHAVIOR AND READING ACHIEVEMENT

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Abstract

COURTNEY M. MANN: Student-Teacher Relationship as a Moderator on the Effects of Classroom Behaviors on Reading Achievement (Under the Direction of Lynne Vernon-Feagans)

Extant research documents associations between child classroom behavior and reading achievement as well as the associations between student-teacher relationships and children’s reading success. Less is known about how all three of these variables may develop and influence one another together, and virtually no research has examined these issues with populations of young students living in rural communities. The current study examined a moderation model of reading achievement in which student-teacher relationship was expected to moderate the relations between fall classroom behavior of rural kindergarten and first grade students and their spring reading achievement. Using a hierarchical linear regression model, child demographic characteristics and beginning levels of reading achievement were controlled for and models predicting both phonological and comprehension skills were examined. Results indicate a significant but weak and un-interpretable interaction between classroom behavior and student-teacher relationship in predicting phonological skills. No interaction was found in predicting comprehension scores.
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Abbreviation

1. TRI: Targeted Reading Intervention

2. SES: Socio-Economic Status

3. HMLR: Hierarchical Multiple Linear Regression
Introduction

The ability to read and comprehend text is an essential skill that contributes to school success. Despite the importance of this skill in a student’s academic life, the majority of students in the US fail to master basic reading skills. According to the 2009 Nation’s Report Card, in grade four, 34% of students read at a basic level and 33% read at below basic, leaving only 33% of the nation’s fourth graders reading at a proficient or higher level of reading. By eighth grade, the level of students reading below basic decreases to 25% but the number of students reading at a proficient or higher level remains the same: 33% (National Center for Education Statistics, 2009). The National Reading Panel (NICDH, 2000) suggests that, in the first three years of school, 17% or more of our nation’s students will experience reading difficulty.

According to Whitehurst and Lonigan (1998), two main factors contribute to children’s reading difficulties: oral language skills and phonological processing skills. Children who have difficulty with reading despite regular classroom instruction generally fall into one of two groups where these skills are concerned. The first group has well-developed oral language (‘outside-in’) skills but poor phonological processing abilities (‘inside-out’ skills) and the second group has both underdeveloped oral language skills and difficulty with phonological processing. Students who experience both difficulty in phonological processing abilities and underdeveloped oral language skills comprise the larger of the two groups and are generally students from low-income families (Vernon-Feagans, Gallagher, & Kainz, 2010).

This link between low socio-economic status and reading difficulty has implications for populations of children characterized by high levels of poverty,
including those in rural schools. Approximately 64% of rural students live in poverty (Johnson & Strange, 2009) and overall experience poverty to a greater degree than those children living below the poverty line in urban schools (O’Hare, 2009). These rural poor children may be more vulnerable to reading difficulties due to barriers created by poverty and lack of access to educational resources (Vernon-Feagans, et al., 2010).

Existing research has demonstrated the importance of adult-child relationships (Pianta, 1994; Pianta, Steinberg, & Rollins, 1995) in children’s reading development. These relationships may act as a critical support for at-risk, rural students as they transition to school (Vernon-Feagans, et al., 2010). Specifically, the relationship between student and teacher has been found to impact academic (including reading) (Howes et al., 2008), social, and behavioral outcomes for students (Burchinal et al., 2008) and these impacts are long lasting (Jerome, Hamre, & Pianta, 2009).

Evidence also suggests that positive and supportive student-teacher relationships may protect at-risk students from negative outcomes. Hamre and Pianta (2005) found that socially, behaviorally, or academically at-risk first grade children who were placed with emotionally and instructionally supportive teachers showed higher levels of reading achievement and lower levels of social, behavioral, and academic risk; levels similar to their no-risk peers at the end of first grade. At-risk students placed in classrooms with teachers who had low levels of emotional and instructional support did not show the same positive gains.

Similarly, several studies have found that a child’s classroom behavior impacts reading achievement (Alexander, Entwisle, & Dauber, 1993; Hinshaw, 1992; Nelson,
2003). In 2008, Stipek and Miles examined the relationship between children’s classroom behaviors and reading achievement in kindergarten and first grade while specifically examining how conflict with the teacher may affect that relationship. This study (Stipek & Miles, 2008) showed that conflict in the student-teacher relationship and child engagement each partially mediated the relationship between children’s aggressive behavior and achievement.

Further research has examined relationships between classroom behaviors, student-teacher relationships, and reading achievement for early elementary school students. Many studies looking to examine student-teacher relationships and reading outcomes have found that positive and supportive student-teacher relationships which are associated with academic achievement are also associated with higher levels of student attention (Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008), student engagement (Hughes & Kwok, 2007), and student work related skills (Pianta, Steinberg, & Rollins, 1995). Conversely, negative and conflicted student-teacher relationships are associated with lower levels of achievement and engagement as well as behavioral problems (Pianta et al., 1995).

Given the interrelations between student behavior, the student-teacher relationship, and reading achievement, further study of the interactions between children’s social behavior and student-teacher relationship on reading achievement is warranted. This is even more true if by examining the interaction effect we can identify the mechanisms through which child classroom behavior and student-teacher relationship interact and use that knowledge to provide greater buffering against
reading difficulty for greater numbers of children who are academically, socially, or behaviorally at-risk.

**Theoretical Model**

Transactional models of development (Sameroff, 2009) define reading development in children as a process in which individual children actively participate in and drive their own development through negotiations that occur between the child and the environment. Within this model, the child’s attributes influence the environment and the environment’s attributes influence the child’s development. Such a model accounts for the evidence Stipek and Miles (2008) found for a reciprocal relationship between student-teacher relationship and child behavior. Using this theoretical framework, the relationships between classroom behavior, student-teacher relationship, and reading achievement as they develop over one academic school year might look something like this:

![Transactional Model of Classroom Behavior, Student-Teacher Relationship, and Reading Achievement](image)

*Fig. 1* Transactional Model of Classroom Behavior, Student-Teacher Relationship, and Reading Achievement. Model of reading development as it is affected by classroom behavior and student-teacher relationship across one academic year. Based on Sameroff’s Transactional Development theory (2009).
Child level attributes of classroom behavior (Classroom Behavior 1) and reading achievement (Beginning of Year Reading Achievement) in the fall of the academic year transact with teacher (environment) level attributes to create the Student-Teacher Relationship for that academic year which in turn has influence on later classroom behavior (Classroom Behavior 2) and reading achievement (End of Year Reading Achievement). Within the transactional model, child level attributes have some stability and hence Classroom Behavior 1 also affects End of Year Reading Achievement and Classroom Behavior 2. Additionally, attributes of the child interact with one another so that Classroom Behavior 1 affects End of Year Reading Achievement and reading achievement at the beginning of the year affects Classroom Behavior 2 (see Fig. 1.)

If the model were to be extended to show multiple years of schooling, the stability of student-teacher relationships across years that has been supported by research (Jerome, et al., 2009) could be demonstrated in the model. However, this study is primarily concerned with classroom behavior and student-teacher relationship interactions over the course of one academic year and will simplify, rather than expand, the previous model from Fig.1.

