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ORIGINAL PAPER

# Student–Teacher Relationships for Young Children with Autism Spectrum Disorder: Risk and Protective Factors

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**Abstract** The quality of early student–teacher relationships (STRs) has been shown to predict children's school adjustment, and children with autism spectrum disorder (ASD) are at risk for poor quality STRs. The present study examined 162 children with ASD (ages 4–7) and their teachers to evaluate student, teacher, and classroom characteristics that predicted concurrent and prospective STR quality across one school year. Child oppositional behavior, autism severity and teacher degree predicted changes in student–teacher conflict over a 1-year period, while child social skills and IQ positively predicted change in student–teacher closeness. Teacher preparedness, trainings in ASD, and classroom setting were unrelated to STR quality. Implications for intervention are discussed.

**Keywords** Autism · Student–teacher relationships · Behavior problems · Psychopathology · Social skills

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## Introduction

During the important transition to early schooling, the quality of children's relationships with their teachers is associated with development across many domains, including behavior, social and emotional development (Baker 2006; Pianta and Stuhlman 2004; Rimm-Kaufman and Pianta 2000). Indeed, it is argued that positive adult relationships are perhaps "the single most important ingredient in promoting positive student adjustment" (Pianta et al. 2012, p. 370). Even modest efforts to engage with students on a personal level have been found to have meaningful impact on youth outcomes by increasing school engagement, decreasing disruptive behavior and fostering more opportunities for learning-oriented interactions (Pianta et al. 2012). Children with autism spectrum disorder (ASD) are at risk for greater difficulties in social-emotional domains (Ashburner et al. 2010) may be at particular risk for more conflicting and less close student–teacher relationships (STRs; Eisenhower et al. 2015), which could feed into downstream academic and relational functioning. The present study examined child, teacher and classroom characteristics that may place children with ASD at increased or decreased risk for poor STR development over time. By examining risk and protective factors for STR development, the current study aims to illuminate logical targets for school-based interventions to promote optimal STRs between young students with autism and their teachers.

### Student–Teacher Relationships in Relation to Student Adjustment

Currently, the vast majority of literature available on STRs stems from studies of students with typical development (TD). Students with TD who share close relationships with

their teachers (i.e. relationships marked by warmth, affection and open communication; Pianta and Stuhlman 2004) are more likely to have better academic performance, while students in high-conflict relationships tend to have poorer attitudes about school and worse adjustment (Birch and Ladd 1997). Moreover, high quality STRs are predictive of positive, non-academic outcomes including social skills and behavioral adjustment in the classroom (Baker 2006). In fact, STR quality not only predicts subsequent academic, social, and behavioral adjustment, but it also predicts change in student adjustment over time (e.g., Birch and Ladd 1998; Silver et al. 2005). Further, the link between STRs and youth outcomes may be particularly strong role for students at risk for poor adjustment in school (e.g., Hamre and Pianta 2001; Peisner-Feinberg et al. 2001).

Children with ASD may be at particular risk for developing poor STRs due to core deficits in social communication and reciprocal social interaction (APA 2013), as well as greater risk for behavioral and psychiatric problems compared to children with TD (Simonoff et al. 2008, 2013). Such social and behavioral difficulties are associated with poorer STRs in youth with TD or intellectual disability (ID; e.g. Doumen et al. 2008; Meehan et al. 2003; Blacher et al. 2009) and may likewise create barriers to forming positive STRs for children with ASD. The available research research on STRs for youth with ASD is quite limited, but the few existing studies on the topic suggest that STR quality for this group is relatively poor, with greater levels of conflict and less closeness reported as compared to children with TD (Longobardi et al. 2012) and children with ID (Blacher et al. 2014). However, students with ASD who do form higher quality relationships with their teachers are more likely to experience positive developmental outcomes, such as less problem behavior and more social inclusion in the classroom (Robertson et al. 2003). Thus, children with ASD are at risk for poor STR development, but jointly stand to benefit from positive STRs. However, little information is available regarding the nature and course of STR development within this at-risk group, including factors that predict positive and negative STR development over time.

### Risk Factors for Poor Student–Teacher Relationships

The quality of STRs is often predicted by child-level characteristics, especially behavioral functioning (Doumen et al. 2008; Meehan et al. 2003). In particular, the presence of externalizing behaviors (e.g. aggression, oppositional behaviors) or internalizing behaviors (e.g. mood symptoms, anxiety) in the classroom may put a child with TD at risk for poor STR quality through divergent pathways, such that externalizing behaviors lead to greater relationship conflict and internalizing behaviors lead to less close relationships (Buyse et al. 2008). Similarly, children with ASD who exhibit higher levels of externalizing behavior problems have more negative interactions with their teachers (Blacher et al. 2014; Brown and McIntosh 2012; Eisenhower et al. 2015; Henricsson and Rydell 2004). Indeed, past research with the current sample of children suggests that child behavior problems may drive changes in children's relationships with teachers over time (Eisenhower et al. 2015). Surprisingly, little attention has been paid to how internalizing problems may contribute to STR quality in youth with ASD. Given the relation that internalizing problems have to student–teacher closeness in populations with TD (Buyse et al. 2008), and the relatively high rates of internalizing problems in children with ASD (e.g. Kim et al. 2000), it is imperative to understand the potential implications of these problems for the STRs of students with ASD.

