Journal of School Psychology 95 (2022) 25–42

Contents lists available at ScienceDirect

Journal of School Psychology

journal homepage: www.elsevier.com/locate/jschpsyc

Psychometric properties of a parent- and teacher-report measure for autistic children: Parent-Teacher Relationship Quality Scale (PTRQS)

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ARTICLE INFO

Action Editor: Steve Kilgus
Editor: Craig A. Albers

Keywords:
Autism Spectrum Disorder (ASD)
Autistic children
Parent-teacher relationship quality
Early childhood
Psychometrics
Measurement

ABSTRACT

Parent-teacher relationship (PTR) quality is linked to child and family-school functioning and may be especially important in the school adjustment of autistic children. However, measurement of PTR quality has been limited by inconsistency in the use of measures, a paucity of two-informant measurement, and limited psychometric consideration. We examined the psychometric properties of the Parent-Teacher Relationship Quality Scale (PTRQS), a parent- and teacher-report measure of PTR quality derived from multiple sources. Specifically, we examined the factor structure, reliability, and convergent validity of the PTRQS among parents and teachers of 192 autistic children in preschool to 2nd grade. Results supported a three-factor model, including (1) parent-perceived relationship quality, (2) teacher-perceived comfort with parent(s), and (3) teacher perceptions of parent abilities. Scores exhibited high internal consistency. As evidence of convergent validity, all three factors of PTR quality, as well as the total PTRQS score, were strongly associated with parent interview-based PTR quality, parent perceptions of teacher effectiveness, and teacher-rated parental school involvement. The two teacher-rated PTR quality factors were also associated with student-teacher relationship quality. Results indicated that (a) the measure can validly capture PTR quality in the context of preschool and early elementary-age autistic children, (b) early PTR quality is linked to parental involvement, and (c) teacher-rated PTR factors are linked to autistic students' own relationships with their teachers. The results have implications for researchers and school psychologists measuring PTR quality in their practice.

Transitioning to formal schooling is an important milestone for all children and reflects a substantial adjustment for children regardless of their disability status (Daley et al., 2011). Children diagnosed with Autism Spectrum Disorder (ASD) may find this transition particularly challenging (Mahan & Matson, 2011; Quintero & McIntyre, 2011). 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 in influencing children's adaptation to school. These relations across microsystems (referred to collectively as the mesosystem), including the relationship between the child's parents and teachers, are important predictors of developmental patterns (Bronfenbrenner & Morris, 1998). Given the importance of Parent Teacher Relationship (PTR) quality, in the

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https://doi.org/10.1016/j.jsp.2022.08.004
Received 5 August 2021; Received in revised form 6 June 2022; Accepted 15 August 2022
Available online 20 September 2022

present study we evaluated the factor structure, reliability, and correlates of a two-informant measure of PTR quality (i.e., the Parent-Teacher Relationship Quality Scale [PTRQS]), among parents and teachers of early elementary-age autistic children. Notably, the term "parent" is used to refer to any primary caregiver role (e.g., guardians, grandparents, other family members). Throughout this article we use identity-first language (e.g., autistic) instead of person-first language (e.g., person with autism) to align with preferences of autistic adults (Bottema-Beutel et al., 2021; Kenny et al., 2016).

PTR quality encompasses the underlying affective components of parent-teacher partnerships, including (a) warmth and mutual respect, (b) parent and teacher opinions and attitudes towards one another, and (c) dynamic parent and teacher behaviors reflecting collaboration and alliance (Clarke et al., 2009; Vickers & Minke, 1995). A growing body of literature demonstrates the importance of positive PTRs to children's school success (Adams & Christenson, 2000; Serpell & Mashburn, 2012). For instance, among a sample of children without disabilities, as well as children with a range of disabilities (presence of autism was unspecified), Chung et al. (2005) found that PTR quality was positively associated with student teacher relationships (STR). Similarly, Serpell and Mashburn (2012) found associations between PTR quality and a range of positive outcomes for non-autistic students, including greater gains in social competence and a higher quality of student-teacher relationships. Student-teacher relationship quality, in turn, has been associated with behavioral and academic engagement (Doumen et al., 2008) as well as academic achievement (Hamre & Pianta, 2001; Hughes et al., 2008; O'Connor & McCartney, 2007).

Although the literature examining the benefits of positive PTRs among autistic children is somewhat limited, PTR quality has been shown to be associated with positive family outcomes for autistic children, including higher parent satisfaction (Labarbera, 2017), greater family quality of life (Hsiao et al., 2017), and a reduced need for parents to resort to safeguards to deal with special education disputes (Burke & Goldman, 2015). Although child outcomes associated with PTR quality have not been investigated among autistic children, child outcomes of *parent-clinician relationships* have been examined, with results indicating that higher quality parent-clinician relationships in the context of ASD-related interventions are linked to more positive child response to these interventions (Brookman-Frazee & Koegel, 2007), suggesting the potential for PTR quality to also predict children's responsiveness to classroom instruction.

PTR quality appears to be particularly important in the preschool and early elementary years. Educational policy has recognized the importance of families in early education (e.g., Individuals with Disabilities Education Act [IDEA], 2006; National Association for the Education of Young Children [NAEYC], 2011) and relationship quality has been identified as a target for intervention to improve outcomes (Pianta & Kraft-Sayre, 2004). Moreover, for families of autistic children, PTR quality may be particularly important in the early childhood through early elementary years because children are typically shifting from individual family service plans and working with early intervention providers to Individualized Education Programs (IEPs) and obtaining support in school settings (Stoner et al., 2005). Furthermore, due to the cross-setting supports received by autistic children, parents are often expected to act as primary care coordinators and navigate different service delivery systems (Carbone et al., 2016). A strong PTR can facilitate greater collaboration and parents can be comfortable sharing information across different settings. Further research is needed to understand how PTR quality affects outcomes for autistic students. However, to aid in researching the construct, we need a reliable measure of PTR quality that is psychometrically validated in an autistic sample, which has not been done to date.

Despite the potential importance of PTR quality for autistic children in early childhood and elementary grades, research in inclusive education settings suggests that establishing a positive relationship between teachers and parents of children with various disabilities is more difficult than for parents who do not have children with disabilities (Elkins et al., 2003; Peetsma et al., 2001). Studies with autistic children suggest that PTRs are often strained, affected by the larger special education context (Slade et al., 2018; Zablotsky et al., 2012). This larger special education system exerts unique pressures on the interactions of parents and teachers of autistic children, warranting the need to address and support that relationship.

Given the increasing numbers of autistic students spending more time in general education settings (US Department of Education, 2014), there is a greater demand for methods to identify how best to support autistic students' needs (Stichter et al., 2016). One of the roles of school psychologists is to conduct evaluations to help develop interventions or implement changes that might improve student outcomes (Albritton et al., 2019). Therefore, school psychologists may benefit from having a feasible tool to use to measure PTR quality. In turn, this tool can be used by teacher or school psychologists to identify at-risk relationships and implement the appropriate interventions to improve the parent-teacher relationship.

Taken together, the evidence suggests that a PTR quality tool can be important for both enhancing research on the construct, as well as to be practically used in schools. However, little research has examined how best to measure PTR quality, balancing both parent and teacher perspectives and with psychometric defensibility, particularly with autistic children.

1. Measuring parent-teacher relationship quality

The measurement of PTR quality has been marked by inconsistency; in addition to multiple different measures being used to assess the same construct, measures often combine PTR-relevant items with other aspects of family-school partnerships or consider only one informant (parent or teacher) rather than both members of the relationship dyad. A literature search to identify existing measures highlights the variability in past research. For the present study, we conducted a search of studies assessing parent-teacher relationships, limiting our search to empirical, peer-reviewed, English-language articles. A PsycINFO search using the key words "parent teacher relationship" or "teacher parent relationship," with no restriction on publication date, yielded 55 published articles. Articles that assessed PTR utilizing qualitative methods ($n = 8$) and review or theoretical articles ($n = 9$) were excluded. Across the remaining 38 studies that measured PTR quality, eight distinct measures of PTR quality were used, including our own measure examined in the present study. As shown in Table 1, four of the eight measures relied on only one informant in the dyad, including two parent-only and

Table 1
Measures assessing parent-teacher relationship quality based on a brief literature review.

Measure name (authors)	Description	Informant	Studies using this measure in our search *
1. Home-school conference subscale from the Family Involvement Questionnaire (FIQ; Fantuzzo et al., 2000)	An 11-item subscale assessing behaviors indicative of PTR quality. The subscale is part of a larger 42-item scale that includes two other subscales: school-based involvement and home-based involvement.	Parent report only	Mendez, 2010; Waanders et al., 2007
2. Co-caring Relationship Questionnaire: CRQ (Lang et al., 2017)	A 25-item scale measuring the teacher-perceived relationship quality with the parent and consisting of four factors that measure agreement, support, endorsement, and undermining.	Teacher report only	Zulauf-McCurdy & Zinsser, 2021
3. Dutch Parental Questionnaire (Dutch Ministry of Education)	A 34-item measure covering several areas including searching for agreement and trust, communication, volunteering, learning at home, and decision-making.	Parent report only	Leenders et al., 2018
4. Home School Relationship Questionnaire (Barbarin, 2000)	A 7-item measure that assesses relationship quality related to satisfaction, emotional tone, level of trust, clarity of communication, agreement, parent appreciation, and parent support and cooperation.	Teacher report only	Serpell & Mashburn, 2012
5. Parent-Teacher Relationship Scale-II (Vickers & Minke, 1995)	A 24-item scale assessing two features of PTR quality: joining (19-item factor consisting of parent-teacher affiliation, support, dependability, and beliefs), and communication-to-other (five-item factor consisting of the need for parent/teacher to express themselves to each other). Teacher and parent versions contained comparable items. Validity and reliability analyses: • Factor analysis conducted separately for parent- and teacher-rated PTRS-II. Vickers and Minke found two factors (joining and communication-to-others). This two-factor model was further confirmed in a more recent study by Dawson and Wymbs (2016) who only used the teacher-rated PTRS-II. • Reliability analyses: Vickers and Minke (1995) found relatively high internal consistency across factors, with alpha coefficient of 0.97 and 0.86 for the joining and communication factors. The internal consistency between 0.97 for joining, and 0.8 and 0.71 for communication factors. • Associations with other constructs: Dawson and Wymbs (2016) examined associations at the same time point between PTRS and several child-level variables including student-teacher relationship, student academic competence, and student behavior and showed that the joining factor was the only one that had moderate to strong associations with these variables.	Parent and teacher report	Clarke et al., 2017; Garbacz et al., 2015; Minke et al., 2014; Sheridan et al., 2006; Garbacz & McIntyre, 2016 (ASD sample)
6. Parent-Caregiver Relationship Scale (PCRS; Elicker et al., 1997)	A 35-item scale of parent and teacher perceptions of relationship quality. Parent and teacher versions contain different, and some overlapping, items. Validity and reliability analyses: • Factor analysis: separate for parent and teacher-rated PCRS. Factor structure for the parent-rated PCRS included a confidence, collaborations, and affiliations factors. For teacher-rated PCRS, factor structure included confidence, collaboration, and caring factors. • Internal consistency: PCRS total scales showed high levels of internal consistency,	Parent and teacher report	Jeon et al., 2020; Sucuoğlu & Bakkaloğlu, 2018

(*continued on next page*)

Table 1 (*continued*)