Within this new, simplified model (Fig.2), three primary variables are considered: Classroom Behavior, Student-Teacher Relationship, and End of Year Reading Achievement. These variables are organized such that the direct effect of child attributes (Classroom Behavior) and environmental attributes (Student-Teacher Relationship) as well as the interaction between those two variables can be used to examine resulting changes in a student's reading achievement.
Fig. 2 Simplified Transactional Model: Student-Teacher Relationship as a Moderator of the Relationship Between Classroom Behavior and Reading Achievement. In this simplified Transactional model, classroom behavior is the independent variable and student-teacher relationship is the moderating variable. The model also includes demographic and beginning reading control variables.

Research Questions

The current study examines the relationships between student-teacher relationship, classroom behavior, and reading achievement within a transactional framework. This study comprises a test of three hypotheses:

1) Classroom behavior predicts reading achievement (as measured by phonological skills and passage comprehension skills) above and beyond beginning reading and demographic characteristics.
2) Student-teacher relationship predicts reading achievement (as measured by phonological skills and passage comprehension skills) above and beyond beginning reading and demographic characteristics.

3) Student-teacher relationship moderates the relationship between classroom behavior and reading achievement such that students with problem behavior who experience positive student-teacher relationships are less likely to experience reading difficulty or experience a lesser degree of reading difficulty than those who do not experience positive student-teacher relationships. See Fig. 3 for expected outcome.

Fig. 3 Expected Interaction. Graphical representation of the expected interaction relationship between classroom behavior and student-teacher relationship as related to reading achievement. Positive student-teacher relationship is expected to buffer against the negative associations between problem behaviors and reading achievement. Reading achievement is represented as standard deviations around the mean.
Literature Review

Reading Achievement and Struggling Readers

Research in the area of reading acquisition over the last several decades has led to the identification of various competencies required for skilled reading. The National Reading Panel (2000) and the National Research Council (Snow, Burns, & Griffin, 1998) have designated phonemic awareness, phonics, fluency, vocabulary, and comprehension as the five skills most important in the process of learning to read. Early phonological sensitivity and the ability to link speech sounds with print are important factors in learning to read (Ehri & Sweet, 1991; Snow, et al., 1998). According to Fletcher, Lyon, Fuchs, & Barnes (2007), awareness of the phonological structure of language is the basis for single-word decoding. If a student understands the alphabetic principle, speech can be decoded into phonemes and those phonemes mapped onto graphemes (Blachman, Tangel Ball, Black, & McGraw, 1999) leading to the mastery of word recognition. However, many children do not master word recognition and single-word decoding has been found to be the primary deficit for individual students who experience difficulty with reading (Fletcher, et al., 2007; Shaywitz & Shaywitz, 2004; Stanovich, 1986). For those students who do experience difficulty with this process, word recognition may be delayed and result in lower levels of reading achievement (Fletcher, et al., 2007).

These skills are especially important to learn in the first years of schooling. Children who do not make quick gains in reading acquisition in the early years of school have a difficult time catching up in later years (Alexander & Entwisle, 1988). Of those
students who are poor readers at the end of first grade, 88% will continue to have
difficulty with reading at the end of fourth grade (Juel, 1988, p. 440).

For children who struggle with reading, there are several important factors for
intervening. Explicit instruction in the alphabetic principle and reading for meaning in
the early grades through small group or one-on-one instruction is highly important
(Foorman & Moats, 2004; Snow, et al., 1998). Children make greater progress in reading
acquisition when they are taught both comprehension- and code-based strategies
(Rayner et al., 2001). Additionally, reading practice should occur frequently (Snow, et
al., 1998) and within the bounds of a supportive student-teacher relationship (Foorman

**Rural Poor**

Rural schools, and therefore children, are underserved by the research
community (Arnold, Newman, Gaddy, & Dean, 2005) as well as by educational policy
makers (Arnold, 2005). Given that just over 32% of US schools are in rural areas
(Johnson & Strange, 2009) this lack of attention is startling. Twenty percent of US
children live in rural areas (Johnson & Strange, 2009). Over 60% of those living in rural
areas experience poverty (Johnson & Strange, 2009) and suffer from greater levels of
poverty than urban children (O’Hare, 2009).

Students in rural areas also tend to perform less well during the transition to
school and typically attend lower quality schools with less qualified teachers than do
children in the suburbs (Lee & Burkham, 2002). Qualified teachers are not the only
resources to which rural children have limited access. Rural children also begin
elementary school with lower levels of reading related skills than do their urban and
suburban counterparts (Vernon-Feagans, et al., 2010). On average compared to suburban students, rural students live further from school, have fewer transportation options, and their parents are more likely to work non-standard hours, making parental active engagement in academic development difficult (Vernon-Feagans, et al., 2010). All of these factors may become barriers to a child’s access to quality teachers, parent-teacher relationships, student-teacher relationships, classroom settings and therefore the reading acquisition process.

**Classroom Behavior and Reading Achievement**

Transactional models of literacy suggest that a child’s cognitive, motivational, and behavioral attributes contribute to early reading development (Stanovich, 1986). When considering such models, examining domains beyond children’s cognitive development becomes important in relation to reading outcomes. One area of focus in recent research is the association between student classroom and reading achievement.

In an early review of the literature, Hinshaw (1992) explores the history of research on externalizing behavior and academic outcomes focusing primarily on literacy outcomes. In the review, externalizing behavior was defined as disruptive, impulsive, overactive, defiant, aggressive, inattentive or antisocial behavior (Hinshaw, 1992). The review (Hinshaw, 1992) found that externalizing behaviors are correlated with reading difficulty.

Specifically, one study showed that aggressive behaviors were predictive of lower levels of reading achievement than non-aggressive behaviors (Rutter, 1975) while another reported similar patterns with non-significant findings (Richman, Stevenson, & Graham, 1982). Hinshaw also divides externalizing behavior into two
distinctive categories: impulsivity-hyperactivity and aggression-conduct behaviors. Upon further differentiation of externalizing behavior (including more items on hyperactivity and inattention rather than focusing on aggressive or defiant behaviors), hyperactivity and inattention accounted for reading difficulty rather than conduct problems and aggressive behaviors, though conduct problems did increase reading underachievement in children who also had hyperactivity and inattention (McGee & et al., 1985a; McGee, Williams, & Silva, 1985b; McGee, Share, Moffitt, Williams, & Silva, 1988). Based on this evidence, Hinshaw (1992) concludes that hyperactivity and inattention, when separated out of behavioral variables, account for more underachievement in the elementary grades than does aggression.