It may be informative to disaggregate externalizing and internalizing problem behaviors into specific symptom groups as many or most children with ASD present with comorbid psychopathology (e.g., Gillberg and Fernell 2014). Documenting such comorbidities has been complicated in some cases; for instance, the DSM classification system did not allow for the dual diagnosis of ASD and ADHD until the publication of the DSM-V in 2013 (APA 2013) due to the great overlap in symptomatology between the two disorders (though, the ICD classification system has long recognized ADHD and ASD as distinct disorders). The high rates of comorbid ADHD, as well as anxiety, and oppositional problems present in children with ASD (Simonoff et al. 2008, 2013) may hold particular implications for STRs, and specifically the level of conflict with teachers. For example, attention deficit hyperactivity disorder (ADHD) symptoms are related to greater student–teacher conflict for children with TD (Mantzicopoulos 2005). Indeed, one study found that, for a small number of children with ASD in a general education setting ($N = 12$), the presence of disruptive behavior disorders such as ADHD and ODD related to student–teacher conflict (Robertson et al. 2003). For youth with TD, internalizing disorders (anxiety, depression) are associated with indicators of STR quality (e.g. Murray and Greenberg 2000). Though children with ASD demonstrate elevated rates of both anxiety (Guttmann-Steinmetz et al. 2010) and depression (Gadow et al. 2011), the relationship between these disorders and STRs remains unexplored. Longitudinal investigations with large samples are needed clarify the presence and direction of the relationship between child psychopathology and STR quality for youth with ASD.

Lastly, one potential risk factor for poor STR development is the severity of autism symptomatology. While all children with ASD are characterized by impairments in social communication and restricted and repetitive behaviors and interests (DSM-5; APA 2013), the severity of this symptomatology plays an important role in social relationships. For

example, increased ASD severity is associated with having fewer friends and poorer quality peer relationships (Mazurek and Kanne 2010), as well as higher parenting stress (Hastings and Johnson 2001). Autism severity may likewise negatively impact the initial development of the STR by impeding the student's ability to form a close and reciprocal relationship with his or her teacher. To date, one study has examined the relationship of autism severity and STR quality, finding that children's autistic mannerisms negatively related to student–teacher closeness (Blacher et al. 2014). The present study seeks to affirm this risk using improved methodology, including employing a large sample, rigorous assessment of autism severity, and a longitudinal design.

### Protective Factors

While certain child characteristics may place children with ASD at risk for poor STRs, others may serve as protective factors of STR quality. For example, having greater cognitive and language skills may be protective against poor STRs for individuals with ASD, as these skills may compensate for other social and behavioral deficits. Though this has yet to be examined in ASD populations, higher IQ has been found to relate to more positive STR quality for youth with TD (Spilt et al. 2012). In addition, findings that children with ID demonstrate more conflict in STRs than youth with TD, over and above social skills and behavior problems, suggest that cognitive ability may also play an important role in determining STR quality (Blacher et al. 2009). Relatedly, children with TD with greater expressive and receptive language skills have closer and less conflictual relationships with their teachers (Walker and Teo 2014). Though language deficits are common in autism, many children with ASD acquire language skills in the typical range (Kjelgaard and Tager-Flusberg 2001), and it is likely that variability in these skills contributes to STR quality.

Another area of development that may be protective for children with ASD is their relative level of social skills. While teacher-reported problem behaviors have been associated with concurrent student–teacher *conflict* for students with ASD, teacher-reported social skills have been linked to student–teacher *closeness* (Blacher et al. 2014). Thus, children with ASD who have relatively better cognitive, language and social skills may develop closer relationships with teachers. Although as of yet untested, we also expect that these characteristics will predict positive changes in student–teacher relationships over time.

Moreover, prevailing models of child development (e.g. bioecological model, dynamic systems perspective; Wubbels et al. 2014) acknowledge the joint contributions of person (student, teacher) and context (classroom, school) in determining early relationships and subsequent adjustment. Indeed, positive teacher characteristics, such as teacher level of experience (Garner and Mahatmya 2015) and perceived teaching competence (Sutherland et al. 2008) have related to more positive STR quality for children with TD. Yet, examination of teacher characteristics is limited in studies of STRs for youth with ASD. One study examined the relationship between teacher trainings in ASD and STRs in a small sample (N = 15) of students with ASD, and did not find a significant association (Brown and McIntosh 2012). This is surprising, given that elementary school teachers, including those of students with ASD, report having little ASD-specific training or knowledge of effective teaching practices for this population (Morrier et al. 2011; National Research Council 2001), and that skilled teaching predicts positive STR quality for young students with TD (Howes et al. 2013). Further, the educational setting (general and special education) may hold implications for STR development. For example, teachers in special versus general education settings may hold different expectations for classroom behavior and therefore perceive students differently, though this has yet to be examined for children with ASD. Further clarification of the role of these teacher and classroom characteristics in determining STR quality for children with ASD is warranted.

### The Current Study

The present study seeks to identify potential risk or protective factors for STR quality over time. Specifically, we examined potential risk factors for developing negative student teacher relationships (i.e. child behavior problems, psychopathology and autism severity) as well as potential protective factors against poor STRs (i.e. child cognitive and language abilities, social skills; teacher experience, degree, preparedness and training). Our design improves upon the few extant studies of STRs among youth with ASD, many of which are limited by small sample sizes, lack of IQ data and gold-standard ASD assessment, a focus on risk factors only, and single time-point analyses. We address three research questions: (1) What characterizes STR quality for young students with ASD? (2) Is the quality of STRs for children with ASD moderately stable across one school year? (3) Which child characteristics manifest as risk and protective factors for concurrent STR quality in children with ASD? (4) Which risk and protective factors are most predictive of change in STR quality across one school year?

## Methods

### Participants

Participants were 162 children with ASD, their parents and teachers, all of whom were involved in a longitudinal

study of early school experiences for young children with ASD. Families were recruited through a variety of methods, including in-print and online advertisements that were distributed to local regional centers, intervention service centers, clinicians, local school districts, as well as ASD-specific parent support groups and websites. Families were recruited from the Greater Boston area of Massachusetts ($n = 57$) and Southern California regions ($n = 105$). This approach, including the use of two recruitment sites, was aimed at ensuring a diverse pool of potential participants in terms of geographic location, school and classroom setting, child ethnicity and individual child functioning.

