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PARENT-TEACHER RELATIONSHIP QUALITY AS A PREDICTOR OF CHANGES IN
EXTERNALIZING BEHAVIORS AT SCHOOL FOR CHILDREN WITH ASD

A Thesis Presented

by

LANA ANDONI

Submitted to the Office of Graduate Studies,
University of Massachusetts Boston,
in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

August 2020

Clinical Psychology Program

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ABSTRACT

PARENT-TEACHER RELATIONSHIP QUALITY AS A PREDICTOR OF CHANGES IN EXTERNALIZING BEHAVIORS AT SCHOOL FOR CHILDREN WITH ASD

August 2020

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Children with Autism Spectrum Disorder (ASD) exhibit high rates of externalizing behaviors compared to children with other disabilities and typically developing peers. These behavioral challenges may impede their ability to successfully transition into school settings. Higher quality relationships between parents and clinicians working with children with ASD have been shown to yield positive student outcomes. Additionally, parent involvement is considered to play a critical role in the success of interventions for children with ASD. Teachers may benefit from parents' extensive knowledge about their child and parents may benefit from greater knowledge of school behavior plans to promote continuity of behavior plans between school and home settings. In order for teachers and parents to share and discuss information with each other, to support each other or to implement interventions in multiple environments, they must also have a comfortable relationship with each other in which they are able to listen and agree or disagree with each other. Therefore, the current study examined the role of parent-teacher relationship

(PTR) quality in predicting changes in externalizing behaviors among 119 young children (mean age = 5 years, 6 months 77.3% males) with ASD over the school year. In addition, the study examined whether student-teacher relationship quality, communication frequency between parents and teachers, and classroom placement moderate the relation between PTR quality and changes in the student's externalizing behaviors. The current study found that PTR quality did not predict changes in externalizing behaviors from the fall to spring of the school year, nor was the relation moderated by student-teacher relationship quality, communication frequency between parents and teachers, or classroom placement. The current study is one of the first studies to examine the direct impact of PTR quality on outcomes of students with ASD, specifically, externalizing behaviors, in a longitudinal design. The findings provide some support that the relation between parent and teacher perceptions of PTR are not direct. Implications for how PTR should be assessed in future studies, as well as implications of our findings are discussed.

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CHAPTER 1

BACKGROUND AND SIGNIFICANCE

Transitioning to formal schooling is an important milestone for all children and reflects a substantial adjustment for children regardless of their disability status (Daley, Munk, & Carlson, 2011). Children with Autism Spectrum Disorder (ASD) may find this transition particularly challenging due to social and communicative deficits as well as restricted and repetitive behaviors. Teachers report being more concerned about the ability of children with autism to transition smoothly compared to other children with disabilities (Quintero & McIntyre, 2011). Additionally, children with autism have a higher incidence of externalizing behaviors than typically developing peers and children with other developmental disabilities (Bauminger, Solomon, & Rogers, 2010; Mahan & Matson, 2011), which poses additional barriers to being successfully included in school settings.

According to Bronfenbrenner's ecological theory, in addition to individual child characteristics that influence a child's successful adaptation to school (such as cognitive abilities, language, and temperament; Rimm-Kaufman & Pianta, 2000), a child's interactions with others around them (typically referred to as their microsystems) influence their successful adaptation to school. For example, children's relationships with their teachers have been shown to predict their academic, social, and behavioral outcomes in school (Hamre & Pianta, 2001). Moreover, Bronfenbrenner's ecological theory emphasizes the

importance not only of the child's microsystems, such as parent-child interactions and teacher-child interactions, but also the relations *between* these microsystems. These relations across microsystems (referred to collectively as the mesosystem) include the relationship between the child's parents and teachers, and are important predictors of developmental patterns (Bronfenbrenner & Morris, 1998). For the purpose of the current study, we examined parent-teacher relationship quality. The quality of the parent-teacher relationship (PTR) encompasses the underlying affective qualities of parent-teacher partnerships such as attitudes towards each other and feelings of collaboration and alliance with each other (Vickers & Minke, 2007).

Parent-Teacher Relationships in School Settings

Within the context of school settings, the relationships between parents and teachers and its association with positive outcomes for children with ASD has been explored in several studies. It is important to note that none of the studies with children with ASD explicitly used the term "parent-teacher relationship quality." However, they assessed similar constructs that include trust and respect between parents and teachers. For instance, Labarbera (2017) used open-ended items and Likert-scale items to assess collaborative practices between parents and teachers that are intended to build relationships based on trust and demonstrate an attitude of respect. Based on responses from 28 caregivers and 102 educators of children with ASD, they found that higher ratings of collaborative practices correlated with higher reported satisfaction with the relationship. Hsiao (2017) used the Beach Center Family Professional Partnership scale to assess parent reported level of content with their service providers. This scale included a child-focused subscale which measures the parents' level of trust in the provider's ability to help their child succeed, and a family-

focused relationship subscale which measures the degree to which families feel that the provider is available, listens to them, and respects them (Summers, 2005). Among 236 parents of school children with ASD (children aged 3-21), Hsiao (2017) found that higher quality collaborative partnerships were correlated with higher family quality of life. Burke and Burke (2015) used the same scale, the Beach Center Family Professional Partnership scale, with 507 parents of children with ASD (average child age: 10.7 years, range 3–21 years) and found that parents' reporting of higher quality collaborative partnerships was associated with a reduced need for parents to resort to safeguards with the school such as mediation and due process for their child. While these safeguards are intended to provide an unbiased forum to resolve disputes, the process has also been associated with increased parent stress (Burke and Hoddap, 2014). The previously mentioned studies have all found evidence of the positive association between PTR quality of a child with ASD with family outcomes such as parent satisfaction or family quality of life. However, to date, no study has specifically examined the association or impact of the PTR quality on specific child-focused outcomes for children with ASD (such as academic, behavioral, or social outcomes). However, as a parallel, a repeated reversal design study has demonstrated that higher quality relationships between parents and clinicians working with children with ASD is associated with positive outcomes, including a reduction of parent stress levels and increases in a child's positive responses to the intervention (Brookman-Fraze & Koegel, 2007).

Among typically developing children, only one study has examined the impact of PTR quality on problem behaviors (Serpell and Masburn, 2012); in their study of 1939 pre-K and kindergarten children, they found that teacher rated PTR quality was concurrently

associated with problem behaviors during the fall and spring of the school year. Longitudinally, they found that higher parent rated PTR quality in pre-kindergarten was associated with higher ratings of social competence and lower student-teacher conflict as rated by kindergarten teachers, even after controlling for entry-level scores. However, teacher rated PTR quality did not predict behavior levels after controlling for baseline levels. Similar to Serpell and Mashburn, our study also examines the question of whether PTR quality predicts change in problem behaviors over time, with slightly different ways of measuring this in a different sample. Our study looks specifically at externalizing behaviors, rather than problem behaviors more generally, and uses both parent and teacher rated PTR Quality as a measure of PTR quality (as opposed to teacher-rated quality only), and by focusing on an ASD sample.

Studies with non-ASD samples have found associations between positive PTRs with several indicators of positive current and future student outcomes. For example, positive parent ratings of the quality of the PTR were strongly associated with concurrent quality of teacher ratings of student-teacher relationship (Chung et al., 2005), which in turn has been associated with behavioral adjustment, social acceptance, and social competence (Baker, 2006; Pianta & Stuhlman, 2004). Positive PTRs appear to be particularly important for children with academic or behavioral risks. For example, Hughes et al. (2005) examined the association between PTR quality and teacher expectations in 607 ethnically diverse first grade children who were academically at risk (as determined by low scores in a literacy test). Teacher expectations, or teacher perceptions of a child's ability, are considered to be an important indicator of child academic outcome because of how such perceptions, be they accurate or not, have been shown to predict students' grades on standardized tests (Jussim &

Harber, 2005). Hughes et al. (2005) demonstrated that higher teacher-rated PTR quality was associated with higher teacher expectations of the child's academic competence in these academically at-risk children. Further, in a sample of 207 children with behavior problems, PTR quality was shown to mediate the relation between receipt of a family-school intervention (conjoint behavioral consultation compared to a control business-as-usual condition in which traditional school support was provided by school personnel), and reduced externalizing behaviors from pre- to post-treatment (Sheridan et al., 2017).

As mentioned previously, no studies have examined PTR quality in relation to future outcomes in children with ASD. Moreover, no studies thus far have examined both parent and teacher perspectives of the PTR with children with ASD. However, the quality of the dynamic interactions between parents and teacher plays an important role, particularly within contexts that create greater vulnerability to strained relationships (Mautone, Marcelle, Tresco, & Power, 2015). Indeed, the larger special education system within which parents and teachers of children with ASD interact often places strain on their relationships. Parents of children with ASD experience greater discontent in their experiences with school communication compared to parents of children without ASD (Zablotsky, Boswell, & Smith, 2012). In addition, it is not unusual for parents of children with ASD to experience conflict and dissatisfaction with the IEP process and/or team (Slade, Eisenhower, Carter, & Blacher, 2018). Given the potential for more highly strained PTRs in children with ASD, as well as the importance of understanding both parent and teacher perspectives of the relationship; this study examined how both parent and teacher perspectives of the PTR plays a role in students with autism's behavior outcomes.

Externalizing behaviors in Children with ASD

It is important to consider the role of PTR quality in reducing externalizing behaviors, given that children with ASD exhibit higher rates of externalizing behaviors compared to children with other disabilities (Brereton, Tonge, & Einfeld, 2006; Eisenhower, Baker, & Blacher, 2005; Mahan & Matson, 2011). Additionally, externalizing behaviors contribute to difficulty integrating students in general education placements (Brereton et al., 2006).

Rationale Aim 1: Relation between PTR quality and externalizing behaviors in children with ASD

Parent-teacher relationships may be particularly important in addressing the externalizing behaviors of children with ASD. Among other reasons, parents may be able to share their knowledge about the child with teachers, including antecedents to the child's behavior as well as successful behavior strategies that have been introduced by other service providers. Children with ASD are more likely to receive services such as educational or school-based services, vocational services, family support services, and social recreational services than children with non-ASD diagnoses (Carbone et al., 2016; Mandell, Walrath, Manteuffel, Sgro, & Pinto-Martin, 2005). Consequently, parents often act as primary care coordinators and navigate the different service delivery systems. Family involvement in early intervention, which includes behavior intervention, is a critical aspect of the intervention process (National Research Council, 2001), and many behavior intervention models are incorporating parent-training components (Matson, Mahan, & Matson, 2009). As a result, parents may have extensive information that would support teachers in identifying and implementing strategies for supporting children's positive behavior in the classroom.

Additionally, the effectiveness of interventions and teaching methods are enhanced when there is consistency across children's multiple environments. Generalization of skills is difficult for some children with ASD (Church et al., 2015) and therefore the ability to practice their skills with both their teachers and parents, at school and at home, will increase the likelihood that reductions in behavior (and appropriate replacement skills) are maintained (Carothers & Taylor, 2004). Such consistency is surely fostered by greater frequency of effective communication between parents and teachers.

