



Early student-teacher relationships and autism: Student perspectives and teacher concordance

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ABSTRACT

Early elementary students on the autism spectrum are at risk for poor quality student-teacher relationships (STRs), a key contributor to student outcomes. However, these students' own appraisals of their STRs are nearly absent from the literature. This study examined children's perspectives of STRs and agreement with teacher-reported STRs for a sample of young autistic students ($N = 136$; 5–9 years). Although a majority of students responded affirmatively to items reflecting positive perceptions of STRs (e.g., 80.7% reported liking their teacher, 75.0% reported being liked by their teacher), results also revealed that some students perceived negative STR experiences (e.g., 14.7% reported that they get angry with their teacher, 17.6% reported that they get in trouble a lot). Student and teachers' scores were not significantly correlated, suggesting that students and teachers may have unique perspectives on specific aspects of their relationship.

Positive student-teacher relationships (STRs), characterized by high closeness and low conflict during the early school years, have been consistently associated with positive student outcomes, such as academic performance, school engagement, self-regulation, and social competence (Birch & Ladd, 1997; Hamre & Pianta, 2001; Lei et al., 2016; Roorda et al., 2017; Wu et al., 2010; Zeedyk et al., 2016). Unfortunately, students with more externalizing behaviors and fewer social skills tend to have poorer-quality STRs and poorer school adjustment and outcomes (e.g., Baker et al., 2008; Fisher et al., 2016; Fowler et al., 2008; Henricsson & Rydell, 2004). Young students on the autism spectrum¹ face social communication and behavior challenges that can make it taxing for teachers to engage in positive student interactions. As a result, teachers report more conflict and less closeness in their STRs with autistic students than other populations of children (Blacher et al., 2014; Caplan et al., 2016; Feldman et al., 2019; Longobardi et al., 2012; Zee et al., 2020). Indeed, an examination of teacher-reported STR quality in our sample of young autistic children found that child externalizing behavior problems (e.g., aggression) significantly predicted changes in STR quality over time; that is, higher behavior problems drove increases in teacher-perceived STR conflict over two academic years (Eisenhower

et al., 2015). Additionally, Caplan et al. (2016) showed a link between social skills and STR quality, such that children with relatively higher social skill scores on the Social Skills Improvement System (SSIS; Gresham & Elliott, 2008) had more positive, close STRs over time.

In particular, autistic children in general education may be uniquely vulnerable to negative teacher interactions due to the incongruence between children's classroom environment (e.g., teacher expectations, social demands) and their developmental skills (e.g., social-communication skills; emotional and behavioral functioning). For instance, Ashburner et al. (2010) found that general education elementary teachers perceived their autistic students as demonstrating more behavioral challenges, emotional difficulties, and academic underachievement than age- and gender-matched typically developing (TD) peers. In their work on 17 case studies of autistic students in general education settings (ages 7–16 years) that included teacher interviews and direct observations, Emam and Farrell (2009) suggest that teacher-perceived tensions in the STR arise from autistic students' difficulties in recognizing and reading teachers' emotions and body language, expressing academic emotions, and literal thinking. Given the critical role of STR quality for students' school functioning and outcomes

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¹ Identity-first language (i.e., "autistic person") or "person on the autism spectrum" is used in place of person-first language (i.e., "person with autism spectrum disorder") to reflect emerging perspectives and preferences from the autistic community (e.g., Botha et al., 2021; Bottema-Beutel et al., 2020; Bury et al., 2020; Kenny et al., 2016).

and the risk faced by young autistic students for developing poor-quality STRs, close and accurate STR assessment in this population is imperative.

However, the assessment of STRs for early elementary (grades K-3) autistic students across the literature has been heavily one-sided, with researchers typically relying on teacher report alone. Reasons may include concerns about the reliability and validity of self-report tools for young students (Mantzicopoulos & Neuharth-Pritchett, 2003; Pianta, 1999). Hughes (2011) hypothesized that self-report measures of subjective experiences prior to third grade may be uncommon due to unidimensional youth perceptions of self-concept that lack accurate social comparison and self-appraisal. Furthermore, autistic students often experience difficulties with perceptions of self and others, awareness of inner experiences (e.g., feelings, thoughts), and social judgment, as well as rigidity in thinking (e.g., Boraston et al., 2007; Williams, 2010). Thus, concerns about the inaccuracy of social comparison and self-appraisal by young children may be compounded for autistic samples.

The one-sided perspective that currently comprises our understanding of STRs for young autistic students is problematic for several reasons. First, a large proportion of the variance in teacher ratings of STRs may be accounted for by student and teacher characteristics (Hughes, 2011; e.g., Mashburn et al., 2006; Murray & Murray, 2004; Murray et al., 2008). For example, some research suggests that teacher-rated STRs may be more positive for teacher-child dyads of the same racial or ethnic background (Thijs et al., 2012; Yiu, 2013). The inclusion of student perspectives may help to illuminate whether ratings of STR quality reflect teachers' reporting biases or actual differences in the relational positivity teachers show towards students who are similar to them or higher performing relative to their peers. Second, teacher reports are often used to assess not only STR quality as a predictor variable but also student outcomes (e.g., teacher-rated social skills, engagement, behaviors), which could result in inflated estimates of predictive relations due to shared method variance between independent and dependent variables (Hughes, 2011). By incorporating students as raters, and thereby utilizing multi-informant data, these shared-method variance issues could be minimized.

Lastly, studies often find a lack of agreement between child and teacher reports on different domains of functioning (Achenbach et al., 1987; Gresham et al., 2010; Nicpon et al., 2010). The lack of concordance between youth and teacher reports extends to ratings of STR quality, with many studies reporting minimal or no significant correlations between student and teacher reports (Koepke & Harkins, 2008; Murray et al., 2008; Spilt et al., 2010). If concordance is low, then the existing body of research on teacher-reported STRs for young autistic students, which tells how *teachers* experience their relationships with students, can be presumed to tell us little about how *children* experience and perceive these same relationships. Low concordance between teacher and student perceptions may highlight the need for additional research examining factors that uniquely contribute to student perceptions and how these student perceptions influence students' school functioning and outcomes. Relationships between students and teachers are two-sided and reciprocal, with students and teachers both acting as key "inside" players (Doumen et al., 2009, p. 515), therefore fully characterizing and accurately studying these key relationships requires assessing how children, in addition to teachers, are perceiving and experiencing their interactions. Together, the aforementioned factors question the accuracy of using only teacher perspectives on STRs and underscore the importance of attempting to incorporate student perspectives, particularly for young students on the spectrum who are at risk for poorer-quality STRs and early school functioning.

Student perspectives on STRs in early elementary

Our current understanding of early elementary (grades K-3) students' perceptions of their STRs is primarily limited to research with TD students. Here, we summarize findings from these studies and review

limitations of previous approaches to child self-report tools for use with young autistic students. Koepke and Harkins (2008) directly adapted the *Student-Teacher Relationship Scale* (STRS; Pianta, 2001) to create the *Child-Report Student-Teacher Relationship Scale* (Child-R STRS) for use with a sample of TD students (grades K-4). The STRS is a widely used teacher-report measure of STR quality that was developed from an attachment perspective and results in a relationship quality total score in addition to three subscales: *Conflict* (i.e., negative feelings towards the student); *Closeness* (i.e., feelings of warmth, affection, trust, openness, and communication); and *Dependency* (i.e., extent to which the student is overly dependent). These subscales and total score were mirrored in the 26-item Child-R STRS. Items retained the 5-point Likert scale of the STRS (1 = "definitely no, not true" to 5 = "yes, always true") and were read aloud to children; no written materials or visual representations of response options were provided. Overall, they found kindergarten reports to be unreliable ($\alpha = 0.13$); first and second grade reports were more reliable ($\alpha = 0.61$), although inconsistent across subscales ($\alpha = 0.40$ for Dependency to $\alpha = 0.69$ for Closeness). Their findings revealed that student and teacher reports were not correlated, with children viewing their relationships as significantly less close than teachers. Importantly, the 5-point Likert scale with no visual supports and 26-item length may create barriers to effective completion for young students on the spectrum.