Further examination of this relationship between externalizing behaviors and reading achievement relate child problem behaviors to reading underachievement (Bulotsky-Shearer & Fantuzzo, 2011; DeRosier & Lloyd, 2011; Miles & Stipek, 2006; Nelson, et al., 2003; Stipek & Miles, 2008). Nelson, et al (2003) conducted a systematic literature review from which they concluded that student problem behavior is predictive of future reading difficulty and suggest that problem behavior is only second to rapid naming in predictive ability while actually having more predictive ability than both knowledge of the alphabetic principle and phonological awareness. Additionally, when the effects of age, gender, ethnicity, classroom, and school are controlled for, preschool classroom behavior problems predict poor literacy outcomes in both kindergarten and first grade (Bulotsky-Shearer & Fantuzzo, 2011). First grade aggressive behaviors have also been found to predict reading difficulty with effects that
strengthen through fifth grade (Miles & Stipek, 2006). These findings suggest effects of child classroom behavior on reading achievement that persist across grades.

In recent years, studies have begun to look at not only externalizing or anti-social behaviors but also motivation and pro-social behaviors. For example, interest and participation behaviors (in addition to attention and restlessness) contribute unique variance to letter recognition (Sperling, 2003) and reading achievement (Alexander, et al., 1993) above and beyond race, gender, and socio-economic status (SES). Higher levels of interest-participation behaviors in the first grade lead to higher levels of reading achievement and have lasting influence on achievement through the fourth grade (Alexander, et al., 1993).

Behavioral control or self-regulation, another pro-social behavior, also plays a role in student reading achievement (Ponitz, McClelland, Matthews, & Morrison, 2009; von Suchodoletz, Trommsdorff, Heikamp, Wieber, & Gollwitzer, 2009). Behavioral regulation has been defined as “the manifestation of executive function skills in overt, observable responses in the form of children's gross motor actions, which are also important for success in classrooms.” (Ponitz, et al., 2009, p.605). While one study has shown gains only in math (and no gains in reading) for children exhibiting higher levels of self-regulation (Ponitz, et al., 2009), another found moderate positive correlations between a child’s ability to delay gratification and their reading achievement (von Suchodoletz et al., 2009).

Despite evidence that positive behaviors can have positive effects on children’s reading achievement in the early grades, there is still cause for concern where negative classroom behavior is concerned. Cultivating positive behaviors in children may not be
enough. Both pro-social and problem behaviors have been found to predict levels of reading achievement in first grade with relationships that persist through fifth grade. However, the relationship between aggressive behaviors and lower achievement strengthen over time while the relationship between pro-social behaviors and higher achievement weaken (Miles & Stipek, 2006). Additionally, poor literacy achievement in first and the third grade predicted higher levels of aggression in later grades suggesting that classroom behavior and reading achievement may have a reciprocal relationship (Miles & Stipek, 2006).

Given the amount of evidence found in extant research, it is apparent that there is a strong relationship between classroom behavior and literacy outcomes. Positive classroom behaviors show positive correlations with reading achievement (Alexander, et al., 1993; Miles & Stipek, 2006; Sperling, 2003; von Suchodoletz et al., 2009 ).

Externalizing behaviors and inattention correlate negatively with academic difficulty (Hinshaw, 1992; Miles & Stipek 2006; Stipek & Miles 2008) and this relationship grows stronger as a student progresses through school (Miles & Stipek, 2006).

**Student Teacher Relationships and Reading Achievement**

Pianta (2006) has stated that, “Relationships between children and adults are the primary medium through which literacy is acquired.” (p.149). Based in Vygotskian theory, this statement suggests that literacy development is set of interactions between the child and the environment. This environment includes the scaffolding provided by more experienced members of society for a child’s learning (Tracey & Morrow, 2006).

Within this framework, the student-teacher (inexperienced-experienced) relationship might be one environmental or contextual factor in the vast network of
transactions occurring throughout the child’s developmental process. The teacher, or rather the type of relationship that the teacher has with the student, is the contextual factor that leads to developmental changes in the child while also being changed by the child themselves. In this way, we can see student-teacher relationships as reciprocal relationships both changing and being changed in a dynamic, transactional system.

Viewing child development through this transactional lens, one might ask what specific ways the child and the student-teacher relationship are changed. Many hypotheses can and have been made on this topic ranging from child behavior eliciting specific types or styles of student-teacher relationships to the converse hypothesis that specific styles of student-teacher relationships eliciting specific child behaviors.

In the area of student-teacher relationships, research has consistently found evidence that two specific aspects of student-teacher relationships affect student’s social and academic outcomes: supportive quality and instructional quality (Howes et al., 2008; Mashburn et al., 2008; Pianta, 2006; Pianta et al., 1995). Supportive aspects of student-teacher relationships are often referred to as closeness or social emotional aspects. This type of support includes characteristics such as an absence of negativity and presence of emotional support, enjoyment and cooperation (Pianta, 2006). Instructional support is comprised of intentional behaviors that teach skills and concepts for academic purposes (Pianta, 2006).

Social-emotional support in the student-teacher relationship has been positively correlated to reading achievement (Pianta, et al., 2008; Stipek & Miles, 2008) and also moderates the relationship between amount of literacy exposure and reading growth (Pianta, et al., 2008). Additionally, instructional quality has shown positive correlations
with academic outcomes (Mashburn et al., 2008; Pianta, et al. 1995) and language
development (Mashburn et al., 2008). While the two dimensions of student-teacher
relationships (emotional support and instructional quality) are moderately correlated,
each one also makes a unique contribution to student outcomes (Mashburn et al., 2008).

Concerning the persistence of effects of student-teacher relationship, Hughes et
al., (2008) found that quality of first grade student-teacher relationships predicted
student engagement and achievement in first as well as in third grade (beyond stability).
Additional research has shown that there is also some consistency or stability for
students in the style of student-teacher relationships experienced across grades with
different teachers (Howes, Phillipsen, & Peisner-Feinberg, 2000; Hughes et al., 2008;
Jerome et al., 2009; Pianta & Stuhlman, 2004). This is particularly true of relationships
characterized by aggression (Howes, et al., 2000; Hughes et al., 2008; Jerome et al.,
2009). These findings suggest that there may be some persistence across years of child
level attributes, which contribute to the formation of student-teacher relationships.

While persistence of relationship style and effects of relationship style on child
development may be cause for concern, evidence suggests that changing patterns of
student-teacher relationships can change child outcomes. Hamre and Pianta (2005)
conducted a study of first grade student-teacher relationships and academic outcomes
for a sample of students identified as socially, behaviorally or academically at-risk for
failure in their kindergarten school year. Results showed that students placed in
classrooms with first grade teachers who were both emotionally and instructionally
supportive showed risk and achievement levels at the end of first grade similar to their
non-risk peers. This did not hold true for at-risk students placed in classrooms that were not emotionally and instructively supportive.

Additional research by Hughes & Kwok (2007) reported similar patterns of change in child outcomes during the transition to a positive student-teacher relationship. As the student-teacher relationship improved, engagement improved. These results are important given that engagement has been shown to mediate the relationship between student-teacher relationship and achievement (Hughes & Kwok, 2007; Stipek and Miles, 2008).