Child demographic data are reported in Table 1. Children eligible for the current study were between the ages of 4 and 7 years and enrolled in school (grades Pre-K to 2nd grade) at the initial visit. Children with estimated IQs of 50 or higher, and a diagnosis of ASD (as determined by the process described under "Assessments" section, below) were eligible. In line with established sex differences in the prevalence of autism, the majority of our sample was male (82 %). Child race was based on an open-ended parent-report item later aggregated into categories: the majority of children were White (58 %), while others were identified as Latino(a)/Hispanic (9 %), Asian-American (5 %), Black or African-American (3 %), bi- or multi-racial (20 %), and other (5 %). In addition, most parents were married (82 %), had obtained a bachelor's degree or further education (66 %), and had an annual gross household income higher than $50,000 (72 %). Most children were enrolled in a public preschool or elementary school. Fifty-four percent of students spent more than 50 % of the school day in a regular education setting. In addition, the majority of children were classified as falling in the "autism" range (88 %) versus the "spectrum" range according to the Autism Diagnostic Observation Schedule (ADOS). Most children were cognitively high functioning, although 15 % had IQs that fell in the range of ID (IQs of 50–69).

**Table 1** Child and school demographics

| | Mean or % | SD |
|---|---|---|
| *Child (N = 162)* | | |
| Child age at intake | 5.5 | 1.0 |
| Child sex (% males) | 82 % | – |
| Child race (% White) | 58 % | – |
| IQ (WPPSI) | 89 | 15 |
| ADOS (% autism versus spectrum classification) | 88 % | – |
| Grade | | |
| Pre-K or preschool | 33 % | |
| Kindergarten | 32 % | |
| 1st grade | 27 % | |
| 2nd grade | 8 % | |
| *Teacher (n = 154)* | | |
| Teacher sex (% female) | 88.3 % | – |
| Teaching experience (years) | 14.2 | 9.1 |
| Highest degree (% master's or higher) | 67.5 % | – |
| Professional training in ASD (% yes) | 25.2 % | – |
| Preparedness to work with ASD (1–4) | 3.0 | 0.9 |
| *Classroom/School (n = 154)* | | |
| Number of students | 16.3 | 8.3 |
| Educational setting (% special education) | 51.7 % | – |
| School setting (% in each category) | | |
| Public school | 70 % | |
| Private school | 10 % | |
| Special school for children with ASD or other developmental disabilities | 12 % | |
| Head start preschool | 3 % | |
| Other | 5 % | |

## Assessments

Data were obtained through laboratory observations and assessments, parent-completed questionnaires and teacher-completed questionnaires. All procedures were reviewed and approved by the Institutional Review Boards of the two participating universities. Prior to participating, parents received a project description, provided informed consent, and completed a telephone screening interview with project staff. Child eligibility criteria were confirmed using the ADOS and *Wechsler Preschool and Primary Scale of Intelligence* (WPPSI-III; Wechsler 2002). Research reliable staff members administered and scored the ADOS (Lord et al. 2000) using the revised research algorithms (Gotham et al. 2007, 2008). Those who did not have a prior ASD diagnosis, or who received a diagnosis of ASD through the school system only, were also administered the ADI-R (Couteur et al. 2003) to confirm the diagnosis. In addition, all children were administered select subtests of the WPPSI-III in order to estimate IQ. Children with ADOS scores (and ADI-R scores when applicable) in the autism or autism spectrum ranges and IQs of 50 or higher were eligible for the study. It should be noted that data collection began in 2011, and therefore the ADOS (with revised research algorithms developed for the ADOS-2) and WPPSI-III were utilized rather than the later released versions of these assessments [ADOS-2 (Lord et al. 2012); WPPSI-IV (Wechsler 2012)].

Eligible families were seen in the lab two more times, once in the fall (Time 1) approximately 1–2 months after the initial visit, and once in the spring (Time 2) approximately 6 months after Time 1. During these visits, parents completed questionnaires while children participated in assessments of language and academic functioning. At each visit, parents were provided with a packet of questionnaires to bring to the child's primary teacher, and provided their consent to

have the child's teacher complete study measures. Teacher participation was voluntary, and all participating teachers also provided informed consent. At each time point, both parents and teachers received a modest honorarium for their participation.

## Measures

### *Autism Diagnostic Observation Schedule (ADOS, Lord et al. 2000)*

The ADOS is a clinician administered assessment of autism symptomology and is considered the gold standard diagnostic instrument for autism spectrum disorders in both research and clinical settings (Hurwitz and Yirmiya 2014). The goal of the ADOS is to elicit spontaneous examples of social interaction and restricted or repetitive behaviors in a semi-structured environment (Lord et al. 2000). The ADOS demonstrates strong specificity and sensitivity, and incorporates age- and language-specific modules (Lord et al. 2000). Ratings were determined using the revised ADOS algorithms (Gotham et al. 2007, 2008), which generate scores for Social Affect and Restrictive/Repetitive Behavior, reflective of the current DSM 5 criteria for ASD (APA 2013). These revised algorithms outperform the original ADOS algorithms, providing improved predictive validity and comparability across modules (Gotham et al. 2008).

### *Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III; Wechsler 2002)*

The WPPSI-III is a widely used assessment instrument of cognitive abilities in children ages 2 years 6 months to 7 years 3 months. The instrument yields IQ scores with a normative mean of 100 and a standard deviation of 15. The WPPSI-III demonstrates strong psychometric properties, including excellent internal consistency (0.86–0.97) and test–retest reliability (0.84–0.92; Wechsler 2002). Three subtests were administered (Vocabulary, Matrix Reasoning, Picture Completion), from which a full-scale IQ score was estimated using Sattler's conversion tables (Sattler 2008). Abbreviated versions of the WPPSI have demonstrated high reliability and convergent validity (e.g., LoBello 1991). The composite score from these subtests correlates strongly ($r = .90$) with the full-scale IQ in the normative sample (Sattler 2008).