Other child self-report measures of STRs have incorporated procedures to make rating scales more concrete and accessible to young students. For example, the *Young Children's Appraisals of Teacher Support* (Y-CATS; Mantzicopoulos & Neuharth-Pritchett, 2003) was designed to assess young students' (ages 4-7) perceptions of teacher support. It includes 31 dichotomous items (i.e., agree or disagree) that result in a total score and three subscales: *Warmth*, *Conflict*, and *Autonomy*. Administration involves an examiner reading an item aloud, handing the child a corresponding response card, and having the child place the card in either a mailbox (i.e., agree) or a trashcan (i.e., disagree). In the validation study, internal consistencies for the Y-CATS ranged from rather low to good ($\alpha = 0.57-0.80$) across grades and subgroups. In comparing students' scores on the Y-CATS to teachers' scores on an early version of the STRS (Pianta & Nimetz, 1991) that included *Security* ($\alpha = 0.91$), *Dependency* ($\alpha = 0.58$), and *Improvement* ($\alpha = 0.70$) subscales, findings were mixed. Student scores on the Y-CATS Warmth subscale were positively and significantly correlated with teacher scores on the STRS Security ($r = 0.17$ ($p < .05$) - 0.25 ($p < .01$)) and Improvement ($r = 0.18$ ($p < .05$) - 0.27 ($p < .01$)) subscales across grade levels, but the other Y-CATS subscales demonstrated minimal agreement with STRS scores across grades. The authors did find significant negative correlations between student-reported Y-CATS Conflict and teacher-rated social skills ($r = -0.17$ ($p < .05$) - -0.31 ($p < .01$)), suggesting that student perceptions of STR Conflict may be related to their social skills, much like social skills have been linked to teacher perceptions of STR Conflict (e.g., Caplan et al., 2016).

Spilt et al. (2010) further evaluated the Y-CATS with a sample of 150 TD kindergarten students and their teachers, finding that children's Y-CATS Warmth scores were positively associated with teacher's STRS Closeness scores ($r(142) = 0.22$, $p < .01$) and negatively associated with STRS Conflict scores ($r(142) = -0.30$, $p < .01$), that Y-CATS Conflict scores were negatively associated with STRS Closeness ($r(142) = -0.22$, $p < .01$) and positively associated with STRS Conflict ($r(142) = 0.17$, $p < .05$), and that Y-CATS Autonomy scores were positive associated with STRS Closeness ($r(142) = 0.25$, $p < .01$). They also found that teachers' ratings of aggression were negatively associated with children's Y-CATS scores for Warmth ($r(142) = -0.20$, $p < .05$) and Autonomy ($r(142) = -0.15$, $p < .05$) and positively associated with children's Y-CATS scores for Conflict ($r(142) = 0.20$, $p < .05$). Together, these two studies with the Y-CATS child-report measure demonstrated mixed findings with regard to agreement between child and teacher ratings of STR quality and suggested that student externalizing behaviors and social skills may be linked to child perceptions of STR quality in a similar manner to

teacher perceptions of STR quality.

The computer-administered *Kindergartener-Teacher Computer Test* (KLIC; Spilt et al., 2010) is another child-report measure of student-teacher interactions that involves a visual aid. Students are presented with two photographs per item depicting positive and negative student-teacher interactions and are asked to select either a large or small circle, which corresponds to the photograph being representative or not representative of their teacher, respectively. The examiner guides the child through each of the photographs and questions to provide additional context and check for understanding. Spilt et al. (2010) evaluated the KLIC among a sample of 150 TD kindergarten students and their teachers, finding a one-factor solution that resulted in a single mean score. The KLIC score was not significantly associated with teacher STRS rating for Conflict, Closeness, or Dependency. It was, however, significantly and negatively associated with teacher ratings of aggression ($r(142) = -0.14, p < .05$). Importantly, the authors also evaluated children's understanding of test procedures for both the Y-CATS and the KLIC, finding that although a large majority of children demonstrated good to very good understanding of procedures, poor and moderate understanding was often due to verbal difficulties and/or inattentiveness. This is a potential limitation to using either measure with students on the autism spectrum, who have social-communication difficulties (American Psychiatric Association, 2013) and often co-occurring behavioral challenges (e.g., inattentiveness; Lecavalier, 2006).

In a study of 71 TD kindergarten students, Doumen et al. (2009) utilized a three-point scale with a visual aid depicting bars of increasing size to administer the three-item Relationship with the Teacher subscale of the student-reported *Feelings about School (FAS; Valeski & Stipek, 2001)*. The STRS was also administered to teachers in order to explore convergence between student and teacher perceptions of closeness in their STRs. Results initially suggested unacceptable levels of internal consistency ($\alpha = 0.47$), only attaining acceptable levels after deleting one of the three items ($\alpha = 0.61$). Using the two-item subscale as a measure of student-reported STR Closeness paired with teacher-reported STRS Closeness, they found significant positive associations between student and teacher perspectives ($r(71) = 0.28, p < .05$).

Murray et al. (2008) adapted the wording of the *My Family and Friends (MFF; Reid et al., 1989)* measure of social supports to be teacher-specific for a sample of 157 TD students in kindergarten classrooms located in an urban setting. The 12-item measure was read aloud to students; 'yes or no' questions (e.g., "When you need help putting on your shoes or coat, do you go to your teacher for help?") were followed by a 4-point illustrated Likert-scale assessment of satisfaction (e.g., "If you go to your teacher for help putting on your shoes or coat, how helpful is he/she?"). Four factors were revealed using exploratory factor analysis (EFA): (a) Informational Support ($\alpha = 0.64$), (b) Emotional Support ($\alpha = 0.51$), (c) Closeness ($\alpha = 0.46$), and (d) Conflict (a one-item scale). When paired with the teacher-report version of the MFF, only one significant association between child and teacher reports was revealed (i.e., children's ratings of closeness were negatively associated with teachers' ratings of conflict; $r(157) = -0.20, p < .05$).

