A REGRESSION TREE ANALYSIS OF FACTORS IMPACTING STUDENT-TEACHER RELATIONSHIP QUALITY FOR CHILDREN WITH DEVELOPMENTAL DELAY

by

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DISSERTATION ABSTRACT

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Title: A Regression Tree Analysis of Factors Impacting Student-Teacher Relationship Quality for Children with Developmental Delay

Student-teacher relationships (STRs) link to healthy development across behavioral, social, and emotional domains and promote healthy adjustment to educational environments and healthy attachments to educators. Previous research identifying variables impacting the quality of these relationships show that poor-quality relationships may be more pronounced for students with high-incidence disabilities. Within-child factors such as the presence and severity of internalizing and externalizing problem behavior, social skill proficiency, and academic competence contribute to challenges establishing high-quality relationships. Parental involvement contributes to within-child characteristics and the development of quality relationships as interactions with teachers may enhance or detract the degree of connection felt by teachers, particularly when children display problem behavior. Furthermore, within-teacher and classroom characteristics such as teacher's level of education and years of experience combined with student-teacher ratios in classrooms and the presence of additional peers with developmental disabilities may compound with within-child and family variables to impact student-teacher relationship quality.

The purpose of the current study was to investigate the unique predictive power of

these variables of interest on student-teacher relationship quality scores from a widely-used metric of student-teacher relationship quality utilizing both a linear regression approach as well as a non-linear parametric approach, correlation and regression tree analysis (CART). Results from our linear analysis indicate teacher-reported social skill proficiency and externalizing problem behavior scores most significantly predict STR quality within this sample. Results from our regression tree analysis identify seven subgroups related to STR quality stemming from three significant predictor variables—teacher-reported externalizing behavior symptomology, social skill proficiency, and number of years of experience in the classroom. These findings align with previous research on factors influencing STR quality while enhancing our understanding of the manner in which they interact differently according to differentiation in child and teacher profiles. Based on this research, it is clear there is a continued need to develop intervention strategies that target multiple variables impacting the quality of student-teacher relationships versus isolating and targeting those which appear most influential according to linear approaches to complex, nuanced problems of social significance.

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DEDICATION

For my family, who represent true loyalty and love in my life.
For my Bucket, for flashing the light at the end of the tunnel when I needed it the most and accepting me just as I am.

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CHAPTER I

INTRODUCTION

Background

A large part of educational research focuses on factors that contribute to poor long-term outcomes and ways to mitigate the compounding challenges that befall school-aged children. Highlighted within this body of literature is the quality of student-teacher relationships (STRs) and their long-lasting impact on childhood social and educational outcomes. These relationships link to healthy development across behavioral, social, and emotional domains promoting healthy adjustment to educational environments and healthy attachments to educators (Baker, 2006; Caplan, Feldman, Eisenhower, & Blacher, 2016).

Student-teacher relationships have the potential to substantially impact long-term trajectories in school success and social-emotional development (Myers & Pianta, 2008). Baker (2006) found the quality of student-teacher relationships significantly predicted academic, behavioral, and social indicators of school success in early school-aged children. A meta-analysis conducted by Roorda, Koomen, Spilt, and Oort (2011) investigated the quality of STRs and levels of student school engagement and achievement in primary and secondary-aged children. They separated their analysis to investigate the unique effects of positive versus negative relationships on these outcome variables and found stronger effect sizes for negative, conflictual relationships than positive along with stronger effects during primary versus secondary grades. This illustrates the importance of intervening on student-teacher relationship quality during the early educational years, particularly for those children at-risk of developing poor-quality

relationships with educators. The influence of poor-quality relationships may be more pronounced for students with high-incidence disabilities who engage in challenging behavior as the presence of problem behavior may have a particularly adverse effect on early student-teacher relationships in this population (Eisenhower, Baker, & Blacher, 2007). Problem behavior may influence the positive development of healthy school relationships and parent involvement in student lives, potentially negatively impacting teacher perceptions of student interactions (Goldberg & Smith, 2014). In addition, poor social skills may exacerbate these challenges as children further struggle to relate and connect with educators, thereby contributing to the occurrence of problem behavior and poor STR relationship quality (Pianta, 1999). Given the increasing barriers facing children with disabilities, research seeking to explore both the individual and combined influences of variables known to contribute to the quality of student-teacher relationships is vital with emphasis placed on detecting malleable factors available for targeted intervention development.

Student Teacher Relationships

Unlike their typically developing peers, students with high-incidence disabilities such as developmental delay (DD) and emotional and behavioral disorders (EBD) show increased risk for difficulties in social, emotional, and behavioral areas of school performance (Murray & Pianta, 2007). A large study conducted by Baker (2006) found that children scoring higher on academic and behavioral measures similarly possessed higher quality student-teacher relationships than those with lower scores in these domains. Employing the most widely used measure of relationship quality between students and teachers, the Student-Teacher Relationship Scale (STRS; Pianta, 2001),

results indicated that amongst students with developmental vulnerabilities, those with positive relationships maintained significant advantages over peers with developmental vulnerabilities who did not have high quality relationships with their teachers (Baker, 2006). Scores on the STRS provide an assessment of the levels of conflict, closeness and dependency present in student-teacher relationship. Elements of closeness are marked by warmth and open communication (e.g., "I share an affectionate, warm relationship with this child."); conflict indicated by oppositional, discordant interactions (e.g., "This child and I always seem to be struggling with each other."); and dependency ratings associated with levels of developmentally inappropriate dependent behavior (e.g., "This child is overly dependent on me."). Relationships marked with high conflict and dependency contribute to negative educational outcomes including poor school adjustment, lower academic achievement, and increased risk for long-term behavioral and mental health problems (Birch & Ladd, 1998; Eisenhower, Blacher, & Bush, 2015).

Adding to these increased risks for poor outcomes, the presence of relational conflict may show greater stability than closeness for some students across early educational years (Pianta & Stuhlman, 2004). Children with intellectual disabilities show poorer quality student-teacher relationships relative to typically developing peers as early as kindergarten (McIntyre, Blacher, & Baker, 2006). The quality of these relationships remains consistent across educational years, with early ratings of relationship quality possessing predictive power over quality ratings across teachers as students progress from grade to grade (O'Connor & McCartney, 2006). In a 2009 study, Blacher, Baker, and Eisenhower followed a sample of students from kindergarten to third grade and

found the quality of student-teacher relationships remained stable for typically developing children but declined in quality for those with intellectual disabilities.

Consistently declining STR quality for children with DD is problematic for several reasons. These students are more likely than typical students to experience conduct problems, depression and anxiety, delinquency, school drop-out, and poor outcomes following high school such as involvement in the criminal justice system and challenges obtaining and maintaining employment (Al-Yagon & Mukilincer, 2004; Murray & Greenburg, 2001). The tendency for teachers to hold more negative attitudes and expectations towards students with disabilities may lead to lower levels of emotional support and behavioral praise and elevated levels of criticism, frustration, and ignoring (Montague & Rinaldi, 2001). Over time, the effects of differential teacher expectations influence levels of engagement and achievement and feelings of connection to educational environments in students with disabilities, with those experiencing greater levels of acceptance and support from teachers exhibiting lower levels of loneliness and dissatisfaction than those whose relationships hold more conflict and less support (Al-Yagon & Mikulincer, 2004). A consideration of the contributing factors leading to negative relationships with teachers elucidates the strong influence of child, parental, teacher, and environmental variables on the quality of STRs.

Child Problem Behavior

One factor known to influence quality of STRs involves the association with childhood behavior problems, as children with disabilities commonly exhibit more externalizing (e.g., aggression, hyperactivity, impulsivity) and internalizing (e.g., depression, social withdrawal) problem behavior than children without disabilities

(Blacher, Baker & Eisenhower, 2009). In an early study, Howes (2000) found that conflictual STRs in preschool are the best predictor of child problem behavior in elementary school years, illustrating the interconnectedness of relationship quality and the presence of child problem behavior. Elevated levels of externalizing problem behavior predict lower quality relationships, with strong evidence suggesting this relationship is transactional, meaning increased externalizing behavior predicts poor quality STRs over time and poor STRs predict increases in externalizing behavior over time (Doumen et al, 2008; Eisenhower, Baker, & Blacher, 2007; Hamre & Pianta, 2001). This effect may change when the relationship between student and teacher is characterized as positive even with the presence of externalizing problem behavior. Under these circumstances, research Conversely, children displaying internalizing problem behavior may have positive attributes to their relationships with teachers but may be overly dependent as a result of poor problem-solving skills and withdrawal from peer social interactions. Although research shows high levels of internalizing behavior may only affect approximately 5% of children during childhood, with problems peaking during adolescence (Letcher, Smart, Sanson, & Toumbourou, 2008; O'Connor et al., 2011), it's important to consider the level of emotional supports needed from educators to help young children adjust to a changing environment in less dependent and avoidant manners. Children with elevated levels of internalizing behavior who are unable to develop a high-quality relationship with their teacher are more likely to form negative beliefs about themselves and their social abilities which may further impact their abilities to navigate stressful transition points in early and later middle childhood (Burgess et al., 2006; O'Connor et al., 2011). Under the support of a positive relationship research shows

decreases in levels of problem behavior over time, illustrating the potential protective and therapeutic effects a close, positive relationship with a teacher can have on students exhibiting challenging internalizing and externalizing behaviors in early childhood (Baker, 2006; Hughes, Cavell, & Jackson, 1999; Meehan, Hughes, & Cavell, 2003).