In order for teachers and parents to share and discuss information with each other, to support each other or to implement interventions in multiple environments, they must also have a comfortable relationship with each other in which they are able to listen and agree or disagree with each other. Previous work with parents of children with special needs has established that positive parent-teacher collaboration involves parents feeling that their concerns are being heard and solicited by teachers, and that they discuss how to address these concerns (Esquivel, Ryan, & Bonner, 2008). Azad & Mandell (2016) found that parents and teachers often agree on a primary concern but do not communicate with each other about that concern and instead may both talk about a non-primary concern. The authors suggest that a potential reason for this disconnect is that parents and teachers may not feel comfortable with each other. In order to expect parents and teachers to discuss and implement behavior plans consistently across settings or to support each other; they must first be comfortable enough to share their concerns with each other; thus, a positive, comfortable relationship between parents and teachers may be an important foundation for fostering behavioral improvements. Therefore, in this study I hypothesized that higher quality relationships between parents and teachers predicts reductions in externalizing behaviors of children with ASD over time.

Reductions of externalizing behaviors in this context may also encompass lower gains in externalizing behavior for those children whose externalizing behaviors are increasing over time, as opposed to absolute reductions per se.

Rationale Aim 2: Student Teacher Relationship as a moderator for the relation between PTR and externalizing behaviors in children with ASD.

In addition to parent-teacher relationships, the quality of student-teacher relationships (STR) has also been associated with both the level of externalizing problems (Brown & McIntosh, 2012; Robertson, Chamberlain, & Kasari, 2003) and the degree of change in externalizing behavior over time for children with ASD (Howes, 2000). High quality student-teacher relationships, typically rated by the teachers, are those characterized by low conflict, high closeness, and appropriate dependency. In their cross-sectional study of 12 second and third grade students with ASD in an inclusive classroom, Robertson et al. (2003) found that children with ASD who had poorer quality STRs, and specifically more conflict in the relationship, showed more behavior problems and were less socially included. Additionally, in a 5-year longitudinal study with 307 typically developing children (152 girls, average age 51.6 months in year 1 and 96.4 months in year 5), Howes (2000) examined the impact of demographic factors, classroom climate, previous behavior problems and STRs on children's rate of behavior problems. Howes (2000) evinced that the best predictor of child behavior problems in elementary school controlling for previous behavior problems was the presence of a current conflictual student-teacher relationship followed by previous student teacher closeness.

The greater behavioral and psychiatric problems facing children with ASD relative to children with other developmental disabilities or typical development (Eisenhower, Blacher, & Bush, 2015) may make them particularly vulnerable to poorer quality STRs (Mahan and Matson, 2011). The current study examined whether STR moderates the association between PTR quality and changes in externalizing behaviors. Hamre & Pianta (2001) postulated that high quality STRs might motivate teachers to devote additional time and resources to ensuring children's achievement. It is possible that high quality STR may result in reductions in externalizing behaviors because these positive STRs may position teachers well to act on, or implement, any strategies or ideas gained from their interactions with parents. With a higher quality PTR where teachers and parents are comfortably sharing information with each other, a higher quality STR may make teachers more motivated to implement strategies or plans suggested by parents, as well as to collaborate with parents on implementing consistent behavior plans. In this sense, a higher quality STR was expected to strengthen the positive predictive impact of PTR quality on changes in externalizing behaviors, such that the association between PTR quality and changes in externalizing behaviors was hypothesized to be stronger for students who have higher quality STRs compared to lower quality STRs.

Rationale for aim 3: Communication frequency as a moderator for the relation between PTR and externalizing behaviors in children with ASD.

The association between PTR quality and children's subsequent externalizing problems may also vary by frequency of communication between parents and teachers. While there is limited research on the ways in which high quality PTRs promote positive

student outcomes, one possible way is that a high quality parent-teacher relationship may facilitate more effective and frequent communication between parents and teachers.

Despite the consensus that parent-teacher communication is an essential component of successful relationships with parents (Christenson, 2004; Sheridan & Kratochwill, 2007), especially for children with ASD (Azad, Kim, Marcus, Sheridan & Mandell, 2016), the relations between parent-teacher communication and both PTR quality and student outcomes remain unclear. Findings with typically developing children indicate that PTR quality and communication frequency do not always go hand in hand. A PTR can be positive and mutually respectful even if the frequency with which the parent and teacher communicate is quite low. In addition, a PTR can be marked by tension or strain even if the frequency with which the parent(s) and teacher communicate is rather high. In their study of 1234 parents and 209 teachers of a K-12 classrooms in a suburban school district, Adams & Christenson (2000) established that the perceived quality of family-school interaction is a better predictor of trust than the frequency of contact. This finding suggests that, whereas PTR quality may have a direct, positive association with child outcomes such as behavioral adjustment, the association between *frequency* of parent-teacher communication and child outcomes may be less clear-cut, a point further solidified by more recent research. For instance, Rimm-Kaufman et al. (2003) found that stronger teacher-rated PTR quality in a sample of 223 kindergarten teachers was associated with more positive child outcomes including fewer behavior problems as well as higher competence, language, and math ratings. However, greater teacher-reported family involvement in activities (including frequency of volunteering in school activities and frequency of communication) was associated only with higher language ratings and surprisingly, more behavior problems. In addition, in their study

of 1939 pre-K and kindergarten children, Serpell and Mashburn (2012) demonstrated that teachers reported lower social competence, more problem behaviors and more conflict in their STR for children whose pre-school teachers reported greater frequency of phone contacts with their parents. Both studies suggest that higher frequency of communication was associated with greater behavior problems, (an undesirable outcome), even though in one of the studies there was a positive association between communication frequency and language ratings (a desirable outcome). Taken together, these studies suggest that the relationship between frequency of communication and child outcomes is not always beneficial, or direct. Indeed, as I hypothesize here, it may be that communication frequency works as a moderator, rather than a direct predictor, in relation to children's externalizing behavior outcome.

Understanding how parent teacher communication frequency impacts the relation between PTR and child outcomes is of particular importance because communication (or lack of communication) has often been cited as a source of conflict between parents and teachers of children with ASD (Blue-Banning, Summers, Frankland, Nelson, & Beegle, 2004; Tucker & Schwartz, 2013). In the current study, it was hypothesized that higher quality parent-teacher relationships, when paired with more frequent communication, may provide more opportunities for teachers to benefit from parents' insight (and vice versa) in order to put strategies in place to reduce externalizing behaviors. On the other hand, when PTR quality is high but communication frequency is low, then there are limited opportunities for parents and teachers to share goals and implement them, thus limiting their ability to benefit from this positive PTR.

In the current study, the role of communication was considered as a moderator when examining the association between PTR quality and changes in externalizing behaviors.

Lower frequency communication was expected to reduce the positive predictive impact of PTR quality on changes in externalizing behaviors, such that the association between PTR quality and externalizing behavior changes was hypothesized to be weaker for children whose parents and teachers communicate less frequently.

Rationale for Aim 4: Classroom placement as a moderator for the relation between PTR and externalizing behaviors in children with ASD.

The association between PTR quality and children's subsequent externalizing problems may also vary by the type of classroom – special education classroom or general education classroom – in which children are enrolled. Specifically, the link between PTR quality and subsequent externalizing problems may be stronger for children in general education classes and weaker in special education classes, where more systems may be in place to address challenging behaviors in a way that is less dependent on individual parent-teacher interactions. As such, it is possible that, due to factors such as a smaller class size and special education teachers' greater expectation of collaboration with teachers, that the impact of PTR quality on externalizing behaviors may be weaker for students in special education classrooms compared to students in general education classrooms.

As noted previously, one of the possible ways in which PTR quality may relate to subsequent externalizing behavior is that a high quality PTR may facilitate better and more frequent communication between parents and teachers around addressing these challenging behaviors (Christenson & Sheridan, 2001). In special education classrooms, there may be more systems and processes set in place to promote routine communication between parents and teachers compared to general education classrooms; as such, regular communication

between parents and teachers may occur to some degree regardless of PTR quality. Existing research does not directly address this question with regard to classroom type; however, research comparing special education schools versus mainstream schools may also be relevant here. In their study of parents' perceptions of PTR quality in Dutch schools, Leenders, Haelermans, de Jong, & Monfrance (2018) interviewed 11 parents from mainstream schools and 8 from special education schools to gain insight into PTR practices. The results of the interviews demonstrated that special education schools are more accustomed to "two-way communication" in contrast to mainstream schools such that it was more common practice for parents from the special education schools to talk about their ambitions and their teacher's ambitions of their child on a regular basis, compared to mainstream school parents and teachers. In addition, the same study measured parents' perceptions of the PTR using a Parental Involvement Questionnaire developed on behalf of the Dutch Ministry with 125 parents from two mainstream schools and 83 parents from two special education schools. The questionnaire tapped into different themes including searching for agreement, trust, communication, volunteering, learning at home, and decision-making. The questionnaire results portrayed that parents felt that their special education teachers had more genuine interest in their child compared to mainstream school teachers.

This pattern is likely present with special education classroom practices as well, in which there may be more processes set in place for parent and teacher communication than in general education classrooms for several possible reasons. Primarily, special educational classrooms tend to have markedly smaller class sizes and thus more teachers per students, which has often been the justification for why students are placed in special education classrooms (Ysseldyke, Algozzine & Thurlow, 1992, (Zarghami & Schnellert, 2003).

Therefore, special education teachers may have more time dedicated to ensuring timely and more frequent parent communication patterns compared to general education teachers. In turn, parents of children in special education classrooms may have more opportunities to collaborate, regardless of PTR quality. On the other hand, parents of children in general education classrooms may require a higher quality PTR to ensure more frequent communication patterns.

Secondly, special education teachers may be more accustomed to collaboration between the home and school such that these practices are already ingrained as part of their day-to-day practices as compared to general education teachers. While there is limited research on this, Spann and colleagues (2003) surveyed 45 parents of children with autism (of whom 73% spend at least part of their day in general education classrooms) about their home-school communication, and found that parents frequently referenced their child's paraprofessional or special education teacher, with only a few parents referencing the general education teachers (Spann, Kohler, & Soenksen, 2003). Additionally, in a study of 437 parents of children with mild, moderate, or severe disability in either special education classrooms or mainstreamed classrooms, Leyser and Kirk (2004) found that almost 60% of parents felt that teachers do not have enough time to help their child with individual instruction. If parents of children in general education perceive that the teachers do not have enough time for their children, they may also be less likely to seek out the teachers and collaborate with them. Therefore, parents may expect and anticipate more frequent communication from special education teachers than general education teachers and may seek that out regardless of their PTR quality. On the other hand, parents may feel less comfortable seeking collaboration with their general education teachers in the absence of a

strong PTR, which may limit the opportunities parents and teachers work together towards bettering the child's outcomes such as reducing challenging behaviors at school.