Taken together, the previous studies demonstrate several important patterns in the assessment of young students' perspectives on their STRs. First, attaining adequate internal consistency with student self-report measures of STRs in early elementary is possible, although challenging with the youngest of students. Several studies did not achieve adequate internal consistency across all subscales for kindergarten (e.g., Koepke & Harkins, 2008; Murray et al., 2008) or first grade (e.g., Mantzicopoulos & Neuharth-Pritchett, 2003) students, despite varied methodological approaches (e.g., reading items aloud, sorting procedures, semi-structured interviews). Second, findings on student-teacher agreement on STRs are mixed, with many of the reviewed studies reporting minimal to no significant correlations between student and teacher reports across domains that would be expected to align (e.g., Koepke & Harkins, 2008; Murray et al., 2008; Spilt et al., 2010). This suggests that student and teacher reports of their STR quality may differ substantially, further

underscoring the need for including students as informants in the assessment of STRs, critical relationships in children's lives. Third, student self-reports of their STRs are often significantly associated with other child factors that have been consistently linked to teacher reports of STRs (i.e., externalizing behavior problems, social skills; Baker et al., 2008; Caplan et al., 2016; Fisher et al., 2016; Fowler et al., 2008; Henricsson & Rydell, 2004). Spilt et al. (2010) found that children's ratings on the KLIC and Y-CATS were both significantly associated with teacher ratings of aggression in the expected directions and children's Y-CATS Conflict scores were significantly and negatively associated with teacher ratings of social skills. Mantzicopoulos and Neuharth-Pritchett (2003) also found student ratings of STRs on the Y-CATS to be significantly and negatively associated with teacher-rated social skills. Thus, young children's perceptions of their STRs may reflect child factors (e.g., externalizing behaviors, social skills) that are also often tied to teachers' perceptions.

Finally, and perhaps most importantly for the present study, the aforementioned studies did not include autistic students. In a recent study, Zee et al. (2020) examined student perspectives of STRs using the *Student Perception of Affective Relationship with Teacher Scale (SPARTS; Koomen & Jellesma, 2015)* in a sample of 510 students on the autism spectrum, with ADHD, or with dyslexia in upper elementary (grades 3–6). Findings demonstrated that teacher ratings of STR quality were poorer for autistic students, but these differences were not reflected in students' ratings. In a related study with a similar upper elementary sample (grades 3–6), Roorda et al. (2021) compared the SPARTS ratings of autistic boys in special education settings with TD boys in regular education settings, finding that autistic students were more likely to report negative experiences of conflict with their teachers compared to TD peers. Importantly, the researchers also found that students' STR ratings were more strongly associated with school engagement for autistic students than TD students, with higher levels of STR conflict indicating lower levels of engagement for autistic students. In sum, autistic students (in grades 3 and above) may have different perceptions of their STRs than their teachers, and these student perceptions may be indicative of important school functioning factors (e.g., school engagement). Further, although Zee et al. (2020) did not find significant differences in STR ratings between autistic students and other groups of students within a general education setting, Roorda et al. (2021) found that autistic students in special education settings reported significantly more conflict in their STRs compared to TD students in general education. Thus, autistic students' perspectives may be associated with their educational setting or level of support needed, which likely reflects several student factors previously found to be associated with teachers' perspectives (e.g., social skills, behavior challenges).

Although young students on the spectrum and students with other developmental disabilities who spend time in early general education classrooms are at heightened risk of developing poorer quality STRs (Brown & McIntosh, 2012; Eisenhower et al., 2015), their perspectives have yet to be included in research on STRs. Due to the social-communication and behavioral challenges associated with autism spectrum disorder (ASD), methods used to assess TD students' perspectives may not be valid for students on the autism spectrum. Thus, additional research is needed to explore how young autistic students regard their STR and whether there is agreement between student and teacher ratings of STR quality and characteristics.

Rationale for the present study

The purpose of this study was to (1) assess child-reported STR quality among a sample of young students on the autism spectrum and (2) explore the extent to which children and teacher's perceptions of STR quality were aligned. A researcher-developed measure, the *My Teacher and Me Questionnaire (MTMQ)*, was employed rather than utilizing one of the aforementioned student self-report measures primarily because the existing measures were not developed for or validated with young

(below grade 3) autistic students. In contrast, the MTMQ was developed intentionally for young autistic students by a research team with specific expertise in ASD, clinical psychology, school psychology, and special education. Many of the previously studied measures required longer procedures (e.g., multi-step methods for the MFF; sorting procedure for the Y-CATS) and/or greater social language demands, which may be appropriate for young TD students but could create barriers to understanding for students with social, verbal, attentional, and/or behavioral challenges (e.g., KLIC and Y-CATS; Spilt et al., 2010), including students on the spectrum. Further, many procedures required materials beyond a traditional paper-and-pencil rating scale approach (e.g., computer in KLIC, mailbox and trashcan in Y-CATS), which, although innovative, may require additional time, training, and cost.

The present study aimed for an administration procedure that would be feasible (e.g., short duration) and accessible (e.g., traditional paper-and-pencil rating scale, minimal social language demands) for young autistic children in classroom contexts. The MTMQ includes items derived from established teacher-report measures of STR quality (i.e., STRS, TSRI) as well as novel items, a brief length (15 items), and a small 3-point Likert scale with a corresponding visual aid to promote clarity, feasibility, and concreteness. (Additional details about measure development are reported in the Measures section.)

Our research questions were the following:

1. How do young children on the autism spectrum rate their student-teacher relationship quality, as measured by the researcher-developed *My Teacher and Me Questionnaire* (MTMQ)?
2. To what extent do student and teacher perspectives on their STR quality demonstrate agreement?

As previous research utilizing teacher ratings alone suggests that STRs for autistic students are poorer-quality with more conflict and less closeness than other populations of students (Blacher et al., 2014; Caplan et al., 2016; Eisenhower et al., 2015; Longobardi et al., 2012), we hypothesized that the majority of students in this all-autistic sample would respond affirmatively to items asking about relational negativity (i.e., conflict), and negatively to items about relational positivity (i.e., warmth). Due to the young age of participants (i.e., majority in kindergarten or first grade) and challenges with emotion perception and self-awareness often associated with ASD (Boraston et al., 2007; Williams, 2010), we hypothesized that the MTMQ would demonstrate low but acceptable internal consistency. Based on findings from previous studies with young elementary children, we hypothesized that students and teachers would have low levels of agreement across subscales/factors. Koepke and Harkins (2008), Murray et al. (2008), and Spilt and colleagues (2010), in their evaluation of the KLIC, found that student and teacher reports of STR quality were not consistently correlated as expected. In their sample of older elementary students, Zee et al. (2020) found that teachers' ratings of STR quality were significantly poorer for autistic students than other populations of students, but that students' ratings did not reflect these group differences. Together, these suggest that young autistic students may perceive their STRs differently than their teachers.

Methods

Participants

Participants in this study were young students on the autism spectrum and their teachers who were enrolled in a larger two-year study, during which data were collected at three time points to examine the transition into early school for children on the spectrum. The present sub-study involved analyses of teacher and student data collected from the final time point of the study, which occurred approximately 18 months after the first time point. Child self-report data were collected at the final time point only. Study participants were recruited around the

Boston and Southern California regions through online and print flyers, local school districts, clinicians, autism resource centers, intervention agencies, autism-related conferences, and parent groups. To be eligible for the larger study, students had to be (a) between the ages of 5–9 years (i.e., ages 4–7 at initial enrollment); (b) enrolled in a preschool or elementary school of any type (e.g., public, private); (c) $IQ \geq 50$ as assessed by a short form of the *Wechsler Preschool and Primary Scales of Intelligence-3* (WPPSI-III; Wechsler, 2002); (d) diagnosed with ASD by school and/or private evaluation; and (e) confirmed ASD diagnosis with the *Autism Diagnostic Observation Schedule* (ADOS; Lord et al., 2000) and, for any children who had not received a full evaluation outside of the school, the addition of the *Autism Diagnostic Interview, Revised* (ADI-R; Lord et al., 1994).