Unfortunately, difficulties in emotional and behavioral regulation pose significant challenges to the development of high quality relationships with both teachers and peers and thus the development of protective supports that might mitigate poor outcomes. Relationships with adults represent a learning model of the social world, with high-quality relationships providing children with behavior supports and teaching methods that support continued development across emotion regulation and communication skill domains (O'Connor, Dearing, & Collins, 2011). Low-quality relationships may result in more authoritative approaches that seek to control child behavior and result in the modeling and perpetuation of maladaptive inter- and intra-personal relational strategies and decreases in pro-social behavior (Birch & Ladd, 1998; Hamre & Pianta, 2001). These concurrent effects compound as the presence of problem behavior and patterned interaction styles repeatedly create the same conditions and result in increases in externalizing and internalizing behaviors and continued poor-quality relationships with others (Myers & Pianta, 2008; O'Connor, Dearing, & Collins, 2011; Skalicka, Stenseng, & Wichstrom, 2015).

Within these contexts, poor student-teacher relationships not only hinder development in socio-emotional and behavioral domains, but similarly result in negative interactions with peers due to poor skills negotiating social relationships (O'Connor, Dearing, & Collins, 2011). Children engaging in externalizing and internalizing behavior

may face peer rejection and less opportunity to engage in socialization, further contributing to poor adaptive social skills and abilities engaging in conflict resolution (Skalicka, Stenseng, & Wichstrom, 2015). As a result, some children may engage in more aggressive problem-solving approaches, thereby perpetuating the pattern of coercive interaction styles that lead to conflictual relationships and continued increases in both problem behavior and relationships marked with conflict. Others may continue to withdraw and or show increases in dependency on adults to compensate for the lack of peer interaction. As these patterns persists across the school years, it is easy to recognize how the reciprocal relationship between child behavior challenges and low-quality student-teacher relationships can lead to long-term negative outcomes in academic, social, and behavioral domains.

Child Social Skills & Academic Competence

The occurrence of problem behavior often coincides with poor-quality social skill presentation (Berry & O'Connor, 2010). Social skills discussions commonly refer to socially reinforced and learned behaviors that encourage positive and effective interactions with others, such as sharing or helping (Skalicka, Stenseng, & Wichstrom, 2015). Children exhibiting deficits in these domains may struggle to connect and engage with both educators and peers and resort to problem behavior to access attention or escape challenging social interactions. This creates a challenging cycle in which these children experience difficulties accessing the social interaction necessary to develop skills and may miss opportunities to increase these skills and the quality of their relationships with others (Berry & O'Connor, 2010). Social skills influence early adaptation to educational environments as children rely on the formation of relationships

with peers and teachers to develop the sense of support and security needed for healthy adjustment. Conflict or avoidance within these relationships and possible subsequent rejection may promote instability (Birch & Ladd, 1997; Ladd, Birch, & Buhs, 1999; Ladd & Coleman, 1997). This instability may lead to poor-quality relationships, with students having high-quality relationships in elementary school showing significantly better social skills trajectories (Berry & O'Connor, 2010). Additionally, children with higher levels of social skills show more positive interactions with peers and better academic gains across elementary school years (Birch & Ladd, 1997).

The effect of externalizing and internalizing behavior problems may be different with regards to their impact on social skill competence. Children displaying externalizing behaviors, particularly aggression, tend to be rated as lower in social competence and may face rejection and victimization by peers (Berry & O'Connor, 2010; Gresham & Elliot, 1990). However, these children may also show prosocial behavior which is uniquely predictive of positive peer relationships when unwanted behavioral characteristics are held constant, indicating that social skill level does not necessarily indicate the p`1*+-4\resence or absence of unwanted externalizing behavior (Berry & O'Connor, 2010; Vitaro, Gagnon, & Tremblay, 1990). Conversely, children displaying internalizing behavior symptoms are more at risk for peer rejection and exclusion as they may avoid further social interaction and prefer isolation or be overly reliant on adult assistance to solve conflict with peers. This may negatively impact the successful attainment of supportive peer relationships and perpetuate a continued dependency on adults that can be challenging to maintain or further hinder positive peer relationship development (O'Connor et al., 2011). In either case, the presence of problem behavior

symptomology can profoundly impact a child's access to the social world whereby they are able to develop effective social connections to both peers and educators that serve as protective factors in the development of quality relationships across time.

In addition to low levels of social skills and the influence of problem behavior, a child's academic capabilities may similarly affect the quality of STRs. In some cases, teachers may display differing levels of positive attention and affect towards students possessing both higher social skills and academic abilities (Nurmi, 2012). Alternatively, teachers may adjust levels of instruction and expectations to meet the needs of lower-performing students and provide more support and attention to their needs, as indicative of the protective qualities of a positive and supportive STR (Connor et al., 2009). How academic competence impacts the development of a positive, supportive relationship likely depends on the level of connection felt between the teacher and child and the amount and type of behavioral challenges present that require the teacher's effort in other domains. Similar to gains made in emotional regulation and social confidence, positive STRS may enable a better focus on learning and engagement in educational activities that promote flexible thinking in both academic and social situations (Pianta, 1999). However, the progression through school years commonly changes the dynamic of STRs as teachers become increasingly attentive to instruction and less focused on the nurturing role common in early childhood educational settings. In this way, children displaying adverse childhood behavior in conjunction with poor social and academic competence may be particularly susceptible to the compounding effect of additional, outside-child sources affecting STR quality.

Parental Involvement

The presence of a disability, problem behavior, and low social or academic skills address some of the common child variables impacting STR quality, yet many additional outside influences also impact child relational skills and exert pressure over relationships with teachers. Current frameworks applied to the development of positive relationships with teachers typically involve a multi-theoretical approach (e.g., attachment theory, developmental systems theory) that considers the unique and combined contributions of external environmental influences, the individual characteristics of those participating in the relationships, and the dynamics of the interactions between relational partners (Lerner, 1998; Myers & Pianta, 2008; Pianta, 1999). Prior to entering in to the education system, a child's most influential source of social-emotional development occurs within the family environment, as specified in Bronfenbrenner's ecological model of child development which highlights the individual and interactive effects a child's micro- and mesosystems have in exerting influence over their development (1986). Connections occurring within the mesosystem maintain heavy influence on the development of positive interactions and relationships between children and individuals within these systems as well as the larger systems themselves. The development of these connections both at home, school, and between settings have important implications on STRs—namely that relationships do not occur in isolation and what occurs in one context has the power to impact what occurs in another. Qualities of the parent-child relationship may mirror what is observed in parent relationships with teachers, as parents help children learn and practice social and cognitive skills that facilitate learning how to effectively interact with adults outside of the family system (e.g., teachers) (Gauvain, 2001; Pianta,

1999). Alternatively, negative and low-quality interactions in home settings may similarly produce an inaccurate representation of how children and adults interact and lead to ineffective and conflictual relational behavior at school (Rubin, Stewart, & Coplan, 1995).

As such, parent-teacher relationships may serve to model the importance of relationships with teachers and influence the degree to which a child develops a quality connection with educators and a positive perception of school (Dearing, Kreider, & Weiss, 2008). Mantzicopoulous's (2005) study reported that children whose parents engaged in more frequent, positive interactions with teachers displayed lower levels of conflict in their relationships with teachers. Conversely, challenging child behavior and poor familial interaction patterns may impact parental motivation to participate in and communicate with other systems of the child's life, such as school. The presence of child problem behavior may negatively affect parental involvement, as being contacted by schools regarding child behavior concerns may lower school satisfaction and lead to perceptions that school contact is a negative experience (Goldberg & Smith, 2014). While some theories suggest that severity of problem behavior and social interaction challenges may lead to more involvement with educational programming due to higher levels of child need, more contact does not necessarily equate to positive parent-teacher relationships and evidence in the literature is mixed on the effect problem behavior has on parent involvement.