As a result, the current study hypothesized that the association between PTR quality on changes in externalizing behaviors will be stronger for children who are in general education classrooms, because high quality PTRs may facilitate communication between parents and teachers that, in the general education context, may not be happening otherwise; such parent-teacher communication, when present in the general education classroom, may enable teachers to effectively address externalizing problems. On the other hand, the association between PTR quality and changes in externalizing behaviors was expected to be weaker for children who are in special education classrooms, where regular parent-teacher communication is already the norm, because these placements are likely to already have processes and resources set in place to promote communication in ways that will address externalizing problems.

CHAPTER 2

RESEARCH DESIGN AND METHODS

Participants

Participants in the current study are a subset of participants that were in the Smooth Sailing study, a federally-funded, longitudinal two-site study that followed young children with ASD as they transitioned into formal schooling. Participating families were from a Northeastern metropolitan area (36%) and southern California (64%). Participants were recruited through a variety of methods including online advertisement, in-print advertisements, and word of mouth, through local school districts, clinicians, autism resource centers, intervention agencies, autism related conferences and websites, and parent support groups.

Inclusion criteria for the larger study included a prior diagnosis of ASD and an IQ above 50. Data were collected through direct child assessments, parent interviews and questionnaires, and teacher questionnaires at three time points (fall of the school year, spring of the school year, and spring of the subsequent school year). In the current study, only children for whom teachers participated in the first two (fall and spring) data collection points were included, as determined by teacher completion of the *Parental School Involvement: the Parent and Teacher Involvement Scale* during those two time points. This subsample is 64.67% of the overall sample (N= 184) and included 119 children (81.5%

males, mean age = 5 years, $SD=1$, range 3-7 years), their parents and teachers. This subsample ($n=119$) did not differ from those who were not included ($N=65$) on any demographic factors (race, gross household income, parent education level, child age, and child sex). Given that these two groups mainly differed in the fact that teacher-report of PTR was not recorded at both time points, we assessed whether the relationship quality differs between these two groups based on the parent-report. Our findings showed that parent perceptions of PTR quality did not differ between the groups with and without missing teacher-rated PTR data.

Based on the current subsample, at the time of entry into the study, 43.7% of children were in preschool, 24.4% were in kindergarten, 23.5% in first grade, and 7.6% in second grade. Most of the parent respondents were the biological mothers (85.7%), were married (81.5%), and had at least a four-year college degree (61.4%). Parents reported their child's race in an open-ended item which was later aggregated into categories; children were 5.0% Asian American, 3.4% African American, 53.8% white, 11.8% Latino, 21% bi- or multi-racial, and 4.2% other. More than half of the families (62.1%) had annual incomes above \$65,000. A minority of children (9.2%) attended private schools, with the remainder attending public elementary school or some form of preschool (Head Start, developmental preschool) or child-care. Most children had received Part C early intervention services (88.2%). Less than half (45.4%) of the participating children were in special education classes (versus general education classes) for 50% or more of the day, and teacher data was provided by the teacher who had the student for 50% or more of the school day; 23.1% of the sample had a classroom aide in addition to the primary classroom teacher. On average, children had a class size of 16 students ($SD=7.56$, median = 14, range =1-31). The majority

of teachers had earned a master's degree (67.2%). Teachers reported their race in response to a multiple choice question as 5.0% Asian American, 2.5% African American, 67.2% White, 16.8% Latino, 0.8% Native, and 6.8% multi-bi racial or other.

Procedures

Families interested in the study attended an eligibility session during the summer or fall between 2011 and 2013. After parents provided informed consent, child participants were assessed for eligibility using the ADOS (Lord et al., 2000) and a three-subtest battery from the WPPSI-III (Wechsler, 2002). The subtests included Matrix Reasoning, Picture Completion, and Vocabulary. For children who had not already received a diagnosis of ASD from a non-school professional, the Autism-Diagnostic Interview (Revised) (ADI-R) (Lord, Rutter, & Couteur, 1994) was also conducted with the parents. Eligible participants for the larger study included those who (a) scored in the autism or autism spectrum range on the ADOS, (b) either had received a previous diagnosis of ASD from a non-school based clinician or scored in the autism or autism spectrum range on the ADI-R, (c) were determined to meet criteria for ASD based on clinical judgment by research staff, (d) earned an estimated IQ score of 50 or higher on the WPPSI-III, and (e) were between ages 4-7 years and (f) entering their final year of pre-K, 1st grade, or 2nd grade in the fall.

After determining eligibility, eligible students and their parent completed three subsequent sessions. Time 1 occurred during the fall of the school year, Time 2 occurred in the spring of the school year (roughly 6 months later), and Time 3 occurred in the spring of the subsequent school year. Sessions included child assessments and parent-completed questionnaires and a lengthy parent interview. Parents were compensated \$50 per visit. Additionally, after each session, teachers were provided with questionnaires to complete,

which were either given to them by the parents or directly mailed to the teachers by the study staff. Teachers were compensated \$25 (or \$50 for their final packet) to complete a packet of measures. Data for the current study were drawn from Times 1 and 2 during the fall and spring of the first year of participation.

Measures

Demographics. Background information about the child and family (parent report) and the teacher and school (teacher report) was obtained through demographic surveys completed at Time 1. Participant demographic characteristics described in the current study include child age, sex, grade, race and ethnicity, parental income, education level, and parent relationship status, as well as teacher gender, race and ethnicity, and education level.

ASD Diagnosis. Children's ASD status and symptom severity was determined using the ADOS (Lord et al., 2000). The ADOS is a semi-structured, interactive observation schedule designed to assess an individual's communication, social interaction, play and imaginative use of materials, and restricted and repetitive behaviors. The ADOS was administered by doctoral students who had completed ADOS research-level training and were research-reliable or in the process of obtaining reliability; in cases where the assessor had not yet obtained research reliability, the assessment was observed and scored by an ADOS reliability trainer whose scores were used in the analyses. To be eligible for our study, children had to fall in the autism or autism spectrum range.

Externalizing Behaviors. The *Caregiver-Teacher Report Form ages 1.5-5*, *Teacher Report Form ages 6-18*, (CTRF, TRF; Achenbach & Rescorla, 2000; Achenbach & Rescorla, 2001) were used to assess child behavior problems from the teacher's perspective depending on the age of the child at each assessment. The CTRF and TRF contain 99 and 112 items

respectively. Items present child problems alphabetically (from “aches and pains without medical cause” to “worries”), and response options include *not true*, *somewhat or sometimes true*, or *very true or often true*, now or in the past 2 months. T scores for broadband (total, externalizing, and internalizing problems) are produced with means of 50 ($SD = 10$). These scores have shown excellent validity and have been correlated with other measures of behavior problems (Achenbach & Rescorla, 2000) and autism symptoms (Sikora, Hall, Hartley, Gerrard-Morris, & Cagle, 2008). Based on the larger sample of the present study, the scale had great reliabilities with a Cronbach alpha of .95 for both age-specific versions. The present study utilizes the externalizing behavior problems T-score for Time 1 and 2.

Parental School Involvement. The *Parent and Teacher Involvement Scale -Teacher* (PTIS-T; Miller-Johnson & Mauary-Gremaud, 2000; NICHD, 2005) and *Parent and Teacher Involvement Scale -Parent* (PTIS-P; NICHD, 2005) were used to assess PTR quality and communication frequency, as described below. These two scales assess both the teacher’s and parent’s perceptions of the parent’s involvement with the child’s school activities (activities subscale), as well as the quality of the teacher’s relationship with the parent(s) (relationship subscale). Both parent- and teacher-report scales demonstrated good internal consistency in the standardization samples with alphas of .79-.93 (Corrigan, 2002; Miller-Johnson & Maumary-Gremaud, 2000). In addition, in the current sample, the subscale had strong reliability with a Cronbach alpha of .74 for the parent version and .89 for the teacher version at time 2.

Parent-Teacher Relationship Subscale. The parent-report and teacher-report parent-teacher relationship subscales were used in order to assess PTR quality. The parent-report

relationship subscale is composed of 9 parent-reported items and includes items like “I think the teacher knows me pretty well”. The teacher-report relationship subscale is composed of 12 teacher-reported items and includes items like “We have a close and mutually respectful relationship.” PTIS relationship scale items are scored on a 5-point scale ranging from “strongly disagree” to “strongly agree”. In the current sample, the subscale had strong reliability, with a Cronbach alpha of .91 and .94 for the parent version at Time 1 and 2, and .93 for the teacher version at Time 1 and 2. Both parent-report and teacher-report relationship subscales were combined to form a latent PTR construct in our analyses.

Communication frequency - based on items from the activities subscale. For the purpose of the current study, in order to assess communication frequency, 10 specific items were chosen from the activities subscale of both the parent and teacher-reported versions of the Parent Teacher Involvement Scale. While the overall activities subscale captures different concepts such as parent’s volunteering at school and attitude towards education, we were specifically interested in those assessing the frequency of parent-teacher contact. Resultantly, 8 items from the parent-reported questionnaire and 2 items from the teacher-reported questionnaire were selected because they were better able to statistically and conceptually capture the “communication frequency” variable that we wanted to study in aim 3 of the study. The parent-report items includes items such as “I send a written note or email to the teacher” and “I ask the teacher questions or make suggestions about my child”; and are scored on a 7-point scale ranging from “never” to “almost every day”. The teacher-report items includes the two items: “How often does this parent ask questions or make suggestions about his/her child?” and “How involved is this parent in his/her child’s education and school life?” and were scored on a 5-point scale ranging from “not at all” to “A great deal”. Given

the low correlation between parent-reported and teacher-reported items on this subscale and because they are measured on different scales, the parent and teacher reported items were tested in two separate analyses: one total score for the parent-reported items and one total score for the teacher-reported items. In the current sample, the parent and teacher reported subscale for communication frequency each had adequate reliability, with a Cronbach alpha of .74 for the parent scale and .72 for the teacher scale at time 2.

Student Teacher Relationship Quality. The *Student-Teacher Relationship Scale* (STRS; Pianta, 2001) was used to assess the teacher's perceptions of the quality of their relationship with a targeted student ranging from preschool to third grade. The 28-item measure includes three subscales: conflict (12 items), closeness (11 items), and dependency (5 items). Conflict scale measures the teacher's feeling of negativity or conflict with the student (e.g., "The child and I always seem to be struggling with one another"). The closeness scale measures the teacher's feelings of affection and open communication with the student (e.g., "I share an affectionate, warm relationship with this child"). The dependency scale measures the extent to which teachers view the student as overly dependent. All of the items on the STRS are scored on a 5-point likert scale with answers ranging from "Definitely does not apply" to "Definitely applies". The total index raw score can range from 28 to 140 and is computed using the following formula: total raw score = (72 - conflict) + closeness + (30 - dependency). These scales have demonstrated good internal consistency ranging from 0.85 and 0.87 for the conflict subscale and 0.91-0.93 for the closeness subscale (Webb & Pritchett, 2011). In elementary grades, the STRS measure has also shown validity with regards to predicting academic and social functioning (Hamre & Pianta, 2001, 2004). In the present study, total, conflict, and closeness scores were used. In the current sample, the scale

had adequate reliability, with a Cronbach alpha of .86 for the conflict subscale, and .81 for the closeness subscale.