Of the 166 children who participated in all time points of the larger study, 136 children received either Module 2 or 3 on the ADOS, an indication of verbal abilities. These children were administered the self-report measure of STR quality in the present study and were included in analyses ($N = 136$). Although our inclusion criteria for enrollment in the larger study was $IQ \geq 50$ in order to accommodate a range of cognitive abilities that are often present in autism and the variability of IQs among young children, the subsample's mean score on the short form of the WPPSI-III was 93.6 (range = 52–139, $SD = 15.8$), with 93.0% of students scoring 70 or greater, suggesting cognitive functioning in the low average to average range for the majority of participants. There were fewer corresponding teacher participants ($N = 107$) due to incomplete teacher data at the final time point, a different academic year than initial enrollment. At the outset of the study, all teachers and parents provided informed consent to participate.

Teachers and parents provided demographic information via a self-report survey. Parent responses to an open-ended question about their child's race were aggregated into the following categories: White (56.6%), Bi/Multiracial (19.1%), Latinx (10.3%), Asian-American (4.4%), African-American or Black (3.7%), and Other (3.7%). There was no response for three students (2.2%). The majority of the children were male (83.1%), which reflects current prevalence rates for ASD, and most (67.5%) were from households with incomes greater than \$50,000 (A recent 2018 study from Pew Research defined middle-income for American families of three to be between \$40,100 and \$120,400. Thus, the majority of the sample would be considered middle-income or higher; Horowitz et al., 2020). The mean age of students was 6.6 years (range = 5–9 years, $SD = 1$ year), with the following distribution of grade levels: 37.1% kindergarten or preschool, 27.4% first grade, 26.7% second grade, and 8.8% third grade or above. Children were enrolled in a range of school and classroom settings. The majority (90.7%) of students attended a public preschool or elementary school, with 51.4% spending more than half of their school day in a general education classroom (23.5% spent half or less of their school day in a general education classroom; 25.0% of teachers did not report the amount of time spent in a general education setting). Most students (89.7%) received special education services under an Individualized Education Program (IEP), among whom 13.6% reported partial- or full-day support from a classroom aide. The majority (90.4%) of parents reported that their child had received a diagnosis from a medical or mental health professional.

For teacher participants, 90.7% identified their gender as female. Over half reported their highest degree earned as a Master's degree (67.3%). Mean years of teaching experience was 14 years (range = 2–37 years; $SD = 8.9$ years); two teachers (1.9%) did not report. For self-reported race, 78.5% of teachers identified as White, 9.3% as Latinx, 2.8% African-American or Black, 2.8% Asian-American, 0.9% Native Hawaiian or Pacific Islander, and 0.9% Other; five did not respond to this item (4.7%). Because 29 teachers within this sub-sample did not participate along with their enrolled students, independent samples t -tests were conducted to examine whether there were significant differences between the group of students whose teachers participated ($N = 106$) and the group whose teachers did not ($N = 29$). No significant

differences were found in mean student age, IQ score, household income, or MTMQ scores.

Measures

Measures of student-teacher relationship quality

Student-teacher relationship scale (STRS; Pianta, 2001). The *Student-Teacher Relationship Scale* is a 28-item teacher-report measure of relationship quality between a teacher and individual student. For each item, teachers rate their level of agreement using a 5-point Likert scale (1 = “definitely does not apply”, 5 = “definitely applies”). In addition to assessing total relationship quality, it is comprised of three subscales: (a) Conflict (12 items), (b) Closeness (11 items), and (c) Dependency (5 items). These subscales reflect the measure's three-factor structure, which was supported by a principal components analysis with varimax rotation (accounting for 48.8% of the total variance among the 28 items) reported in the STRS Professional Manual (Pianta, 2001). Subscale scores were calculated according to a formula provided in the STRS Professional Manual (Pianta, 2001). Cronbach's alphas for this sample were: Closeness $\alpha = 0.76$, Conflict $\alpha = 0.86$, and Dependency $\alpha = 0.58$. The lower alpha for the Dependency subscale is in alignment with previous studies using the STRS (e.g., Blacher et al., 2014; Doumen et al., 2009; Mantzicopoulos & Neuharth-Pritchett, 2003; Ogelmana & Seven, 2014; Rey et al., 2007) and with the standardization sample (Pianta, 2001).

The STRS has been used with teachers of children in the early school years (pre-K through 3rd grade) and has been utilized widely with samples of TD students (e.g., Hamre & Pianta, 2001; Portilla et al., 2014), and students on the spectrum or with other developmental disabilities (e.g., Blacher et al., 2014; Longobardi et al., 2012; Prino et al., 2016; Robertson et al., 2003; Roeden et al., 2012; Zee et al., 2020), consistently demonstrating adequate reliability and validity with different student and teacher populations (e.g., Pianta, 2001). For example, Roeden et al. (2012) provided evidence supporting the three-factor structure of the STRS, good internal consistency, and good test-retest reliability for a sample of individuals with intellectual disability (ID). Here, confirmatory factor analysis (CFA) was conducted for the established three-factor structure of the STRS using the lavaan package with RStudio Version 1.3.1056 (Rosseel, 2012; RStudio Team, 2015). Goodness of fit indices revealed that the three-factor structure was not an adequate fit (root mean square error of approximation (RMSEA) = 0.08, comparative fit index (CFI) = 0.78; Hu & Bentler, 1999). However, when the Dependency factor and its five associated items were removed due to the subscale's unsatisfactory internal consistency, a two-factor structure (i.e., Closeness and Conflict) indicated an acceptable RMSEA value (RMSEA = 0.07) and a slightly less than good CFI value (CFI = 0.85) in this relatively small sample ($N = 107$). All items significantly loaded onto their expected factors at a level of $p < .01$ with the exception of one item in the Conflict scale ($p = .05$), “when this child is misbehaving, he/she responds well to my look or tone of voice.” This item was removed, and the remaining 11 items in the Conflict scale were summed to create a revised Conflict subscale score ($\alpha = 0.89$). A third CFA was conducted with the revised 11-item Conflict scale, and the model was a slightly better fit (RMSEA = 0.07, CFI = 0.88) with all items loading significantly onto their corresponding factor at a level of $p < .01$. Due to the low internal consistency of the Dependency subscale and the two-factor model being a better fit for the data in this sample, the Dependency subscale was excluded from analyses. The STRS Dependency subscale has often been found to be a less reliable subscale than Conflict and Closeness (Blacher et al., 2014; Doumen et al., 2009; Ogelmana & Seven, 2014; Rey et al., 2007). In the standardization sample, Pianta (2001) reported internal consistency of 0.64, relatively low compared to the Conflict (0.92) and Closeness (0.86) scales. The total relationship quality score was not utilized in this study because it is intended to sum

all three subscale scores (Pianta, 2001), and only two subscales were retained.