In one study, O'Connor (2010) found that quality and level of family involvement may impact levels of problem behavior and overall relationship quality between students and teachers. In their sample, students who received more support at home and whose

parents had higher quality interactions with teachers had significantly higher quality STRs (O'Connor, 2010). Similarly, Pianta and Walsh (1996) found that higher quality parent-teacher relationships may increase teacher perceptions of the quality of interactions with students, thereby impacting relationship quality ratings. In contrast, Garbacz et al. (2016) found that in a sample of children with autism spectrum disorder, parents of children displaying higher levels of developmental risk (i.e., low communication skills and higher levels of child hyperactivity) may experience lower levels of family involvement and poorer relationships with teachers than parents of children with lower levels of hyperactivity and higher communication skills. Thijs and Eilbracht (2012) suggest that teacher perceptions of student-teacher relationship quality may be strongly impacted by teacher perceptions of parent-teacher relationships, particularly with regards to students displaying challenging behavior. Whereas positive perceptions may strengthen the quality of interactions between teachers and students, negative perceptions may compound with teacher experiences of relational conflict with students and contribute to low quality STRs (Hughes, Gleason, & Zhang, 2005; Wyrick & Rudasill, 2009).

Teacher Expertise and Classroom Context

Student-teacher relationships may be further influenced by teacher and classroom contextual variables in combination with levels of problem behavior and social skills that impact individually as well as via the influence of parental involvement in schools. Current research shows many influential within-teacher characteristics influence quality of STRs including teachers' beliefs and perspectives about students (Stulman & Pianta, 2001), gender and ethnicity (Kesner, 2000), quality of instructional practices (La Paro,

Pianta, & Stuhlman, 2004; Mantzicopoulos, 2005), perception of teaching role and competency (Breeman et al., 2015; Brophy & Rohkemper, 1981), and levels of stress and self-efficacy (Pianta, 1994; Yoon, 2002). Teachers completing more years of educational training commonly show better quality relationships with students, though this effect does not appear to translate when considering years of experience in educational settings (Hearns, 1998; Howes, Whitebrook, & Phillips, 1992). In these instances, those with more experience tend to form poorer quality relationships with students, particularly those who exhibit problem behavior (Mashburn, Hamre, Downer, & Pianta, 2006; O'Connor & McCartney, 2006). Teachers with lower education levels may experience more challenges with severe problem behavior in their classrooms than those with higher education levels, though this effect has not been consistently established across studies (Early et al., 2006; Kim & Stormont, 2012). The difference in the effects of education level versus experience level on better quality STRs is not well understood in the literature. It may be that more educational training prepares teacher with more extensive skills and understanding of classroom behavior management practices, or an effect of variables influencing the expectations of teachers (Egyed & Short, 2006).

One such influence may occur via the interaction between the classroom environment and teachers' abilities to manage children who may present with low cognitive, communication, or social-emotional skills. Class size and type of educational setting are associated with student-teacher relationship quality, with lower child-teacher ratios in special education settings showing less challenging behavior as teachers may be less burdened by large-class size demands and better able to approach children with higher needs individually (McGiverin, Gilman, & Tillitski, 1989; Thurlow, Ysseldyke,

Wotruba, & Algozzine, 1993). Teachers working in special education and inclusionary settings may possess different expectations of behavior and thus approach children presenting with poor social skills and challenging behavior differently (Caplan, Feldman, Eisenhower, & Blacher, 2016). Furthermore, the number of children presenting as at-risk for or diagnosed with developmental disabilities predicts classroom instructional practices, which also impact quality of STRs (Buchanan, Burts, Bidner, White, & Charlesworth, 1998; La Paro, Pianta, & Stuhlman, 2004; Mantzicopoulos, 2005). Though these relationships are also not well understood within the current literature, it is possible that significant associations between contextual variables and classroom practices may provide a mechanism contributing to the development of positive relationships between students and teachers (Mantzicopoulos, 2005).

Summary

Student-teacher relationship quality has the potential for long-lasting impacts on social-emotional, behavioral, and academic outcomes. Children with cognitive and social skill deficits, such as those diagnosed with developmental delay, may be particularly impacted by the quality of their relationships with teachers. This effect may be even more pronounced when children exhibit challenging behavior from an early age which may impede their ability to develop and maintain positive relationships with educators and summarily create barriers to teachers feeling positive and effective with students. In addition to disability status and the presence of problem behavior, a lack of parent communication and involvement may contribute to teachers' negative perceptions of interactions with students and lead to poor-quality STRs. Teacher level of education and years of experience may impact a teacher's perceptions about child behavior and family

engagement, further compounding the development of conflictual relationships with challenging students. Additive effects are likely when additional environmental contextual variables (i.e., number of students in the classroom, type of setting) are considered in relation to within-child and teacher variables. In this way, the combination of multiple sources of influence and the negative long-term outcomes associated with poor-quality STRs necessitate a focus on relationship quality and malleable factors available for targeted intervention. The current study aims to examine the saliency of levels of child problem behavior and social skills, parent involvement, teacher education and experience levels, class size and type of setting in predicting the student-teacher relationship quality at one point in time.

Research Questions

In this study, we investigated the predictive power of several variables on the quality of STRs to determine the extent to which levels of externalizing, internalizing, and social skills behavior, ratings of parental contact and involvement, ratings of teacher education level and experience, and classroom characteristics are salient predictors of student teacher relationship quality for children with DD. We then sought to obtain a more nuanced understanding of the way levels of problem behavior, social skills, parent involvement, and teacher and classroom characteristics, when considered in combination, predict quality of student-teacher relationships. To achieve this, we conducted a classification and regression tree analysis (CART) to identify subgroups of students most at risk for low quality student teacher relationships. This type of statistical approach is designed for exploratory analyses rather than a priori hypotheses, so hypotheses of interactions occurred via the data partitioning unique to this type of process (Skedgell &

Kearney, 2018). To our knowledge, this is the first time CART has been used to examine the combined contributions of these variables on student-teacher relationship quality.

CHAPTER II

METHODS

Participants

Data for the current study were drawn from the Oregon Parent Project (R01 HD059838, McIntyre, PI), a family-based early intervention program provided to the caregivers of preschool children identified with early DD and approved by the University of Oregon's Institutional Review Board. This study analyzed data obtained from approximately 120 caregivers referred for participation via local early-childhood agencies providing early intervention and early special education services to children in the greater Eugene, Oregon area. Parents were contacted by phone for participation and completion of screening measures to ensure inclusionary criteria were met. Criteria for the original study required children be between the ages of 2.5 and 3.5 years, meet the criteria for a diagnosis of developmental delay or disability as determined by standardized assessments performed by a multidisciplinary educational team (i.e., 1.5 standard deviations below the mean in two or more developmental areas or two or more standard deviations below the mean in one developmental area), current eligibility for an individual family service plan (IFSP), and live with a primary caregiver for a duration of at least one year. Elements of the original study led to children who are non-ambulatory, deaf, or blind being ineligible for participation. This study utilized data from Wave 6, at which point participating children were between the ages of five and six. See Table 1 for child demographic information.

Table 1.
Child Demographic Information

	N	*Mean*	*SD*
Age (in months)		63.81	6.15
Vineland Adaptive Behavior Composite Score		83.14	14.17
Gender			
a. Male	106		
b. Female	35		
Ethnicity			
a. White-Caucasian	98		
b. Black-African American	6		
c. Hispanic-Latino	2		
d. Asian	1		
e. Native American	0		
f. Pacific Islander	0		
g. Other	1		
h. Bi-Multi Racial	33		
Primary Diagnosis Category:			
a. Developmental Delay	9		
b. Speech/Language Delay	54		
c. Autism Spectrum Disorder	29		
d. Cerebral Palsy	2		
e. Chronic medical illness	1		
f. Other: Unknown	3		
g. Genetic disorder	6		
h. Sensory disorder	4		
i. Learning disability	2		
j. Fetal alcohol syndrome	2		
k. Social emotional delay	1		
l. other: ADHD	2		
Identified as having DD or learning problem			
a. No	26		
b. Yes	115		

Special Education Eligibility	
a. No	34
b. Yes	95
c. Don't Know	4

Consent procedures. The Institutional Review Board at the University of Oregon approved all study procedures. Researchers obtained verbal consent from caregivers prior to completing phone-based screening measures and mailed a written informed consent describing the study's procedures in detail following eligibility determination.

Study Procedures

Following eligibility confirmation, researchers mailed participants a packet containing self-report questionnaires and a demographic interview to be completed by the participating child's primary caregiver during Wave 1. For this study, we used information from Wave 6 which requested parents to complete additional measures over the phone (approximately 45 minutes) and via mail (approximately 30 minutes). Additionally, parents identified the primary classroom teacher for their child who consequently received a packet containing an informational sheet regarding the study's aims, a consent document to be reviewed, signed, and returned, a demographics interview, and related self-report or teacher-reported measures (approximately 30 minutes). Parents and teachers utilized self-addressed and postage-paid envelopes to return completed documents. Participating parents and teachers received $50 as compensation for completion and receipt of materials during Wave 6. Educational Assistants were ineligible for participation in this study as the relationship of interest was

between children and their primary teachers. See Table 2 for teacher demographic information.