Measure name (authors)	Description	Informant	Studies using this measure in our search *
	with alpha 0.93 for the parent scale and 0.94 for the caregiver scale (Elicker et al., 1997). • Test-retest reliability was adequate between 0.59 and 0.78.		
7. Relationship Quality Subscale from the Parent Teacher Involvement Questionnaire (PTIQ; Kohl et al., 2000; Conduct Problems Prevention Research Group, 1991a, 1991b; PTIQ-P, Corrigan, 2002; PTIQ-Malone et al., 2000)	This includes 6–7 parent-reported items and 5–6 teacher-reported items, depending on the version. The subscale is part of a larger PTIQ measure that includes other subscales such as amount of parent teacher contact, parent involvement at school, and parent involvement at home. Notably this measure was a part of a longitudinal study and therefore, there were several iterations of the measure (with slight differences). • Factor analysis of both parent and teacher-rated PTIQ scale in community sample, suggested that the 11 PTR quality items loaded together as a single factor (Kohl et al., 2000). In contrast, a recent study of the Relationship Quality subscale among parents and teachers of children with ADHD found support for a two-factor structure, with parent and teacher items falling on separate factors (Mautone et al., 2015). • Reliability: internal consistency of 0.89 in a non-clinical, community sample at high-poverty schools (Kohl et al., 2000) and 0.87 in a sample of children with ADHD (Mautone et al., 2015). • Associations with other constructs: adequate with other family-school samples such as teacher-rated STR (Mautone et al., 2015).	Parent and teacher report	Clarke et al., 2016; Dawson et al., 2016; Kohl et al., 2000; Mautone et al., 2012, 2015
8. Parent-Teacher Relationship Quality Scale (PTRQS)	The PTRSQ is the focus of the current study. PTRQS items (9 parent, 12 teacher) are based on the PTIQ (#7 in this table), with additional items to increase comprehensiveness and ensure consistency between parent and teacher versions.		Slade et al., 2018; Bush et al., 2017 (utilized the current sample; parent version only)

Note. *For Measures 5 and 7 that had >10 published papers, we only cited studies that looked at two informants, as per the original measure, as well as those that used the English questionnaire (and not a translated version).

two teacher-only measures, with the remaining four measures relying on both parent and teacher reports. In addition, two of the measures were subscales that were usually combined and examined with other family-school partnership aspects (the Family Involvement Questionnaire [FIQ], Fantuzzo et al., 2000, and the Parent and Teacher Involvement Questionnaire [PTIQ], Kohl et al., 2000). Finally, none of these measures, except for our own, has been examined in the context of autistic children.

Noting the measurement inconsistencies and limitations, other researchers have highlighted the need for an efficient PTR tool that is psychometrically validated (Dawson & Wymbs, 2016), both among general student populations and within distinct subpopulations of students, such as autistic students. The absence of such a tool presents challenges both for researchers examining the construct, as well as for school psychologists and other school staff interested in understanding child outcomes within the context of parent-teacher relationships.

Considering PTR quality from both parent and teacher perspectives may be especially important. Primarily, the dyadic nature of interactions between parents and teachers, particularly within contexts that are vulnerable to strained relationships (Mautone et al., 2015), make it valuable to ensure that perspectives of both members of the dyad are incorporated. Furthermore, parents and teachers regularly differ in their ratings of other constructs, like child behaviors or parent involvement (De Los Reyes & Kazdin, 2005) especially in the context of autism (Levinson et al., 2021; Thompson & Winsler, 2018), underscoring the importance of considering both informant perspectives for a complete picture of relationship quality.

2. Existing multi-informant parent and teacher-report measures of PTR quality

Despite the potential value of both parent and teacher informants, our search revealed only three measures beyond our own that use a multi-informant approach to assessing PTR quality (see measures 5, 6, and 7 listed in Table 1, which includes identified measures

and associated psychometric properties). First, the Parent Teacher Relationship Scale – II (PTRS-II; Vickers & Minke, 1995), with parent- and teacher-rated versions, shows good internal consistency and validity in assessing PTR quality in a general sample of parents and teachers of elementary-aged children. The validity and utility of the teacher version of this measure was replicated in a more recent study, again with a general sample of elementary school teachers and parents (Dawson et al., 2016). Notably, both studies ran factor analyses separately for parent and teacher-rated PTRS-II. The measure is strengthened by the fact that parent and teacher versions of the measure include parallel items and therefore can be directly comparable. However, its length (24 parent items, 24 teacher items) makes it difficult to use repeatedly, particularly when included in a battery of other measures.

Second, the Parent-Caregiver Relationship Scale (PCRS; see Table 1), with parent- and child-care provider-rated versions, has shown good reliability in assessing quality of relationships between parents and child-care providers working with infants and toddlers in childcare contexts (Elicker et al., 1997). Factor analyses were run separately for parent- and provider-rated PCRS and three factors were found for each informant. Some of the items are parallel between parent and provider versions, thus supporting a degree of direct comparability across parents and child-care providers. Although the PCRS has demonstrated reliability and validity in studies assessing parent-provider relationship quality (Cantin et al., 2012; Swartz & Easterbrooks, 2014), its validity has not been examined among school-aged children or in an autistic sample. In addition, its length (35 parent items, 35 provider items) limits feasibility and efficiency.

Third, the Relationship Quality subscale of the Parent and Teacher Involvement Questionnaire (PTIQ; #7 in Table 1) includes 6 parent- and 5 teacher-report items (Conduct Problems Prevention Research Group, 1991a, 1991b; Corrigan, 2002; Kohl et al., 2000; Miller-Johnson & Maumary-Gremaud, 2000). Strengths of this measure include its brevity and its inclusion of both parent and teacher report. Furthermore, some items, although not all, on the PTR subscale have parallels both on the parent and teacher reports, allowing for item-level comparisons. A limitation of this measure, as it is, is that several researchers have used the Relationship Quality subscale in combination with other items in to obtain a more comprehensive assessment of PTR quality (Hughes et al., 2005; Rimm-Kaufman et al., 2003). In addition, because it was developed as part of a longitudinal study, the measure has several iterations and therefore has been assessed over time with slightly different items. Studies using the original 11-item Relationship Quality subscale of the PTIQ found strong reliability (Corrigan, 2002; Miller-Johnson & Maumary-Gremaud, 2000) and internal consistency of 0.89 in a non-clinical, community sample in high-poverty schools (Kohl et al., 2000) and 0.87 in a sample of children with ADHD (Mautone et al., 2015). Kohl et al. (2000) ran a factor analysis for both parent and teacher-rated forms of the overall PTIQ measure that included the Relationship Quality subscale among other scales and found that the Relationship Quality subscale items loaded onto one factor. However, Mautone et al. (2015) exclusively assessed the factor structure of the parent and teacher-rated Relationship Quality subscale and found support for a two-factor model, with separate parent-rated and teacher-rated factors.

3. Purpose of the present study

In the present article, we report on the psychometric properties of a measure of PTR quality, referred to herein as the Parent Teacher Relationship Quality Survey (PTRQS). The PTRQS is derived from the Relationship Quality subscale of the PTIQ but modified to address limitations of past measures by relying on a two-informant approach, ensuring some parallel items across parent and teacher reports, enhancing comprehensiveness of content, and maximizing feasibility with 9 parent and 12 teacher items. Psychometric characteristics of a measure can be assessed in different ways including internal structure (i.e., how items relate to each other in a factor analysis and Cronbach's alpha coefficients), consistency in performance on the measure over time (test-retest reliability), as well as validity, such as convergent validity (i.e., how the item is associated with measures that assess the same construct or a related construct that we expect the measure to be associated with [Kazdin, 2016, p. 250]). Given the inconsistent findings as to whether parent and teacher-rated items load onto the same or separate factors in the measure of which the PTRQS is derived from (i.e., the Relationship Quality subscale of PTIQ), our study included parent and teacher-rated items and conducted an exploratory factor analysis to identify whether parent or teacher-rated items load onto separate factors.

The specific goals of this study were to (a) assess the factor structure of PTRQS scores with a sample of parents and teachers of preschool and early elementary-age autistic children, (b) assess the reliability (internal consistency coefficients and test-retest reliability) of PTRQS scores with a sample of parents and teachers of preschool and early elementary-age autistic children, and 3) evaluate convergent validity through the PTRQS factors' association with other aspects of parent-school connectedness, as well as with student-teacher relationship quality, which has been shown to relate to PTR quality in past research, including among typically developing children and children with a range of disabilities (Chung et al., 2005). By establishing the psychometric properties of this brief measure for a specific population of children, we aimed to promote feasibility and encourage its use across research, clinical, and school purposes. School psychologists could use this tool to regularly and efficiently monitor PTR quality with the autistic students they serve. The information from this measure will provide school psychologists with an opportunity to efficiently provide support when needed to improve collaboration and trust between teachers and parents of autistic students.

4. Method

4.1. Participants

Participating families were from a large Northeastern metropolitan area (36%) or southern California metropolitan area (64%). Children for whom a teacher or a parent completed the parent-teacher relationship scale at Time 1 or Time 2 were included in analyses ($n = 192$, excluded 16 participants). At Time 1 (fall of the school year), children (81.8% boys) were 5 years, 8 months on average

(range: 4.0–7.7 years); a large percentage of children were enrolled in preschool (41.7%) versus kindergarten (27.0%), first grade (22.9%), and second grade (6.3%). Child race/ethnicity (53.6% White, 9.4% Hispanic or Latinx, 7.3% Asian American, 3.6% Black or African American, 19.8% multi-racial, 4.2% other, and 2.1% missing) was based on an open-ended parent-report item later aggregated into categories. The majority of parents responding to the questionnaire were mothers (87.5%), had attained a college degree or higher (63.1%), and reported a gross household income of over US $65,000 per year (57.2%). Most children (86.8%) were enrolled in public schools (versus 13.2% in private schools), and 54.6% of children spent at least 50% of their school day in general education settings (versus special education settings).

Of the data available for 153 teachers, most were female (88.3%), identified as White (69.6%, as well as 13.7% Hispanic or Latinx, 5.9% Asian, 0.7% American Indian, 6.5% multi-racial or other) on an open-ended item later aggregated into categories, and had a master's degree or higher (67.1%). On average, teachers had 14 years of teaching experience (range: 1–44), and 55.2% of teachers were teaching in general education settings (versus 51.3% in special education classrooms). Teacher data were provided by the teacher who had the student for 50% or more of the school day. On average, classrooms consisted of 16 students (range: 1–48) and teachers reported that, on average, six students had Individualized Education Programs (IEPs) or Section 504 Plans in their classroom.

Eligible participants were teacher and parent dyads who had a child who (a) met criteria for ASD, (b) was between 4 and 7 years of age and was entering elementary school or their final year of preschool in the Fall (because this was part of a longitudinal study about early school transitions), and (c) earned an estimated IQ score of 50 or higher on the Wechsler Preschool Primary Scale of Intelligence, third edition (WPPSI-III; Wechsler, 2002), which was needed for them to complete self-report measures as part of the larger longitudinal study [not examined here]). The criteria for ASD were met if the child scored in the autism or spectrum range on the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2000), and either had a previous ASD diagnosis from a non-school-based clinician; or in cases where children did not have a previous ASD diagnosis (2% of the sample), the Autism-Diagnostic Interview Revised (ADI-R; Lord et al., 1994) was administered, on which children scoring in the autism or spectrum range were eligible.

4.2. Procedure

As part of a larger longitudinal study, autistic children ages 4–7 years and their parents were recruited through a variety of methods including word of mouth and online and in-print advertisements through local school districts, clinicians, autism resource centers, intervention agencies, autism related conferences and websites, and parent support groups. Potential participants attended eligibility sessions during the summer or fall. After parents provided informed consent, children were assessed for eligibility using the ADOS (Lord et al., 2000) and a three-subtest battery from the WPPSI-III (Wechsler, 2002). WPPSI-III subtests included Matrix Reasoning, Picture Completion, and Vocabulary and were used to estimate a Full-Scale IQ score (Sattler, 2008). For children not already in receipt of an ASD diagnosis from a non-school-based clinician, the ADI-R (Lord et al., 1994) was conducted with parents.