My teacher and me questionnaire (MTMQ). To develop a student report measure of STR quality, a literature review of existing measures of STR quality was first conducted. Initial item construction drew heavily from the STRS, the most established teacher-report written measure of STR quality, and the *Teacher-Student Relationship Inventory* (TSRI; Ang, 2005). The TSRI is a 14-item teacher-report paper-and-pencil measure of STR quality validated with TD youth in grades 4–9 that results in the following three subscales: (a) Instrumental Help, (b) Satisfaction, and (c) Conflict. Ang (2005) reported Cronbach's alphas that were high (0.81–0.94), and preliminary measures of convergent, discriminant, and predictive validity were reasonable. Although the TSRI has demonstrated adequate internal consistency and reasonable levels of convergent, discriminant, and predictive validity with TD students in late childhood and early adolescence (i.e., grades 4–9), it has not been widely validated with younger students and/or students with disabilities. The MTMQ includes items derived from established teacher-report measures of STR quality (i.e., STRS, TSRI) as well as novel items, a brief length (15 items), and a small 3-point Likert scale to promote clarity, feasibility, and concreteness.

Development process. Using the STRS and TSRI as the basis for content, MTMQ statements were drafted from the child's perspective with language at a low reading level and in short sentences that would be easily understood by young children on the autism spectrum. Although there was not a 1:1 correspondence between items on the MTMQ and items on the STRS or TSRI, some items were directly adapted from either the STRS or the TSRI (e.g., STRS = “This child easily becomes angry with me” versus MTMQ = “I get angry with my teacher”), some items synthesized several items (e.g., STRS = “If upset, this child will seek comfort from me” and TSRI = “The student turns to me for a listening ear or sympathy” versus MTMQ = “When I'm having a bad day, my teacher helps me feel better.”), and some items were novel, intending to tap into the key constructs of Closeness, Conflict, and/or Dependency (see Table 1).

An initial pool of drafted items was presented to two different panels

Table 1
MTMQ: Sources of item adaptation and development.

Item	Original measure	Original subscale
1. I like my teacher.	TSRI	Satisfaction
2. My teacher and I like the same things.	Researcher developed	–
3. I can ask my teacher for help.	TSRI	Instrumental
4. I think my teacher is not fair to me.	STRS	Conflict
5. If my teacher is busy, I can still go and get help from my teacher.	STRS TSRI	Dependency Instrumental
6. I try to make my teacher happy.	STRS	Closeness
7. I get in trouble with my teacher a lot.	Researcher developed	–
8. I don't like being away from my teacher.	STRS	Dependency
9. I follow the rules at school.	Researcher developed	–
10. My teacher likes me.	TSRI	Satisfaction
11. If my teacher is busy, I can still get help from someone in class.	STRS TSRI	Dependency Instrumental
12. I get angry with my teacher.	STRS	Conflict
13. I feel unhappy when my teacher spends time with other kids in class.	STRS	Dependency
14. My teacher listens to me.	STRS TSRI	Closeness Instrumental
15. When I'm having a bad day, my teacher helps me feel better.	STRS TSRI	Closeness Instrumental

TSRI = Teacher-Student Relationship Inventory (Ang, 2005).

STRS = Student-Teacher Relationship Scale (Pianta, 2001).

Note. For a description of the researcher-developed items, see Measures section.

through an iterative focus group process. The first panel was comprised of eight doctoral students in the fields of special education, school psychology, and educational psychology with research experience administering assessment measures and teaching experience working with special populations of students. They were asked to provide initial verbal feedback on wording, appropriateness of items, and construct being assessed to address the face validity of the measure. A second panel was then consulted, comprised of doctoral students and eleven faculty across three universities with clinical and research expertise in ASD, special education, school psychology, and clinical psychology, all of whom were familiar with the construct of STR. This second panel provided detailed written feedback, content-level evaluation regarding appropriateness of items and modifications for use with young autistic students, focusing on potential social-communication and developmental barriers. Wording of items, number of items (i.e., length and duration), administration format (e.g., reading items aloud), and use of prompts and alternative response formats (i.e., pointing, verbalizing, or circling) were among the topics discussed. Items were then reworded to avoid response bias or inaccurate reporting; administration instructions were also amended. Revisions included, for example, avoiding double negatives in item wording, adding practice items to gauge students' understanding of the rating scale, and adding administration guidelines for providing additional prompts (i.e., repeating an item) as needed. The revised measure was presented to the second panel for finalization and approval.

Resulting MTMQ measure. The final version resulting from the development phase consisted of 15 items (see Table 2), including 10 items with a positive valence and 5 items with a negative valence. Aligned with the procedure used in Doumen et al. (2009), a 3-point Likert scale was applied (i.e., 1 = No, 2 = Sometimes, and 3 = Yes), rather than a larger-point scale in order to minimize measurement problems with young children differentiating between Likert scale points. Visual supports are common evidence-based strategies used to promote prosocial behaviors and skill learning for students on the autism spectrum (Steinbrenner et al., 2020); thus, a visual aid was developed to promote comprehension by making Likert scale points more concrete. Similar to the procedures used in Doumen et al. (2009) and Valeski and Stipek (2001), the visual aid depicted the 3-point Likert scale as black-and-white bars of varying fullness (i.e., completely shaded bar represented “yes,” half-shaded bar represented “sometimes,” and empty bar

represented “no”) was provided to students as needed to further clarify the response choices. The examiner verbally administered the paper questionnaire by reading the instructions, list of items, and response options (“Yes”, “No”, “Sometimes”) aloud to each student using the visual aid and recording their responses. Students could respond verbally or non-verbally by pointing to the corresponding visual bar.

Convergent child measures

To provide evidence supporting the convergent validity of the resulting MTMQ measure, the concordance of MTMQ scores with two child factors previously found to be significantly associated with teacher-rated STR quality (externalizing behavior problems and social skills) was examined. Previous research suggests that teacher-perceived STR quality is (1) significantly and negatively related to child externalizing behavior problems and (2) significantly and positively related to child social skills, such that children with more externalizing behavior problems tend to have poorer-quality STRs (e.g., Blacher et al., 2014; Henricsson & Rydell, 2004; Spilt et al., 2010) and children with higher social skills tend to have higher-quality STRs (e.g., Caplan et al., 2016; Fisher et al., 2016; Fowler et al., 2008). These relationships have been mirrored in some work on child-reported STR quality (e.g., Mantzicopoulos & Neuharth-Pritchett, 2003; Spilt et al., 2010). To determine whether the MTMQ also shows these expected significant relationships with child externalizing behavior problems and social skills, teachers completed the *Teacher Response Form* (TRF; Achenbach & Rescorla, 2001; Achenbach & Rescorla, 2000) and the *Social Skills Improvement System* (SSIS; Gresham & Elliott, 2008). In our prior work, we have found significant associations between these variables and teacher-reported STR quality on the STRS (Caplan et al., 2016; Eisenhower et al., 2015), thus it was hypothesized that there would also be significant associations with child-reported STR quality on the MTMQ.

The TRF is a standardized, norm-referenced teacher report version of the *Child Behavior Checklist* (CBCL; Achenbach, 2007) that provides a measure of children's behavioral and emotional problems and competencies. Teachers respond to either 99 items (ages 1:5–5) or 112 items (ages 6–18) using a 3-point Likert scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true). Previous research consistently supports the TRF as a psychometrically-sound measure of child behavioral and emotional functioning (e.g., Kendall et al., 2007; Leung et al., 2006; Tehrani-Doost et al., 2011). For the present study, the Externalizing Problems Scale T Score from the TRF was used as a measure of externalizing behavior problems (e.g., rule-breaking, aggression). These standardized scores were obtained using the TRF computer-based scoring program. Descriptive statistics for the scale were the following: $M = 55.8$, $r = 36-81$, $SD = 8.8$. Cronbach's alpha for TRF scales in the study sample ranged from 0.87 to 0.94.