Table 2.
Teacher Demographic Information

	N
Age Range	
a. 18-25	1
b. 26-35	30
c. 36-45	35
d. 46-55	16
e. 56-65	13
f. 66 and older	1
Gender	
a. Male	4
b. Female	92
Ethnicity	
a. White-Caucasian	89
b. Hispanic-Latino	1
c. Bi-Multi Racial	5

Measures

Adaptive behavior. Researchers used the Vineland Adaptive Behavior Scale-Second edition (VABS-II; Sparrow, Cicchetti, & Balla., 2005) to determine child levels of adaptive behavior in four domains: Communication, Daily Living Skills, Socialization, and Motor Skills. Scores from all four domains combine to create a Composite standard score ($M = 100$, $SD = 15$) that characterizes the overall adaptive behavior of child participants. The VABS-II shows strong reliability (i.e., test-retest and split-half reliability coefficients ranging between .76 and .92; interrater reliability ranging between

.71 and .81; Community-University Partnership, 2011) and was included in this study as a characterizing measure of our sample of child participants (see Table 1).

Teacher Demographic Questionnaire. Teachers completed a 17-item questionnaire developed for the purposes of the larger study providing information on demographic variables pertaining to the teacher's background (i.e., level of formal education, years of experience teaching, years of teaching in specific classroom, years of experience teaching age group), classroom characteristics (i.e., type of setting, type of school or classroom, number of students in classroom), and level of parent contact (i.e., number of times met or spoken with parents, Likert-type rating of parental involvement). Only these variables from the questionnaire were included in the data analysis procedures of this study.

Student-Teacher Relationship Scale (STRS; Pianta, 2001). Researchers used the STRS to determine the quality of the student-teacher relationship between each participating child and their teacher. Teachers completed the 28-item measure assessing their perceptions of their relationship with the participating child in three dimensions—closeness (n = 11 items), conflict (n = 12 items), dependency (n = 5 items), and overall quality rating. High scores in the Conflict subscale (range = 12 to 60) indicate the teacher perceives their relationship to a student to be negative and involving frequent struggle and feelings of ineffectiveness. The Closeness subscale (range = 11 to 55) indicates the amount of affection, communication, and warmth present between the teacher and the student as well as feelings of effectiveness in teachers. The Dependency subscale (range = 5 to 25) assesses the degree to which a teacher feels the student is overly dependent or needy and reactive to separation. Total scores measure the extent to which a teacher

perceives their relationship with the student as positive and effective, with higher scores reflective of low levels of conflict and dependency and high-levels of closeness. Alternatively, negative relationships are reflected in high scores in conflict and low scores in closeness. In this study we utilized total quality scores as this is in line with previous research and we are interested in variables affecting the total quality rating of the relationship between participants and their teachers. Participating teachers completed this measure one time at the onset of their participation. A 5-point Likert scale measured whether the provided statement "definitely does not apply" (1), "does not really apply" (2), "neutral, not sure" (3), "applies somewhat" (4), and "definitely applies" (5) to the identified student. Total STRS score was our dependent variable in our data analysis procedures.

Social Skills Improvement System (SSIS; Gresham & Elliot, 2008). The SSIS is one of the most widely-used ratings scales of childhood social behavior. This 79-item rating instrument provides scores in three behavioral domains: Social Skills, Problem Behaviors, and Academic Competency. Scores from all three domains were used in this analysis. The Social Skills domain consists of scores from subscales of communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. The Problem Behaviors scale includes subscales of externalizing, internalizing, hyperactivity/inattention, autism spectrum, and bullying behaviors. The Academic Competency subscale includes ratings in the areas of reading, math, motivation, parent support, and a general impression of cognitive functioning. The SSIS is available in both parent and teacher-specific forms, with both requiring frequency-based ratings to questions ranging on a 4-point scale from "never" to "almost always". In addition, raters

indicate the importance of the social skill to the target child's development and success in the classroom using a 3-point Likert scale of "not important", "important", and "critical". Academic competence ratings utilize a 5-point scale ranging from "lowest 10%" to "highest 10%" (Gresham & Elliot, 2008).

Parent and Teacher Report Form (PRF; TRF). Research frequently utilizes the parent and teacher versions of the Child Behavior Checklist for Ages 1.5—5 *(CBCL;* Achenbach & Rescorla, 2001*)* with DD populations to determine the presence and relative frequency of child problem behavior. The CBCL has well-established reliability and validity in this application and provides a total problem behavior scores as well as broad-band scores in both externalizing and internalizing domains in school-aged children (Achenbach & Rescorla, 2001). Caregivers and teachers completed the 99-item checklist once at the onset of participation with questions indicating current or recent (i.e., within the last two months) child behavior problems and whether the listed item is "not true" (0), "somewhat true or sometimes true" (1), or "very true or often true" (2). The total *T* score served as confirmation of the presence and individual severity levels of problem behavior for each participating child. We included raw scores in Internalizing and Externalizing domains in our data analysis procedures.

CHAPTER III

ANALYSIS PLAN

During our preliminary analysis we reviewed our data set to determine if there were any missing data points and perform and imputation process if needed using SPSS software. We ran descriptive statistics, frequencies, and histograms of included variables to ensure normal distribution and detect the presence of outliers that may skew further analysis. We then conducted a Pearson's correlation test to determine the relationship between all variables of interest. Variables discovered to be highly correlated (e.g., $r > .80$) were combined into one variable via the creation of a standardized composite score to avoid issues with multicollinearity using SPSS. We utilized a regression model to determine the unique predictive power of individual or composite variables on the quality of student-teacher relationships in children with developmental disabilities. This allowed us to determine which variables most strongly predict STR quality within this sample.

To determine the interactive effects of measures of interests, we conducted a CART analysis utilizing SPSS decision tree software to identify which variables, considered concurrently, placed students at higher risk for poor quality STRs. CART is a nonparametric technique that utilizes decision trees to create decision rules based on the variables in the data set that best differentiate the data according to the dependent variable, total score on the STRS. CART utilizes a binary recursive partitioning approach that sequentially splits the data into two groups based on reported values of the predictor variable, maximizing the between-sum of squares at each split (Strobl, Malley & Tutz, 2009). Nodes are created during each split of this "tree" building process, isolating subsets of groups whereby the variable with the strongest association to the response

variable (i.e., STR quality) became the next split (Strobl, Malley & Tutz, 2009). This process was recursive and stopped when there were no additional significant predictors, or the node was too small for continued analysis (Merkle & Shaffer, 2007). An interaction was signified when two variables occur within the same split (Seeley, Stice, & Rohde, 2009). CART differs from parametric approaches in its ability to examine higher-order interactions among predictors to isolate homogenous subgroups in the sample as well as its strengths in resisting the effects of outliers, missing data, and multicollinearity (Merkle & Shaffer, 2011; Zhang & Singer, 2010). In this study, all individual or composited predictors were included in the CART analysis.

CHAPTER IV

RESULTS

Preliminary Analysis

We reviewed the data set to assess for missing data points and ran descriptive statistics, frequencies, and histograms of included variables to ensure normal distribution and detect the presence of outliers. These are included in Table 3.

Table 3.
Descriptive Statistics for Included Variables

	Mean	*SD*
Level of Education	3.49	0.82
Yrs: Experience	13.80	9.70
Yrs: Classroom	5.35	6.17
Yrs: Age Group	9.87	8.17
Number of IEPs	5.31	6.89
Number of Students	19.83	7.57
Number of Parent Meetings	14.51	27.20
Parent Involvement	3.96	1.15
Social Skills	77.50	22.78
Academic Competence	23.16	13.95
Problem Behavior	11.24	7.04
STRS Total	108.94	15.42
TRF Externalizing	16.72	13.80
TRF Internalizing	11.57	8.28
PRF Externalizing	17.63	11.18
PRF Internalizing	12.49	10.13

The majority of variables showed normal distribution, with STRS scores showing a slight positive skew that suggested more positive appraisals of relationships with participating children. We conducted a Pearson's correlation test to determine the relationship between all variables of interest with particular focus on bivariate correlations between variables of interest and our dependent variable—total score on the STRS. These results can be found below in Table 4. Neither correlation coefficients between variables of interest part of the same construct (e.g., separate questions pertaining to teacher experience) nor those individual correlations between independent variables indicated concerns with multicollinearity (e.g., $r > .80$). The strongest correlation between teacher and classroom characteristic variables occurred between measures of years in the classroom and years with the age group ($r(92) = .704$, $p < .001$). Within this sample, only one bivariate correlation with the dependent variable exceeded a value of .80 and indicated that as problem behavior scores on the SSIS increase, so do teacher reported externalizing behavior scores on the CBCL ($r(92) = .853$, $p < .001$).