Three subsequent assessment sessions at three different time points were conducted. Each time point included child performance-based measures, parent interviews and questionnaires (completed during a research office visit), and teacher questionnaires (completed by mail). Data for the present study were collected during the Fall (Time 1; between late September–December) and Spring of the school year (Time 2; in April and May) to examine school experiences over the course of the school year (i.e., Time 1 and Time 2, approximately 6 months apart). Parents and teachers received an honorarium for participation. Study activities took place in 2011–2016 such that there was ongoing enrollment at the beginning of academic years that spanned several years. The university IRBs approved all procedures prior to the start of the study.

4.3. Measures

4.3.1. Measures used to confirm eligibility for study in initial session

Autism Diagnostic Observation Schedule (ADOS). 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 demonstrates high sensitivity (86%–100%) and a moderate to high specificity (68%–100%), and incorporates age- and language-specific modules (Lord et al., 2000). 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.

Wechsler Preschool and Primary Scales of Intelligence III, 3-subtest IQ estimate (WPPSI-III). WPPSI-III (Wechsler, 2002) scores have demonstrated high subtest and scale reliability and the measure is commonly used to assess the cognitive ability of children between the ages of 2 years 6 months, and 7 years 3 months (Wechsler, 2002). The abbreviated 3-subtest IQ estimate of the WPPSI-III has demonstrated high reliability and convergent validity (Sattler, 2008).

Autism Diagnostic Interview-Revised (ADI-R). In cases where participants did not have a previous diagnosis, and to not exclude those who had not yet had a chance to receive a medical diagnosis, research assistants trained in the ADI-R collected developmental history information from caregivers. Psychologists on our research team, who were present at the assessment, used clinical judgment to determine whether the child met criteria for ASD based on performances on the ADOS, ADI-R, and clinical impressions.

It should be noted that because data collection began in 2011 and spanned multiple years, the ADOS (with revised research algorithms), ADI-R, and WPPSI-III were utilized rather than the later released versions of these assessments.

4.3.2. The Parent Teacher Relationship Quality Survey (PTRQS)

We examined the PTRQS measure collected during Fall (Time 1) and Spring (Time 2) of the school year. This scale has 9 parent-reported items and 12 teacher-reported items, all scored on a 5-point scale from *strongly disagree* to *strongly agree*. The PTRQS was developed with the Relationship Quality subscale of the PTIQ (Corrigan, 2002; Kohl et al., 2000; Malone et al., 2000; National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network, 2005) as its foundation because of its brevity and its use in several studies. Team members of the larger longitudinal study with content knowledge developed the questions by drawing from the existing literature to determine what was important to include and drafted items to reflect gaps in the existing PTR measures. Other team members with expertise in school psychology and the school experiences of autistic students reviewed the content and provided feedback. Other team members not as familiar with the measures reviewed the items, piloted them, and provided feedback on content clarity. Table 2 shows the text of each PTRQS item as well as its source. We modified and added items to improve consistency across informants and comprehensiveness of content while maintaining brevity relative to other PTR quality measures.

First, for item content that was reflected only on the parent or teacher version, we added parallel items to the other informant's version to enable comparison of parent and teacher perspectives on the same issue (item marked as "parallel" in Table 2), similar to the PTRS-II (Vickers & Minke, 1995; #5 from Table 1). Second, we added 3 items (marked as "reverse" in Table 2) to capture the teacher's

Table 2
Initial 21-Item Parent Teacher Relationship Quality Scale (PTRQS) with Item Sources and Corrected Inter-Item Correlations.

Item	Source of the item	Mean (SD)	Corrected item-total correlation	Cronbach's alpha if item deleted
P-1 Parent, We have a close and mutually respectful relationship.	New	4.15 (0.82)	0.65	0.904
P-2 Parent, I feel that he/she pays attention to my suggestions	PTIQ-P	4.20 (0.89)	0.61	0.905
P-3 Parent, I feel welcome to visit at any time	PTIQ-P*	4.10 (1.13)	0.59	0.91
P-4 Parent, I feel comfortable talking with my child's teacher	PTIQ-P	4.44 (0.81)	0.64	0.905
P-5 Parent, I think the teacher knows me pretty well	New	3.76 (1.02)	0.56	0.907
P-6 Parent, I enjoy talking with the teacher	PTIQ-P	4.28 (1.02)	0.66	0.904
P-7 Parent, I spend time with my child and the teacher	New	3.49 (1.22)	0.53	0.909
P-8 Parent, h. I have confidence in my child's teacher	PTIQ-P	4.27 (0.89)	0.61	0.905
P-9 Parent, i. My child's teacher is doing good things for my child	PTIQ-P	4.35 (0.83)	0.63	0.905
T-a Teacher, We have a close and mutually respectful relationship	New	4.09 (0.76)	0.60	0.906
T-b Teacher, I feel that he/she pays attention to my suggestions	Added (to parallel item P-2)	4.21 (0.74)	0.56	0.906
T-c Teacher, He/she feels welcome to visit at any time	Added (to parallel item P-3)	4.36 (0.64)	0.52	0.907
T-d Teacher, I feel comfortable talking with this child's parent(s)	PTIQ-T	4.43 (0.69)	0.60	0.906
T-e Teacher, This child's parent(s) feels comfortable talking with me	Added (reverse of T-d)	4.41 (0.56)	0.60	0.907
T-f Teacher, I know this parent(s) pretty well	New	3.8 (0.88)	0.45	0.909
T-g Teacher, I enjoy talking with this parent(s)	Added (to parallel item P-6)	4.23 (0.68)	0.63	0.905
T-h Teacher, I spend time with this child and his/her parent(s)	New	3.40 (1.12)	0.36	0.913
T-i Teacher, I have confidence in this parent(s)	Added (to parallel item P-8)	4.21 (0.77)	0.44	0.909
T-j Teacher, This parent(s) has confidence in me as a teacher	Added (reverse of T-i)	4.16 (0.64)	0.58	0.906
T-k Teacher, This parent(s) is doing good things for his/her child	Added (to parallel item P-9)	4.38 (0.69)	0.43	0.909
T-l Teacher, This parent thinks I am doing good things for the child	Added (reverse of T-k)	4.26 (0.64)	0.54	0.907

Note. The primary source for the PTRQS is the Relationship Quality subscale of the PTIQ (Corrigan, 2002; Measure 7 in Table 1), with substantial modifications as indicated in the *Source of the Item* column above. *New* refers to items that were created by the authors of this study. *Added* refers to items (all teacher-report) that were added either to *parallel* an existing parent item, or to reflect the *reverse* of an existing teacher item. PTIQ-P = Parent Teacher Involvement Questionnaire–Parent version. PTIQ-T = Parent Teacher Involvement Questionnaire–Teacher version (both from Conduct Problems Prevention Research Group, 1991a, 1991b). * This item was part of the original PTIQ-P and was included in all PTIQ-P technical reports (e.g., Corrigan, 2002) and the published instrument itself, even though it was omitted from Kohl et al. (2000) without explanation; thus, we have retained it here.

perception of the parent's comfort level and confidence in the relationship, such as "This child's parent feels comfortable talking to me" or "This parent thinks I'm doing good things for this child", consistent with other existing measures of PTR quality (PCRS; Elicker et al., 1997). Third, we created new items (marked "New" in Table 2) to better capture all three PTR dimensions (Clarke et al., 2009; Vickers & Minke, 2007). Team members ensured that items in the survey included those that reflected all three dimensions: (a) warmth and mutual respect (e.g., "We have a close and mutually respectful relationship"), (b) parent and teacher opinions and attitudes towards one another (e.g., "I enjoy talking with the teacher/parent", "I think the teacher knows me pretty well", or "My child's teacher is doing good things for my child)", and (c) dynamic behaviors reflecting collaboration and alliance (e.g., "I feel that he/she pays attention to my suggestions" or "I feel welcome to visit at any time").

A previous examination of the parent version of the PTRQS was limited to the present sample and demonstrated a Cronbach's alpha of 0.94 for the 9-item, parent-reported PTR quality scale (Bush et al., 2017). Bush and colleagues found that parent-reported PTR quality on the PTRQS was associated with parents' expectations for their autistic children in school; parents showed more positive, optimistic educational expectations for their children when their parent-teacher relationships were stronger. In addition, within the same sample, Slade et al. (2018) found that both parent-reported PTR and teacher-reported PTR were also associated with parents' level of satisfaction with their child's IEP. However, the psychometric properties of both the parent- and teacher-report PTRQS, including its factor structure, reliability, and convergent validity with other related measures, were not examined and thus, that is the focus of this article.

4.3.3. Measure used to assess convergent validity

Parent Interview Measure of Overall PTR Quality. Interviewers conducted semi-structured interviews with parents at Time 2. For the purpose of the larger study, the goal of the interview was to understand the parents' perceptions of their child's teacher, classroom climate, and the child's school experiences. An interview was considered to provide more nuance than self-report surveys. For our study, we focused on the interview section pertaining to the parent's perception of the teacher. The interview included open-ended questions, starting with "How do you like your child's teacher?" and followed by prompts to encourage elaboration around parent-teacher communication (e.g., "What types of things do you talk about with [your child's teacher]"?) and parent-teacher relationship quality (e.g., "How do you feel about your relationship with [teacher's name]?").

Research assistants conducted a semi-structured interview (approximately 45 min) in a private room. Interviewers included doctoral- and bachelor's-level staff who were trained by the principal investigators (PI) in semi-structured interview strategies and reflective listening; interviewers conducted practice interviews that were recorded, reviewed both individually and with a PI for feedback, and repeated if needed before conducting participant interviews. Interviews were audio recorded; a team of five coders (2 faculty, 2 graduate students, 1 post-baccalaureate) subsequently reviewed interviews and, based on the parent's overall response, assigned a score of overall parent-teacher relationship quality on a 0–3 scale ranging from *a completely negative relationship* to *a wholly positive relationship with the child's teacher*. Inter-rater reliability among coders was assessed by scoring individually and then comparing rates in groups of 2–3 individuals until reaching 80% or higher agreement. Subsequently, all coders coded independently. An additional 20% of interviews were coded by all coders who achieved 80% or higher reliability with the consensus codes. Consensus codes were based on group discussion when coded by multiple coders. Siegel and Castellan Jr.'s (1988) kappa, chosen because it accommodates >2 coders and accounts for bias, averaged 0.79 across all coder combinations, indicating substantial inter-rater agreement (Landis & Koch, 1977).

Parental School Involvement. The parent involvement subscale of the Parent and Teacher Involvement Questionnaire measures perceptions of the parent's involvement in the child's school activities. Responses were gathered at Times 1 and 2 both from teachers (PTIQ-T; Miller-Johnson & Maumary-Gremaud, 2000; NICHD Early Child Care Research Network, 2005) and parents (PTIQ-P; NICHD Early Child Care Research Network, 2005). Examples of the 16 parent-report items include "I send a written note or email to the teacher" and "I participate with my child at home in activities for the classroom." Items are scored on a 7-point scale ranging from *never* to *almost every day*. Examples of the 10 teacher-report items include "How often does this parent send things to class?" and "How often does this parent ask questions or make suggestions about his/her child?" Items are scored on a 5-point scale ranging from *not at all* to *a great deal*. Parent items and teacher items are each summed to create two distinct parental school involvement scores. Internal consistency as measured by Cronbach's alpha was 0.70 for parents at both Time 1 and Time 2, and 0.87 and 0.90 for teachers at Time 1 and Time 2, respectively.