Classroom Placement. Classroom placement was determined based on teacher's report of a multiple-choice question "*What percentage of time does the student spend in a regular education setting?*" with 4 options including "up to 25%", "26-50%", "51-75%", and "76-100%". A special education classroom placement was determined if the teacher reported that the child spends 50% or less in the regular education setting, whereas a regular education placement was determined if the teacher reported that the child spends more than 50% in the regular education setting.

Proposed Statistical Analyses

Data were analyzed with two statistical packages: SPSS and MPlus. Before running specific aims, SPSS was used to run descriptive statistics regarding the child, parent, and teacher data. Mplus was used to run bivariate correlations. Additionally, MPlus was used to conduct structure equation modeling (SEM) to address the four aims of the study. In this study, SEM was chosen as the preferred statistical method, because it has demonstrated usefulness in estimating over-time models when the number of time points is as few as two as in our sample (Cook & Kenny, 2005). Additionally, SEM is a good statistical measure of the moderation effects that are explored in the second, third, and fourth aims. A latent variable was used to measure the parent-teacher relationship construct. All other variables were observed/manifest variables including externalizing behaviors at Time 1 and Time 2, STR at Time 2, parent-teacher communication frequency at Time 2, and classroom placement at Time 1. For the second, third, and fourth aim, each of the moderator variables (STR quality at Time 2, parent-teacher communication frequency at Time 2, and classroom

placement at Time 1) were transformed into dichotomous variables based on a median split. The moderator variables were dichotomized to capitalize on the ability within SEM to conduct a multi-group regression model as a means of testing for a moderator effect.

CHAPTER 3

RESULTS

Preliminary Statistical Analyses

Data were analyzed with the SPSS 25.0 and MPLUS 8.3 statistical packages. SPSS was used for descriptive statistics. Descriptive statistics were run in SPSS to describe sample demographics regarding child, parent, and teacher demographics (See table 1). Next, the normality of the data was examined in SPSS to determine whether the assumption of multivariate statistical estimations used in the study were met. All measured continuous variables were examined for departure from normality terms using skewness and kurtosis. Parent-rated PTR total score at Time 1 and 2 had slightly elevated skewness values (-1.08 and -1.19 respectively), and the parent-rated PTR total score at Time 2 also had a slightly elevated kurtosis value (2.10); all other variables had kurtosis and skewness within acceptable ranges (-1 to 1 and -2 to 2, respectively). Given that the two concerning values were only slightly elevated, we used the non-transformed variables.

Participants for this particular study were a subsample of the larger sample in the Smooth Sailing study (57% of the larger sample) which included participants who had teacher-rated PTR scale completed at both Times 1 and 2 ($N = 119$). The rate of missingness for key variables (including parent and teacher report of PTR at Time 1 and 2, externalizing

behaviors at Time 1 and 2, classroom placement, as well as STR and communication frequency at Time 2) within this subsample ranged from 0% to 4.3% (average of 1.8%).

Missing data analysis indicated that data was missing completely at random (Little's MCAR test: $X^2(567, N=119) = 285.72$ $p >.05$). Little's Missing Completely at Random (MCAR) test supported the use of FIML. Full Information Maximum Likelihood was used to address missingness for all remaining analyses on MPLUS (Muthen & Muthen, 2010). FIML was chosen as a preferred statistical method for missing data because Maximum likelihood estimation techniques have demonstrated better performance than similar response pattern imputation, list wise deletion, or pairwise deletion; and it produced unbiased parameter estimates, including when data is not completely missing at random (Enders & Bandalos, 2001).

Bivariate correlations were run between all indicators used in the analyses (See Table 3). Externalizing behaviors T-score at Time 1 were strongly correlated with externalizing behaviors at Time 2 ($r=.77$, and $p<.01$). The average externalizing T-score at Time 1 was 58.19 (SD=9.37), and 56.33 (SD=9.8) at Time 2. At Time 1, 16% of the sample was in the borderline range (T-score of 60-63), and 25.8% were in the clinical range (>64) for externalizing behaviors. At Time 2, 17.6% of the sample were in the borderline range and 23.5% in the clinical range for externalizing behaviors, indicating that a substantial portion of our sample had elevated externalizing behavior scores at both Time points. Paired T-tests show that externalizing behavior T-scores decreased from the fall to the spring of the school year ($t(114)=3.38$, $p=.001$).

Teacher-rated PTR quality raw scores at Time 1 (M=49.81, SD=6.31) and at Time 2 (M=49.74, SD=7.84), were moderately correlated ($r = .65$, $p<.001$). Parent -rated PTR

quality raw scores at Time 1 ($M=36.95$, $SD=6.80$) and Time 2 ($M=37.06$, $SD=6.76$) were also moderately correlated ($r=.43$, $p<.001$). Parent-rated and teacher-rated PTR quality raw scores were correlated at Time 1 during the fall of the school year ($r = .26$, $p =.004$), and at Time 2 by the spring of the school year ($r = .53$, $p <.01$). Notably, the parent-rated and teacher-rated PTR quality at time 1 was more strongly correlated than parent-rated and teacher-rated PTR quality at time 2 ($z= -.24$, $p=. 01$). Parent and teacher PTR quality at Times 1 and 2 did not differ by the child's classroom type (special education vs. general education).

Statistical Analyses of Specific Aims

Specific Aim 1: The relation between PTR and externalizing behaviors in children with ASD.

Measurement model. We first ran a measurement model to examine how the observed variables loaded onto their hypothesized latent factors. To create the PTR quality latent factor, I conducted confirmatory factor analyses were first conducted to determine the fit of a model comprised of the four observed indicators: parent-rated PTR quality at Time 1, parent-rated PTR quality at Time 2, teacher-rated PTR quality at Time 1, and teacher-rated PTR quality at Time 2. The model was identified with $2df$. Goodness of fit was not achieved based on our criteria. As a result, parceling was used instead, such that three parcels (Parcel 1, Parcel 2, and Parcel 3), or indicator variables, were created from both parent-and teacher-report scales at Time 1 and 2 by assigning every third item to a parcel. The model is identified with $0df$. Goodness of fit was evaluated using the chi-square (χ^2), standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), and

comparative fit index (CFI). Guided by suggestions provided in Hu and Bentler (1999), acceptable model fit was defined by the following criteria: RMSEA (<.06, 90% CI), SRMR (<.08), and CFI (>.95). Three of four of the goodness of fit indices (with the exception of chi-square) indicated that the latent-factor model fit the data well, $\chi^2(0) = 0$, $p < .01$, SRMR = .00, RMSEA = 0 (90% CI = 0.00 - 0.00), CFI = 1. Factor loading estimates revealed that the parcels were strongly related to the latent factor of PTR quality (0.95 - 0.96) and all loading were significant at $p < .001$. As the model was just identified, fit indices could not be generated; however, given the high factor loadings, it was seen fit to proceed with the structural model model.

Structural model. Next the association between the PTR latent variables with changes in a child's externalizing behaviors over time was tested using structural equation modeling (SEM) in MPlus. The model included two paths, one between the latent PTR Variable and spring externalizing behaviors (Time 2), and another path between fall externalizing behavior (Time 1) and spring externalizing behaviors (Time 2). The model fit was strong on three out of four indices; $\chi^2(4) = 1.14$, $p = .89$, SRMR = .01, RMSEA = 0.00 (90% CI = 0.00 - 0.06), CFI = 1.00. See Figure 1.

Results demonstrated that there was no significant effect of the PTR quality latent factor on spring externalizing behaviors (estimate = -.067, $p = .28$), after including the path from fall externalizing behaviors to spring externalizing behaviors (estimate = .76, $p < .001$). The results do not support my hypothesis, as PTR quality does not appear to predict change in externalizing behaviors over time.

For each of the remaining analyses, I tested whether a moderator variable will change the association between PTR latent variable and externalizing behaviors at Time 2, over and

above the effect of externalizing behaviors at Time 1. The moderators were split into dichotomous variables with two groups. For these analyses, the model was first run with all paths constrained across the two groups. Next, the model was run with the path between PTR and Time 2 externalizing behavior (Path B in the figure 2) unconstrained. Subsequently, a chi square difference test was conducted to compare the model fit between the first and second model.

Specific Aim 2: STR conflict, closeness, and total score as a moderator

STR Conflict. We examined whether the association between the PTR latent variable and change in externalizing behaviors over time was moderated by teacher-reported STR conflict at Time 2. STR conflict was converted into a dichotomous variable including the low STR conflict group (N=62) and the high STR conflict group (N=57) based on a median split at 21. The model was run first with the paths constrained across two groups; model fit was strong on three out of four indices; $\chi^2(15) = 11.70, p = .71, SRMR = .12, RMSEA = 0.00$ (90% CI = 0.00 - 0.095), CFI = 1.00. Next the model was run with the path between PTR and Time 2 externalizing behaviors unconstrained; model fit was strong on three out of four indices; $\chi^2(14) = 11.50, p = .65, SRMR = .13, RMSEA = 0.00$ (90% CI = 0.00 - 0.10), CFI = 1.00. A Chi-square difference test revealed no significant drop in Chi square between the constrained and unconstrained models ($\Delta\chi^2 = .20, df=1, p=.66$). Therefore, the association between PTR quality and change in externalizing behavior was not moderated by STR conflict.

STR Closeness. We examined whether the association between the PTR latent variable and change in externalizing behaviors over time was moderated by teacher-reported STR closeness at Time 2. STR closeness was converted into a dichotomous variable including the low STR closeness group (N=62) and the high STR closeness group (N=54) based on a median split at 41. The model was run first with the paths constrained across two groups where fit was strong on three out of four indices; $\chi^2(15) = 14.78, p = .47, SRMR = .105, RMSEA = 0.00$ (90% CI = 0.00 - 0.12), CFI = 1.00. Next the model was run with the path between PTR and Time 2 externalizing behaviors unconstrained, where model fit was also strong on three out of the four indices; $\chi^2(12) = 13.84, p = .31, SRMR = .11, RMSEA = 0.051$ (90% CI = 0.00 - 0.15), CFI = .99. A Chi-square difference test revealed no significant drop in Chi square coefficients between the constrained and unconstrained models ($\chi^2 = .94, df=3, p=.81$). Therefore, the association between PTR quality and change in externalizing behavior was not moderated by student-teacher closeness.