Regression Models

We then utilized a regression model to determine the unique predictive power of individual variables on the quality of student-teacher relationships in children with developmental disabilities. This allowed us to determine which variables most strongly predict STR quality within this sample. We grouped variables according to measures and performed several multiple regression analyses. First, we regressed total STRS scores on teacher and parent ratings for externalizing and internalizing behavior. Results of the multiple regression can be found in Table 5 below. The multiple regression was significant, $F(4, 87) = 21.010$, $p < .001$. The regression equation accounted for 49% of the

total variance in STRS scores. The regression weight for teacher ratings in externalizing behavior domains on the CBCL was significant, $t(91)= -4.472$, $sr^2 = .12$, $p < .001$, meaning that teacher ratings contributed to the prediction of total STRS scores above and beyond internalizing behavior ratings and parent ratings in both domains. Additionally, the regression weight for teacher scores in internalizing behavior domains was significant, $t(91)= -2.522$, $sr^2 = .04$, $p = .013$. Internalizing behavior, as rated by participating teachers, contributed to the prediction of total STRS scores above and beyond parent ratings of externalizing and internalizing behavior. The regression weights for parent ratings of externalizing and internalizing child behavior were not significant, meaning that neither contributed to the prediction of total STRS scores within this sample.

Next, we regressed total STRS scores on social skills, problem behavior, and academic competence ratings from the SSIS with results displayed below in Table 6. The multiple regression was significant, $F(3, 83)= 32.191$, $p < .001$, with the regression equation accounting for 54% of the variance in total STRS scores. Individually, the regression weights for social skills and problem behavior were significant with child level of social skills predicting total STRS scores above and beyond the contributions of problem behavior and academic competence within this sample, $t(86)= 2.673$, $sr^2 = .04$, $p < .001$. Ratings of problem behavior predicted total STRS scores beyond the contributions of academic competence, $t(86)= -3.993$, $sr^2 = .09$, $p < .001$ but academic competence scores were not significant predictors within this model.

We performed a third multiple regression regressing total STRS scores on the number of times teachers met with parents and teacher ratings of parent involvement. See

below for results in Table 7. The multiple regression was not significant, $F(2, 89)= 0.351$, $p = .705$, with the regression equation accounting for 1% of the variance in total STRS scores. These results indicate that, within this sample, neither of these variables significantly contributed to the prediction of total STRS scores.

To run our fourth multiple regression, we first dummy coded the categorical variable of level of education so that master's and beyond levels of education were coded as one and levels below a master's degree coded as zero. We then conducted a multiple regression and regressed total STRS score on dummy-coded level of formal education, years of experience teaching, years in classroom, and years of experience with this age group. Results are shown below in Table 8. The regression was not significant, $F(4, 89)= 2.133$, $p = .083$. The regression equation only accounted for 9% of the variance in total scores on the STRS. Within this sample, teacher characteristics did not significantly contribute to the prediction of total scores on the STRS measure for students with DD. However, the regression weight for dummy-coded level of education was significant, $t(93)= -2.441$, $sr^2 = .06$, $p= .017$, meaning level of education significantly predicted STRS scores despite years of experience, years in the classroom, and years with the age group not significantly predicting STR quality within this sample.

We again utilized dummy-coding to recode categorical variables of type of setting and type of classroom to conduct our fifth multiple regression. For type of setting, we coded self-contained special education setting as one and inclusion, mainstream, and general education settings as zero. We recoded school district as one within the type of school or classroom category and all other categories coded as zero. We performed a multiple regression with the dependent variable regressed on dummy-coded type of

setting and type of school or classroom, number of students in the classroom, and number of students having an IFSP or IEP, as shown in Table 9. The multiple regression was not significant, $F(4,88)= 1.599$, $p = .182$, indicating that neither individual nor combined classroom characteristics saliently contribute to the prediction of total STRS scores within this sample. This regression equation only accounted for 8% of the variance in STRS scores.

We ran a final analysis to determine the unique predictive power of variables showing significant contributions to the prediction of total STRS scores from previous multiple regression results to determine which would be most salient when included within the same multiple regression. Results are displayed below in Table 10. We regressed total STRS scores on CBCL teacher ratings of externalizing and internalizing behavior and social skills ratings from the SSIS measure. We did not include ratings in problem behavior from the SSIS due to a large correlation (e.g., $r(92) = .853$, $p < .001$) and concerns with multicollinearity. The multiple regression was significant, $F(3, 85)=$, $p < .001$, and accounted for 57% of the variance in total STRS scores within this sample. When entering in all three variables, teacher ratings on child social skills emerged as the most salient predictor of STRS scores, $t(88)= 3.856$, $sr^2 = .08$, $p < .001$. The regression weight for teacher ratings of externalizing behavior was significant as well, $t(88)= -3.096$, $sr^2 = .05$, $p = .003$, but not for teacher ratings of internalizing behavior, indicating this variables did not contribute to the predictive power of the regression equation once considered in relation to more stronger predictors of STR quality.

CART

The results of our linear regression analysis do not conflict with discussed findings of variables contributing to poor STR quality, nor do they elucidate the way all variables, including those nonsignificant in a linear model, interact simultaneously to predict STR quality. To determine the nature of the possible interactive effects of our measures of interests, we conducted a CART analysis utilizing SPSS decision tree software to identify which variables, considered concurrently, interact to significantly predict quality of STRS scores within this sample to test our hypothesis that variables nonsignificant in a linear analysis may emerge as significant within a CART analysis. CART is a nonparametric technique that utilizes decision trees to create decision rules based on the variables in the data set that best differentiate the data according to the dependent variable, in this study the total score on the STRS. CART utilizes a binary recursive partitioning approach that sequentially splits the data into two groups based on reported values of the predictor variable, maximizing the between-sum of squares at each split (Strobl, Malley & Tutz, 2009). Nodes are created during each split of this "tree" building process, isolating subsets of groups whereby the variable with the strongest association to the response variable (i.e., STR quality) becomes the next split (Strobl, et al., 2009). This process is recursive and will stop when there are no additional predictors that are significant, or the node is too small for continued analysis (Merkle & Shaffer, 2007). An interaction is signified when two variables occur within the same split (Seeley, Stice, & Rohde, 2009). CART differs from parametric approaches in its ability to examine higher-order interactions among predictors to isolate homogenous subgroups in the sample as well as its strengths in resisting the effects of outliers, missing data, and

multicollinearity (Merkle & Shaffer, 2011; Zhang & Singer, 2010). In this study, we included all individual variables in the CART analysis regardless of saliency of individual predictive power of STR quality as some with nonsignificant main effects may still interact significantly with other variables.

The regression tree analysis tested the extent to which all included variables interacted to predict overall STR quality within this sample. Given our sample size, we set the minimum parent node size to 10 and child node size to five cases. This produced a regression tree with six forks and seven terminal nodes from the three predictor variables forming the model, seen below in Figure 1. Teacher ratings of externalizing behavior emerged as the most salient predictor of STR quality, splitting from the root node of STRS total score behavior ($N = 95$). For children with externalizing behavior ratings greater than a raw score of 22.5 on the teacher-reported CBCL externalizing scale ($N = 33$), four subgroups emerged with number of years teaching in the classroom resulting as the next predictor of STRS scores, splitting at raw values greater than 10.5 years (terminal node; $N = 5$, $M = 80.2$, $SD = 14.45$) and less than or equal to 10.5 years ($N = 28$). The next predictor to emerge was child social skill level for children with high externalizing behavior scores whose teacher listed less than or equal to 10.5 years in the classroom, splitting once at raw scores above or equal to or below 54 ($N = 8$, $N = 20$, respectively). Child social skills raw scores on the SSIS social skills scale above 54 served as the final parent node for children with high externalizing behavior scores whose teachers listed less than or equal to 10.5 years in the classroom, splitting at scores greater than 68.5 (terminal node; $N = 9$, $M = 95.56$, $SD = 9.08$) or less than or equal to 68.5 but greater than 54 (terminal node; $N = 11$, $M = 107.36$, $SD = 9.53$).