Parent Perceptions of Teacher Effectiveness. The Parent Perception of Teacher Effectiveness is a 15-item subscale of a larger 46-item survey, the Parent Perception Measure (PPM; Lauderdale & Blacher, 2008). The measure was administered to parents at Time 2 to assess their perceptions and opinions of their child's teacher. Items (e.g., "My child's teacher understands his/her needs" and "My child's teacher is open to my concerns") are scored on a 5-point scale ranging from *strongly disagree* to *strongly agree*. In the present study, internal consistency of the subscale was high (0.96). Past research with the PPM in a sample of autistic children showed good to excellent Cronbach's alpha coefficients for all PPM subscales (0.70–0.96; Lauderdale & Blacher, 2008) and in a Canadian sample of 200 parents of autistic youth ages 6–18 years, the teacher effectiveness subscale was significantly and concurrently associated with the Family Empowerment Scale (MacMullin et al., 2010).

Student-Teacher Relationship Quality. The Student-Teacher Relationship Scale (STRS; Hamre & Pianta, 2001) was administered to participating teachers to assess their perceptions of the quality of their relationship with the participating child at Time 1 and Time 2. The 28-item measure includes three subscales, namely (a) conflict (12 items), (b) closeness (11 items), and (c) dependency (5 items). The 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 (e.g., "The child reacts strongly to separation from me"). Items are scored on a 5-point scale ranging from *definitely does not apply* to *definitely applies*. In the present study, Total STR quality scores were used. Hamre and Pianta (2001) reported adequate reliability of the scale and good validity in predicting academic and social functioning. In the present sample, internal consistency as measured by Cronbach's alpha was also adequate (0.77 and 0.82 at Time 1 and Time 2, respectively).

4.4. Data analyses

4.4.1. Factor structure

To evaluate the factor structure of the PTRQS among parents and teachers of autistic children, analyses were conducted with SPSS 25 (IBM Corp., 2020) and Mplus version 1.6 (Muthén & Muthén, 2007). First, corrected item-total correlations (correlations between each item and a scale score that excludes that target item) were conducted in SPSS to examine how parent- and teacher-report items loaded on the overall scale. Corrected item-total correlations <0.40 were removed from the scale if their removal resulted in an increased Cronbach's alpha.

Second, an exploratory factor analysis (EFA) using the principal axis factoring (PAF) estimation method and promax rotation was conducted in SPSS with Time 1 data to determine the factors that underlie scale items. Regarding missing data, listwise deletion was used in SPSS when conducting the EFA, as most of the missing cases (78% of cases missing parent data and 98% of cases missing teacher data) were missing the entire scale. Third, to determine the number of underlying factors to extract, results from the EFA were examined using the Kaiser-Guttman Rule (i.e., the number of factors is equal to the number of Eigenvalues >1), the point of inflexion in scree plots, parallel analysis, minimum average partial (MAP) criteria (Velicer, 1976), and a review of item loadings and communalities, where communalities above 0.3 and factor loadings above 0.4 were considered acceptable (Pett et al., 2003).

To confirm the fit of the chosen EFA model, confirmatory factor analysis (CFA) models were conducted in Mplus separately for Time 2 data. For the CFA, missingness was addressed using full information maximum likelihood (FIML) with Mplus. Latent factors were permitted to correlate, whereas measurement error was presumed to be uncorrelated. Goodness of fit was evaluated using chi-square ($\chi 2$), standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), and comparative fit indices (CFI and TLI). Good model fit was defined as RMSEA <0.08, SRMR <0.08, CFI > 0.95, and TLI >0.95 (Hu & Bentler, 1999). Modification indices and standardized residuals were checked to identify any localized points of poor fit.

4.4.2. Reliability analyses

Alpha coefficients were computed to examine the internal consistency of PTRQS scores, as well as the resulting factors. Test-retest reliability was also examined by computing correlations between Time 1 and Time 2 PTRQS scores. Notably, this is a limitation in our study as the measure was administered roughly 6 months apart, which is not ideal as this construct is expected to change over the school year.

4.4.3. Convergent validity of total PTRQS score and resulting factors

To examine convergent validity of the factor structure of PTR quality proposed by the EFA and CFA, we examined correlations between total PTRQS scores and the resulting PTRQS factors with the parent interview-based measure of PTR quality, measures of parental school involvement (the parental involvement subscale of the PTIQ), student-teacher relationship quality (STRS Total score), and a measure of parent perceptions of the teacher (Parent Perception Measure, teacher quality score). We examined correlations between constructs at the same time point.

Table 3
Average scores on key variables at Time 1 (Fall) and Time 2 (Spring).

	Teacher-rated		Parent-rated	
	M	(*SD*)	*M*	(*SD*)
	Parent Teacher Relationship Quality (PTR)			
Time 1 Parent-Teacher Relationship Quality Scale (PTRQS)	50.0	(6.4)	37.1	(6.9)
Time 2 Parent-Teacher Relationship Quality Scale (PTRQS)	49.6	(7.9)	36.3	(7.3)
	Overall PTR Quality based on the Spring Parent Interview			
Parent interview-based rating of PTR quality (Time 2)	–	–	3.17	(1.0) range: 0–4
	Parental School Involvement - Activity Subscale			
Time 1 Parental School Involvement (Total score on the Activities subscale of the PTIQ)	38.9	(6.8)	48.3	(10.8)
Time 2 Parental School Involvement (Total score on the Activities subscale of the PTIQ)	38.9	(7.7)	45.7	(9.8)
	Parent Perception of Teacher			
Time 2 Parent Perception of Teacher (PPM)	–	–	59.5	(11.8)
	Student Teacher Relationship Scale (STRS)			
Time 1 Student-Teacher Relationship Quality Total Score (STRS)	109.5	(12.8)	–	–
Time 2 Student-Teacher Relationship Quality Total Score (STRS)	108.6	(14.4)	–	–

Note. Parent-rated and teacher-rated scores are not directly comparable. The parent-rated PTRQS quality scale contained 9 items; the teacher-rated PTR quality scale contained 12 items. Similarly, the parent-rated parental school involvement scale contained 16 items; the teacher-rated parental school involvement scale contained 10 items. PTIQ = Parent Teacher Involvement Questionnaire. PPM = Parent Perception Measure. STRS = Student Teacher Relationship Survey.

5. Results

5.1. Descriptive analyses

Within this sample, there was relatively low missingness for parents (4.8% and 6.8% at Time 1 and Time 2, respectively), but greater missingness for teachers (25.0% and 28.6% at Time 1 and Time 2, respectively) on the PTRQS. Little's test of Missing Completely at Random (MCAR) provided confidence that data were missing completely at random, $X^2 = 85.01$, DF = 81, $p = .359$.

Descriptive results are shown in Table 3. Corrected item-total correlations for 20 of the 21 items had moderate values (0.43–0.66; see Table 2). The corrected item-total correlation for Item T-h ("I spend time with this child and his/her parents(s)") was 0.36. When this item was deleted, the alpha was virtually unchanged (from 0.911 to 0.913). However, given this item's focus on teacher-parent-child interactions rather than dyadic interactions between the teacher and parent, as well as the item's focus on frequency rather than quality of interactions, it made theoretical and statistical sense to remove this item. For conceptual consistency, the parent-rated version of this item (Item P-7: "I spend time with my child and his/her teacher") was also removed, which had an item-total correlation of 0.53. The remaining 19-item scale had an alpha coefficient remaining the same (0.911) and corrected item-total correlation values were all within the acceptable range (0.43–0.66).

5.2. Exploratory factor analysis

Following removal of the above two items, an EFA was conducted with the remaining 19 items at Time 1. Although visual review of the resulting scree plot (See Fig. 1) and the Kaiser-Guttman Rule (see Table 4) suggested a three-factor solution, parallel analyses (see last column in Table 4), and MAP results indicated a two-factor model. Factor loadings and communalities of the two- and three-factor solutions were further compared. The factor loadings were highly similar between the two- and three-factor solutions, with the two-factor solution showing slightly lower item loadings (0.62–0.87; Table 5) than the three-factor solution (0.64–0.87; Table 5). Communalities for the two-factor solution (0.39–0.75) were also slightly lower overall than communalities for the three-factor solutions (0.42–0.75; see Table 5.)

Overall, EFA results slightly favored the three-factor solution. The two-factor model included parent items on one factor and teacher items on a second factor. The three-factor model included *parent-perceived PTR quality* as one factor, *teacher-perceived comfort with parent* as a second factor, and *teacher perceptions of parent abilities* as a third factor. Statistical and conceptual reasons favored a three-factor solution. Statistically, except for parallel analysis and MAP, multiple methods (i.e., scree plot visual analysis, Kaiser-Guttman Rule, communalities, and factor loadings) slightly favored a three-factor model. Conceptually, the third factor appeared to be measuring a distinct construct from the other two factors. Thus, the three-factor model was determined to provide additional nuance and differentiation between constructs.

5.3. Confirmatory factor analysis at Time 2

To assess whether this model held with data at the second time point, we conducted a CFA on the 19-item PTRQS at Time 2. Fit

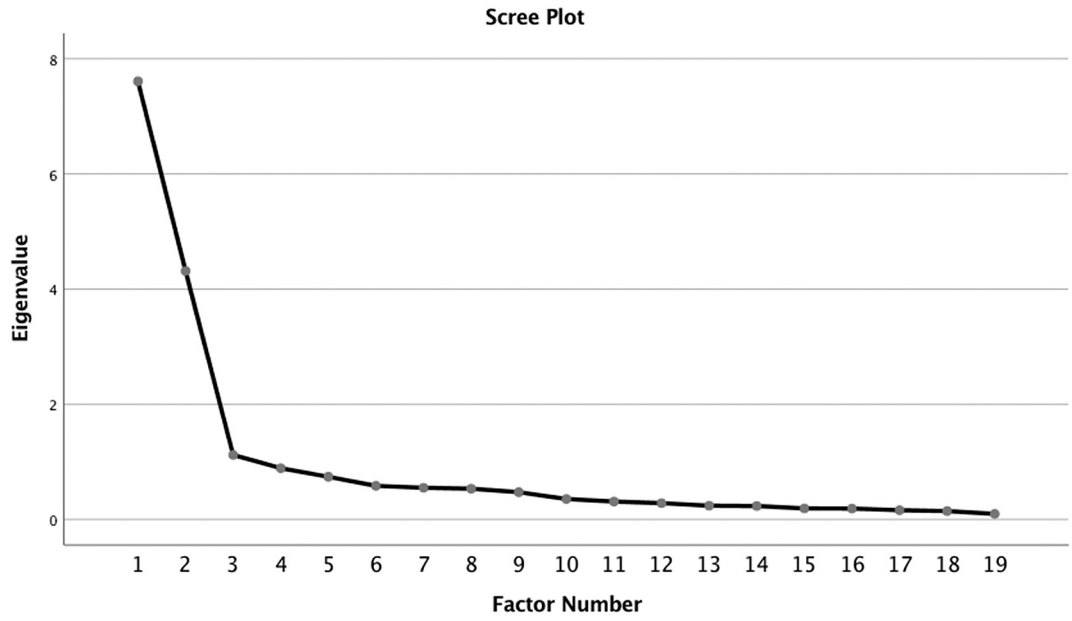

Fig. 1. Scree plot based on the 19-item parent teacher relationship quality scale.

Table 4
Eigenvalues based on EFA of the 19-item parent-teacher relationship quality scale and based on a parallel analysis generating random eigenvalues.

Factor	Initial eigenvalues			Extraction sums of squared loadings			Parallel analysis
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Eigenvalues based on random generator
1	7.61	40.04	40.04	7.25	38.14	38.14	1.82
2	4.32	22.71	62.75	3.97	20.89	59.04	1.65
3	1.12	5.89	68.64	0.80	4.21	63.25	1.54
4	0.80	4.68	73.32	–	–	–	1.43
5	0.74	3.89	77.22	–	–	–	1.34
6	0.58	3.07	80.28	–	–	–	1.27
7	0.55	2.89	83.17	–	–	–	1.20
8	0.53	2.80	85.97	–	–	–	1.13

Table 5
Factor analysis loadings for the two- and three-factor parent-teacher relationship quality scale models, as well as communalities for the chosen three-factor parent-teacher relationship model.