This review of literature has shown the variety of ways in which student-teacher relationships influence student outcomes. While various aspects of student-teacher relationships have been studied and many different terms used for individual attributes, the majority of studies reviewed above tend to focus on the same set of attributes of the student-teacher relationship, emotional and instructional support. Emotional support is generally examined on the basis of positive and negative emotional attributes of relationships. These may include closeness and conflict, warmth and aggression, or dysfunctional/aggressive and positively involved, but are generally easily related. Instructional support is primarily examined on the basis of availability and amount of involvement.

These positive and negative student-teacher relationship styles have been examined in various studies across gender (Howes et al., 2000; Hughes & Kwok, 2007; Jerome et al., 2009), age (Hughes et al., 2008; Jerome et al., 2009), and race (Hughes & K, 2007; Hughes et al., 2008; Saft & Pianta, 2001) with evidence that similar types of student-teacher relationships are experienced across populations, though the
distributions may be skewed. Additionally, the variability observed in types of student-teacher relationships across classrooms suggests that student and teacher factors are involved in the development of types of student-teacher relationships (Pianta, 1994). This last finding is consistent with transactional models of development where the context of the relationship is created by the interaction of child level and teacher level variables.

**Classroom Behavior, Student-Teacher Relationships, & Reading Achievement**

In recent years, research has begun to focus no only on the individual relationships between classroom behavior and reading achievement or student-teacher relationship and reading achievement, but also on how these three variables may all work together. Social-emotional support in the student-teacher relationship has been positively correlated to reading achievement (Pianta, et al., 2008; Stipek & Miles, 2008), and social competence (Mashburn et al., 2008; Pianta & Stuhlman, 2004) but has been negatively correlated to development of problem behaviors (Mashburn et al., 2008; Pianta & Stuhlman, 2004). Several studies also suggest that close relationships between students and teachers may increase motivation, attention and engagement through which academic achievement is then increased (Pianta, et al., 2008; Stipek & Miles, 2008).

Stipek & Miles (2008) conducted a study with 403 children with low SES backgrounds in which students were followed from kindergarten or first grade through fifth grade in order to examine the relationship between aggressive behaviors and academic achievement. Results showed a similar pattern to previously cited research in that externalizing and problem behaviors were related to lower reading achievement.
Analysis found that the relationship between aggressive behavior and academic outcomes was mediated by student-teacher relationship and also that the relation between student-teacher relationship and achievement was mediated by student engagement. The significance of engagement behavior in the classroom as a mediator between student-teacher relationship and reading achievement has also been found in the case of positive student-teacher relationships (Hughes & Kwok, 2008).

With respect to development of social, behavioral and literacy skills within a transactional framework, the reviewed literature suggests that student and teacher level attributes transact to form student-teacher relationships. Within these contexts (as well as others) children develop their social and literacy related skills. There are many ways in which the context of student-teacher relationship may work for and against child development.

Extant research suggests that positive student-teacher relationships are related to student outcomes by giving children an emotional security or secure base from which they can safely develop socially, behaviorally, and academically (Al-Yagon & Margalit, 2006; Hamre & Pianta, 2005; Pianta, 2006). These positive relationships allow students to take developmental risks (such as persisting at difficult academic problems) more readily. Research supports this framework in various studies linking positive student-teacher relationships to child effortful engagement (Hughes and Kwok, 2007; Stipek & Miles, 2008), coping mechanisms (Al-Yagon & Margalit, 2006), and positive work habits and skills (Pianta et al., 1995). These results suggest that when a student becomes distressed or encounters difficulty at school, those with a positive student-teacher relationship view their teacher as an available, non-rejecting source of support.
(Al-Yagoon & Margalit, 2008) that allows them to persist in academically and socially challenging situations. Hence, child level attributes (behavior) transact with teacher level attributes to create a context (the student-teacher relationship). Within this context, the student can be supported and receive scaffolding while actively participating in his or her own reading development or experience conflict and a lack of support adding an additional challenge to his or her reading development.
Methodology

Participants

Using secondary data analysis, 331 kindergarten and first grade students were initially identified for this study. Students were selected from a larger pool of data obtained from the Targeted Reading Intervention (TRI) (Vernon-Feagans, et al., 2010). The TRI was a five-year study (2005-2010) completed by the National Research Center for Rural Education Support at UNC-Chapel Hill with the purpose of examining the effectiveness of a diagnostically based reading intervention. The study included students in grades K-1 from 11 rural schools in four states across the Midwest, South, and Southeastern United States. Schools were located in low-income areas with high percentages of students qualifying for free and reduced lunch (75% or more). Additionally, included schools were racially diverse with minority populations comprising at least 50% of the students.

All kindergarten and first grade students in these schools were eligible for inclusion in the TRI provided they spoke the English language in the home and did not have a severe disability. Students were selected for the study by teachers and TRI coaches based on two criteria: 1) scores on teacher administered standardized school assessments of phonological awareness, decoding, print awareness, and fluency skill, and 2) teacher perceptions of progress in the classroom. The TRI coach helped the teacher to use information from these two areas to decide whether each student was below, at or above grade level and whether or not the child was benefiting from regular classroom instruction. Of those students below grade level, five were randomly selected as struggling readers while five who were at or above grade level were randomly
selected as non-struggling readers. Random assignment to experimental and control conditions was done at the school level.

For the secondary data analysis, participants from this study were selected only from the TRI study control group to avoid contamination of the model of general reading development by intervention effects. Data were collected about each of the 331 control participants for one full academic during one of the last three years of the study (years three through five). Only data about students who had participated in all reading achievement assessments used as outcome measures for this study were used in analysis. From this data set, list-wise deletion was used to eliminate any participants who were missing classroom behavior or student-teacher relationship scores. The resulting sample contained 213 students.

The student sample included in the study is 41.78% female, 6.02% American Indian, 22.97% African American, 22.97% Hispanic, and 50.24% Caucasian. Mean age of participants in the fall of the academic year was six years, two months. In 36.64% of the sample, maternal education was 12 years or less (2.48% 8 years, 9.41% 10 years, 24.75% 12 years). Only 23.27% of the sample had mothers with education levels of 16 years or higher, leaving the largest segment of the population (40.10%) having maternal education levels of 14 years. See Table 1 for more detail.

**Procedures**

All students involved in the TRI study were administered a battery of standardized tests in the fall and again in the spring of the school year. Teachers completed questionnaires concerning their professional background, classroom, and individual
Table 1

Sample Demographics ($N = 213$)

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<td><strong>Mother's Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>1</td>
</tr>
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<td>16</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note: Four students were missing data on race and 11 were missing data on mother’s education.*

students in both the fall and spring of the school year. Graduate students from the University of North Carolina at Chapel Hill administered all child assessments in quiet rooms within the schools. All graduate student assessors had previous standardized testing experience and also participated in a two-day training during which each graduate student
assessor administered of the complete test battery with non-participating students. Assessors were blind to school’s experimental or control status.