STR Total. We examined whether the association between the PTR latent variable and change in externalizing behaviors over time was moderated by teacher perceptions of STR quality at Time 2 (which included the closeness, conflict, and dependency items). STR total score was converted into a dichotomous variable including the low STR group (N=59) and the high STR group (N=57) based on a median split at 108. The model was run first with the paths constrained across two groups where fit was strong on three out of four indices; $\chi^2(15) = 10.53, p = .78, SRMR = .11, RMSEA = 0.00$ (90% CI = 0.00 - 0.08), CFI = 1.00. Next the model was run with the path between PTR and Time 2 externalizing behaviors unconstrained, where model fit was similarly strong on three out of four indices; $\chi^2(14) =$

10.17, $p = .75$, SRMR = .12, RMSEA = 0.00 (90% CI = 0.00 - 0.09), CFI = .99. A Chi-square difference test revealed no significant drop in Chi square coefficients between the constrained and unconstrained models ($\chi^2 = .36$, $df=1$, $p=.55$). Therefore, the association between PTR quality and change in externalizing behavior was not moderated by overall STR quality.

Specific Aim 3: Parent and teacher perspectives of communication frequency as moderators

Parent-rated parent-teacher communication frequency. We examined whether the association between the PTR latent variable and change in externalizing behaviors over time was moderated by parent-rated communication frequency between parents and teachers at Time 2. The parent-rated communication frequency score was converted into a dichotomous variable including the low communication frequency group (N=60) and the high communication frequency group (N=54) based on a median split at 26. The model was run first with the paths constrained across two groups where fit was poor, meeting only one out of four indices; $\chi^2(15) = 25.51$, $p = .03$, SRMR = .17, RMSEA = 0.12 (90% CI = 0.03 - 0.19), CFI = .98. Next the model was run with the path between PTR and Time 2 externalizing behaviors unconstrained, where model fit was poor; $\chi^2(14) = 26.42$, $p=.02$, SRMR = .169, RMSEA = 0.12 (90% CI = 0.05 - 0.20), CFI = .98. A Chi-square difference test revealed no significant drop in Chi square coefficients between the constrained and unconstrained models ($\chi^2 = .09$, $df=1$, $p=.76$). Therefore, the association between PTR quality and change in externalizing behavior was not moderated by parent-rated communication frequency.

Teacher-rated parent-teacher communication frequency. We examined whether the association between the PTR latent variable and change in externalizing behaviors over time was moderated by teacher-rated communication frequency between parents and teachers at Time 2. The teacher-rated communication frequency score was converted into a dichotomous variable including the low communication frequency group (N=62) and the high communication frequency group (N=56) based on a median split at 8. The model was run first with the paths constrained across two groups where fit was strong on all four indices; $\chi^2(15) = 7.15, p=.95$, SRMR = .07, RMSEA = 0.00 (90% CI = 0.00 - 0.00), CFI = 1.00. Next the model was run with the path between PTR and Time 2 externalizing behaviors unconstrained, where model fit was also strong; $\chi^2(14) = 7.15, p=.93$, SRMR = .07, RMSEA = 0.00 (90% CI = 0.00 - 0.04), CFI = 1.00. A Chi-square difference test revealed no significant drop in Chi square coefficients between the constrained and unconstrained models ($\chi^2 = .001, df=1, p=.97$). Therefore, the association between PTR quality and change in externalizing behavior was not moderated by teacher-rated communication frequency.

Specific aim 4: Classroom placement as a moderator

We examined whether the association between the PTR latent variable and change in externalizing behaviors over time was moderated by classroom placement. Classroom placement is a binary variable including a group of students who spend more than 50% of their time in a special needs classroom (N= 54) and a group of students who spend more than 50% of their time in a general education classroom (N=61). The model was run first with the paths constrained across two groups where fit was strong on three out of four indices; $\chi^2(15) = 16.81, p=.33$, SRMR = .14, RMSEA = 0.05 (90% CI = 0.00 - 0.14), CFI = .99. Next the

model was run with the path between PTR and Time 2 externalizing behaviors unconstrained, where model fit was also strong on three out of four indices; $\chi^2(14) = 16.35$, $p=.29$, SRMR = .14, RMSEA = 0.05 (90% CI = 0.00 - 0.14), CFI = .99. A Chi-square difference test revealed no significant drop in Chi square coefficients between the constrained and unconstrained models ($\chi^2 = .46$, $df=1$, $p=.498$). Therefore, the association between PTR quality and change in externalizing behavior was not moderated by classroom placement.

CHAPTER 4

DISCUSSION

The current study explored the association between parent-teacher relationship (PTR) quality and changes in externalizing behaviors over the course of the school year among early elementary-age students with ASD. It also examined whether student-teacher relationship quality (STR), parent-teacher communication frequency, or classroom placement in a general versus special education class moderated the association between PTR quality and changes in externalizing behaviors over time. In contrast with our hypotheses, PTR quality did not predict changes in externalizing behaviors, and was not significantly associated with baseline externalizing behaviors. In addition, the association between PTR quality and change in externalizing behavior was not moderated by student-teacher relationship quality, parent-teacher communication frequency, or classroom placement.

The measure used in our study, a latent PTR quality variable, encompassed both parent and teacher reports of quality of the relationship at both time points and was not associated with baseline levels of externalizing behaviors. At the same time, correlations of the T-scores showed that, when examined separately, teacher-rated PTR quality at Time 1 and 2 was in fact negatively associated with externalizing behaviors at both time points, such that higher teacher ratings of PTR quality was associated with lower externalizing behaviors.

This is an important observation as it is consistent with the literature examining PTR quality and child outcomes, which has predominantly used teacher ratings of the PTR quality, and involved research that is cross-sectional, rather than predicting change over time. Similar to our findings, Serpell and Mashburn (2012) found a negative concurrent association between teacher-rated PTR quality and fall and spring problem behaviors in typically developing children, and similarly did not find an association between teacher-rated PTR quality and change in problem behaviors over time. Our study replicates this finding in an ASD sample.

The field lacks consistency in terms of the scales used to assess the parent-teacher relationship (Dawson, 2016). Based on the research reviewed here, we have found that researchers have used different scales, or combination of scales, to measure the same concept. In addition, many of the PTR measures used in studies did not provide psychometric support for their measures (Dawson, 2016). Researchers have also chosen whether to use the teacher perspective or parent perspectives to measure PTR. It is possible that the use of different scales across studies may mean that these studies are tapping into different parts of the PTR construct, which may contribute to the inconsistent findings across studies. In the current study both parents and teacher perceptions of PTR quality were used because the quality of the dynamic interactions were hypothesized to be important. However, the results showed that teacher – and not parent or combined perspectives of the PTR quality – were concurrently associated with externalizing behaviors. These results indicate that perhaps teacher perceptions of PTR quality are more important when examining associations with child school outcomes than parent perceptions of PTR quality.

It is possible that PTR has stronger effects on child outcomes other than externalizing behaviors. For example, Serpell and Mashburn (2012) examined the role of PTR quality on

child outcomes over time in a sample of 2966 typically developing children. While they did not find that PTR quality predicted changes in externalizing behaviors, they found that higher pre-K teacher-rated PTR quality was associated with an increase in social competence as well as a decrease in STR conflict as rated by their kindergarten-teacher. Future studies with students with ASD could consider examining the role of PTR quality on changes in social competence and STR quality since that has been found in typically developing samples. In addition, given evidence showing that teachers do not feel prepared to manage student's behaviors (e.g., Garland et al., 2013; Truog et al., 1998; Browers & Tomic, 2000), one can imagine that a stronger PTR may be more likely to facilitate parents and teachers' discussion and collaboration on academic or social goals as opposed to behavior reduction goals. In their interview study with pre-service teachers completing their teaching degree, Garland et al. (2013) found that participants felt uncertain about their ability to manage behaviors in the classroom. Further, Truog et al. (1998), in surveying 255 school principals about their perceptions of newly hired teacher's preparedness, found that principals rated classroom behavior management to be the lowest competency of new teachers, compared to other skills such as assessment or integration of curricula skills. When inquiring about teacher's self-efficacy on a variety of classroom management skills, Baker (2005) found that teachers reported low self-efficacy on skills such as documenting student behavior systematically or implementing specific behavior interventions plans, and they reported higher self-efficacy for skills such as using a consistent routine and implementing clear rules in the classroom. However, those skills that teachers felt less effective in such as implementing specific behavior plans are possibly the components that may be necessary to implement if parents and teachers are collaborating for a targeted behavior change. In all, given this lower

confidence among teachers toward managing challenging behaviors, teacher may be less likely to effectively collaborate with parents around addressing behavior challenges with parents of children with ASD.

It is notable that a large percentage of our sample (42% and 41% at Times 1 and 2, respectively) had borderline or clinical levels of teacher-rated externalizing behaviors, consistent with previous studies of children with ASD (Marsh et al. 2017), further solidifying the need for research to understand changes in externalizing behaviors among young children with ASD. In the current study, externalizing behaviors decreased from the fall to spring of the school year, although there was a high correlation between the fall and spring scores. While our study looked at the association between relationship quality and changes in externalizing behaviors in school settings, other studies have looked at relationship quality in clinical settings. For instance, higher quality relationships between parents and clinicians working with children with ASD was associated with a reduction in parent stress level and increases in child's positive responses to the intervention (Brookman-Fraze & Koegel, 2007). Similarly, Sheridan et al. (2017) found that PTR quality mediated the relation between receipt of a family-school behavior consultation intervention and reduced externalizing behaviors. Both studies included active interventions that targeted specific behaviors. In contrast, in the present study, there was no active intervention targeting behaviors that was being administered by teachers or parents. Therefore, perhaps the PTR quality has a stronger contribution when both parents and teachers are working on specific behavior reduction goals or otherwise in the context of an intervention.

It is possible that PTR quality may more effectively lead to gains in a specific behavior that is actively being worked on between parents and teachers, rather than global

behavior changes, and therefore, may be more measurable using a targeted approach. Future studies could examine the question of PTR quality and its impact on specific problem behaviors that the parent and teacher are explicitly targeting together. For instance, while the CTRF externalizing behaviors broadband score include a wide-ranging number of aggressive and rule-breaking behaviors, the impact of PTR quality on behavior may be more evident when examining specific behaviors at the item-level of the scale, especially those that are initially high for the child. Alternatively, this more targeted change can potentially be measured using goal attainment scaling (GAS). GAS is a technique to measure individual changes, which involves identifying the client's main issue, transforming it into three explicit and realistic goals, selecting a specific indicator for progress with regard to each goal, as well as defining and reviewing the expected level of outcome (Smith, 1994). GAS has evidenced to be more sensitive to individual change than standardized questionnaires and global measurement (Kleinrahn, 2013).