### *Comprehensive Assessment of Spoken Language (CASL; Carrow-Woolfolk 1999)*

The CASL is a standardized assessment of spoken language in youth between the ages of 3 and 21 years. For the purposes of the current study, two subtests were selected as a representative selection of syntactic (Syntax Construction) and pragmatic (Pragmatic Judgment) language skills. For both subtests, an age-based standard score is derived with a mean of 100 and a standard deviation of 15. In the normative sample, internal consistency coefficients ranged from 0.85 to 0.96 and test–retest reliability correlations coefficients ranged from 0.65 to 0.96 (Carrow-Woolfolk 1999). For the purposes of data reduction, the two subtests were summed to create a composite spoken language score. The correlation among the subscales was 0.80, suggesting strong interdependence.

### *Student–Teacher Relationship Scale (STRS; Pianta 2001)*

The STRS is a widely used, 28-item instrument that assesses a teacher's perceptions of his or her relationship with a target student (grades Pre-K to 3rd). The measure is composed of three subscales: Conflict (12 items), which measures the teacher's feelings of negativity or conflict with the student (e.g. "The child and I always seem to be struggling with one another"); Closeness (11 items), which measures the teacher's feelings of affection and open communication with the student (e.g. "I share an affectionate, warm relationship with this child"); and Dependency (5 items), which measures the extent to which the teacher views the student as overly dependent. In the current sample. Closeness and Conflict did not significantly correlate at either time point ($p < .10$); therefore, these subscales were examined separately rather than assessing the STRS Total score. Reliability alphas for Conflict were 0.83 and 0.85 and Closeness were 0.80 and 0.85 for time 1 and 2, respectively.

### *Teacher Response Form (TRF; Achenbach and Rescorla 2001)*

The TRF is the teacher-report version of the popular *Child Behavior Checklist* (Achenbach and Rescorla 2001), a well-validated and widely used assessment of child behavior problems. Participating teachers completed one of two versions of the TRF (ages 1.5–5 or Age 6–18, determined by the child's age). Both versions contain items that assess a range of behavioral and emotional problems on a 3-point Likert scale. Both versions of the TRF produce total problems, broadband internalizing and externalizing problems, and DSM-oriented scales with T-scores that have a normative mean of 50 and a standard deviation of 10. Of the DSM-oriented scales, Anxiety Problems, ADHD, ODD were included in the present study. In the current sample, alphas ranged from 0.87 to 0.94 for the broadband and total problems scales, and from 0.68 to 0.89 for the DSM-oriented scales.

*Classroom Climate Inventory*

The Classroom Climate Inventory was completed by teachers to assess teacher and school characteristics. Teachers were asked to report their number of years teaching, highest educational degree (Associate's, Bachelor's, Master's, PhD), self-reported preparedness to work with children with ASD [Likert scale: 1 (not at all prepared) to 4 (very prepared)], and whether they received professional trainings in autism. Teachers' highest educational degree was collapsed into Bachelor's or below versus Master's or above, given the relatively few teachers that endorsed high school/Associate's degrees ($n=9$) or a PhD ($n=1$). Teachers also reported the number of students in their classroom and the educational setting (general versus special education). Teacher demographics are reported in Table 1.

## Results

### Analytic Plan

To address our first aim of characterizing STRs for children with ASD, we examined descriptive statistics (i.e., mean, standard deviation) and compared these to established norms of the STRS for typically developing children. We then inspected the stability of STR quality indices (Closeness, Conflict, Dependency and Total score) by running Pearson correlations as well as paired t tests between the corresponding subscales of the STRS at Time 1 and Time 2. To address our aim of identifying risk factors for, and protective factors against poor STR quality, we first ran Pearson correlations of Time 1 and Time 2 STRS Closeness and Conflict and Time 1 child and teacher characteristics that were hypothesized to place children at high risk (i.e., behavior problems, psychopathology, autism severity) and low risk (e.g., social skills, language and cognitive ability, teacher experience) for poor STRs. Relationships between dichotomous teacher and school variables (teacher degree, teacher training in ASD and classroom setting) and STR quality were assessed using t tests.

To evaluate a possible predictive association of proposed risk and protective factors, multiple linear regressions were run in Mplus (Muthén and Muthén 2010) using full information likelihood (FIML) to estimate missing data. FIML is a robust estimator that demonstrates superior performance to list-wise and pairwise deletion in multiple regression (Enders 2001). Included participants had teacher-reported data at one or two time points ($N=162$). Twenty-five percent of children were missing teacher data at one time point; FIML has shown to be robust to bias at this level of missingness (Enders 2001). Time 1 levels of the corresponding STRS subscale (Conflict or Closeness) were entered in the model along with the predictor variables in order to control for prior levels of STR in predicting Time 2 STRS Conflict or Closeness; this approach has been found to be more statistically powerful in estimating change than using change scores as the dependent variable (Rausch et al. 2003). Only predictor variables that are significantly associated to Time 1 or Time 2 STR quality will be included in the multiple regression analyses. Separate multiple regressions were run for the proposed risk and protective factors to predict change in STR Conflict and Closeness.

### Student–Teacher Relationship Quality and Stability

Table 2 indicates mean levels of student–teacher relationship scale scores. Scores on Conflict are elevated, falling in the 62nd percentile relative to the normative sample, while Closeness scores were lower than average, falling in the 25th percentile (Pianta 2001). Pearson correlations, presented in Table 3, revealed moderate correlations between Conflict and Closeness with the Total scores, and modest correlations between Dependency and the Total scores. As noted earlier, Conflict and Closeness did *not* significantly correlate with one another at Time 1 or at Time 2. This lack of correlation is a stark contrast from the moderate negative correlation reported in the normative sample ($r=-.45$; Pianta 2001).