**Measures**

**Classroom Behavior.** The Classroom Behavior Inventory (CBI; Schaeffer, Edgerton, & Aaronson, 1978) is a measure of teacher perception of child behavior and social adjustment. The CBI includes measures of Considerateness/Hostility, Extroversion/Introversion, Task Orientation/Distractibility, Independence/Dependence, and Creativity/Curiosity. A revised version of the CBI (Cronbach’s $\alpha = .95$) consisting of 21 test items from five subscales was used. Each subscale included 3 to 5 items each. The subscales include Hyperactivity, Distractibility, Considerateness, Independence and Task Orientation. Items are rated on a 5-point scale based on how typical of the child the specified behaviors are, with responses ranging from “not at all” to “very much like the child”. Scores for all five subscales (hyperactivity and distractibility reversed) were combined for an overall behavior score in which higher scores indicate positive behaviors and lower scores indicate negative behaviors.

Teachers reported on classroom behavior for each child in their class using the CBI during the fall of each academic year. Teachers completed the CBI as part of a larger teacher survey administered to all participating teachers.

**Student Teacher Relationship.** The Student Teacher Relationship Scale – Short Form (STRS-SF; Pianta, 2001) is a 15 item, teacher report scale addressing aspects of closeness and conflict in the relationships between students and teachers. The STRS-SF was derived from the full STRS, comprising 28 items on three subscales (Conflict, Closeness, and Dependency). The STRS has shown strong test-retest reliability on the
Conflict \((r=.92)\) and Closeness \((r=.88)\) (Pianta, 2001). Additionally, the STRS was shown to have predictive and concurrent validity with respect to behavioral and academic outcomes for students as well as construct validity as determined by factor analysis (Pianta, 2001).

Sample items from the STRS-SF closeness scale include, “I have an affectionate, warm relationship with this child” and “This child spontaneously shares information about himself/herself with me.” Sample items from the conflict scale include, “This child and I always seem to be struggling with each other” and “This child easily becomes angry at me.” Items are rated on a 5-point scale based on the degree to which each item statement applies to the teacher’s relationship with a child. Responses include “definitely does not apply”, ‘not really”, “neutral, not sure”, “applies sometimes”, and “definitely applies”.

Teachers reported on student-teacher relationship for each child in their class using STRS-SF in the spring of each academic year the child was involved in the project. The STRS-SF was completed by the teacher as part of a larger teacher survey administered to all participating teachers.

**Reading Achievement.** Participants in the study were administered a battery of standardized measures of reading skills in the fall and the spring during both years of involvement in the study. A subset of this battery was used in the current analysis and is detailed below. All tests in the subset used were from The Woodcock-Johnson Tests of Achievement, III (WJTA, III) (Woodcock, Mather & Schrank, 2004). Three subtests of the *WJTA, III* (2004) were administered to all participating children including Word Attack, Letter-Word Identification, and Passage Comprehension.
**Word Attack.** *Word Attack* measures a student’s ability to apply phonic and structural analysis skills to read and pronounce unfamiliar printed sounds and words. To begin, test items are focused on phonemic skills, or letter-sound identifications, and require the child to produce the sounds for single letters. Later test items focus on a child’s ability to read and vocalize combinations of letters that are considered regular in English orthography but are non-words or low-frequency words. The median reliability for *Word Attack* is .87 for ages 5 to 19 (Woodcock et al., 2004).

**Letter-Word Identification.** *Letter-Word Identification* is a measure of a child’s word identification abilities. To begin, children are asked to identify letters in large type. In later test items, children are asked to pronounce words correctly but it is not necessary for the child to know the meaning of the word. Item difficulty is based on frequency in written English. The median reliability of *Letter-Word Identification* is .91 in ages 5 to 19 (Woodcock et al., 2004).

**Composite scores.** Word attack and Letter-Word Identification raw scores were converted into $W$ scores. These $W$ scores are a special transformation of the Rasch ability scale with mathematical properties (e.g., equal interval units) that make the scale/scores well suited for use as an intermediate step in the interpretation of test performance and especially useful for interpreting gain scores. $W$ scores from the Word attack and Letter-Word Identification tests were added together and are referred to as the ‘combined reading score’ or ‘combined reading’.

**Passage Comprehension.** Passage Comprehension is a measure of a student’s reading comprehension skills. Initial items measure symbolic learning and require the child to match a rebus with an actual picture of an item. Later items of the subtest make
use of a modified cloze procedure that requires the child to read a short passage and provide a missing key word that makes sense within the context of the passage. Item difficulty is increased between items by removing pictorial support and also by increasing level of vocabulary, passage length, and passage difficulty. Passage Comprehension has a median reliability of .83 in the 5-to-19 age range (Woodcock et al., 2004).

**Analytic Strategy**

Statistical analysis was performed to assess the relationship between classroom behavior and each measure of reading achievement (combined reading and passage comprehension), STR and each measure of reading achievement, and the interaction between classroom behavior and STR as it relates to reading achievement. To begin, a series of chi-square tests comparing the sample of students prior to list-wise deletion to the sample remaining after list-wise deletion was performed based on race, gender, and maternal education in order to assess the impact of list-wise deletion. Next, analysis of correlations among all variables in the set and analysis of multicolinearity of independent variables involved in the interaction were completed. Finally, a hierarchical multiple linear regression (HMLR) model was used to examine the moderation model.

The HMLR was carried out in five steps. The first set of variables to be entered into the model was the demographic control variable set: gender, race, and mother’s education level (entered in the order listed). Categorical variables, gender and race, were coded for numerical analysis with gender being dummy coded. Race was weighted effects coded due to the disparity in the size of racial groups contained in the sample.
Second, beginning of year reading achievement was entered as an additional control. In the next steps of the MLR model, the independent variable (classroom behavior, entered in the third model) and the moderator (student-teacher relationship, entered in the fourth model), were entered in order to assess predictive abilities. The last step of the moderation model examined the interaction between classroom behavior and student-teacher relationship. All statistical analysis was performed using SAS version 9.2 (SAS Institute, Cary, NC).

In interaction models such as the one in this study, more than one hypothesis is being tested. The first is the effect of independent variables on the dependent variable and the second is the effect of the moderating variable on the relationship between the independent variable and dependent variable. In such models, power is reduced as the number of predictor variables \((k)\) increases. At its highest, the \(k\) in the present model is 9. Using the equation \(n = \left( \frac{L}{f^2} \right) + k + 1\) (Cohen, Cohen, West & Aiken, 2003), and assuming a moderate effect \((f^2=0.15)\) and power=0.8, the required \(n\) (number of students in the sample) for \(\alpha = 0.05\) is 114. The present study includes 213 participants, surpassing the \(n\) required for adequate power with the previous stated assumptions.
Results

Descriptive Statistics

To begin, it is necessary to note that because of the use of secondary data analysis the sample used for this analysis was designed to be split evenly between students who were poor readers and students who read at and above proficient level. In every classroom, teachers and standardized testing were used to identify poor readers and an even number of students were randomly selected from both the group of poor readers and the remaining classroom students. This leads to a sample distribution that is equally weighted between poor readers and those readers who are proficient or above. This equal weighting cannot necessarily be expected to occur in the general population and hence we can only expect our results to be representative of classrooms where population distributions are similar to the distribution of our sample.