Our study found that teacher-rated STR quality does not moderate the relationship between PTR quality and changes in externalizing over time. We hypothesized that a strong STR may position teachers to be able to act on and implement suggestions gained from their interactions with parents, and therefore may lead to greater reductions in externalizing behavior over time. However, within the same sample, Eisenhower et al. (2014) found that externalizing behaviors appear to drive changes in children's relationships with teachers, while the reverse path was not supported. This may suggest that the relation between STR and externalizing behaviors may be nuanced.

While it was hypothesized that higher communication frequency between parent and teachers would improve the predictive impact of PTR quality on externalizing behavior

change, our study found no such effect. Previous research has found that communication frequency is a complex construct that does not have a clear-cut relation to child outcomes. For example, Rimm-Kauffman et al. (2003) found that higher frequency of communication between home and school was associated with more behavior problems. This may be because higher communication frequency may be indicative of greater behavior problems that require more frequent communication with parents. Future studies should consider looking at a 3-way interaction between the level of communication, relationship quality, and whether the child has or doesn't have elevated behavior problems. In addition, communication frequency alone may not be as important as looking at what the content of the communication is (for instance, is the teacher updating the parent on the behaviors or are they problem-solving together). Swick (2003) found that problem solving – considered a form of communication – might underlie successful family-school collaborations. In my study, communication frequency was measured through items that ask parents and teachers to globally rate how frequently they communicate with each other based on a likert-type scale. Our measure did not capture any qualitative aspect of that communication. Future studies could consider using scales that specifically examine problem solving and other aspects of effective communication, such as the Parent/Teacher Participation in Problem-Solving scales (PPS/TPPS; Sheridan et al. 2013).

Lastly, our results showed that educational placement did not moderate the relation between PTR quality and changes in externalizing behaviors. An important limitation in our measure was that classroom placement was not a pure placement, but rather it was on a continuum. As a result, classroom placement was defined based on a cut-off of 50% such that students who spent more than 50% in a special education classroom were considered as

having a “special education classroom placement” and students who spent less than 50% in a special education classroom were considered as having a “general education placement”. Differences in the relation between PTR quality on externalizing behaviors across classroom types may have been more noticeable had we compared children in wholly general education classroom environments to children in more restrictive environments and non-public school settings.

While my study examined how PTR quality drives changes in externalizing behaviors, it is possible that the reverse is true; that externalizing behaviors drive changes in PTR quality. Greater child externalizing behaviors may negatively impact the interpersonal relationship between parents and teachers, due to, for instance, a greater number of negative interactions that revolve around discussing behaviors. Dishion & Stormshak (2006) found that parents and teachers of students with significant behavioral concern often experience strained interpersonal relationships. Therefore, while beyond the scope of this study, future research should examine the effect of externalizing behaviors on PTR quality, or their reciprocal effect on each other, over time.

Strengths and Limitations

This is the first study to examine the predictive strength of PTR quality on changes in externalizing behaviors in children with ASD. The study had some methodological strengths such as a longitudinal study design and a relatively large sample size. In addition, our sample included children with varying severity of symptoms and cognitive functioning, including IQs of 50 and above. The sample was also made up of participants with diverse racial backgrounds (with 21% bi-or multi-racial, 11.8% Latino, 5% Asian American, and 3.4% Black or African American).

Despite these strengths, it's important to note some of the study's limitations. Primarily, the sample is comprised of mostly middle- and upper-income families; our findings may not be generalizable to families across different economic contexts. While the study included a range of cognitive functioning, children with moderate to severe intellectual disabilities were not enrolled, and thus the results may not generalize to students with a larger range of cognitive functioning. The study also followed children between pre-school to second grade, and thus the results may not generalize to children in different grade spans since expectations for relationships may vary by grade. Moreover, it is important to note that our sample included only the students whose teachers completed the questionnaires at both Time 1 and Time 2. This limits the generalizability of our results because it may be that those whose teachers who did not complete the questionnaires had an inherently different relationship with parents than those teachers who are in our study; this concern is somewhat alleviated by the lack of differences in parent-reported PTR quality between the children whose teachers did versus did not complete the questionnaires.

As previously mentioned, measurement issues could have also been a limitation in this study. First, it should be noted that, while demonstrating good model fit in the present study, the validity of the PTR scale has yet to be fully assessed in the ASD population, thus, future psychometric examination of the PTR is clearly needed. Second, the study used a latent variable of PTR quality including both parent and teacher ratings to measure the impact of PTR quality over time. While this is a strength in that it captures both parent and teacher perspectives of the relationship; it may have missed an important feature of PTR quality. Future studies should consider analyzing the parent and teacher perspectives in separate analyses.

Clinical Implications

Previous research has found that the quality of the PTR is an important contributor to family outcomes in families of children with ASD, and PTR has shown strength in predicting certain child outcomes such as academic ability and social competence in typically developing children. The results of the current study confirmed an association between teacher ratings of PTR with externalizing behaviors. However, a combined factor of parent and teacher perspectives of PTR quality did not predict changes in externalizing behaviors over the school year. Perhaps a strong PTR alone may not be sufficient to guarantee that parents and teacher collaborate to reduce child problem behaviors overall. It is possible, however, that PTR quality would be more impactful in changing child behavior when it occurs in the context of an ongoing intervention or when parents and teachers are collaborating to address a specific, targeted child behavior rather than on global externalizing problems. Indeed, a strong PTR quality may allow parents to collaborate on a specific goal and therefore leading to a reduction in a specific externalizing behavior. In particular, given previous studies that found that PTR quality was especially important in moderating the effectiveness of a targeted behavior intervention at school, we may recommend to teachers that a strong PTR could be more impactful in the context of more targeted behavior interventions.

Table 1
Selected Demographics of Participants

N=119	Mean (SD)
Age in Months	65.46 (12)
	%
Sex (% Male)	81.5%
Child Race	53.8% White, 21.0% Bi/multi-racial, 11.8% Latino, 5.0% Asian American, 3.4% Black or African American, 5.0% missing or other
Child Grade	43.7% Pre-school, 24.4% Kindergarten, 23.5% First grade, 7.6% Second Grade.
Gross Household Income (% earning > \$65K/year)	62.1%
Parent Education Level	58.9% have a college degree or higher
Teacher Gender (% Female)	88.2%
Teacher Race	67.2% White, 16.8% Latinx, 5% Asian, 2.5% Black or African American, 0.8% American Indian/Alaska Native, and 6.7% other, and .8 missing.
Teacher Education Level (% with Master's Degree)	67.2%

Table 2*Average Scores on Key Variables at Time 1 and Time 2*

Time 1	<i>M^a</i> (<i>SD</i>)	
Externalizing Behavior T-Score	58.19 (9.37)	
Parent-rated Total PTR quality	36.95 (6.80)	Mean item score: 4.10 (0.75)
Teacher-rated Total PTR quality	49.81 (6.31)	Mean item score: 4.15 (0.53)
Parent and teacher-rated PTR quality average across items	--	Mean item score: 4.13 (.50)
Time 2	<i>M^a</i> (<i>SD</i>)	
Externalizing Behavior T-Score	56.33 (9.80)	
Parent-rated Total PTR quality	37.06 (6.76)	Mean item score: 4.12 (0.75)
Teacher-rated Total PTR quality	49.74 (7.84)	Mean item score: 4.12 (0.75)
Parent and teacher-rated PTR quality average across items	--	Mean item score: 4.14 (.65)
STR – Conflict	22.67 (8.41)	
STR – Closeness	40.09 (8.34)	
STR – Total Score	108.74 (13.96)	
Parent-rated Communication Frequency	27.14 (7.69)	
Teacher-rated Communication Frequency	8.14 (1.66)	
Classroom Placement	51.3% General Education Placement, 45.4% Special Education Placement, 3.4% Missing	

Note. Although missing data was estimated using full information maximum likelihood (FIML), these descriptives are based on original data.

Note. The parent-rated PTR quality scale contained 9 items; the teacher-rated PTR quality scale contained 12 items. Mean item scores were calculated in order to provide a clear comparison. Both parent and teacher rated PTR quality Items were rated on a scale of 1-5.

Table 3
Bivariate Correlations Between Coefficients

	1. Ext. Beh T1	2. Ext. Beh T2	3. Parent PTR Total T1	4. Parent PTR Total T2	5. Teach -er PTR Total T1	6. Teach -er PTR Total T2	7. STR Total T2	8. STR Confl- ict T2	9. STR Close- ness T2	10. Parent Com Freq	11. Teach- er Com Freq	12. Class Type
1.	1											
2.	.77**	1										
3.	.04	.02	1									
4.	-.100	-.17	.43**	1								
5.	-.18*	-.14	.27**	.37**	1							
6.	-.18*	-.25**	.27**	.53**	.65**	1						
7.	-.45**	-.54**	-.003	.18	.24**	.23*	1					
8.	.60**	.69**	.100	-.18	-.196*	-.234*	-.76**	1				
9.	-.05	-.09	.10	.15	.19*	.26**	.59**	-.15	1			
10.	.12	.18	.21*	.32**	.25**	.24*	-.07	.18*	.07	1		
11.	.032	-.07	.16	.34**	.43**	.52**	.22*	-.20*	.16	.25**	1	
12.	-0.05	-.14	-.11	-.05	-.17	-.05	.04	-.06	.13	-.17	.13	1

These correlations are between parent and teacher perspectives of PTR quality total score at Time 1 and 2, externalizing behavior at Time 1 and 2, as well as STR total, conflict, closeness scores at Time 2, parent and teacher communication frequency at Time 2, and classroom placement.

Although missing data was estimated using full information maximum likelihood (FIML), these are based on original data.

** . Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Figure 1

Structural Model Between PTR Latent Variable and Externalizing Behaviors

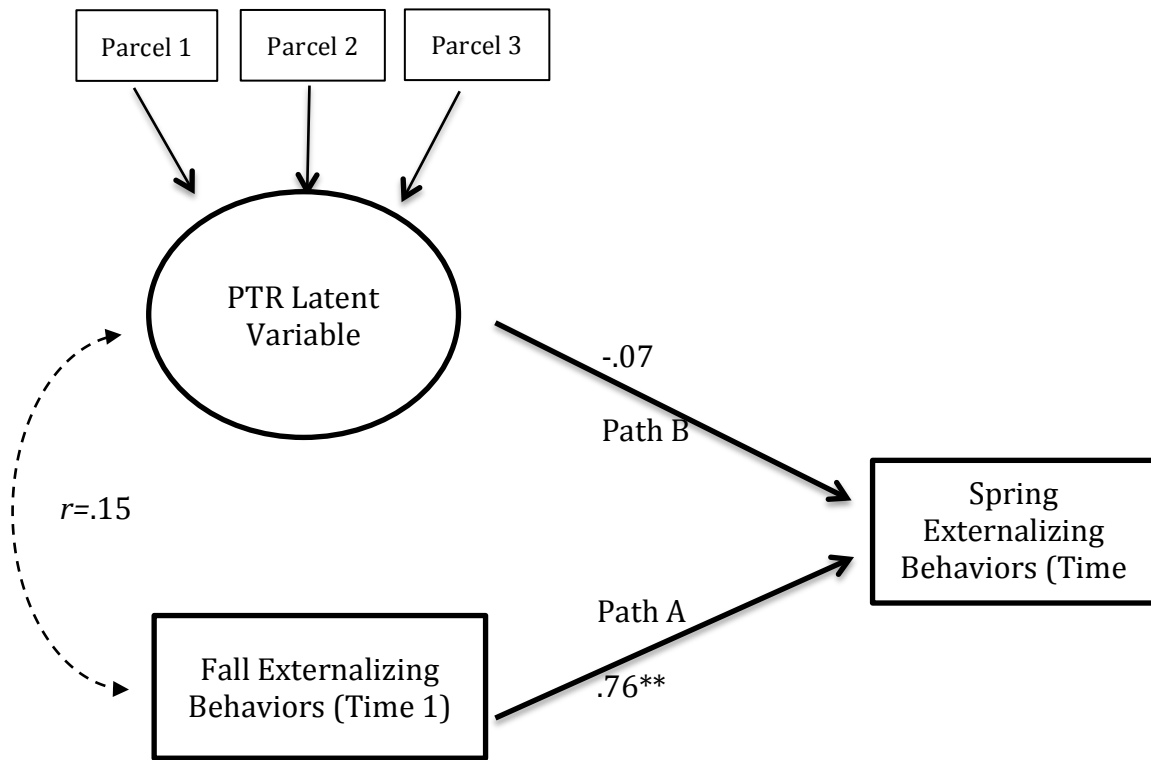


Figure 2
Structural Model Between PTR Latent Variable and Externalizing Behaviors with a Moderator Variable

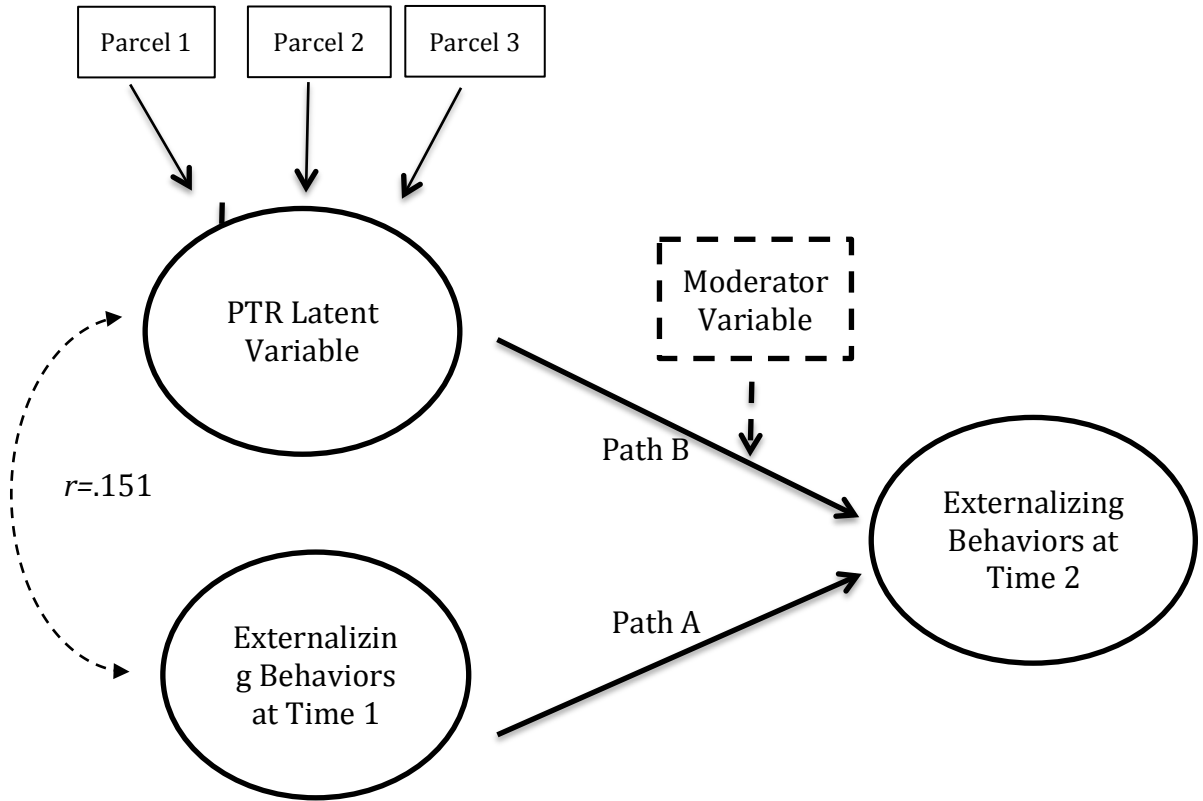


Figure 3

Structural Model Between PTR Latent Variable and Externalizing Behaviors with STR Quality as Moderating Variables

Figure 3.a STR Conflict Quality as a moderating variable

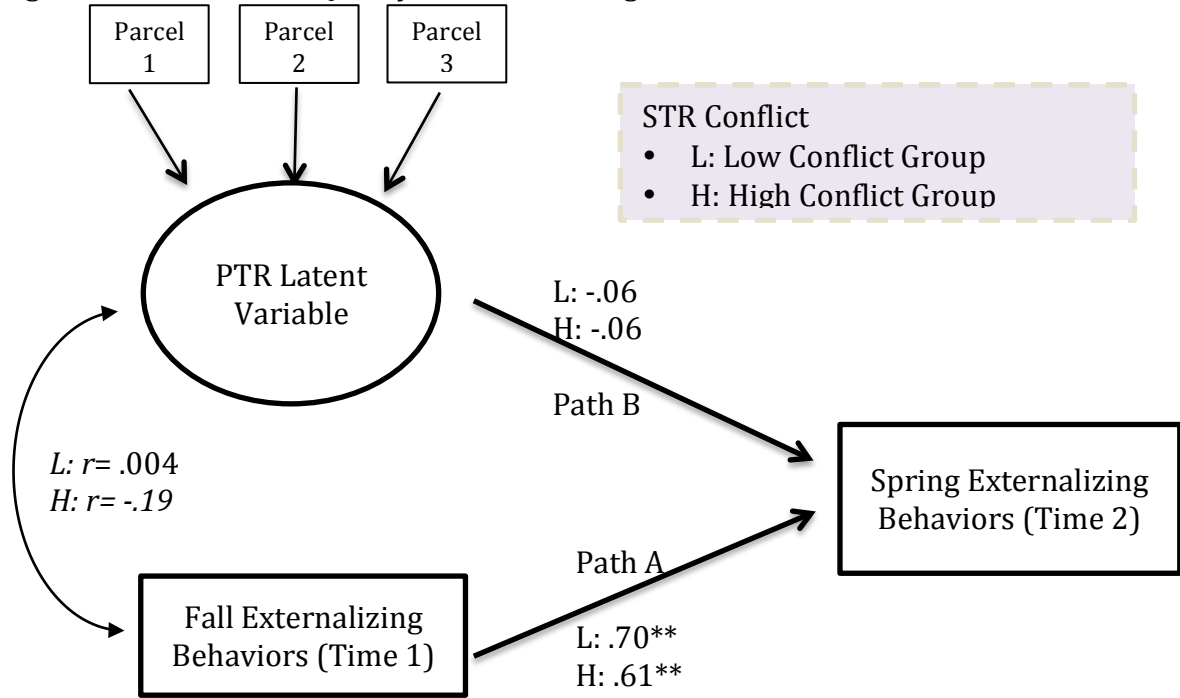


Figure 3.b STR Closeness quality as a moderating variable

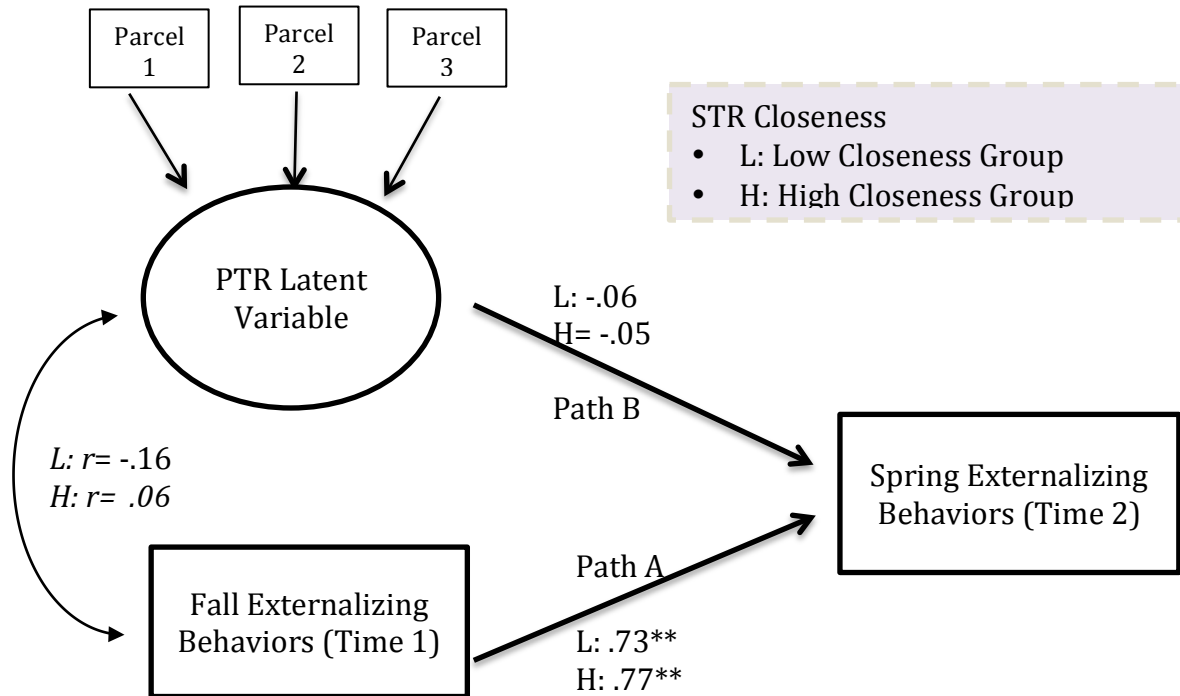
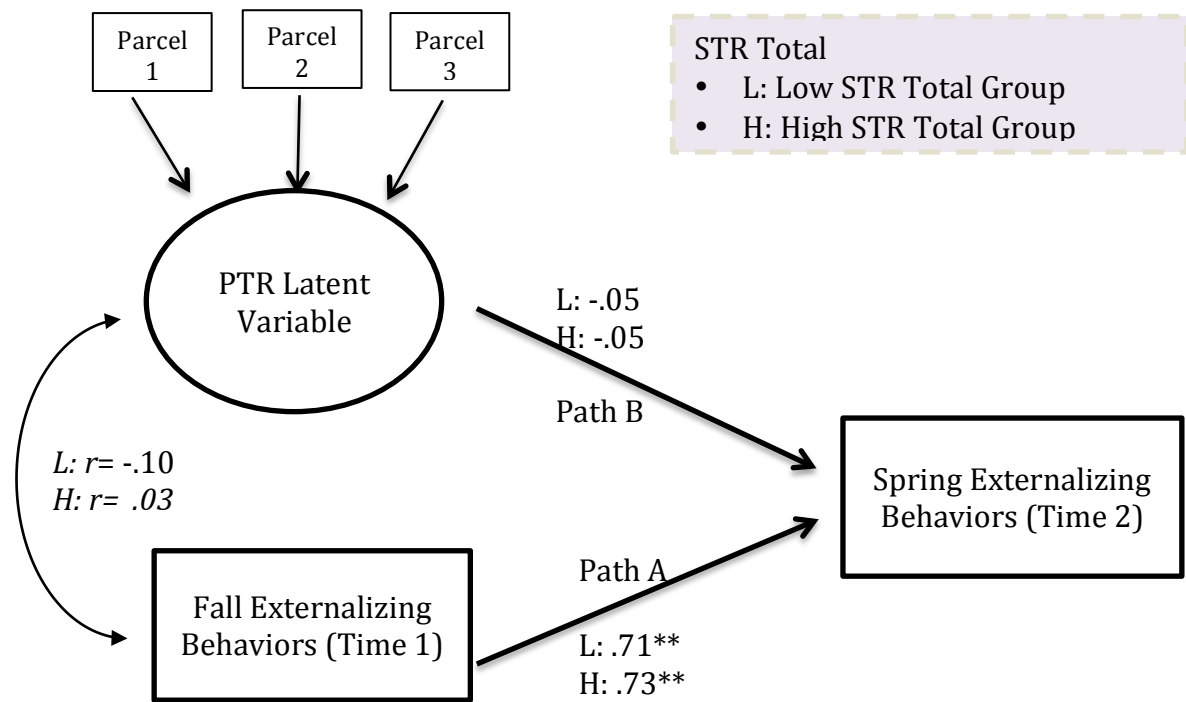