Stability of STR scores was examined in two ways. Table 3 indicates the correlations between STR indices at Time 1 and Time 2. These correlations reflect moderate stability of subscales across one school year ($r=.51$–$0.70$). In addition, paired t tests were run comparing subscales and total scores from Time 1 to Time 2. Results indicated no significant differences in score for all indices over time ($t=-0.70$–$0.17$), also suggesting significant stability of STR indices across one school year for the present sample.

**Table 2** Descriptive statistics of STRS scores at Time 1 and Time 2

| STRS scores | Mean (SD) | Percentile |
|---|---|---|
| Time 1 ($n=146$) | | |
| Conflict | 22.9 (8.0) | 62 |
| Closeness | 40.4 (7.5) | 25 |
| Dependency | 10.1 (3.3) | 50 |
| Total | 109.5 (12.8) | 34 |
| Time 2 ($n=137$) | | |
| Conflict | 22.7 (8.3) | 62 |
| Closeness | 40.3 (8.1) | 25 |
| Dependency | 10.1 (3.6) | 50 |
| Total | 108.6 (14.4) | 32 |

**Table 3** Correlations amongst subscales of the STRS at Time 1 and Time 2

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Time 1 ($n=146$) | | | | | | | | |
| Conflict | 1 | | | | | | | |
| Closeness | −0.13 | 1 | | | | | | |
| Dependency | 0.47*** | 0.18* | 1 | | | | | |
| Total | −0.83*** | 0.62*** | −0.45*** | 1 | | | | |
| Time 2 ($n=137$) | | | | | | | | |
| Conflict | 0.70*** | −0.08 | 0.38*** | −0.57*** | 1 | | | |
| Closeness | −0.10 | 0.53*** | 0.11 | 0.34*** | −0.16 | 1 | | |
| Dependency | 0.24** | 0.24** | 0.51*** | −0.14 | 0.45*** | 0.30*** | 1 | |
| Total | −0.49*** | 0.30** | −0.27** | 0.55*** | −0.72*** | 0.57*** | −0.29** | 1 |

*p < .05, **p < .01, ***p < .001

## Risk Factors and Student–Teacher Relationship Quality

Relationships between STRS Conflict and Closeness and proposed Time 1 risk factors (child behavior problems and psychopathology) are reported in Table 4. Teacher-reported internalizing and externalizing problems *t* scores both demonstrated moderate correlations with student–teacher conflict at Time 1 and Time 2, such that higher internalizing and externalizing problems were associated with higher concurrent and prospective student–teacher conflict. Internalizing problems also related to concurrent and prospective student–teacher closeness. Thus, while child externalizing problems demonstrate an association with student–teacher conflict only, internalizing problems are associated with both conflict and closeness, and these associations persist across time.

Three DSM-oriented scales of the TRF were also examined at Time 1 to determine which teacher-reported psychopathology symptoms are associated with poorer STRs. ADHD symptoms were found to be significantly associated with Time 1 and Time 2 STR quality, relating positively to student–teacher conflict and negatively to closeness. ODD symptoms, on the other hand, were moderately and positively associated with Time 1 and Time 2 student–teacher conflict, but not closeness. Child anxiety symptoms were also positively associated with conflict at both time points, though not with closeness. Lastly, child autism severity (assessed with the ADOS total score) was negatively associated with student–teacher closeness at Time 1 and Time 2, and positively associated with STRS Conflict at Time 2 only.

**Table 4** Correlations between Time 1 child and teacher characteristics and STR quality at Time 1 and Time 2

| | Time 1 STR ($n=144$) | | Time 2 STR ($n=121$) | |
|---|---|---|---|---|
| | Conflict | Closeness | Conflict | Closeness |
| *Risk factors* | | | | |
| TRF broad band | | | | |
| Externalizing | 0.69*** | −0.16 | 0.60*** | 0.05 |
| Internalizing | 0.43*** | −0.21* | 0.42*** | −0.18* |
| TRF DSM-oriented | | | | |
| TRF ADHD | 0.45*** | −0.30*** | 0.42*** | −0.19* |
| TRF ODD | 0.67*** | −0.10 | 0.64*** | −0.07 |
| TRF anxiety | 0.26** | −0.15 | 0.38*** | −0.13 |
| Autism severity | | | | |
| ADOS total score | 0.11 | −0.20* | 0.22* | −0.19* |
| *Protective factors* | | | | |
| SSiS-T social skills | −0.41*** | 0.48*** | −0.41*** | 0.45*** |
| IQ: WPPSI composite | −0.14 | 0.18* | −0.21* | 0.30*** |
| Language: CASL Sum | −0.18* | 0.28** | −0.24** | 0.30** |
| Teacher experience (years) | −0.25** | 0.18* | −0.21** | 0.09 |
| Teacher preparedness: ASD[a] | −0.09 | 0.09 | −0.02 | 0.07 |

*p < .05, **p < .01, ***p < .001

[a]Teachers reported their felt preparedness to work with students with ASD on a Likert scale from 1 (not at all prepared) to 4 (very prepared)

## Protective Factors and Student–Teacher Relationship Quality

Table 4 also displays the Pearson correlations between the proposed protective factors and student–teacher closeness and conflict at Times 1 and 2. In considering child characteristics that may be protective against poor STR quality, teacher-rated social skills were moderately associated with student–teacher conflict and closeness at both time points, with higher social skills relating to lower conflict and higher