The percentage of students missing data on any one of the variables was 32%. A chi-square test of independence was used to examine the similarities between groups prior to and after list-wise deletion. Results showed that children with missing data did not significantly differ from children with no missing data by gender, $X^2 (1, N = 341) = 0.9882, p = .3202$, or mother’s education level in years, $X^2 (5, N=320) = 8.9068, p = .1128$. However, chi-squared comparisons did reveal variance in the two samples based on race $X^2 (4, N = 332) = 18.8837, p < .01$. For demographic information and sample descriptives, see Table 1 and Table 2, respectively.
Variable Correlations

Correlations between all model variables were computed (see Table 3). To begin, correlations between reading achievement variables were examined. As expected, strong positive correlations were found between pre and post measurements on each reading achievement variables (combined reading, \( r = .84, p < .01 \); passage comprehension, \( r = .71, p < .01 \)). Strong positive correlations were also found between combined reading and passage comprehension measures at the beginning of the academic year (\( r = .78, p < .01 \)) as well as the end of year combined reading and passage comprehension measures (\( r = .87, p < .01 \)).

Second, correlations between control variables (gender, race, and mother’s education level) and the model variables (classroom behavior, student-teacher relationship, and all reading achievement variables) were examined and most were
determined to be non-significant. The primary exceptions were classroom behavior and student-teacher relationship. Classroom behavior showed mild to moderate positive correlations with gender ($r=.14, p < .05$) African American status ($r=-.27, p < .01$), and mother’s education level ($r=.28, p < .01$) while student-teacher relationship showed mild to moderate correlations with only American Indian ($r=-.26, p < .01$), and African American ($r=-.16, p < .05$) status.

Additional analysis of correlations between independent variables (classroom behavior and student-teacher relationship) and outcome variables (combined reading and passage comprehension) showed significant correlations (mild positive) between almost all variables. Additionally, a moderately positive ($r=.52, p < .01$) relationship between classroom behavior and student-teacher relationship was found. See Table 3 for more detailed description of these correlations.

**Multicolinearity**

Prior to examining the moderation models, multicolinearity was assessed using the variance inflation (VIF) procedure in SAS 9.2. Multicolinearity of the interaction variables (classroom behavior and student-teacher relationship) was assessed both before and after centering data. Results show that multicolinearity was low prior to (VIF = 1.37 for both variables) and after centering (VIF = 1.37 for both variables).

**Multiple Regression Analysis**

Hierarchical multiple linear regression (HMLR) was used to examine the two moderation models (each with a different reading achievement measure, combined reading or passage comprehension) and test the hypothesis that, in addition to main
Table 3

<table>
<thead>
<tr>
<th></th>
<th>Mother’s Ed.</th>
<th>Beginning Combined Reading</th>
<th>Beginning Passage Comp.</th>
<th>Student-Teacher Relationship</th>
<th>Classroom Behavior</th>
<th>End of Year Combined Reading</th>
<th>End of Year Passage Comp.</th>
</tr>
</thead>
<tbody>
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<td>Gender</td>
<td>.00</td>
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<td>.11</td>
<td>.09</td>
<td>.14**</td>
<td>.11</td>
<td>.04</td>
</tr>
<tr>
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<td>.03</td>
<td>.04</td>
<td>-.26**</td>
<td>-.08</td>
<td>.03</td>
<td>.06</td>
</tr>
<tr>
<td>African American</td>
<td>-.11</td>
<td>-.04</td>
<td>-.03</td>
<td>-.16*</td>
<td>-.27**</td>
<td>-.01</td>
<td>-.08</td>
</tr>
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<td>-.13</td>
<td>-.07</td>
<td>-.01</td>
<td>-.13</td>
<td>-.06</td>
<td>-.10</td>
</tr>
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<td>.15**</td>
<td>.28**</td>
<td>.17**</td>
<td>.21**</td>
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<tr>
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<td></td>
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<td>.78**</td>
<td>.09</td>
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<tr>
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<td></td>
<td></td>
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<td>.84**</td>
<td>.08**</td>
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<td>Student-Teacher Relationship</td>
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<td></td>
<td></td>
<td></td>
<td>.52**</td>
<td>.15**</td>
<td>.11</td>
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<td>.33**</td>
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<tr>
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<td>.35**</td>
<td>.33**</td>
<td>.87**</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01.
effects of classroom behavior and student-teacher relationship on end of year reading achievement, an interaction between classroom behavior and student-teacher relationship also has a measureable influence on reading achievement. The first model examined predicted combined reading achievement scores which included phonology based measures of the WJ-III: Letter-Word Identification and Word Attack sub-tests.

**Predicting combined reading** Results of analysis of the first model predicting combined reading scores only partially support the research model. Demographic control variables (gender, race, and mother’s education) were entered at the first step of the model and did not contribute significantly to reading achievement (see Table 4). During the second step in the model, beginning reading achievement was added as a control variable and showed the greatest level of prediction, $\beta = .81$, $SE = 0.03$, $p < .0001$. Concerning the main variables of interest, a significant main effect was found for classroom behavior in the third step of the HMLR analysis, $\beta = .20$, $SE = 3.06$, $p < .0001$, though none was found for student-teacher relationship in the fourth step of the HMLR analysis $\beta = .04$, $SE = 3.63$, $p = .40$.

When the interaction of these two variables was examined a small significant effect was shown, $\beta = .10$, $SE = 3.70$, $p < .05$. However, when the interaction was plotted, at the mean and +/- one standard deviation, the relationship (see Figure 4) was shown to be contradictory to the proposed model of positive student-teacher relationship as a buffer against risks in reading achievement associated with poor classroom behavior. In opposition to this proposed theory, the data shows an interaction in which negative student-teacher relationships buffer against the effects of classroom behavior in general, whether that behavior is positive or negative.
### Table 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Demographics</th>
<th>Model 2 Beginning Reading</th>
<th>Model 3 Classroom Behavior (CB)</th>
<th>Model 4 Student-Teacher Relationship (STR)</th>
<th>Model 5 CBxSTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td>0.04</td>
<td>0.02</td>
<td>0.02</td>
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<td>-0.02</td>
<td>-0.02</td>
<td>0.00</td>
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<td>0.06</td>
<td>0.06</td>
<td>0.07</td>
</tr>
<tr>
<td>Other Race</td>
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<td>0.07</td>
<td>0.06</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>Mother's Ed.</td>
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<td>0.01</td>
<td>-0.02</td>
<td>-0.03</td>
<td>-0.03</td>
</tr>
<tr>
<td>Beginning CR</td>
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<td>0.035</td>
<td>0.81**</td>
<td>0.81**</td>
<td>0.81**</td>
</tr>
<tr>
<td>CB</td>
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<td>2.67</td>
<td>0.18**</td>
<td>0.18**</td>
<td>0.19**</td>
</tr>
<tr>
<td>STR</td>
<td></td>
<td></td>
<td></td>
<td>0.01</td>
<td>3.55</td>
</tr>
<tr>
<td>CBxSTR</td>
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<td></td>
<td></td>
<td>0.10*</td>
<td>3.70</td>
</tr>
<tr>
<td>Total $R^2$</td>
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<td>.74</td>
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<td>.75</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td></td>
<td></td>
<td>0.68**</td>
<td>0.03**</td>
<td>0.00</td>
</tr>
<tr>
<td>$F$</td>
<td>1.18</td>
<td>79.64**</td>
<td>78.70**</td>
<td>68.52**</td>
<td>73.22**</td>
</tr>
</tbody>
</table>