	2-Factor solution		3-Factor solution			
	Factor		Factor			
Item	1	2	1	2	3	h^2
P-1 Parent, We have a close and mutually respectful relationship.	0.25	**0.82**	**0.82**	0.24	0.21	0.68
P-2 Parent, I feel that he/she pays attention to my suggestions	0.21	**0.87**	**0.87**	0.21	0.13	0.75
P-3 Parent, I feel welcome to visit at any time	0.26	**0.73**	**0.73**	0.27	0.12	0.53
P-4 Parent, I feel comfortable talking with my child's teacher	0.26	**0.83**	**0.83**	0.25	0.20	0.70
P-5 Parent, I think the teacher knows me pretty well	0.19	**0.71**	**0.70**	0.19	0.11	0.50
P-6 Parent, I enjoy talking with the teacher	0.28	**0.85**	**0.85**	0.28	0.18	0.72
P-8 Parent, I have confidence in my child's teacher	0.22	**0.86**	**0.86**	0.25	0.05	0.75
P-9 Parent, My child's teacher is doing good things for my child	0.23	**0.86**	**0.86**	0.25	0.07	0.75
T-a Teacher, We have a close and mutually respectful relationship	**0.75**	0.24	0.24	**0.76**	0.46	0.58
T-b Teacher, I feel that he/she pays attention to my suggestions	**0.76**	0.22	0.22	**0.74**	0.56	0.57
T-c Teacher, He/she feels welcome to visit at any time	**0.65**	0.22	0.22	**0.64**	0.47	0.42
T-d Teacher, I feel comfortable talking with this child's parent(s)	**0.76**	0.29	0.29	**0.78**	0.45	0.61
T-e Teacher, This child's parent(s) feels comfortable talking with me	**0.83**	0.23	0.23	**0.82**	0.56	0.68
T-f Teacher, I know this parent(s) pretty well	**0.64**	0.11	0.11	**0.66**	0.34	0.44
T-g Teacher, I enjoy talking with this parent(s)	**0.80**	0.29	0.29	**0.78**	0.60	0.64
T-i Teacher, I have confidence in this parent(s)	**0.62**	0.14	0.15	0.55	**0.85**	**0.73**
T-j Teacher, This parent(s) has confidence in me as a teacher	**0.71**	0.28	28.	**0.75**	0.34	0.59
T-k Teacher, This parent(s) is doing good things for his/her child	**0.63**	0.13	0.14	0.55	**0.84**	**0.72**
T-l Teacher, This parent thinks I am doing good things for the child	**0.77**	0.18	0.18	**0.80**	0.42	0.65

Note. Numbers have been bolded to indicate which items were loading highly on their factors.

indices were good on three out of five indices (CFI = 0.978, TLI = 0.975, SRMR = 0.058, RSMEA = 0.092, $\chi 2(149) = 382.03$, $p < .05$). The CFA at the second time point showed support for the three-factor model (See Fig. 2). The two teacher-rated factors (i.e., *teacher-perceived comfort with parent* factor, *teacher perceptions of parent abilities* factor) had the highest correlation ($r = 0.82$, $p < .01$). There were moderate correlations between the parent-perceived PTR quality factor and the teacher-perceived comfort with parent factor ($r = 0.51$, $p < .01$), as well as a moderate correlation between the parent-perceived PTR quality factor and teacher perceptions of parent abilities ($r = 0.41$, $p = .01$).

In addition, because the statistical values associated with the two-factor models were close, both two- and three-factor models were tested in a CFA. The three-factor model demonstrated significantly better fit than the two-factor model at Time 2 ($\chi 2_{diff}$-value = 52.975, $p < .001$, critical value = 5.99), providing further confirmation for our three-factor model.

5.4. Reliability analyses

Internal consistency of the Total PTRQS was 0.91 at Time 1 and 0.94 at Time 2. The *parent-perceived PTR quality* factor had an internal consistency of 0.94 at both Times 1 and 2, the *teacher-perceived comfort with parent* factor had an internal consistency of 0.92 and 0.93 at Times 1 and 2, respectively, and the *teacher perceptions of parent abilities* had an internal consistency of 0.85 and 0.91 at Times 1 and 2, respectively.

Test-retest reliability was good (Cicchetti, 1994). Correlations across Time 1 and Time 2 for Total PTRQS, the *parent-perceived PTR quality* factor, the *teacher-perceived comfort with parent* factor, and the *teacher perceptions of parent abilities* were also run and demonstrated moderate coefficients that were statistically significant ($r = 0.62$, 0.49, 0.64, and 0.62, respectively). Notably, as indicated above, assessing test-retest reliability using our sample is not ideal given that the PTRQS was administered 6 months apart – a relatively long time to measure test-retest reliability given that we expect a measure like PTR quality to change over the course of a semester. Therefore, consistent with our expectations, the test re-test reliability correlations were significant but not very high. Refer to Table 6

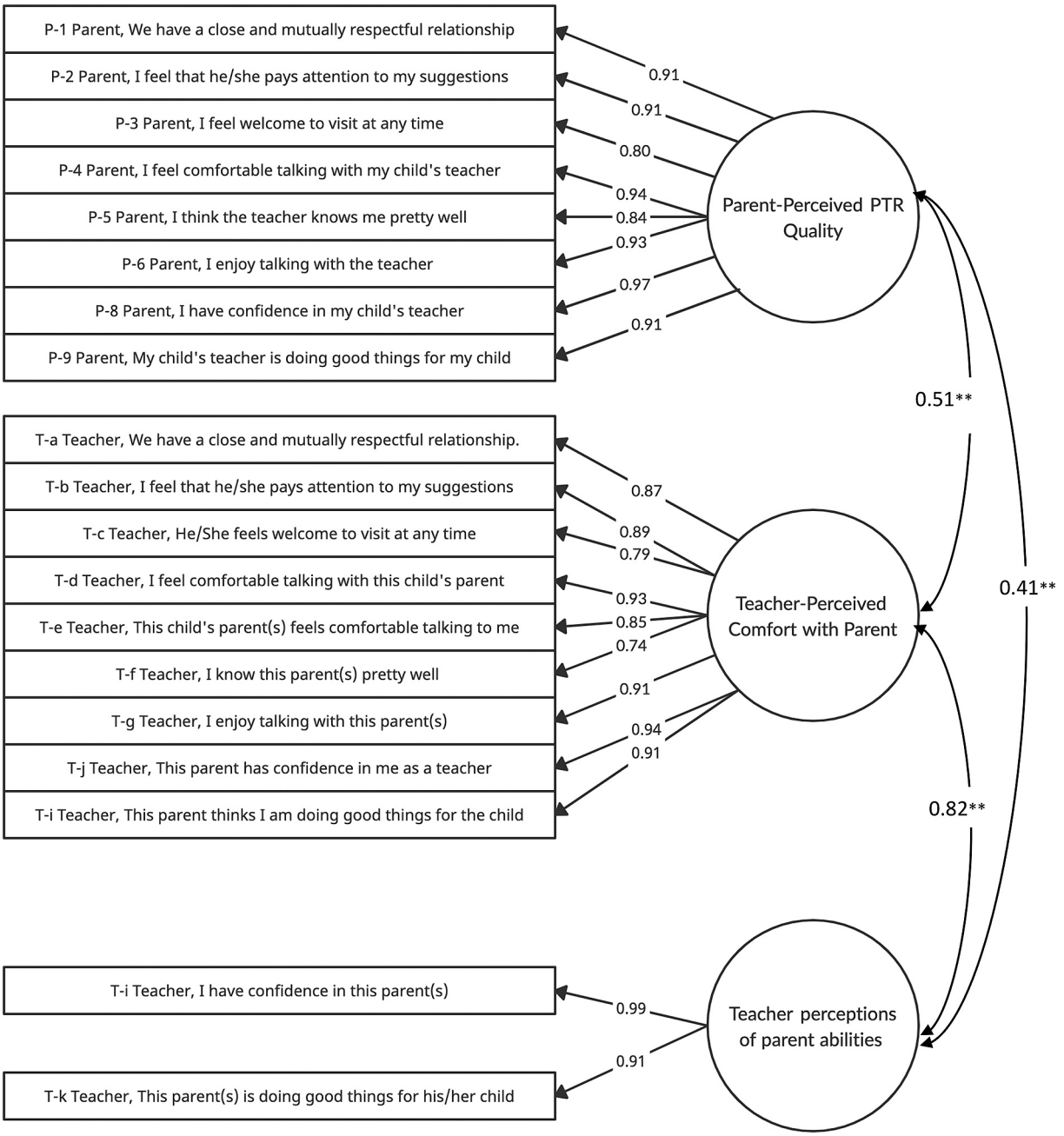

Fig. 2. Standardized CFA loadings for a three-factor model at Time 2 (spring of the school year).

Table 6
6 Month test-retest reliability score (correlations between Time 1 and Time 2 parent teacher relationship quality scale total score and the three factors at Time 1 and Time 2).

	Factor 1 (Time 1)	Factor 2 (Time 1)	Factor 3 (Time 1)	PTRQS Total (Time 1)
Factor 1 (Time 2)	0.492**	0.302**	0.314**	0.506**
Factor 2 (Time 2)	0.347**	0.635**	0.519**	0.588**
Factor 3 (Time 2)	0.234**	0.443**	0.622**	0.428**
PTRQS Total (Time 2)	0.454**	0.565**	0.543**	0.620**

Note. Factor 1 = Parent-perceived PTR Quality. Factor 2 = Teacher-perceived comfort with parent. Factor 3 = Teacher perceptions of parent abilities. PTRQS Total = Parent Teacher Relationship Quality Scale Total score. * = $p < .05$, ** = $p < .01$.

for details on correlations across the two time points.

5.5. Convergent validity for the PTRQS and its resulting factors

Strong convergent validity was indicated by the strong correlations between parent interview-based scores of PTR quality at Time 2 and PTRQS total score, as well as all three factors of the PTRQS at Time 2, including *parent-perceived PTR quality*, *teacher-perceived comfort with parent*, and *teacher perceptions of parent abilities*; *rs* range from 0.58 to 0.80, *ps* < 0.001, as shown in Table 7. Given that the PTR quality interview measure attempts to tap into the same construct of PTRQS, we expected this measure to have the strongest association; consistent across the factors, this was confirmed.

Correlations between the three PTR quality factors of the PTRQS and related constructs, including parental school involvement, parent perceptions of teacher effectiveness, and STR quality are reported in Table 7. In evidence of convergent validity, the PTRQS total score and all three PTR quality factors showed significant, concurrent, and low to moderate associations with teacher-rated parental school involvement at Time 1 and Time 2. The PTRQS total score and *parent-perceived PTR quality* factor were associated with parent-rated parental school involvement at Time 1, whereas the PTRQS total score, *parent-perceived PTR quality* factor, and *teacher-perceived comfort with parent* factor were correlated with parent-rated parental school involvement at Time 2.

The PTRQS total score and all three factors were associated with parent perceptions of the teacher at Time 2. Finally, at Time 1, the *teacher-perceived comfort with parent* factor and the *teacher perceptions of parent abilities* factor, but not the *parent-perceived PTR quality* factor, were associated with STR quality. At Time 2, PTRQS total score, the *teacher-perceived comfort with parent* factor and the *teacher perceptions of parent abilities* factor were associated with STR quality. Overall convergent validity was demonstrated for all three PTR factors, with each PTR factor correlated with at least two out of three related constructs at Time 1 and at least four out of five related constructs at Time 2.