**Table 5** Means and group differences in STR quality by teacher degree, teacher training in ASD and classroom setting

| | Teacher educational degree[a] | | | Teacher trainings in ASD | | | Classroom setting | | |
|---|---|---|---|---|---|---|---|---|---|
| | *BA* | *MA* | *t* test | Yes | No | *t* test | General Ed | Special Ed | *t* test |
| STR conflict | | | | | | | | | |
| Time 1 | 24.9 | 21.8 | $t=2.25$* | 22.5 | 23.0 | $t=0.33$ | 23.2 | 22.2 | $t=0.76$ |
| Time 2 | 22.4 | 22.9 | $t=-0.31$ | 24.2 | 22.3 | $t=-1.11$ | 22.1 | 22.9 | $t=-0.54$ |
| STR closeness | | | | | | | | | |
| Time 1 | 40.0 | 40.6 | $t=-0.46$ | 42.4 | 39.7 | $t=-1.8$ | 40.0 | 41.3 | $t=-1.00$ |
| Time 2 | 39.6 | 40.6 | $t=-0.68$ | 40.7 | 39.5 | $t=0.75$ | 40.6 | 40.6 | $t=0.01$ |

*BA* bachelor's degree or below, *MA* master's degree or above

*p < .05

[a]Teacher educational degree was dichotomized as follows: $BA=0$, $MA=1$

**Table 6** Multiple regressions of Time 1 student and teacher variables predicting change in STR quality over time ($N=162$)

| | STR conflict (Time 2) | | | STR closeness (Time 2) | | |
|---|---|---|---|---|---|---|
| | β | *B* | SE (*B*) | β | *B* | SE (*B*) |
| Model 1: Risk factors | | | | | | |
| Time 1 STR (conflict/closeness) | 0.51*** | 0.53*** | 0.09 | 0.51*** | 0.54*** | 0.08 |
| TRF ADHD | −0.16 | −0.14 | 0.07 | 0.08 | 0.08 | 0.40 |
| TRF ODD | 0.31** | 0.34** | 0.10 | −0.04 | −0.04 | 0.72 |
| TRF anxiety | 0.11 | 0.11 | 0.07 | −0.05 | −0.05 | 0.55 |
| ADOS total score | 0.13* | 0.22* | 0.10 | −0.16 | −0.25 | 0.13 |
| Model 2: Protective factors | | | | | | |
| Time 1 STR (conflict/closeness) | 0.64*** | 0.67*** | 0.07 | 0.44*** | 0.47*** | 0.09 |
| SSiS-T social skills | −0.05 | −0.06 | 0.05 | 0.22* | 0.11* | 0.05 |
| IQ (WPPSI) | −0.11 | −0.03 | 0.04 | 0.20* | 0.10* | 0.05 |
| CASL sum | 0.00 | 0.00 | 0.03 | −0.10 | −0.04 | 0.03 |
| Teacher experience (years) | 0.01 | 0.01 | 0.06 | −0.08 | −0.07 | 0.07 |
| Teacher degree[a] | 0.13* | 2.36* | 1.16 | 0.06 | 1.08 | 1.26 |

*β* standardized beta, *B* unstandardized beta

*p < .05, **p < .01, ***p < .001

closeness. Language skills were also significantly related to STR quality, positively associating with student–teacher closeness and negatively associating with student–teacher conflict at both time points. Child IQ was positively associated with student–teacher closeness at both time points, and negatively associated with student–teacher conflict at Time 2.

At the teacher and classroom level, years of teaching experience was positively associated with student–teacher closeness at Times 1 and 2, and negatively associated with student–teacher conflict at Time 2 only. Surprisingly, teacher-reported preparedness to work with children with ASD was not associated with student–teacher conflict or closeness. Table 5 depicts the means and group differences for student–teacher closeness and conflict by teacher degree, teacher training in ASD and classroom setting (special education versus general education). No significant differences in student–teacher conflict or closeness were found by classroom setting or by whether the teacher had received professional training in ASD. Ratings of student–teacher conflict differed by teacher's educational degree ($t=2.25$, $p<.05$) at Time 1 only, with teachers with at least a Master's levels degree reporting less Time 1 conflict than those with Bachelor's degrees or below. However, this group difference in student–teacher conflict did not persist to Time 2.

### Risk Factors and Change in STR over Time

Multiple regression models were used to determine which proposed risk factors were most predictive of change in student–teacher relationships over time. For the risk models, DSM-oriented scales, but not broadband scales were included, as these two sets of scales overlap and are thus confounded (see Table 3). In addition, DSM-oriented scales are better suited to provide more detailed information about which specific behaviors are driving changes in STR quality (e.g. hyperactive behavior versus defiant behavior). Autism severity (ADOS Total Score) was also included as a potential predictor of change in STR quality over time.

Results (shown in Table 6) indicate that teacher-reported ODD symptoms were the strongest predictor of change in student–teacher conflict, with more ODD symptoms predicting increased conflict over time, over and above the effects of anxiety symptoms, ADHD symptoms, and autism severity (ADOS scores). ADOS scores also predicted relative increases student–teacher conflict over time when holding other variables in the model constant. Anxiety and ADHD symptoms did not surface as significant predictors of student–teacher conflict in the model. In addition, *no* variables in the risk model predicted change in student–teacher closeness.

### Protective Factors and Change in STR Over Time

Proposed protective factors that were associated with Time 1 or Time 2 STR quality were also assessed as predictors of change in STR quality over time using multiple regression (see Table 6). Social skills and IQ surfaced as significant predictors of change in student–teacher closeness, over and above the other variables in the model; higher initial social skills and higher IQ related to relative increases in student–teacher closeness across one school year. Child language ability and teachers' years of experience did not predict change in student–teacher closeness. Interestingly, teacher degree was associated with changes in student–teacher conflict (but not closeness), such that a teacher having a higher educational degree (Master's or above) was associated with relative increases in student–teacher conflict over time (keeping in mind that this group began with significantly lower student–teacher conflict at Time 1). No other variables in the protective factor model predicted change in student–teacher conflict.