*Note: Classroom Behavior and Student-Teacher Relationship were centered at their means.
  *$p < .05$. **$p < .01$*
**Fig. 4** Obtained Interaction. Actual interaction obtained from HMLR analysis. Interaction suggests that negative student-teacher relationships buffer against the associations between classroom behaviors and reading achievement whether those behaviors are positive or negative.

**Predicting passage comprehension.** The second model examined predictions of comprehension scores from the passage comprehension sub-test from the WJ-III and here analysis did not support the research model. As was done previously, demographic control variables (gender, race, and mother's education) and were entered at the first step of the model and did not contribute significantly to reading achievement (see Table 4). Again, beginning reading achievement was added to the model next and had the greatest predictive ability, \( \beta = .71, SE = .05, p < .0001 \). When the main variables of
### Table 5

*Summary of Hierarchical Regression Analysis for Variables Predicting Passage Comprehension (PC) Score (N = 213)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Demographics</th>
<th>Model 2 Beginning PC</th>
<th>Model 3 Classroom Behavior (CB)</th>
<th>Model 4 Student-Teacher Relationship (STR)</th>
<th>Model 5 CBxSTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>β = 0.02 SE = 4.00</td>
<td>β = -0.05 SE = 2.80</td>
<td>β = -0.07 SE = 2.73</td>
<td>β = -0.07 SE = 2.74</td>
<td>β = -0.07 SE = 2.74</td>
</tr>
<tr>
<td>American Indian</td>
<td>β = 0.09 SE = 10.23</td>
<td>β = 0.05 SE = 7.13</td>
<td>β = 0.05 SE = 6.92</td>
<td>β = 0.05 SE = 7.10</td>
<td>β = 0.06 SE = 7.21</td>
</tr>
<tr>
<td>African American</td>
<td>β = -0.07 SE = 3.49</td>
<td>β = -0.05 SE = 2.43</td>
<td>β = 0.00 SE = 2.46</td>
<td>β = 0.00 SE = 2.47</td>
<td>β = -0.01 SE = 2.48</td>
</tr>
<tr>
<td>Other Race</td>
<td>β = -0.08 SE = 3.70</td>
<td>β = -0.04 SE = 2.58</td>
<td>β = -0.05 SE = 2.51</td>
<td>β = -0.05 SE = 2.52</td>
<td>β = -0.05 SE = 2.52</td>
</tr>
<tr>
<td>Mother’s Ed.</td>
<td>β = 0.14 SE = 0.99</td>
<td>β = 0.09 SE = 0.69</td>
<td>β = 0.05 SE = 0.69</td>
<td>β = 0.05 SE = 0.69</td>
<td>β = 0.05 SE = 0.69</td>
</tr>
<tr>
<td>Beginning PC</td>
<td></td>
<td>β = 0.71** SE = 0.05</td>
<td>β = 0.68** SE = 0.05</td>
<td>β = 0.68** SE = 0.05</td>
<td>β = 0.68** SE = 0.05</td>
</tr>
<tr>
<td>CB</td>
<td></td>
<td></td>
<td>β = 0.19* SE = 1.84</td>
<td>β = 0.19** SE = 2.14</td>
<td>β = 0.20** SE = 2.14</td>
</tr>
<tr>
<td>STR</td>
<td></td>
<td></td>
<td></td>
<td>-0.01 SE = 2.48</td>
<td>0.01 SE = 2.56</td>
</tr>
<tr>
<td>CB x STR</td>
<td></td>
<td></td>
<td></td>
<td>0.07 SE = 2.61</td>
<td>2.61</td>
</tr>
<tr>
<td>Total R²</td>
<td>0.05</td>
<td>0.54</td>
<td>0.57</td>
<td>0.57</td>
<td>0.57</td>
</tr>
<tr>
<td>∆R²</td>
<td>0.49**</td>
<td>0.03**</td>
<td>0.00</td>
<td>0.00</td>
<td>.00</td>
</tr>
<tr>
<td>F</td>
<td>1.83</td>
<td>37.23**</td>
<td>35.76**</td>
<td>31.13**</td>
<td>27.99**</td>
</tr>
</tbody>
</table>

*Note: Classroom Behavior and Student-Teacher Relationship were centered at their means.*

*p < .05. **p < .01.*
interest were added, a significant main effect was found for classroom behavior in the third step of the HMLR analysis, $\beta = .20$, $SE = 2.14$, $p < .001$, though none was found for student-teacher relationship in the fourth step of the HMLR analysis $\beta = .01$, $SE = 2.56$, $p = .83$. When the interaction of these two variables was examined no significant effect was shown, $\beta = .07$, $SE = 2.61$, $p = .18$. $SE = 2.48$ $p = .83$. 
Discussion

Extant research suggests that child classroom behavior and student-teacher relationships are important for children’s academic and reading achievement. The current study contributed to existing literature regarding reading achievement and children’s relational and behavioral development in two ways. First, this study examines these processes in a highly diverse, rural sample of elementary school students. Additionally, the moderation model used, which suggests interaction between variables rather than direct causal links, is not often found in research involving models of child classroom behavior, student-teacher relationship, and reading achievement where mediation models are more common. Given that child classroom behavior and student-teacher relationship are likely to influence one another over the course of an academic year and that the existence of one before the other is difficult to pin point, the moderation model may be an appropriate one for examining these variables, especially in samples of data which do not span multiple years of schooling for individual students.

According to the current moderation model of classroom behavior, student-teacher relationship, and reading achievement, student-teacher relationship was expected to act as a buffer on the relationship between poor classroom behavior and reading achievement. The study assessed the model with outcome measures of reading that examined both phonological based reading skills (combined reading scores) and reading comprehension skills (passage comprehension). Results partially support the proposed model in the case of combined reading skills but not in the case of reading comprehension.
In the initial model concerning combined reading scores, and in line with previous research (Bulotsky-Shearer & Fantuzzo, 2011; Miles & Stipek, 2006; DeRosier & Lloyd, 2011; Nelson, Benner & Gonzalez, 2003), classroom behavior was found to directly predict end of year reading achievement. Unlike previous research (Mashburn, et al., 2008; Pianta, et al., 1995; Pianta, et al., 2008; Stipek & Miles, 2008) however, student-teacher relationship showed no predictive ability. When these variables were examined together, the interaction between classroom behavior and student-teacher relationship was found to be significant suggesting an interplay between child level and teacher/environment level attributes. Both of the significant findings (regarding classroom behavior and the interaction variable) fit within the research model and theoretical framework. However, contrary to previous predictions, the interaction was found to work in a manner not consistent with the expected moderation relationship.