6. Discussion

In the present study, we examined the psychometric properties of the PTRQS, which is a measure of PTR quality, among parents and teachers of autistic children (See online Supplemental Materials for PTRQS measure and scoring instructions). The PTRQS used the Relationship Quality subscale of the PTIQ (Conduct Problems Prevention Research Group, 1991a, 1991b; Corrigan, 2002; Kohl et al., 2000; Miller-Johnson & Maumary-Gremaud, 2000) as its foundation, due to its brevity and its established use in past research (Dawson et al., 2016; Hughes et al., 2005; Mautone et al., 2015). However, we made substantial modifications to ensure comprehensiveness in capturing PTR quality and consistency across parent and teacher items (consistent with Vickers & Minke, 1995). The results of this study indicated that, among parents and teachers of preschool and early elementary-age autistic children, the PTRQS contained three factors consisting of (1) parent-perceived PTR quality, (2) teacher-perceived comfort with parent, and (3) teacher perceptions of parent abilities. The measure also demonstrated good validity and reliability, indicating that this measure can be used to capture parent-teacher relationship quality in the context of preschool early elementary autistic children.

The ability to validly measure PTR quality through the PTRQS is especially important for both clinical and research purposes. Further research is needed to understand the predictors and outcomes associated with PTR quality, and research findings can be stronger when they can be grounded in valid measures. With the growing number of autistic students entering general inclusive classrooms (Albritton et al., 2019), understanding the different PTR profiles for parents and teachers of autistic children can support efforts to improve the experiences of autistic children in school settings. Clinically, given the increasing evidence suggesting that PTR quality is an important indicator of positive child outcomes, including improved social competence and reduced conflict with teachers (Serpell & Mashburn, 2012), it is important to have a measure that is comprehensive and yet brief enough to be included in the battery of tests that school psychologists use. Use of such a measure can allow school psychologists to monitor PTR quality and intervene as needed to support individual children and families. The measure can also be used on a broader level to help schools implement changes

Table 7
PTRQS total score and the three factors of PTRQS and correlations with other measures at Time 1 and Time 2 (fall and spring of the school year).

	Factor 1 (P)	Factor 2 (T)	Factor 3 (T)	PTRQS Total
Time 1				
Parent-rated PTIQ (P)	0.26**	0.07	0.02	0.20*
Teacher-rated PTIQ (T)	0.24**	0.70**	0.73**	0.62**
Total STRS (T)	−0.01	0.23**	0.18*	0.16
Time 2				
Parent-rated PTIQ (P)	0.36**	0.22*	0.03	0.28**
Teacher-rated PTIQ (T)	0.53**	0.78**	0.74**	0.78**
PPM (P)	0.82**	0.42**	0.34**	0.68**
Total STRS (T)	0.13	0.19*	0.20*	0.20*
Parent interview of PTR Quality (P)	0.74**	0.66**	0.58**	0.80**

Note. Factor 1 = Parent-perceived PTR Quality. Factor 2 = Teacher-perceived comfort with parent. Factor 3 = Teacher perceptions of parent abilities. PTR = Parent Teacher Relationship. PTIQ = Parent Teacher Involvement Questionnaire. STRS = Student Teacher Relationship Survey. PPM = Parent Perception Measure. *$p < .05$. ** $p < .01$.

as needed to support better PTRs.

Examining the psychometric validity of the PTRQS is valuable because the PTRQS (a) addresses limitations of past measures by relying on a two-informant approach, (b) includes parallel and comparable items across both parent and teacher versions, and (c) maintains feasibility of the measure while still comprehensively capturing three dimensions of PTRs. In addition, the study also provided validation to this measure within the specific population of interest. To our knowledge, this is the first study of its kind to investigate the psychometric properties of a measure examining the dynamic PTR quality from both parent and teacher perspectives with a focus on autistic children.

In the present study, an EFA supported a three-factor model, including parent-perceived PTR quality, teacher-perceived comfort with parent, and teacher perceptions of parent abilities. It is notable that where teacher items were split among two distinct factors (i.e., *teacher-perceived comfort with parent* factor; and *teacher perceptions of parent abilities* factor), all parent items, including those assessing parent-perception of teacher abilities, loaded on one factor (*parent-perceived PTR quality* factor). Our results show that parents' perceptions of teacher's abilities were closely intertwined with their level of comfort with the teacher, with both loading onto one factor. Conversely, teachers' perceptions of the parent's abilities were relatively distinct from their level of comfort in the relationship with the parent, with these two elements – perceived abilities and comfort – emerging as separate factors. One interpretation of this finding is the possibility that because teachers are trained in collaborating with families (Hamilton-Jones & Vail, 2009), this in turn could mean that teachers are able to work and develop strong relationships with a variety of families and parents, regardless of how they perceive the parents' abilities, thus enabling a sense of comfort with parents regardless of their perceptions of the parents' abilities.

The *teacher perceptions of parents' ability* factor has potential to be culturally embedded. It has been argued that teachers are more effective in facilitating communication and relationships with parents who share their values and beliefs (Berthelson & Walker, 2008). Furthermore, teachers view parents who are culturally different from them as less interested in their children's education as compared to families who have similar backgrounds to the teachers (Epstein & Dauber, 1991). Additionally, research suggests that teachers in majority English-speaking schools communicate less frequently with parents whose first language is not English (Dyson, 2001). This reduced communication, and perceived disinterest in schooling, may incorrectly be attributed to less competence. In turn, these teacher perceptions may impact their perceptions of student's behavior and abilities, their expectations, and their disciplinary choices (e.g., Gilliam et al., 2016; Zulauf-McCurdy & Zinsser, 2021). In sum, in measuring teachers' subjective opinions and implicit bias, this third factor may be an especially valuable intervention target. Better training, support, and modeling of cultural humility and cross-cultural communication may enhance teachers' readiness to view parents confidently across cultural differences (Haynes-Mendez & Engelsmeier, 2020).

Future research should also examine the extent to which the *teacher perceptions of parent abilities* factor uniquely affects outcomes. For example, the teacher's confidence in a parent's abilities may impact various aspects of parent-teacher interactions, such as impacting home-based practices the teacher suggests, the ways they problem solve with the parent, or the degree to which they seek out the parent's input. Ultimately, teachers' confidence in parent's abilities may be malleable through interventions, such as through improved cultural humility that would help teachers understand parents' point of view, goals, strengths, and values better.

In addition, the *teacher perceptions of parent abilities* factor may be particularly salient for parents and teachers of autistic children, as it is possible that many teachers do not themselves possess the training or knowledge to support autistic children and may look to parents for support. Indeed, a prior study based on the sample used in the present study found that only 25% of teachers had any professional training in autism (Caplan et al., 2016). Relatedly, Chung et al. (2005) found that teachers of children with developmental delays reported lower teaching efficacy scores. In Chung and colleagues' study, the role of PTR quality was proposed as a possible moderator when teachers feel less than capable in teaching children with developmental delays in their classroom. Thus, it is possible that for autistic children, teacher perceptions of parent abilities allow teachers who may otherwise feel less equipped to work with the student to seek support from the parent.

Associations between the parent-rated factor (i.e., the *parent-perceived PTR quality* factor) and the teacher-rated factors (the *teacher-perceived comfort with the parent* factor; the *teacher perceptions of parent abilities* factor) were moderate, suggesting that these two factors may each provide unique information about the quality of PTRs. Like other multi-informant measures that assess child constructs using both parent and teacher reports, such as the Child Behavior Checklist (Achenbach & Rescorla, 2001), the correlation between parent and teacher informants was significant, but not high. Our results indicate that each informant adds unique information to the assessment of the parent-teacher relationship quality.

Consistent with the finding that parent and teacher-rated items loaded onto different factors, the correlations of PTRQS factors with various outcome measures demonstrated that there may be slightly different aspects of the relationship quality that parents and teachers value, which makes it important to examine the predictors of parent- and teacher-rated PTR quality separately. For instance, parent-rated parental school involvement had very low associations with the parent-rated PTR factor, whereas teacher-rated parental school involvement was highly associated with the two teacher-rated PTR factors, and somewhat associated with the parent-rated PTR quality factor. This may suggest that parental involvement may be more highly valued by teachers and contributes to a higher teacher-rated PTR quality. Prior research has established that parent and teacher perceptions of parent involvement differ (Wong & Hughes, 2006), and that sometimes teachers may interpret parent's lack of involvement at school as evidence of parents' negative attitude towards school, leading to an unproductive working alliance or poorer relationship quality (Lawson, 2003). In addition, consistent with our finding that teacher-rated factors correlated with teacher-rated STR of the student, Mautone et al. (2015) found that teacher-rated PTR (as measured by the Relationship Quality subscale of the PTIQ) had low to moderate correlations with teacher-rated STR. Further research ought to examine the predictors and outcomes of the three factors.

The Total PTRQS score and the three factors in our model meaningfully related to other aspects of children's school experiences.

Notably, the Total PTRQS and all three factors were highly correlated with a parent-interview based measure of overall PTR quality, a different measure of parents' perceptions of teacher effectiveness, and teacher ratings of parental school involvement. In addition, two teacher-rated PTR quality factors, but not the parent-rated PTR factor, were associated with teacher reports of student-teacher relationship quality. Together, this suggests PTR quality is an important construct that may influence the school adjustment of autistic children and warrants further research in longitudinal studies to assess whether these associations are predictive.

6.1. Strengths, limitations, and future directions

Overall, the study benefits from a relatively large sample size that was used to validate this measure, consisting of a sample of children diagnosed with ASD of varying severity of symptoms and cognitive functions, including IQs of 50 and above. Additionally, the sample consisted of participants from relatively diverse racial backgrounds, but of insufficient size to separately examine the associations of race and ethnicity with parents' and teachers' experiences of PTR quality for autistic children. Previous research has found that shared or different racial and ethnic backgrounds between parents and teachers can play different roles in parents' and teachers' personal goals, values, and communication quality in community samples (Hughes et al., 2005; Reynolds et al., 2015; Wong & Hughes, 2006).

Despite the relatively large sample size, the study is limited by the fact that the sample was composed of mostly middle- and upper-income families, as well as mainly families who spoke English; as such, findings may not be generalizable to families with lower economic resources or who have greater linguistic diversity. Future studies could examine the differential item functioning or measurement invariance across groups. Although the present study included a range of cognitive functioning, children with moderate to severe intellectual disabilities (IQ scores <50) were not enrolled; future research should examine how PTR quality may vary across children's intellectual functioning and other developmental characteristics. Moreover, most of our caregiver respondents were mothers, which limits our ability to generalize to other caregiver dyads (e.g., fathers, grandparents). Finally, consistent with teacher demographics in the US according to data from the National Teacher and Principal Survey in 2017–2018 (National Center for Education Statistics, 2018), most of our teachers were white females, which limits our ability to generalize the findings to other teachers; future research should examine how PTR may differ by teacher identity, including gender and race. Furthermore, 13.2% of our sample attended private schools; future research should examine how these parent-teacher interactions may differ in private school settings where the same legal special education requirements are not present and student services may not be guided by IEPs relative to public school settings.

Moreover, the current study did not include other measures that have been validated to assess PTR, such as the Parent Teacher Relationship Scale-II (Vickers & Minke, 1995). Although we used an interview measure of PTR quality, a limitation of this interview measure was that it was not a well-established and psychometrically validated measure and it was coded by interviewers based on how positive or negative the coders perceived the relationship to be, which can be subjective and culturally embedded. Future studies could include a more well-established PTR measure (such as the PTRS-II) to strengthen the evaluation of convergent validity of the PTRQS.

7. Conclusion

A major contribution of this study is that it provides researchers and school psychologists with a psychometrically valid measure of PTR quality, the PTRQS, for use with preschool and elementary aged autistic children. The PTRQS is short, although still comprehensive in how it addresses many aspects of the parent teacher relationship, from both parent and teacher perspectives. Measuring PTR has important implications for educational researchers aiming to assess the contributions of parent-teacher relations to child outcomes, as well as to school psychologists aiming to measure effectiveness of interventions that are meant to enhance family-school partnerships.