In contrast, we identified three subgroups for children whose externalizing behavior scores were less than or equal to 22.5 ($N = 62$). The next predictor to emerge for this group was social skill level, splitting at values less than or equal to 83.5 (terminal node; $N = 28$, $M = 109.32$, $SD = 8.08$) or greater than 83.5 ($N = 34$). Similar to previous results, scores greater than 83.5 split again for child social skill level, this time at values less than or equal to 110 (terminal node; $N = 28$, $M = 120.25$, $SD = 6.99$) or greater than 110 (terminal node; $N = 6$, $M = 130.0$, $SD = 4.15$). Therefore, the regression tree analysis revealed a two-way interaction between externalizing behavior symptoms and number of years teaching in the classroom, a two-way interaction between externalizing behavior symptoms and social skills level, and a three-way interaction between externalizing behavior symptoms, number of years teaching in the classroom, and social skills level. For a small number of children with more externalizing behavior symptoms, having a teacher with more years of experience alone led to significant predictions of lower STR quality and suggest that, within this sample and for some teachers, additional within-child variables do not appear to influence STR quality. Lower quality STRS scores for those children who displayed more externalizing behavior symptoms but who's teacher had less years of experience are further influenced by level of social skill proficiency, with lower, middle, and high raw scores differentially predicting quality when considered in relation to other predictor variables. This differs somewhat for children with less externalizing behavior symptomology and better quality STRS scores. For these children, their level of social skill proficiency alone serves as an additional predictor to behavioral symptomology, again predicted via raw scores along a lower, middle, and high

continuum. Years in the classroom did not significantly predict STR quality for these children within this sample.

Table 4.
Correlation Coefficients for Selected Variables

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
A	1																
B	- .30**	1															
C	-.17	.55**	1														
D	-.32**	.70**	.70**	1													
E	.41**	-.16	-.08	-.24*	1												
F	.26*	-.19	-.06	-.19	.43**	1											
G	.08	-.11	-.02	.0.021	-.06	.24*	1										
H	-.22*	-.01	.04	.02	-.27*	-.10	.07	1									
I	-.02	-.08	.03	.08	-.01	-.02	-.02	.03	1								
J	-.06	.10	.03	.05	.08	.15	-.36**	-.09	.17	1							
K	-.03	.14	.10	.10	-.01	.04	-.03	-.04	.01	.49**	1						
L	.00	-.10	.01	-.02	-.17	-.16	.14	.09	-.23*	.69**	-.20	1					
M	-.15	.02	-.12	-.02	.01	.20*	-.06	-.03	.09	.67**	.37**	.64**	1				
N	-.03	.00	.08	.07	-.27**	-.23*	.18	.12	-.14	-.62**	-.21	.85**	-.66**	1			
O	-.06	-.08	.12	.04	-.09	-.10	.17	-.01	-.18	-.59**	-.15	.68**	-.60**	.66**	1		
P	.02	-.03	-.03	.07	-.24*	.00	.18	.14	-.06	-.24*	-.06	.30**	-.20	.33**	.16	1	

Q	-.02	-.03	-.01	.02	-.07	.01	.11	.02	-.05	-.28**	-.15	.21*	-.22*	.20	.21	.68**	1

** Significant correlation at the $p = .01$ level

* Significant correlation at the $p = .05$ level

Key: A = Level of Education, B = Years of experience teaching, C = Years of experience in the classroom, D = Years with age group, E = Type of setting, F = Number of students, G = Number of students with an IEP, H = Number of parent meetings, I = Parent Involvement rating, J = Social skills, K = Academic competence, L = Problem behavior, M = STRS total, N = TRF Externalizing, O = TRF Internalizing, P = PRF Externalizing, Q = PRF Internalizing

Table 5.
Multiple Regression Results for Total STRS Score on Teacher Ratings for Externalizing and Internalizing Behavior, and Parent Ratings for Externalizing and Internalizing Behavior

Model	*B*	*SE*	*t*	*β*	sr^2	*F*	R^2
1. Intercept	124.26	2.58	48.173**			21.010*	0.49
Teacher Externalizing	-0.55	0.12	-4.472**	-0.49	0.12		
Teacher Internalizing	-0.50	0.20	-2.522*	-0.27	0.04		
Parent Externalizing	0.12	0.14	0.853	-0.27	0.00		
Parent Internalizing	-0.20	0.16	-1.293	-0.13	0.01		

Note: N=91
*$p < .05$

Table 6.
Multiple Regression Results for Total STRS Score on Social Skills, Problem Behavior, and Academic Competence Ratings from the SSIS

Model	*B*	*SE*	*t*	*β*	sr^2	*F*	R^2
1. Intercept	99.65	7.77	12.820*			32.191*	0.54
Social Skills	0.21	0.08	2.673*	0.31	0.04		
Problem Behavior	-0.47	0.12	-3.993*	-0.42	0.09		
Academic Competence	0.32	0.20	1.628	0.14	0.01		

Note: N = 86
*$p < .01$

Table 7.
Multiple Regression Results for Total STRS Score on Number of Times Teachers Met with Parents and Involvement Rating

Model	*B*	*SE*	*t*	*β*	sr^2	*F*	R^2
1. Intercept	104.54	6.08	17.201*			0.351	0.01
Number of Meetings	-0.02	0.06	-0.311	-0.03	0.00		
Involvement Rating	1.15	1.46	0.786	0.08	0.00		

Note: N = 86
**p* < .01

Table 8.
Multiple Regression Results for Total STRS Score on Dummy Coded Level of Formal Education, Years of Experience Teaching, Years in Classroom, and Years of Experience with Age Group

Model	*b*	*SE*	*t*	*β*	sr^2	*F*	R^2
1. Intercept	116.19	4.19	27.758*			2.133	0.09
Dummy Coded Level of Education	-8.57	3.51	-2.441	-0.27	0.06		
Years of Experience Teaching	0.02	0.23	0.102	0.02	0.00		
Years in Classroom	-0.52	0.36	-1.442	-0.21	0.02		
Years with Age Group	0.07	0.32	0.228	0.04	0.00		

Note: N=93
*$p < .01$

Table 9.
Multiple Regression Results for Total STRS Score on Dummy Coded Type of Setting, Dummy Coded Type of Classroom, Number of Students in Classroom, and Number of Students with an IFSP or IEP

Model	*b*	*SE*	*t*	*β*	sr^2	*F*	R^2
1. Intercept	103.84	5.23	19.862*			1.807	0.08
Dummy Coded Setting Type	-7.15	5.96	-1.200	-0.18	0.01		
Dummy Coded Classroom Type	-0.87	3.76	-0.232	-0.03	0.00		
Number of Students	0.36	0.28	1.302	0.18	0.02		
Number of Students with an IFSP or IEP	-0.02	0.33	-0.050	-0.01	0.00		

Note: N=92
*$p < .01$

Table 10.
Multiple Regression Results for Total STRS Score on Teacher CBCL Ratings for Externalizing Behavior and Internalizing Behavior and SSIS Ratings for Social Skills

Model	*b*	*SE*	*t*	*β*	sr^2	*F*	R^2
1. Intercept	99.32	6.82	14.558*			36.84*	.57
Teacher Externalizing	-.37	0.12	-3.096*	-.32	0.05		
Teacher Internalizing	-.33	0.19	--1.732	-.17	0.01		
Social Skills	.25	0.07	3.856*	.37	0.08		