Specifically, the expected interaction was one which would show positive student-teacher relationship buffering the effects of poor classroom behavior so that reading achievement for students with positive student-teacher relationships would show similar reading achievement outcomes regardless of style of classroom behavior. Within the proposed model, considering student-teacher relationship as a buffer for the effects of classroom behavior on reading achievement, theories of engagement and motivation in the classroom help to explain why this buffer exists. As in research conducted by Hughes and Kwok (2007), if a student who exhibits poor classroom behavior develops a positive and supportive relationship with a teacher, the student may then find themselves more engaged and motivated in the classroom because of the closeness with and a possible
desire to perform well for a teacher with whom the student gets along well. Conversely, according to findings in a recent study by Miles and Stipek (2008) in a conflicted relationship, a student with poor classroom behavior may experience reduced engagement in the classroom of a teacher with whom they share no closeness or positive feelings.

However, findings in this study both support and contradict these results from previous studies. In the present study, negative student-teacher relationships buffer against the effects of classroom behavior whether that classroom behavior is positive or negative. In regards to students who exhibit more positive classroom behaviors, this finding can explained by theories of engagement and motivation being effected by negative and conflicted student-teacher relationship (Miles & Stipek, 2008). This is problematic in that it predicts negative student-teacher relationships may adversely affect the reading achievement of students in their classrooms who have positive classroom behaviors.

Contrary to these same engagement explanations (Miles Stipek, 2008), the interaction predicts that students who have poor classroom behavior and experience negative student-teacher relationships will have higher reading achievement than their peers with poor classroom behavior and positive student-teacher relationships. This is also contrary to previously mentioned findings of Hughes and Kwok (2007), which found positive student-teacher relationship to buffer students with classroom behavior problems from poor reading outcomes. No adequate explanation for this interaction can be formulated which allows children with classroom behavior problems to have poorer reading achievement when in a positive student-teacher relationship rather than a negative student-teacher relationship. However, the interaction effect was small, accounting for only
1% of the variation in combined reading scores ($\Delta R^2 = .01$). Over all, whether students experience positive or negative student-teacher relationships, those students with positive classroom behaviors still fair better in reading achievement than those with poor classroom behavior.

This combination of findings lends partial support to the theoretical basis of the proposed model in which child level and teacher level attributes interact and contribute to the child's development and reading achievement. However, the expected nature of the interaction was not supported.

In the second model concerning passage comprehension scores, no significant contribution of the interaction was found. The fact that this interaction effect was not found in the model including passage comprehension rather than phonological based skills is not necessarily an issue with the research theory or model given that the students who were included in the study were in kindergarten and first grade, a period during which phonological based skills are developing rapidly (Snow, Burns, & Griffin 1998) and children are learning basic reading skills. They are learning to read rather than “reading to learn”. Children at this early stage may not have developed enough comprehension skill for such skills to be adequate measures of their reading ability (Snow, Burns, & Griffin 1998).

In addition to finding no interaction effect in the model predicting passage comprehension, no direct affect of student-teacher relationship on passage comprehension scores was shown. This finding is in contradiction to existing research on student-teacher relationships and reading achievement (Howes et al., 2008; Mashburn et al., 2008; Pianta, 2006; Pianta et al., 1995). It's possible that no associations were found between passage
comprehension scores and student-teacher relationship ratings due to the distribution of scores on the STRS-SF being skewed toward the positive end of the scale. Lack of variance in scores could contribute to the lack of a significant relationship.

Finally, classroom behavior was found to directly affect passage comprehension and accounted for 3% of the variance in scores ($\Delta R^2 = .03$). One possible explanation for this finding is that behaviors that are measured and considered negative are those such as hyperactivity and distractibility, which may contribute to reading achievement scores by detracting from the amount of content a student can take from the classroom. Conversely, positive behaviors measured, including considerateness, independence and task orientation may enhance the amount of content knowledge taken from the classroom. When considering classroom behavior in this way, specific types of behaviors can be considered barriers to learning while others can be considered enhancers.

**Limitations and Implications for Future Research**

This research has various limitations in terms of sampling. Primarily, further studies should be done which include a more even distribution of poor readers and skilled readers. Sampling could also be done across years and grades in a longitudinal study to examine whether the lack of findings of the buffering effect of student-teacher relationship where comprehension is concerned is specific to the reading skill or a developmental period in the reading process.

Further limitations may include the use of teacher-report measures for both classroom behavior and student-teacher relationship. Teacher-report measures of classroom behavior may include teacher bias in behavior scores based on student-teacher
relationships. Student-teacher relationship scores may include teacher bias or unwillingness to score relationships as negative or characterized by conflict, creating a ceiling effect where most or all student-teacher relationships are rated as highly positive. The sampling distribution of student-teacher relationships in this study was normal but skewed with most scores in the mid to high range and very few reporting negative relationships. For these reasons, independent classroom observations and child report measures may be helpful in collecting more balanced classroom behavior and student-teacher relationship scores.

Additionally, examination of individual behavior and student-teacher relationship styles may be warranted given that stronger or weaker effects of individual subsets of the variables may be masked by using combined scores rather than individual models for each behavior or relationship type. For example, examining models which look closely at relational conflict and student problem behaviors may be more appropriate than examining classroom behavior and student-teacher relationship in general.

The results of this study highlight the importance of aiding children in developing positive classroom behaviors as well as educating teachers about how their relationships with children may influence a child’s academic success. Teachers cannot be wholly responsible for the outcome of a two-sided relationship, but knowing the various ways that their student-teacher relationships could influence students may help them to examine the relationships they are developing and share the importance of these relationships with parents in order to gain support in student families for positive views of the teacher and the student-teacher relationship. This type of approach may be particularly meaningful for
rural populations in which teachers are more likely to know the families of the students in their community (Vernon-Feagans et al., 2010), but is not necessarily limited to these rural populations.

Given the results of this study, which suggest that an un-interpretable interaction exists between student-teacher relationship and classroom behavior as they predict reading achievement, further research is warranted to examine the given model. However, as is commonly found in the research body, this study also found evidence that children with poor classroom behavior are more likely to underperform in reading (Bulotsky-Shearer & Fantuzzo, 2011; DeRosier & Lloyd, 2011; Miles & Stipek, 2006; Nelson, et al., 2003; Stipek & Miles, 2008) as compared to students without poor classroom behavior. As such, this study adds to the growing body of literature supporting the examination of relational mechanisms as they relate to reading achievement in the classroom.
REFERENCES


Pianta, R. C. (2001). The Student-Teacher Relationship Scale Short Form. Unpublished, University of Virginia, Charlottesville, VA.