Author's note

This study was funded by the Institute of Education Sciences (R324A110086; J. Blacher, P.I.) We are grateful to the teachers and families who participated in our study, and to the students and staff whose help and support made this project possible.

Portions of these findings were presented as a poster in the 2021 International School Psychology Association conference, Nicosia, Cyprus. We have no conflicts of interest to disclose.

Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jsp.2022.08.004.

References

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms & profiles*. University of Vermont, Research Center for Children, Youth, & Families.

Adams, K. S., & Christenson, S. L. (2000). Trust and the family-school relationship examination of parent-teacher differences in elementary and secondary grades. *Journal of School Psychology, 38*(5), 477–497. https://doi.org/10.1016/S0022-4405(00)00048-0.

Albritton, K., Mathews, R. E., & Boyle, S. G. (2019). Is the role of the school psychologist in early childhood truly expanding? A national survey examining school psychologists' practices and training experiences. *Journal of Applied School Psychology, 35*(1), 1–19.
Barbarin, O. (2000). *Home-school relationships questionnaire*. Unpublished measure. University of North-Carolina-Chapel Hill: National Center for Early Development and Learning.
Berthelson, D., & Walker, S. (2008). Parents' involvement in their children's education. *Family Matters, 79*, 34–41.
Bottema-Beutel, K., Kapp, S. K., Lester, J. N., Sasson, N. J., & Hand, B. N. (2021). Avoiding ableist language: Suggestions for autism researchers. *Autism in Adulthood, 3*(1), 18–29. https://doi.org/10.1089/aut.2020.0014.
Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (pp. 993–1028). John Wiley & Sons Inc.
Brookman-Frazee, L., & Koegel, R. L. (2007). Using parent/clinician partnerships in parent education programs for children with autism. *Journal of Positive Behavior Interventions, 6*(4), 195–213. https://doi.org/10.1177/10983007040060040201.
Burke, M. M., & Goldman, S. E. (2015). Identifying the associated factors of mediation and due process in families of students with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45*(5), 1345–1353. https://doi.org/10.1007/s10803-014-2294-4.
Bush, H. H., Cohen, S., Eisenhower, A., & Blacher, J. (2017). Parents' academic expectations for their young children with autism spectrum disorder. *Education and Training in Autism and Developmental Disabilities Journal, 52*(4), 357–368.
Cantin, G., Plante, I., Coutu, S., & Brunson, L. (2012). Parent-caregiver relationships among beginning caregivers in Canada: A quantitative study. *Early Childhood Education Journal, 40*, 265–274. https://doi.org/10.1007/s10643-012-0522-0.
Caplan, B., Feldman, M., Eisenhower, A., & Blacher, J. (2016). Student-teacher relationships for young children with autism spectrum disorder: Risk and protective factors. *Journal for Autism and Developmental Disorders., 46*, 3653–3666.
Carbone, P. S., Behl, D. D., Azor, V., Murphy, N. A., Hughes, J. N., Kwok, O. M., & Fan, X. (2016). Family-centered care for children with autism spectrum disorders: A review. *Research in Autism Spectrum Disorders, 31*(1), 469–498.
Chung, L. C., Marvin, C. A., & Churchill, S. L. (2005). Teacher factors associated with preschool teacher-child relationships: Teaching efficacy and parent - teacher relationships. *Journal of Early Childhood Teacher Education, 25*(2), 131–142.
Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment, 6*(4), 284–290.
Clarke, B. L., Sheridan, S. M., & Woods, K. E. (2009). Elements of healthy family-school relationships. In S. L. Christenson, & A. L. Reschly (Eds.), *Handbook of school-family partnerships* (pp. 61–79). Routledge.
Clarke, B. L., Wheeler, L. A., Sheridan, S. M., Witte, A. L., Sommerhalder, M. S., & Svoboda, E. A. (2017). Supporting Latinx student success via family–school partnerships: Preliminary effects of conjoint behavioral consultation on student and parent outcomes. *Journal of Educational and Psychological Consultation, 27*(3), 317–343. https://doi.org/10.1080/10474412.2017.1293543.
Clarke, T., Tickle, A., & Gillott, A. (2016). Substance use disorder in Asperger syndrome: An investigation into the development and maintenance of substance use disorder by individuals with a diagnosis of Asperger syndrome. *International Journal of Drug Policy, 27*, 154–163. https://doi.org/10.1016/j.drugpo.2015.06.003.
Conduct Problems Prevention Research Group. (1991a). Parent and teacher involvement measure – Teacher [On-line]. Available: http://www.fasttrackproject.org/.
Conduct Problems Prevention Research Group. (1991b). Parent–teacher involvement questionnaire: parent version. Available from http://www.fasttrackproject.org.
Corrigan, A. (2002). Parent-teacher involvement questionnaire: parent version (fast track project technical report). Available from http://www.fasttrackproject.org.
Daley, T. C., Munk, T., & Carlson, E. (2011). A national study of kindergarten transition practices for children with disabilities. *Early Childhood Research Quarterly, 26*(4), 409–419. https://doi.org/10.1016/j.ecresq.2010.11.001.
Dawson, A. E., & Wymbs, B. T. (2016). Validity and utility of the parent–teacher relationship scale–II. *Journal of Psychoeducational Assessment, 34*(8), 751–764. https://doi.org/10.1177/0734282915627027.
Dawson, A. E., Wymbs, B. T., Marshall, S. A., Mautone, J. A., & Power, T. J. (2016). The role of parental ADHD in sustaining the effects of a family-school intervention for ADHD. *Journal of Clinical Child and Adolescent Psychology, 45*(3), 305–319. https://doi.org/10.1080/15374416.2014.963858.
De Los Reyes, A., & Kazdin, A. E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin, 131*(4), 483–509.
Doumen, S., Verschueren, K., Buyse, E., Germeijs, V., Luyckx, K., & Soenens, B. (2008). Reciprocal relations between teacher-child conflict and aggressive behavior in kindergarten: A three-wave longitudinal study. *Journal of Clinical Child and Adolescent Psychology, 37*(3), 588–599. https://doi.org/10.1080/15374410802148079.
Dyson, L. L. (2001). Home–school communication and expectations of recent Chinese immigrants. *Canadian Journal of Education, 26*, 455–476.
Elicker, J., Noppe, C. I., Noppe, D., & L., Fortner-Wood, C.. (1997). The Parent–Caregiver Relationship Scale: Rounding out the relationship system in infant childcare. *Early Education and Development, 8*(1), 83–100. https://doi.org/10.1207/s15566935eed0801_7.
Elkins, J., Kraayenoord, C. E., & Jobling, A. (2003). Parents' attitudes to inclusion of their children with special needs. *Journal of Research in Special Educational Needs, 3*(2), 122–129.
Epstein, J. L., & Dauber, S. L. (1991). School programs and teacher practices of parent involvement in inner-city elementary schools. *The Elementary School Journal, 91*, 289–300.
Fantuzzo, J., Tighe, E., & Childs, S. (2000). Family involvement questionnaire: A multivariate assessment of family participation in early childhood education. *Journal of Educational Psychology, 92*(2), 367–376. https://doi.org/10.1037/0022-0663.92.2.367.
Garbacz, S. A., & McIntyre, L. L. (2016). Conjoint behavioral consultation for children with autism spectrum disorder. *School Psychology Quarterly, 31*(4), 450–466. https://doi.org/10.1037/spq0000114.
Garbacz, S. A., Sheridan, S. M., Koziol, N. A., Kwon, K., & Holmes, S. R. (2015). Congruence in parent–teacher communication: Implications for the efficacy of CBC for students with behavioral concerns. *School Psychology Review, 44*(2), 150–168. https://doi.org/10.17105/spr-14-0035.1.
Gilliam, W., Maupin, A., Reyes, C., Accavitti, M., & Shic, F. (2016). *Do early educators' implicit biases regarding sex and race relate to behavior expectations and recommendations of preschool expulsions and suspensions?* Yale University Child Study Center Research Brief.
Hamilton-Jones, B. M., & Vail, C. O. (2009). *Preparing for collaboration: Pre-service special education teachers' perceptions and beliefs*. Doctoral Dissertation. The University of Georgia https://getd.libs.uga.edu/pdfs/hamilton-jonesbethany_m_200908_phd.pdf.
Hamre, B., & Pianta, R. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development, 72*(2), 625–638. http://www.jstor.org/stable/1132418.
Haynes-Mendez, K., & Engelsmeier, J. (2020). Cultivating cultural humility in education. *Childhood Education, 96*(3), 22–29. https://doi.org/10.1080/00094056.2020.1766656.
Hsiao, Y. J., Higgins, K., Pierce, T., Whitby, P. J. S., & Tandy, R. D. (2017). Parental stress, family quality of life, and family-teacher partnerships: Families of children with autism spectrum disorder. *Research in Developmental Disabilities, 70*(November 2016), 152–162. https://doi.org/10.1016/j.ridd.2017.08.013.
Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118.
Hughes, J. N., Gleason, K. A., & Zhang, D. (2005). Relationship influences on teachers' perceptions of academic competence in academically at-risk minority and majority first grade students. *Journal of School Psychology, 43*(4), 303–320. https://doi.org/10.1016/j.jsp.2005.07.001.
Hughes, J. N., Luo, W., Kwok, O. M., & Loyd, L. K. (2008). Teacher-student support, effortful engagement, and achievement: A 3-year longitudinal study. *Journal of Educational Psychology, 100*(1), 1–14. https://doi.org/10.1037/0022-0663.100.1.1.
IBM Corp. (2020). *IBM SPSS statistics for windows, version 27.0*. IBM Corp.
Individuals with Disabilities Education Act. (2006). *U.S.C. 1400 et seq. (2006 & Supp. V. 2011)*.
Jeon, H., McCartney, C. M., Richard, V., & Johnson, S. J. (2020). Associations between parent-teacher and teacher-child relationships and children's socioemotional functioning. Early Child Development Care. Retrieved May 22, 2021 https://doi.org/10.1080/03004430.2020.1711747.