The Social Skills Improvement System (SSIS; Gresham & Elliott, 2008) is a standardized, norm-referenced rating scale for children ages 3–18 used to measure social, behavioral, and academic functioning. The measure includes 83 items, each rated on a 4-point Likert scale (1 = never, 2 = seldom, 3 = often, 4 = almost always). For the present study, the Total Social Skills Scale standard score from the SSIS teacher-report form was used to assess overall social skills in the school context. Items in this scale include those related to cooperation, empathy, and responsibility (e.g., “shows concern for others,” “takes turns in conversations,” “interacts well with other children”). The standardized composite scores were obtained using the SSIS computer-based scoring program. The SSIS has been used extensively with clinical populations, including students on the autism spectrum, and has demonstrated strong psychometric properties, including convergent validity with the *Behavior Assessment System for Children, 2nd Edition* (BASC-2), the *Vineland Adaptive Behavior Scales, 2nd Edition*, and the *Social Skills Rating System* (Crosby, 2011; Gresham & Elliott, 2008; Gresham et al., 2011). In the present sample, the Total Social Skills Scale standard score was $M = 88.9$, $SD = 13.6$. Cronbach's alpha for the Social Skills Scale in the study sample indicated strong internal consistency (above 0.90).

Table 2

MTMQ items: Percent of responses endorsed ($N = 136$).

Item	No	Sometimes	Yes	Missing
1. I like my teacher. ^a	5.2	14.0	80.7	0.7
2. My teacher and I like the same things.	30.9	32.4	35.3	0.7
3. I can ask my teacher for help.	11.8	16.9	70.6	0.7
4. I think my teacher is not fair to me.	58.1	17.6	2.8	1.5
5. If my teacher is busy, I can still go and get help from my teacher.	33.8	20.6	44.9	0.7
6. I try to make my teacher happy. ^a	9.6	12.5	77.2	0.7
7. I get in trouble with my teacher a lot. ^a	55.1	26.5	17.6	0.7
8. I don't like being away from my teacher.	42.2	20.6	36.0	2.2
9. I follow the rules at school. ^a	4.4	16.9	77.2	1.5
10. My teacher likes me. ^a	7.4	16.2	75.0	1.5
11. If my teacher is busy, I can still get help from someone in class.	12.5	16.9	69.1	1.5
12. I get angry with my teacher. ^a	66.2	16.9	14.7	2.2
13. I feel unhappy when my teacher spends time with other kids in class. ^a	44.9	21.3	31.6	2.2
14. My teacher listens to me. ^a	14.0	22.1	61.8	2.2
15. When I'm having a bad day, my teacher helps me feel better. ^a	14.7	17.6	63.2	4.4

Note. In order to more easily clarify patterns in the data, we have bolded cells that reflect those responses endorsed by more than 50% of respondents.

^a Item included in final analyses following EFA.

Procedures

All study visits took place at one of two research universities with laboratory or clinic facilities for conducting child assessments and parent interviews. At the initial visit, students were administered the short form of the WPPSI-III as an estimate of their IQ, completed the ADOS to determine eligibility, and parents completed a background and demographics survey as part of a larger questionnaire battery. The MTMQ was administered individually to all children who had received an ADOS Module 2 or 3 during their study eligibility visit.

At the initial onset of the study, parents provided written consent for the administration of the MTMQ to their child. During the visit, prior to administering the MTMQ, children were reminded of their participation in the study and given instructions to the MTMQ. The MTMQ was read aloud to all students in order to control for varying reading levels across the young sample. Students were first verbally presented with the following instructions: "Now I'm going to ask you some questions about school. You can answer these questions by saying 'Yes,' 'No,' or 'Sometimes' [or by pointing to the corresponding bar as you say each response]." Next, the examiner provided a series of scripted examples to provide the student with an opportunity to practice responding (e.g., "Do you like to play games?" "Do you like it when you can't go to recess?" "Do you get out of school early?").

After administration of the practice items, the examiner stated: "Great job answering those! I think you get how this works. Let's try some more. So, [Child's Name], I want to know more about you and your teacher. I am going to ask you some questions about [Teacher's Name]. Remember, you can answer either 'yes,' 'no,' or 'sometimes.' Ready?" The teacher's name was verified with the child's parent prior to administration to ensure accuracy of responses based on the teacher completing the STRS. In other words, examiners were aware of the teacher's name and inserted the name prior to administering the questions. Each of the 15 MTMQ items was then read aloud, pausing after each to allow the student to respond. Students could either respond verbally or point to their response on the visual aid. The examiner would then record the child's response on the paper questionnaire form. Items were repeated for clarification if requested by the children. Appropriate prompts (e.g., rereading the item or response options) were given to students who had difficulty understanding the questions and required additional accommodations. Prior to statistical analysis, administration notes were examined to assess whether any items needed to be excluded from analyses. One item (i.e., "I think my teacher is not fair to me.") was excluded based on reports indicating that children consistently requested clarification and a lack of examiner confidence that children were interpreting the question accurately and uniformly. This resulted in a total of 14 included items for analysis.

The STRS was completed by teachers on their own time, as part of a packet of measures (e.g., demographic information, classroom climate survey). Teachers and parents each received an honorarium for their participation.

Data analysis

All statistical analyses were conducted using IBM SPSS Version 24.0 (IBM Corp, 2016).

First, an exploratory factor analysis (EFA) was conducted with the 14-item measure in order to examine the number of reliable and interpretable factors that could be extracted from the MTMQ. The Kaiser-Meyer-Olkin measure of sampling adequacy index and Bartlett's test of sphericity were calculated to assess whether the sample and correlation matrix were appropriate for EFA. Based on the initial eigenvalues and accompanying scree plot, the number of factors was determined. Horn's parallel analysis (Horn, 1965) was performed to verify that an accurate estimation was made in determining the number of factors to retain (i.e., by comparing the results of the parallel analysis to the results of the EFA; O'Connor, 2000). The determined factor solution was rotated using

oblique rotation. Items were excluded if they loaded less than 0.40 on the relevant factor and/or greater than 0.40 on any other factors (Stevens, 1996). Each factor was interpreted and named based on common items with the highest factor loadings. The accompanying items for each factor were summed to compute subscale and total scores.

As an assessment of convergent validity, bivariate Pearson correlations were conducted among the resulting MTMQ scales and two child factors previously found to be associated with teacher-reported STRS quality, externalizing behavior problems (TRF Externalizing T Scores; Blacher et al., 2014) and social skills (SSIS; e.g., Caplan et al., 2016). Additionally, independent samples *t*-tests were conducted to assess potential differences in MTMQ scores between male and female participants, and bivariate Pearson correlations were employed to examine potential links between child age and MTMQ scores. Concordance between MTMQ scores and STRS scores was also assessed using a bivariate Pearson correlation matrix.

Results

Exploratory factor analysis

The EFA was applied to the 14-item MTMQ and yielded a Kaiser-Meyer-Olkin value that verified the sampling adequacy for the analysis, $KMO = 0.71$ ('good'; Field, 2009). Bartlett's test of sphericity, $X^2(91) = 310.45, p < .001$, indicated that correlations between items were sufficiently large. Five factors had eigenvalues over Kaiser's (1960) criterion of 1; three of the 5 factors had eigenvalues marginally over 1. Horn's parallel analysis was performed to provide evidence towards the number of factors to retain. Comparisons between the results of the EFA and parallel analysis indicated a two-factor solution, as the observed eigenvalue for the third factor of the EFA was significantly smaller than the generated eigenvalues of the parallel analysis. Therefore, a two-factor solution was retained in the analysis, which accounted for 36.0% of the variance.