Note: N=88
**p* < .01

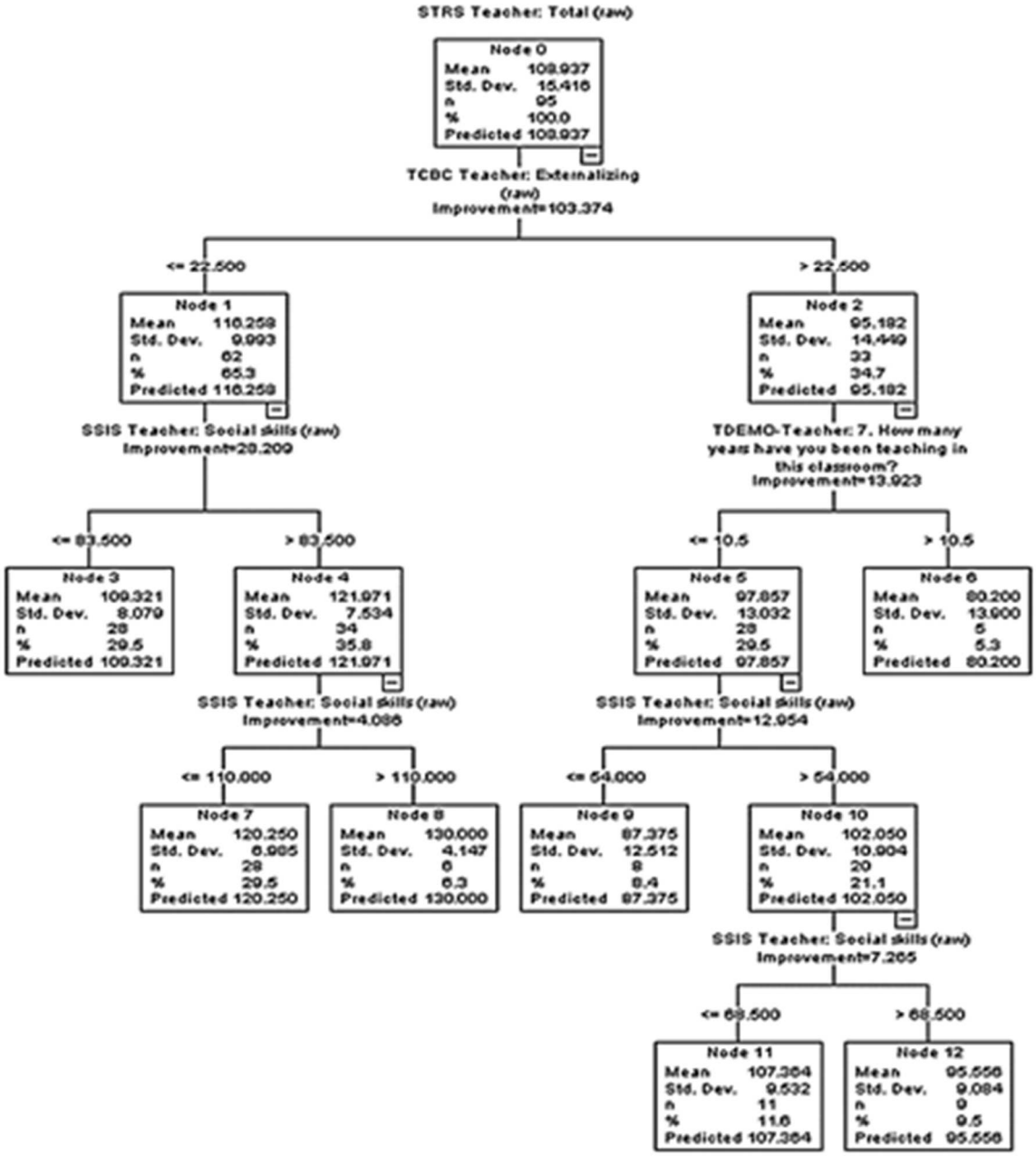

Figure 1. Regression Tree Results

CHAPTER V

DISCUSSION

Summary of Results

The most prevalent theories regarding the development of positive student teacher relationships for students with disabilities involve attachment and ecological perspectives applied to the consideration of individual variable influences. In consideration of those factors implicated in healthy attachment (e.g., warmth, trust, support) and their interaction with environmental characteristics of both home and school, the interplay of these variables on the quality of relationship that forms is critical when considering negative outcomes associated with a poor-quality STRs. Children with disabilities face a heightened risk for negative outcomes as the nature of many childhood disabilities involve deficits in social communication and challenges with emotional and behavioral regulation. Previous research identifies numerous sources of impact on the development of relationships between teachers and students, several stemming from within-child characteristics (e.g., disability status, problem behavior, social and academic skills) while others originate from the environment (e.g., class size) or from within-teacher characteristics (e.g., experience and education level, attitude).

Implications

This study's results align with that of previous studies' illustrating the predictive qualities of several variables on the quality of STRs when considered independently and concurrently. Multivariate regressions performed with factors grouped according to variable of influence (i.e., within-child, parental, within-teacher, and environmental) elucidated four salient predictors of STR quality within this sample, all teacher-reported

ratings—child internalizing, externalizing, social skills, and problem behavior. A final multivariate regression conducted excluding SSIS problem behavior scores due to multicollinearity with externalizing behavior scores on the CBCL resulted in the identification of child social skill level and externalizing behavior problems as the most significant predictors of STR quality. Our results confirm those of previous findings identifying these variables as critically influential on student-teacher relationship quality (e.g., Eisenhower, Baker, & Blacher, 2007; Berry & O'Connor, 2010; Hamre & Pianta, 2001).

Prior research frequently discusses the presence of problem behavior as one of the most influential factors on student-teacher relationship quality, particularly externalizing behavior topographies. Though both forms of problem behavior initially predicted STR quality, when considered in relation to other predictors, only externalizing behavior scores emerged as a significant predictor. This aligns with theories that the nature of externalizing behavior problems (e.g., aggression, defiance) may have a greater impact on the level of connection possible between a child and their teacher when considered in comparison to those symptoms of internalizing behavior (e.g., withdrawal, neediness). It is possible that adults respond differentially to children depending on the type of challenging behavior present, with there being a slight protective effect of the dependency or worry present when a child exhibits needy or withdrawn behavior versus defiant, aggressive, or hyperactive behavior that may be overwhelming and challenge feelings of connection (Baker, 2006; Meyers & Pianta, 2008).

Results also indicate that child levels of social skills and levels of problem behavior had more predictive power over STRS scores than academic competence within

this sample of children. Levels of problem behavior emerging as a salient predictor was expected given the relative impact of child levels of problem behavior discussed previously and the type of questions about problem behavior asked on the SSIS that overlap heavily with those from the CBCL behavioral measure. Similarly, previous studies have reported the effects of a child's social skill proficiency on the development of a positive relationship with both teachers and peers so our findings were not unexpected (e.g. Berry & O'Connor, 2010; Birch & Ladd, 1997; O'Connor et al., 2011). That both variables remained significant when considered together in the final regression also follows current theory. Children displaying significant challenges connecting socially with others may be more prone to exhibiting problem behavior due to feeling frustrated or anxious by social interaction and difficulties engaging in appropriate problem solving. Persistent negative interaction patterns with peers do not provide adequate opportunities for these children to learn appropriate social skills requiring more assistance from teachers. In turn, this may also negatively impact the degree to which a child is able to form a healthy relationship with their teacher that is not overly reliant on them to solve social conflict or be the child's only source of social support while at school. Children struggling to develop healthy relationships may form maladaptive behavior patterns that persist, creating declines in relationship quality which contribute to long-term negative outcomes, particularly those with disabilities who face additional barriers to success. Given these results and the previously established stability of these effects (e.g., Blacher, Baker, & Eisenhower, 2009; O'Connor & McCartney, 2006; Pianta & Stuhlman, 2004), this study underscores the importance of within-child characteristics

on the quality of student-teacher relationships, particularly those that may be amenable to intervention efforts.

Although several other variables included did not emerge as salient predictors of STR quality (e.g., parent involvement, level of education, number of children in the classroom), all have been shown in the literature to have an influential effect on relationship quality, though results have been mixed in many studies. As such, it is possible that, though they failed to have predictive power in isolation, these variables contribute to overall predictions of STR quality in this sample. To investigate this hypothesis, we conducted a CART analysis to determine if there were any significant predictors included that may emerge when considered from a non-linear approach. Results from our regression tree analysis indicate only one variable aside from social skill level and externalizing behavior significantly predicted total STRS score within this sample. For children with higher externalizing behavior scores (e.g., greater than 22.5), the number of years the teacher has been in the classroom emerged as a relevant variable. For teachers with more than 10.5 years of experience in the classroom, only externalizing behavior scores and their time in the classroom significantly predicted total STRS score—this subgroup's path did not include social skills level as a significant variable towards predicting scores. It may be that, for teachers with more experience in the classroom, relationship quality is more dependent on a child's behavioral impact to the classroom and less on the "reasons" why their behavior may be occurring (e.g., presumably from a lack of social skill proficiency or disability symptomology). This has been observed within the literature in that the positive effect of more educational training on STRS is not reflected when considering years in the educational setting (Hearns, 1998;

Howes, Whitebrook, & Phillips, 1992). Additionally, these teachers may have less flexibility in their approach to teaching given a stronger history of "business as usual" or may represent a cohort of educators trained under different conditions than those with less experience and, as such, consequently received less preparation for working with children with disabilities who engage in problem behavior (Mashburn, Hamre, Downer, & Pianta, 2006; O'Connor & McCartney, 2006).

Though our results indicate similar variables as the multivariate regression analysis, it is interesting that the regression tree analysis largely resulted in social skills level affecting STRS scores via a pathway through externalizing behavior scores whereas our linear analysis indicated social skill level was the strongest predictor when included with externalizing and internalizing behavior. It may be that there are more complex combinations of social skill level interactions that differ among subgroups of children that interact with externalizing behavior and time in the classroom, illustrating the heavy influence social skill level has in combination with challenging behavior on relationship quality. Students with externalizing behavior ratings greater than or equal to 22.5 whose teachers had less than 10.5 years in the classroom differentiated according to three subgroups of social skills scores: those with scores less than or equal to 54, those with scores less than or equal to 68.5 but greater than 54, and those with scores greater than 68.5. Additionally, we observed large differences in the mean values of STRS scores along social skill differentiation, suggesting a strong influence in resulting scores according to varying social proficiency profiles. These findings are interesting in that they indicate meaningful differences in total STRS scores based on three levels of the same predictor variable for children with high externalizing behavior scores. It is possible

that, for these educators, the varying degree of social skill performance is also indicative of differences in the amount of support and effort required of the teacher to intervene socially or assist the child in navigating social situations. These results also support assertions that not all children displaying externalizing behavior problems have low social skills and in fact, may possess prosocial behavior repertoires (e.g., Estell et al., 2003). These variations in effort and support may influence the additional impact of externalizing behavior challenges and be reflected in the predictive power of social skill proficiency on total STRS scores. The significance of these results illustrate the potential pathways towards enhancing the quality of student-teacher relationships for children displaying higher levels of externalizing behavior given the differentiation occurring on the basis of social skill proficiency, particularly for those teachers with less than 10 years of experience in the classroom.