Kazdin, A. E. (2016). *Research design in clinical psychology* (5th ed.). Pearson.
Kenny, L., Hattersley, C., Molins, B., Buckley, C., Povey, C., & Pellicano, E. (2016). Which terms should be used to describe autism? Perspectives from the UK autism community. *Autism, 20*(4), 442–462.
Kohl, G. O., Lengua, L. J., & McMahon, R. J. (2000). Parent involvement in school conceptualizing multiple dimensions and their relations with family and demographic risk factors. *Journal of School Psychology, 38*(6), 501–523. https://doi.org/10.1016/S0022-4405(00)00050-9.
Labarbera, R. (2017). A comparison of teacher and caregiver perspectives of collaboration in the education of students with autism spectrum disorders. *Teacher Education Quarterly, 44*(3), 35–56.
Landis, J., & Koch, G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*(1), 159–174. https://doi.org/10.2307/2529310.
Lang, S. N., Schoppe-Sullivan, S. J., & Jeon, L. (2017). Examining a self-report measure of parent–teacher co-caring relationships and associations with parental involvement. *Early Education and Development, 28*(1), 96–114.
Lauderdale, S., & Blacher, J. (2008). *Children with autism in school: A new measure of parent perceptions*. Unpublished manuscript. Riverside: University of California.
Lawson, M. A. (2003). School-family relations in context: Parent and teacher perceptions of parent involvement. *Urban Education, 38*(1), 77–133+147 https://doi.org/10.1177/0042085902238687.
Leenders, H., Haelermans, C., de Jong, J., & Monfrance, M. (2018). Parents' perceptions of parent–teacher relationship practices in Dutch primary schools–an exploratory pilot study. *Teachers and Teaching: Theory and Practice, 24*(6), 719–743. https://doi.org/10.1080/13540602.2018.1456420.
Levinson, S., Neuspiel, J., Eisenhower, A., & Blacher, J. (2021). Parent–teacher disagreement on ratings of behavior problems in children with ASD: Associations with parental school involvement over time. *Journal of Autism and Developmental Disorders, 51*(6), 1966–1982. https://doi.org/10.1007/s10803-020-04675-1.
Lord, C., Risi, S., Lambrecht, L., Cook, E. H., Levelthal, B. L., Dilavore, P. C., … Rutter, M. (2000). The autism diagnostic observation schedule–generic: A standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders, 30*(3), 205–223.
Lord, C., Rutter, M., & Le Couteur, A. (1994). Autism diagnostic interview-revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 24*, 659–685. https://doi.org/10.1007/BF02172145.
MacMullin, K. A., Viecili, A. M., Cappadocia, M. C., & Weiss, J. (2010). Parent empowerment and mental health: Understanding parent perceptions of educational experience. *Journal on Developmental Disabilities, 16*(3), 69–71.
Mahan, S., & Matson, J. L. (2011). Children and adolescents with autism spectrum disorders compared to typically developing controls on the behavioral assessment system for children, second edition (BASC-2). *Research in Autism Spectrum Disorders, 5*(1), 119–125.
Malone, P. S., Miller-Johnson, S., & Maumary-Gremaud, A. (2000). Parent and teacher involvement measure – Teacher (technical report) [on-line]. http://www.fasttrackproject.org/.
Mautone, J. A., Marcelle, E., Tresco, K. E., & Power, T. J. (2015). Assessing the quality of parent-teacher relationships for students with ADHD. *Psychology in the Schools, 52*(2), 196–207. https://doi.org/10.1002/pits.
Mautone, J. A., Marshall, S. A., Costigan, T. E., Clarke, A. T., & Power, T. J. (2012). Multidimensional assessment of homework: An analysis of students with ADHD. *Journal of Attention Disorders, 16*(7), 600–609. https://doi.org/10.1177/1087054711416795.
Mendez, J. L. (2010). How can parents get involved in preschool? Barriers and engagement in education by ethnic minority parents of children attending head start. *Cultural Diversity and Ethnic Minority Psychology, 16*(1), 26–36. https://doi.org/10.1037/a0016258.
Miller-Johnson, S., & Maumary-Gremaud, A. (2000). Parent-teacher involvement questionnaire: Teacher version (fast track project technical report). http://www.fasttrackproject.org.
Minke, K. M., Sheridan, S. M., Kim, E. M., Ryoo, J. H., & Koziol, N. A. (2014). Congruence in parent-teacher relationships: The role of shared perceptions. *The Elementary School Journal, 114*(4), 527–546.
Muthén, L. K., & Muthén, B. O. (2007). *Mplus user's guide* (6th ed.). Muthén & Muthén.
National Association for the Education of Young Children: NAEYC. (2011). Code of ethical conduct and statement of commitment. http://www.naeyc.org/files/naeyc/image/public_policy/Ethics%20Position%20Statement2011_09202013update.pdf.
National Center for Education Statistics. (2018). *Characteristics of public and private elementary and secondary schools in the United States: Results from the 2017–18 National Teacher and principal survey*. Institute of Educational Sciences. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2019140.
NICHD Early Child Care Research Network. (2005). *Child care and child development: Results from the NICHD study of early child care and youth development*. The Guilford Press.
O'Connor, E., & McCartney, K. (2007). Examining teacher-child relationships and achievement as part of an ecological model of development. *American Educational Research Journal, 44*(2), 340–369. https://doi.org/10.3102/0002831207302172.
Peetsma, T., Vergeer, M., Roeleveld, J., & Karsten, S. (2001). Inclusion in education: Comparing at-risk pupils' development in special and regular education. *Educational Review, 53*(2), 125–135.
Pett, M. A., Lackey, N. R., & Sullivan, J. J. (2003). *Making sense of factor analysis: The use of factor analysis for instrument development in health care research*. Sage Publications.
Pianta, R. C., & Kraft-Sayre, M. (2004). *Successful kindergarten transition: Your guide to connecting children, families, and schools*. Brookes Publishing Company.
Quintero, N., & McIntyre, L. L. (2011). Kindergarten transition preparation: A comparison of teacher and parent practices for children with autism and other developmental disabilities. *Early Childhood Education Journal, 38*(6), 411–420. https://doi.org/10.1007/s10643-010-0427-8.
Reynolds, A. D., Crea, T. M., Medina, J., Degnan, E., & McRoy, R. (2015). A mixed-methods case study of parent involvement in an urban high school serving minority students. *Urban Education, 50*(6), 750–775. https://doi.org/10.1177/0042085914534272.
Rimm-Kaufman, S. E., Pianta, R. C., Cox, M. J., & Bradley, R. H. (2003). Teacher-rated family involvement and children's social and academic outcomes in kindergarten. *Early Education & Development, 14*(2), 179–198. https://doi.org/10.1207/s15566935eed1402_3.
Sattler, J. (2008). *Assessment of children: Cognitive foundations* (5th ed.). Jerome M Sattler Publisher.
Serpell, Z. N., & Mashburn, A. J. (2012). Family-school connectedness and children's early social development. *Social Development, 21*(1), 21–46. https://doi.org/10.1111/j.1467-9507.2011.00623.x.
Sheridan, S. M., Clarke, B. L., Knoche, L. L., & Edwards, C. P. (2006). The effects of conjoint behavioral consultation in early childhood settings. *Early Education and Development, 17*(4), 593–617. https://doi.org/10.1207/s15566935eed1704_5.
Siegel, S., & Castellan, N. J., Jr. (1988). *Nonparametric statistics for the behavioral sciences* (2nd ed.). Mcgraw-Hill Book Company.
Slade, N., Eisenhower, A., Carter, A. S., & Blacher, J. (2018). Satisfaction with individualized education programs among parents of young children with ASD. *Exceptional Children, 84*(3), 242–260. https://doi.org/10.1177/0014402917742923.
Stichter, J. P., Riley-Tillman, T. C., & Jimerson, S. R. (2016). Assessing, understanding, and supporting students with autism at school: Contemporary science, practice, and policy. *School Psychology Quarterly, 31*(4), 443–449. https://doi.org/10.1037/spq0000184.
Stoner, J. B., Bock, S. J., Thompson, J. R., Angell, M. E., Heyl, B. S., & Crowley, E. P. (2005). Welcome to our world: Parent perceptions of interactions between parents of young children with ASD and education professionals. *Focus on Autism and Other Developmental Disabilities, 20*(1), 39–51.
Sucuoğlu, N. B., & Bakkaloğlu, H. (2018). The quality of parent-teacher relationships in inclusive preschools. *Early Child Development and Care, 188*(8), 1216–1224. https://doi.org/10.1080/03004430.2016.1261124.
Swartz, I. M., & Easterbrooks, A. M. (2014). The role of parent, provider, and child characteristics in parent-provider relationships in infant and toddler classrooms. *Early Education and Development, 25*(4), 573–598.
Thompson, B., & Winsler, A. (2018). Parent–teacher agreement on social skills and behavior problems among ethnically diverse preschoolers with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 48*, 3163–3175. https://doi.org/10.1007/s10803-018-3570-5.
U.S. Department of Education. (2014). *IDEA data*. Author.
Velicer, W. F. (1976). Determining the number of components from the matrix of partial correlations. *Psychometrika, 41*, 321–327.
Vickers, H. S., & Minke, K. M. (1995). Exploring parent-teacher relationships: Joining and communication to others. *School Psychology Quarterly, 10*(2), 133–150. https://doi.org/10.1037/h0088300.

Waanders, C., Mendez, J. L., & Downer, J. T. (2007). Parent characteristics, economic stress, and neighborhood context as predictors of parent involvement in preschool children's education. *Journal of School Psychology, 45*(6), 619–636. https://doi.org/10.1016/j.jsp.2007.07.003.

Wechsler, D. (2002). *The Wechsler preschool and primary scale of intelligence* (3rd ed.). The Psychological Corporation (WPPSI-III).

Wong, S. W., & Hughes, J. N. (2006). Ethnicity and language contributions to dimensions of parent involvement. *School Psychology Review, 35*(4), 645–662. https://doi.org/10.1080/02796015.2006.12087968.

Zablotsky, B., Boswell, K., & Smith, C. (2012). An evaluation of school involvement and satisfaction of parents of children with autism spectrum disorders. *American Journal on Intellectual and Developmental Disabilities, 117*(4), 316–330. https://doi.org/10.1352/1944-7558-117.4.316.

Zulauf-McCurdy, C. A., & Zinsser, K. M. (2021). How teachers' perceptions of the parent–teacher relationship affect children's risk for early childhood expulsion. *Psychology in the Schools, 58*(1), 69–88. https://doi.org/10.1002/pits.22440.

Supplementary Material

Parent-Teacher Relationship Quality Scale (PTRQS)
Parent-Rated Version

The following statements are about your experiences with your child's teacher. Please read each item and rate the degree to which you agree or disagree with this statement by circling the appropriate number in this 5-point scale.

	1 Strongly Disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
P-1 Parent, We have a close and mutually respectful relationship.	1	2	3	4	5
P-2 Parent, I feel that he/she pays attention to my suggestions	1	2	3	4	5
P-3 Parent, I feel welcome to visit at any time	1	2	3	4	5
P-4 Parent, I feel comfortable talking with my child's teacher	1	2	3	4	5
P-5 Parent, I think the teacher knows me pretty well	1	2	3	4	5
P-6 Parent, I enjoy talking with the teacher	1	2	3	4	5
P-8 Parent, I have confidence in my child's teacher	1	2	3	4	5
P-9 Parent, My child's teacher is doing good things for my child	1	2	3	4	5
Parent-Perceived PTR Quality					

Teacher-Rated Version

The following statements are about your experiences with the parent of a particular student. Please read each item and rate the degree to which you agree or disagree with this statement by circling the appropriate number in this 5-point scale.

	1 Strongly Disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
T-a Teacher, We have a close and mutually respectful relationship	1	2	3	4	5
T-b Teacher, I feel that he/she pays attention to my suggestions	1	2	3	4	5
T-c Teacher, He/she feels welcome to visit at any time	1	2	3	4	5
T-d Teacher, I feel comfortable talking with this child's parent(s)	1	2	3	4	5
T-e Teacher, This child's parent(s) feels comfortable talking with me	1	2	3	4	5
T-f Teacher, I know this parent(s) pretty well	1	2	3	4	5
T-g Teacher, I enjoy talking with this parent(s)	1	2	3	4	5
T-j Teacher, This parent(s) has confidence in me as a teacher	1	2	3	4	5
T-l Teacher, This parent thinks I am doing good things for the child	1	2	3	4	5
Teacher-perceived comfort with parent					
*T-i Teacher, I have confidence in this parent(s)	1	2	3	4	5
*T-k Teacher, This parent(s) is doing good things for his/her child	1	2	3	4	5
***Teacher-perceptions of parent abilities**					

PTRQS Total Score

Parent-Perceived PTR Quality Sum	
Teacher-perceived comfort with parent Sum	
Teacher-perceptions of parent abilities Sum	
PTRQS Total Score	

Scoring instructions:

- Sum up the items (none are reverse scored) for each of the three factors: Teacher-perceived comfort with parent, teacher-perceptions of parent abilities, and parent-perceived PTR.
- Sum up the factor scores for a PTRQS total score.

Recommended instructions for use:

- Clinically, the Total Score can be used to get a general idea of PTR quality, while the factor scores can provide more nuance.
- For research purposes, factors can be used separately.