Figure 3.c STR Total Quality as a moderating variable



****** $p < .01$

When the model was unconstrained by STR variables, model fit did not significantly improve; therefore a moderator effect was not supported. The constrained model is presented here.

Figure 4.

Structural Model Between PTR Latent Variable and Externalizing Behaviors with Parent and Teacher Communication Frequency as moderating variables

Figure 4.a Parent-rated parent-teacher communication frequency as a moderating variable

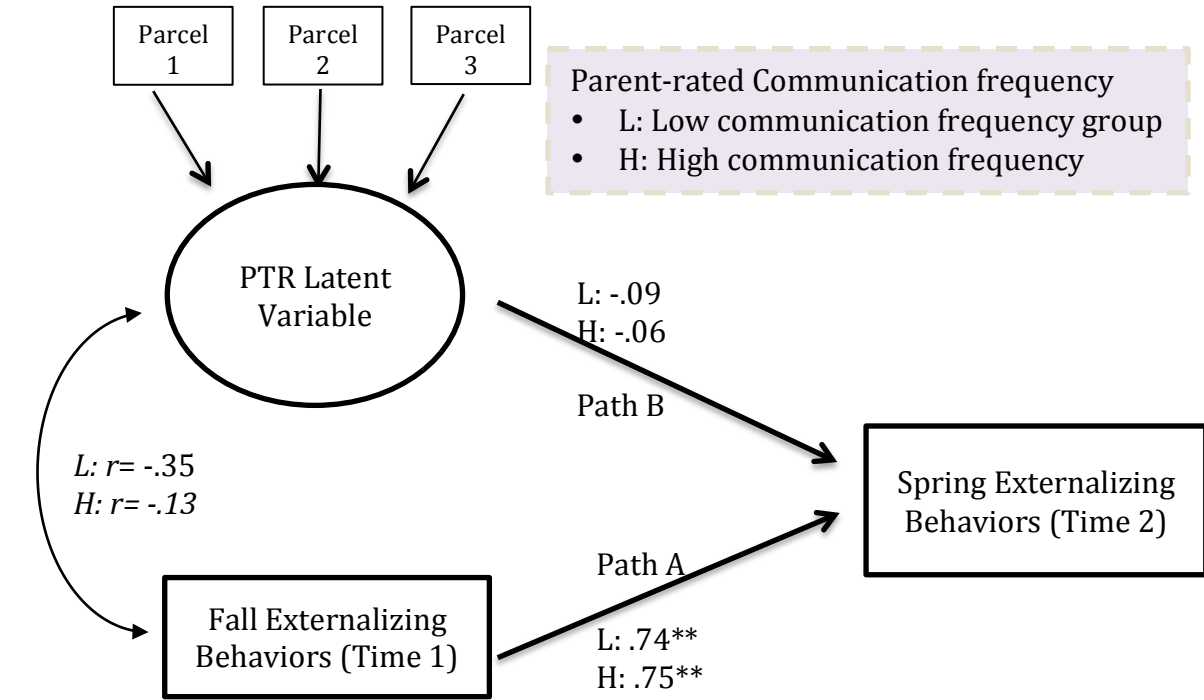


Figure 4.b Parent-rated parent teacher communication frequency as a moderating variable

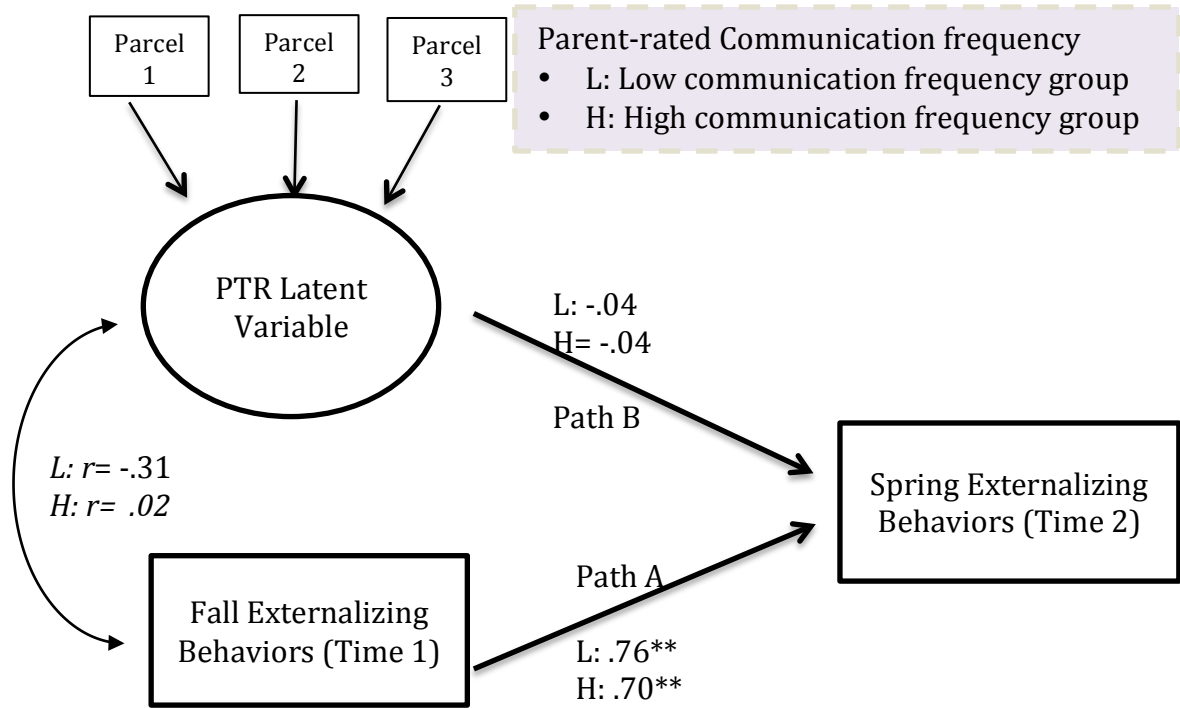
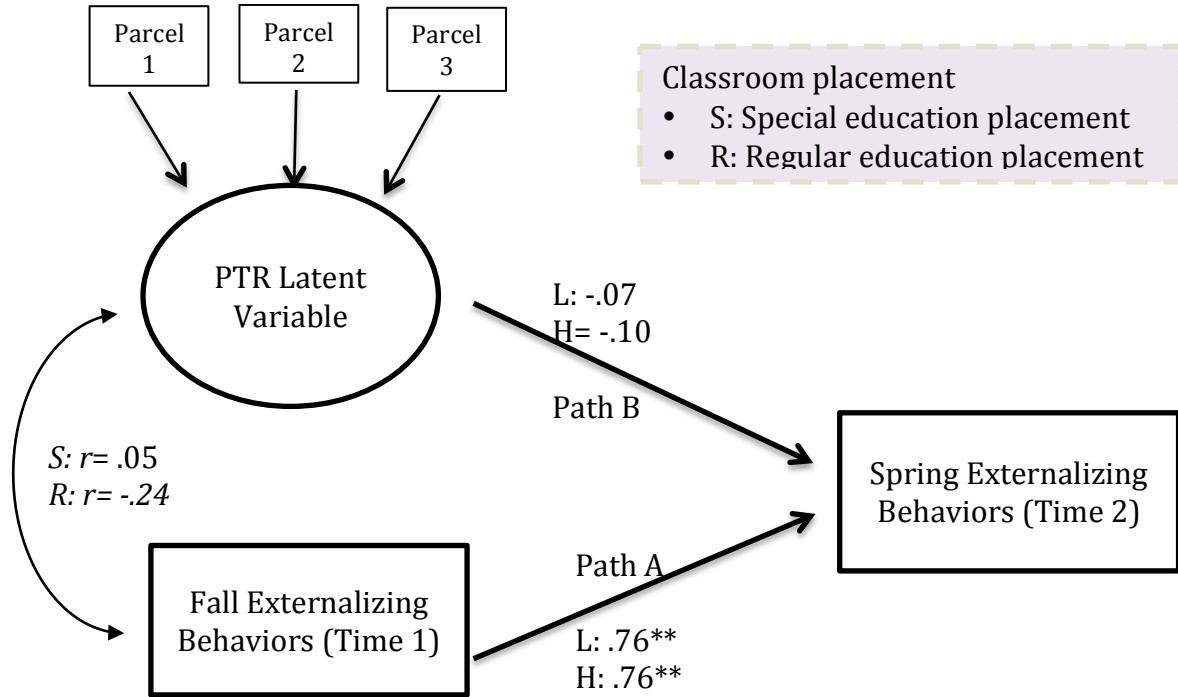


Figure 5.

Structural Model Between PTR Latent Variable and Externalizing Behaviors with Classroom Placement as a Moderating Variable



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