## Discussion

The present study examined the levels and stability of STR quality for young children with ASD, as well as child, teacher and classroom characteristics that relate to concurrent and prospective changes in STR quality over time. The results of this investigation suggest that young children with ASD demonstrate relatively poor quality STRs, with higher levels of conflict and less closeness than those reported for typically developing children (Pianta 2001). This is consistent with prior research demonstrating comparatively low quality STRs for children with ASD (Blacher et al. 2014; Eisenhower et al. 2015; Longobardi et al. 2012), and holds important implications for child school adjustment. Of note, student–teacher conflict has been shown to relate to perceived loneliness in young children with ASD (Zeedyk et al. 2016).

Further, as is the case with young students with ID (Blacher et al. 2009), our study found that STR quality for young students with ASD remains moderately stable, here across one school year. Thus, poor quality STRs for this population may be at risk to remain so without formal intervention. Our results also reveal a unique aspect of STRs for children with ASD, in that student–teacher conflict and closeness were not significantly related. This lack of correlation is surprising, given the established negative relationship between these two indices across several samples of children with TD (e.g., Pianta 2001; Sclavo et al. 2012), and suggests that conflict and closeness may operate more independently in this population. Additional research is needed to interpret the lack of association between STR closeness and conflict indices. Perhaps it is that some children with ASD uniquely co-express risk factors and protective factors such that student–teacher conflict does not preclude closeness and vice versa. This would convey a hopeful message to researchers and educators that the experience of student–teacher conflict among children with ASD does not prohibit these students from also forming close relationships with their teachers.

Centrally, the current investigation revealed that child risk factors (behavior problems, psychopathology, autism severity) tended to demonstrate stronger relationships with student–teacher *conflict*, while protective factors (social skills, IQ, language ability) tended to relate to student–teacher *closeness*. These results suggest that many risk and protective factors operate in a similar manner in ASD as in other populations. For example, externalizing problems are well-established as a risk factor for poor STR quality across other risk populations (e.g., Eisenhower et al. 2007; Brown and McIntosh 2012) as well as populations with TD (Buyse et al. 2008). Past findings with the current sample further demonstrated that externalizing problems predicted prospective change in student–teacher conflict using structural equation modeling (Eisenhower et al. 2015). Contrary to what is found for children with TD (e.g. Henricsson and Rydell 2004; Buyse et al. 2008), we found that internalizing problems demonstrated stronger positive associations with student–teacher *conflict* than with closeness. Thus,

it appears that internalizing problems may pose a unique risk for student–teacher conflict for children with ASD, a phenomena that may be accounted for by the idiosyncratic presentation of anxiety symptoms apparent in autism (e.g. unusual specific phobias, fears of change/novelty; Uljarevic et al. 2016). Perhaps, for example, extreme anxiety around novelty could create conflict during novel classroom activities and teaching methods. Together, these findings provide evidence that child behavior problems (both externalizing and internalizing problems) in ASD are strongly associated with student–teacher conflict, and hold important implications for intervention. School programs may choose to target the amelioration of child problem behaviors, such as through teacher trainings in effective behavior management or school-based mental health services as a means of fostering positive STRs (Pianta et al. 2012).

In this study, we also disaggregated the two broadband scores on the TRF (externalizing and internalizing problems) to examine the relationship of specific child psychopathologies (ADHD, ODD, anxiety) to STR quality. While ADHD, ODD and anxiety symptoms all positively related to concurrent student–teacher conflict, only higher levels of ODD symptoms were associated with relative increases in conflict over time, controlling for other risk variables. One potential mechanism through which child oppositional behavior affects STR is teaching-related stress, as greater externalizing problems of students with ASD are associated with increased teacher stress (Lecavalier et al. 2006). This mechanism holds important implications for STR-focused intervention. Just as interventions targeting parenting stress reduction have a positive impact on parent–child relationships (Lewallen and Neece 2015), interventions seeking to improve STR may benefit from a focus on teaching-related stress reduction.

Lastly, autism severity was negatively associated with student–teacher closeness at both time points, positively associated with student–teacher conflict at Time 2, and predicted change in student–teacher conflict over time, even when controlling for child psychopathology (ADHD, ODD, anxiety). Thus, autism severity is likely an important contributor to STR quality, and should be a consideration for both class placement and school-based interventions for youth with ASD. For example, interventions targeting core deficits of autism (repetitive behaviors and social communication) may mitigate the salience of these characteristics and thus their contribution to student–teacher conflict. Alternatively, this pattern of worsening conflict for children with more severe symptoms may also be interpreted as a reflection the challenges teachers face in understanding and interpreting children's ASD symptoms. Without sufficient, effective ASD-related training, teachers may struggle to make adaptive attributions for these children's ASD symptoms, such as those that lend themselves to empathy and understanding, rather than toward increased frustration and conflict with the student. Along these lines, effective teacher and paraprofessional psychoeducation and training around understanding ASD-specific behaviors (see Koegel et al. 2012 for review) may help to foster positive STRs.

Conversely, child social skills and cognitive ability were associated with both student–teacher conflict and closeness, and predicted change in student–teacher closeness across one school year. Interventions to improve child social skills could thus foster greater student–teacher closeness by creating opportunities for more positive and reciprocal interactions between students with ASD and their teachers. However, research establishing or approximating a causal relationship between social skills change and STR quality, such as randomized controlled trials or cross-lagged panel models, are needed to corroborate this effect. These findings also suggest that high-functioning children with ASD may have closer STRs than their peers with ASD who have lower IQs. Therefore, intervention efforts may have differential effects on high- and low-functioning children with ASD, as these groups differ in their risk for poor quality STRs.