In examination of the pattern matrix of factor loadings for this model, five items did not load saliently onto either of the two factors and were excluded: "My teacher and I like the same things," "I can ask my teachers for help," "I don't like being away from my teacher," "If my teacher is busy, I can still get help from someone in class," and "If my teacher is busy, I can still go and get help from my teacher." See Table 3 for the pattern loading matrix.

The resulting two factors were characterized as Positivity (e.g., "I try

Table 3
MTMQ factor loadings for items retained following EFA.

Item	Factor 1: positivity	Factor 2: negativity
1. My teacher likes me.	0.69	
2. My teacher listens to me.	0.65	
3. When I'm having a bad day, my teacher helps me feel better.	0.55	
4. I follow the rules at school.	0.54	
5. I like my teacher.	0.53	
6. I try to make my teacher happy.	0.42	
7. I get angry with my teacher.		0.63
8. I get in trouble with my teacher a lot.		0.50
9. I feel unhappy when my teacher spends time with other kids in class.		0.49
Excluded Items		
1. My teacher and I like the same things.	0.30	0.36
2. I can ask my teacher for help.	–	–
3. If my teacher is busy, I can still go and get help from my teacher.	0.39	–
4. I don't like being away from my teacher.	–	–
5. If my teacher is busy, I can still get help from someone in class.	–	–

Note. Bartlett's Test of Sphericity: $X^2(91) = 310.45, p < .001$. Only loadings greater in absolute value than 0.4 were included.

to make my teacher happy”) and Negativity (e.g., “I get in trouble with my teacher a lot”). Cronbach’s alpha, assessed for internal consistency, was 0.73 for Positivity and 0.52 for Negativity. Notably, only the Positivity scale was greater than 0.70, which is generally the benchmark for acceptability. Items from each factor were summed. Prior to computing a total score, the three negative items (i.e., “I get angry with my teacher,” “I get in trouble with my teacher a lot,” and “I feel unhappy when my teacher spends time with other kids in class”) were reverse-scored, with greater total scores indicating better-quality STRs. Cronbach’s alpha for the 9-item total score was 0.64. Means and standard deviations for each of these subscales and total scores are reported in Table 4.

In assessing relations between MTMQ scores and concurrent teacher report measures of related child factors, TRF Externalizing T Scores had significant negative associations with MTMQ Total scores ($r = -0.33, p < .01$) and MTMQ Positivity subscale scores ($r = -0.27, p < .01$), and significant positive associations with MTMQ Negativity subscale scores ($r = 0.22, p < .05$). SSIS Social Skills had a significant positive association with MTMQ Total scores ($r = 0.29, p < .01$) and MTMQ Positivity subscale scores ($r = 0.24, p < .05$). Independent samples t-tests revealed that there were no significant group differences between male and female participants for MTMQ Total ($t(127) = -0.33, p = .74$), Positivity ($t(128) = -0.19, p = .85$), or Negativity ($t(130) = 0.28, p = .78$). Child age was not significantly associated with MTMQ Total ($r = 0.06, p = .51$) or subscale scores ($r = -0.02-05, p = .59-79$).

Findings from student reports

Examination of the means revealed that most early elementary-age children on the autism spectrum held positive perceptions of their interactions with their teachers, with the majority stating that they like their teacher (80.7% responded “yes”), try to make their teacher happy (77.2% responded “yes”), follow the rules at school (77.2% responded “yes”), feel their teacher likes them (75.0% responded “yes”), and feel their teacher listens to them (61.8% responded “yes”). On the other hand, a sizeable minority of children endorsed experiences of negativity with their teachers, including reporting that they get angry with their teacher (14.7% responded “yes”), get in trouble a lot (17.6% responded “yes”), and feel unhappy when their teacher spends time with other kids in class (31.6% responded “yes”). MTMQ scores and STRS scores were not significantly correlated. All correlation results are reported in Table 5.

Discussion

The present study (1) examined student self-reports of their STR quality using a researcher-developed measure (i.e., MTMQ) with a

Table 4
Means and standard deviations for MTMQ and STRS scores.

Variable	N	Min. – Max.	Mean	Standard deviation
MTMQ Positive Subscale (6 items)	130	0–12	9.86	2.50
MTMQ Negative Subscale (3 items)	132	0–6	1.92	1.70
MTMQ Total Score (9 items)	129	2–18	13.93	3.18
STRS Closeness Subscale (11 items)	106	26–55	42.51	6.71
STRS Conflict Subscale, Revised (11 items)	106	11–50	18.25	8.00

Note. A range of N values were observed due to missing items that inhibited subscale or total score calculation. MTMQ total scores were calculated as the sum of the Positive subscale (i.e., the sum of the scores on items within the Positivity factor) and the Negative subscale (i.e., the sum of reverse-scored items within the Negativity factor), with greater total scores indicating better-quality STRs.

Table 5
Bivariate Pearson correlations between MTMQ and STRS scores (N = 136).

Score	1	2	3	4	5
1. MTMQ Positivity Subscale	–	–	–	–	–
2. MTMQ Negativity Subscale	–0.11	–	–	–	–
3. MTMQ Total	0.85***	–0.63***	–	–	–
4. STRS Closeness Subscale	0.18	0.11	0.09	–	–
5. STRS Conflict Subscale, Revised	–0.06	0.18	–0.14	–0.12	–

STRS = Student-Teacher Relationship Scale (Pianta, 2001).

*** $p < .001$.

sample of young students (age 5–9) on the autism spectrum and (2) determined how well these student perspectives aligned with teacher perspectives using the widely-employed STRS (Pianta, 2001). Findings from EFA suggest that, in addition to an overall STR quality score, the MTMQ characterized two unique components of the STR from the student’s perspective, described herein as positivity and negativity. Items in the Positivity scale indicated warmth, liking, and openness (e.g., “I like my teacher,” “My teacher listens to me,” “When I’m having a bad day, my teacher helps me feel better”), reflecting security and closeness in the relationship similarly to items in the Closeness subscale of the STRS (e.g., “I share an affectionate, warm relationship with this child,” “This child values their relationship with me,” “If upset, this child will seek comfort from me”). Items in the Negativity scale reflected conflict, hostility, and tension in the relationship (e.g., “I get angry with my teacher,” “I get in trouble with my teacher a lot”), much like the items in the Conflict subscale of the STRS (e.g., “This child easily becomes angry with me,” “This child sees me as a source of punishment and criticism”).

Results demonstrated an acceptable level of internal consistency for the Total quality score of the MTMQ and the Positivity subscale among this sample of young autistic children. However, the internal consistency of the Negativity subscale was rather low, possibly due to the inclusion of only three items. Although this presents a substantial limitation to the present version of the MTMQ, it is not unusual for studies attempting to measure the perspectives of young children to report alphas below 0.6. For example, Murray et al. (2008) reported alpha values of 0.46 for the Closeness subscale and 0.54 for the Emotional Support subscale on their child-report adaptation of the MFF among a sample of 157 non-autistic kindergarteners. In Koepke and Harkins’ (2008) pilot study of the child-reported STRS, internal consistency for both the Conflict and Dependency subscales was below 0.60 (Conflict $\alpha = 0.55$; Dependency $\alpha = 0.40$) among their sample of non-autistic first and second graders. They found kindergarten students’ reports to have even lower internal consistency overall (Total Score $\alpha = 0.13$). In contrast to their sample of non-autistic children in first and second grades (mean age of 7.5 years), the present study used a younger sample of autistic students (mean age of 6.6 years), many of whom were enrolled in preschool or kindergarten settings (37.1%).