Alternatively, but not dissimilar to results for children with high externalizing behavior scores, subgroups identified for children with externalizing behavior scores less than 22.5 further emphasize the relative importance social skill level has on the quality of student teacher relationships. For those not exhibiting high externalizing behavior symptomology, social skill level emerged as the only significant predictor variable, with three identified and distinct subgroups: those with social skills scores below or equal to 83.5, those with scores greater than 83.5 but less than or equal to 110, and those with scores greater than 110. This aligns with current views on the importance of social skills even when externalizing behavior challenges are not experienced at higher levels, also indicated in our linear regression results whereby social skills emerged as a more salient predictor of relationship quality. This finding also supports previous research on the

independent contributions social skill performance has on the development of positive STRs as well as the way positive STRs can enhance the social skills of children and lead to less aggressive behavior (Birch & Ladd, 1998; Howes, 2000). That social skills proficiency predicts total STRS score via externalizing behavior ratings illustrates the need for intervention efforts focused on increasing social skills as well as the quality of STRs. Previous research has demonstrated that STR quality is positively associated with children's social skill development as well as trajectories across time (Berry & O'Connor, 2010).

Previous research has also established the compensatory effect social skills plays with students who exhibit high levels of externalizing behavior symptoms. As mentioned previously, problem behavior does not necessarily equate poor social skills, with some children establishing high social skills repertoires unrelated to their ability to participate in social situations (e.g., Estell et al., 2003). Newcomb, Bukowsky, and Pattee (1993) described these children as those possessing a *controversial* sociometric status whereby elevated levels of aggressive or destructive behavior that might normally be met with rejection from peers are buffered by qualities such as positive prosocial actions and traits. The social skills measure of the SSIS is comprised of sub-domains in communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. It is possible that scores in a domain such as self-control, a trait one might expect to be less present in children exhibiting externalizing behavior problems, is lacking in the profiles of children displaying problematic relationships with teachers despite high skills in other domains. On the other hand, given their relative strengths in other domains, those children possessing higher quality social skills may be better posed to created quality

relationships with others despite engaging in problem behavior. Future research should seek to further investigate the mechanisms by which social skills serve to buffer the existence of problem behavior, determining if targeted intervention in specific social skills domains will enhance relationship quality between students and teachers. Moreover, future research should consider investigating the specific influence of individual sub-domains from the SSIS social skills measure to determine if these are amenable to intervention efforts and which traits most significantly impact STRS quality.

Limitations and Future Directions

The current findings further demonstrate the importance of within-child and within-teacher characteristics on the quality of student teacher relationships utilizing an analytical approach not previously used to investigate these variables and their impact on STRs. However, there are several limitations worth discussing. Conducting multiple hypotheses testing, as done in this study, increases the chance of a Type 1 error. We observed a high correlation between two variables of interest, externalizing behavior scores on the CBCL and problem behavior ratings on the SSIS. As a result, we chose to only include externalizing behavior ratings in our final regression as we believe the similarities in the types of questions asked on both measures led to observed multicollinearity. Since the CBCL is designed to separate internalizing and externalizing behavior symptoms, it was used to further isolate the relative impacts of differing behavioral traits over the more comprehensive problem behavior ratings from the SSIS. Additionally, our smaller sample size limits the generalizability of these results and increases the chances of a Type 2 error whereby an effect is detected that is not actually present due to statistical underpowering. The resulting regression tree may be affected by

a small sample size as well, with the additional splits in social skills scores from the SSIS not representing large differences in values and potentially indicating that our model was overfit as a result of node size. Recall our node size of 10 cases for parent nodes and five cases for child nodes was set according to challenges with a smaller sample. This is also observed in the large differences in resulting mean values along continued social skill node splits. Overfitting offers a more plausible explanation for over-extended splitting of social skills scores rather than splits indicating meaningful differences. It remains possible that children with higher skill profiles who exhibit problem behavior present a unique challenge to teachers who may perceive better social repertoires as indicative of the ability to exhibit traits such as self-control and thereby struggle more with these students than those with lower proficiency who engage in problem behavior. However, it is more likely that our results are heavily influenced by overfitting resulting from sampling constraints and model parameters.

Our study included a relatively homogenous sample of students and teachers (e.g., white, middle class, college educated) which further limits generalizability to those outside of similar racial, socio-economic, and educational parameters. This may have also impacted the predictive power of parent involvement within this sample as it lacked variability due to the majority of parents indicated they were involved with their child's teacher. Future research should seek to obtain larger, more representative sample sizes when assessing which variables are of most interest when addressing low-quality student teacher relationships. Furthermore, although the questions used in our analysis were aligned with our variables of interest, they were included as part of the original study and not specifically for these research questions and additional data or more specific

questions were unavailable. Future research should seek to determine if other variables not considered in this study further contribute to poor STRS scores (e.g., presence and number of aides in classroom, previous training managing problem behavior, etc.). In conjunction with additional variables, several variables unexplored within this study are known to influence quality of student teacher relationships, such as gender, ethnicity, and SES (e.g., Kisner, 2000; Spilt & Hughes, 2015). Future research should consider adding these variables into additional analyses utilizing CART decision tree software to determine their relative impact on the prediction of student-teacher relationship quality.

This analysis relied exclusively on teacher reported measures to assess child levels of problem behavior, social skill proficiency, and relationship quality. Though research utilizing these types of measures is common within the current literature, there are several limitations to their use that may have impacted our results and introduced mono-method bias into our analysis. For instance, most teachers desire a close relationship with their students. Merely acknowledging the challenges associated with specific students may be difficult for some teachers and lead to response bias or a more optimistic presentation of their relationship with the child in question, particularly if they internalize any judgements around their difficulties or implications due to child disability status. Additionally, many of the measures included utilize rating scales which are subject to challenges with individual interpretations of what constitutes a specific rating. Future research should seek to obtain observational measures that involve an independent observer gathering contextual behavioral and social skills data within the classroom to more closely measure those variables impacting STR quality.

Extrapolating the impact of previously insignificant predictor variables on those serving as stronger, more consistent significant predictors of STRS scores provides a closer unpacking of the way variables influence one another in ways not always observed through a linear regression lens. This study utilized a statistical analysis method not commonly used in educational research, particularly in investigations of variables impacting student teacher relationship quality. Though results align with previous research in several ways, this study is unique in that it provides us with additional information on the differential impact of related variables that may not initially serve as salient predictors, such as amount of experience. As discussed previously, evidence of the influence and predictive qualities of amount of experience in the classroom is inconsistent. Future research should seek to specify the mechanisms of this influence by elucidating those variables that drive this impact. For instance, do more years of experience equate less flexibility with problem behavior, as suggested, or do more years of experience contribute to stress and burnout which further exacerbate stressors related to student problem behavior? Given that a common approach to addressing student problem behavior occurs via consultative processes, understanding the influence this may have on a teacher's perspective and participation in behavior management strategies would be very beneficial to interventionists working in these conditions. Additionally, the consistency of the effect of child levels of social skills on relationship quality, as observed in this study and discussed from the literature, explicates a pathway for intervention via improvements in levels of social skills. Unfortunately, creating change within this repertoire can be challenging for some children with DD. Intervention efforts directed towards teachers and staff with the express purpose of increasing their ability to

engage socially with children who exhibit limited social skills or challenging behavior may serve to increase teacher motivation to provide a supportive, flexible environment best-suited to manage childhood problem behavior.

Conclusion

Results from this study suggest that current theories surrounding factors influencing STR quality for children with disabilities that focus on both within-child and within-teacher characteristics are sound in their assertions, particularly when discussing those included in our analyses. Unlike previous studies utilizing traditional linear regression models, this study utilized a non-linear model that allowed us to identify specific pathways to STRS scores, highlighting the different compounding interactive effects of child externalizing behavior symptoms, child social skill proficiency, and more or less teacher experience. The explication of these variables offers additional information to our understanding of how relationships between children with disabilities and their teachers may develop when these variables are at play. Perhaps most importantly, it illustrates the importance of employing analytical methods that allow us to investigate the nuances of those factors we know contribute to relationship development. By unpacking these pathways, more targeted and individualized intervention approaches can be developed to positively impact relationship quality for students with disabilities and their teachers.

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