Similarly, child language ability was found to associate with concurrent student–teacher conflict and closeness, though it did not uniquely predict change in STR quality. As children develop more language, they are better equipped to take part in conversation and increase their exposure to opportunities for social learning. Thus, though language abilities did not predict change in STR over and above other protective factors, interventions that improve language ability may facilitate more complex social skills, and thus collateral benefits in student–teacher closeness. Additionally, for children who are less verbal, these findings suggest the need to identify and foster intervention strategies for improving STRs that do not rely on child language, such as teacher psychoeducation in ASD and behavioral training.

Teacher and classroom characteristics demonstrated inconsistent associations with STR quality. Teachers' years of experience was associated with student–teacher conflict (both time points) and closeness (Time 1), with better relationships for those with more years of experience, but did not predict change in STR quality over time. Teacher degree was related to Time 1 student–teacher conflict, in that teachers with a Master's degree demonstrated less conflict with their students at the beginning of the school year than those with a Bachelor's degree. However, teacher degree was also positively associated with relative change in conflict over time, suggesting that the Master's-level teachers showed greater increases in conflict across the school year. This suggests that Bachelor's-level teachers may experience more student–teacher conflict, or may encounter a more difficult time managing conflict with students, early in the school year. By the end

of the school year, however, the Bachelor's-level teachers had settled to a relatively stable level of conflict, while the Master's-level teachers conflict worsened. This pattern suggests that, while Bachelor's-level teachers might be particularly in need of support at the beginning of the year in establishing strong relationships with their students with ASD, and might benefit from enhanced behavioral management and teaching strategies (Howes et al. 2013), both groups of teachers would benefit from support in sustaining low-conflict interactions over the course of the school year.

Teacher training in ASD and self-reported preparedness to work with children with ASD did *not* relate to STR closeness or conflict. This corroborates prior evidence that such trainings are unrelated to STR quality (Brown and McIntosh 2012), and may be due to the variability in the nature and quality of trainings afforded to teachers in the community (Morrier et al. 2011), which typically range from self-teaching to one-day or half-day workshops with limited follow-up. However, evidence that high quality teacher training benefits both teachers and students (Koegel et al. 2012), suggests that the development and implementation of high quality teacher training programs in ASD is a promising future direction for research. This lack of impact of ASD-specific training as it currently exists in the community, may also explain the lack of relationship between classroom setting and STR quality. Even though special education teachers are likely to receive more ASD-specific training, the variable duration and quality of these training may lead to minimal benefits in terms STRs.

### Limitations and Future Directions

The results of the current examination must be interpreted within the context of its methodological limitations. First, this study excluded children with moderate to severe comorbid ID, and findings may not generalize to students with ASD and very low cognitive functioning. The scope of the current investigation was also limited to direct relationships between child and school factors and STR. Though, it may be that certain aspects of the child or environmental factors serve to moderate the relations between child behavior or abilities and STR. For example, STR quality may not differ between special and general education classrooms, but classroom type could moderate the association between STR quality and child behavior. Future studies should carefully delineate moderators and mediators of these relationships to refine our understanding of STRs for young children with ASD.

Although one strength of the current investigation was the ability to assess child, teacher and school factors as they relate to STRs, the scope of the factors examined is certainly not exhaustive. For example, teacher sex and ethnicity match may relate to STR quality for youth (Pianta et al. 2002), but it is unclear to what extent this is the case for children with ASD. The present study was limited in that the vast majority of teachers were women (88.3 %), but future studies may seek to recruit a greater proportion of male teachers in order to address this question. Further, future research may benefit from observational methods conducted within the classroom setting. For example, evidence suggests that teachers may respond inconsistently to students with ASD (Keen et al. 2005), and such interactions will also likely impact STR quality for this population. It will be important for future research to uncover what specific approaches in the classroom will facilitate positive STRs for youth with ASD, as well as how teachers can effective apply their knowledge of ASD to foster these positive relationships.

Further, much of the rationale for the current investigation is rooted in research on STRs for children with TD. Though research suggests that STRs play a particularly strong role for children at risk for adverse outcomes (e.g. Hamre and Pianta 2001; Peisner-Feinberg et al. 2001), future research should assess to what extent these associations apply to youth with ASD. The few existing studies of children with ASD suggest an association between poor STR quality and behavior problems and loneliness (Zeedyk et al. 2016; Robertson et al. 2003), though further research is needed to affirm these relationships, assess the relationship of STR to other relevant outcomes (e.g. academic functioning) and consider prediction over time. Research in these domains will be vital for informing school-based interventions aimed at improving school adjustment for youth with ASD.

The current study exhibited many methodological strengths, such as the use of a relatively large, community-based sample of young students with ASD, as well as the use of the "gold standard" autism diagnostic assessment (ADOS) to confirm ASD diagnosis for all participants. The study focused on a narrow age range (ages 4–7 at Time 1) in order to best characterize student–teacher relationships during early school transitioning for students with ASD. By implementing a longitudinal design, we were able to examine how risk and protective factors relate to change in STR quality over time, addressing a limitation of the extant literature.

The current investigation calls attention to the need to direct efforts to improve the quality of STRs for young students with ASD. Analyses suggest that interventions targeting the reduction of oppositional problems and promotion of social skills may have the greatest collateral benefits for the student–teacher relationship. It will also be important to consider interventions that better inform teachers about the importance of the STR and its potential effect on school adjustment for children with ASD, and pave the way for more opportunities for educational growth.

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**Author Contributions** BC conceived of the study, conducted statistical analyses and drafted the manuscript; MF co-drafted the manuscript and participated in the design and interpretation of the data; AE and JB provided consultation regarding the design of the study, the selection and interpretation of statistical analyses, and manuscript revision. All authors read and approved the final manuscript.

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**Compliance with Ethical Standards**

**Conflict of Interest** The authors declare that they have no conflicts of interest.

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