Descriptive findings from the MTMQ suggested that the majority of young students in this sample reported positive experiences of their STR. This seems to contrast with previous research on teacher perceptions of STRs, which suggest that students on the spectrum are at risk for developing STRs of significantly poorer quality than other populations of students (e.g., Blacher et al., 2014; Eisenhower et al., 2015; Longobardi et al., 2012). However, because this sample did not include a TD comparison group, conclusions are unable to be drawn regarding the relative positive or negative valence of child perspectives of their STRs. Despite many students reporting positive perceptions, a palpable minority of students in this sample reported negative experiences with their teachers on certain items, suggesting that there is room for improvement. Student responses on the MTMQ could provide valuable feedback to teachers for improving student perceptions of their STRs. For example, about 14% of students indicated that their teacher does not listen to them, though 35% of students indicated that they shared an interest with their teacher. Encouraging teachers to learn about and

leverage shared interests with their autistic students and provide opportunities for these students to be heard in the classroom may promote more positive student perceptions of STRs.

Correlational analyses between student and teacher reports of STR quality demonstrated minimal agreement. There could be several conceptual and theoretical explanations for this lack of concordance between student and teacher ratings of relationship domains. First, these results could suggest that students and teachers have unique perspectives on different qualitative aspects of their relationship (e.g., Hughes, 2011; Li et al., 2012; Roorda et al., 2021). Previous research has found greater agreement between children and teachers on negative aspects of STRs than positive aspects (Murray & Murray, 2004). Additional research is needed to reliably examine these connections due to the limitations of the MTMQ Negativity subscale and the lack of interpretability of the STRS Dependency subscale in this sample.

Second, correlations between domains of teacher-reported STR quality (i.e., Closeness and Conflict) were not as strong in this sample compared to some previous TD samples or the standardization sample (e.g., Pianta, 2001; Portilla et al., 2014), suggesting that these domains may function differently in samples of autistic students (Eisenhower et al., 2015). Although the three-factor structure of the STRS has been validated with other populations of individuals with developmental differences (e.g., ID; Roeden et al., 2012), a confirmatory factor analysis in this sample revealed that the established three-factor structure (e.g., Pianta, 2001) was not a good fit. A two-factor structure excluding the Dependency items was a better, but not close, fit. Perhaps items that measure overdependency and overreliance on teachers for TD students instead capture social skill challenges or help-seeking behaviors in ASD (e.g., responses to “this child asks for my help when he/she does not really need it” may reflect communication challenges). Dependency for students on the spectrum may be indicated by different behaviors than those of TD students who may be better equipped to seek support from their teachers. Although the limited sample size may have affected the outcome of the CFA, future validation studies should further explore the factor structure and measurement invariance of the STRS for autistic individuals, specifically. It is important to note that the conceptualization of the STRS is deeply rooted in attachment theory (Davis, 2003), but attachment and adult-child interactions may look different for subgroups of children who may be more vulnerable to poor emotional attachments (Beurkens et al., 2013; Rutgers et al., 2007) or demonstrate differences in social communication and emotional awareness to understand nuances within dyadic relationships and their role in that relationship. For example, the item that did not significantly load as expected onto the Conflict factor (in the two-factor model), “when this child is misbehaving, he/she responds well to my look or tone of voice,” may be more closely related to challenges in social communication (e.g., skills such as understanding tone of voice and facial expressions) in the relationship than to relational conflict. Our current understanding of STRs is limited to an extensive amount of work under one theoretical approach with a particular population of students (i.e., predominantly TD). Thus, additional research is needed to further validate applications of attachment-rooted perspectives within the context of ASD.

Finally, the low levels of agreement between MTMQ and STRS subscale scores may lend support to previously proposed limitations of self-report measures in young children on the autism spectrum. For example, students may face potential difficulties with identifying, evaluating, and reporting their internal states and experiences (e.g., Mazefsky et al., 2011). However, one-sided teacher-only evaluations of STRs may be subject to teacher bias against autistic students in mainstream or inclusive classes (Ashburner et al., 2010). These biases may also indirectly influence student-teacher interactions in ways that contribute to further behavioral challenges and academic disengagement, thus impacting the students' experiences in the classroom (Ashburner et al., 2010). Child-report measures for young autistic students that assess students' subjective experience of their STRs might help balance these potential teacher biases and ultimately assist teachers in improving the quality of

their interactions and creating affirming classroom environments that embrace all students.

Despite the challenges of measuring young children's perspectives on STRs, which may be compounded for young children on the autism spectrum, the present study indicated that a brief child self-report measure of STR quality could demonstrate acceptable levels of internal consistency for total STR quality and positive STR characteristics, among a sample of young autistic students. Our findings also suggest that young autistic students' perspectives on positive and negative aspects of their relationship may diverge from those of their teachers. For this reason, studies aiming to delineate critical relational components of STRs that predict student outcomes should be mindful of students' unique appraisals of their STRs, as they may differ from teachers' appraisals in ways that meaningfully impact their school experiences and resulting behavior in the classroom.

Future directions and limitations

The important findings presented here should be interpreted within the context of the study's limitations. First, due to the heterogeneous nature of ASD and the focus of the present study on autistic students in the general education classroom, participants were limited to a majority of children with average levels of cognitive functioning, and the results should not be generalized to autistic students who have IQs significantly lower than 70. Second, the results of the EFA led to a parsimonious 9-item scale, which is advantageous for use with young autistic children due to its brevity, but may lead to limitations in measurement reliability and validity. This measure provides a single snapshot of an otherwise complicated relationship that may not be fully captured through a single method approach. Lastly, although the measure may be feasible for use in a classroom setting (e.g., short length, few materials and training needed), data for the present study were collected in a university clinic, and therefore students' responses may have been impacted by the context (e.g., more willing to express negative feelings towards teachers as a result of being outside the classroom; unfamiliar environment leading to heightened levels of anxiety).

Nonetheless, future studies should aim to explore students' perspectives on STR quality as predictors of student outcomes in the later grades, especially since these have already demonstrated associations with teacher ratings of STR quality (e.g., social skills, academic achievement, school participation, engagement). Efforts to refine the MTMQ may involve eliciting qualitative data from students about their perspectives on negative aspects of relationships with teachers and subsequently developing additional items to more thoroughly indicate negativity; such efforts may improve the internal consistency of the MTMQ's Negativity subscale. Future studies should expand upon the present findings supporting positive student perceptions of their STRs by comparing self-ratings of STR quality among autistic students with the self-ratings of other populations of students (e.g., ID, TD), to determine whether patterns of student-perceived STR quality across groups align with the patterns previously found through studies of teacher perceptions. The short length (i.e., 9 items) and flexibility (i.e., option to respond verbally or nonverbally) of the MTMQ support its feasibility for additional populations. Of course, as in many studies, replication of results will be key.

Declaration of Competing Interest

The authors declare no competing interests.

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