Development and Validation of the Teacher–Student Relationship Inventory Using Exploratory and Confirmatory Factor Analysis

REBECCA P. ANG
Nanyang Technological University, Singapore

ABSTRACT. Development and validation of the 14-item Teacher–Student Relationship Inventory (TSRI) is described. The TSRI is a self-report measure assessing teacher perceptions of the quality of their relationship with students from Grade 4 through junior high school. In Study 1, findings from exploratory factor analysis provided evidence for a 3-factor solution (Satisfaction, Instrumental Help, Conflict) for the scores from the TSRI. Preliminary evidence of convergent and discriminant validity of TSRI scores was also reported. In Study 2, results from confirmatory factor analysis provided additional support for results obtained from Study 1. High internal consistency estimates for TSRI scores from both studies were obtained. Initial evidence of predictive validity for TSRI scores was also presented. TSRI scores show promise as a reliable and potentially valid measure of the quality of teacher–student relationships.

Key Words: confirmatory factor analysis, teacher–student relationship, validation

FOR MOST STUDENTS, late childhood and early adolescence is a time of change, adjustment, and transition. Each day at school, children strive to establish and maintain interpersonal relationships and to develop a sense of belonging. Usually, children who experience positive school adjustment are also the most successful students. School adjustment refers to how well children and adolescents adapt to the school environment and other school-related experiences (Juvonen & Wentzel, 1996). There is recent recognition that positive school adjustment is valuable for understanding students’ ability to succeed behaviorally and academically (Juvonen & Wentzel). Research has documented significant associations between aspects of teacher–student relationships and children’s behav-
ioral and academic adjustment at school (Birch & Ladd, 1996; Hughes, Cavell, & Jackson, 1999). Specifically, the quality of teacher–student relationships has been shown to be an important predictor of students’ behavioral and scholastic competence in elementary and middle school years (e.g., Pianta, Steinberg, & Rollins, 1995; Wentzel & Asher, 1995). Consequently, elements in the teacher–student relationship have become the focus of many school-based interventions for both academic and behavioral problems (Doth & Lyon, 1998). Given that the teacher–student relationship is a key relationship within the school environment and that students spend a significant amount of time in school, it is not surprising that the teacher–student relationship is important for students’ school adjustment.

The quality of the teacher–student relationship has been found to influence students’ behavioral and social adjustment. Murray and Greenberg (2000) found that fifth- and sixth-grade students who had poor relationships with teachers also had poorer scores on self- and teacher-rated social and emotional adjustment compared with students who had positive relationships with teachers. Similarly, Hughes et al. (1999) provided empirical evidence that the quality of teacher–student relationships predicts aggressive children’s developmental trajectories. Specifically, children’s and teachers’ reports of relationship quality predicted teachers’ ratings of child aggression a year later. Positive teacher–student relationships were followed by less childhood aggression the following year. Birch and Ladd (1998) also found that kindergarten children who were rated high on conflict were assessed the next year by their first-grade teachers as high on disruptiveness and low on prosocial behavior. Likewise, in a recent study, Silver, Measelle, Armstrong, and Essex (2005) found that conflict in the teacher–student relationship during transition to elementary school contributed to faster rates of increase in externalizing behavior from kindergarten through third grade above and beyond negative parenting and initial levels of externalizing behavior.

Having a positive and supportive relationship with teachers has been shown to influence students’ academic success (e.g., Parker & Asher, 1987; Wentzel, 2002). Hamre and Pianta (2001) showed that a conflictual kindergarten teacher–student relationship had a negative correlation with students’ math and language achievement in Grades 1 through 9. Teachers have warmer relationships with students who are less active and more pleasurable to work with, and these teachers were also found to be more encouraging and to have more patience with these students. These positive teacher behaviors could increase students’

The author thanks the executive editor and both reviewers for The Journal of Experimental Education for their helpful and constructive feedback on an earlier version of this article.

Address correspondence to: Rebecca P. Ang, Psychological Studies Academic Group, National Institute of Education, Nanyang Technological University, 1 Nanyang Walk, Singapore 637616. E-mail: pfragang@nie.edu.sg or rp_ang@yahoo.com
confidence, which can, in turn, enhance academic performance (Hamre & Pianta). A recent longitudinal study (DiLalla, Marcus, & Wright-Phillips, 2004) showed that students with poor teacher–student relationships, as characterized by conflict, for example, had poorer grades in school.

The measurement of teacher–student relationships among young preschool and early elementary children has generally used teacher perceptions (Birch & Ladd, 1998; Pianta, 1999). A literature review revealed that there are a few ad hoc scales that measure the quality of teacher–student relationships for various studies. Teacher–student relationships have typically been measured either as a subdimension embedded in larger scales of social support (e.g., Baker, 1999; Malecki & Demaray, 2002) or as a single dimension based on items extracted from other scales (e.g., Blankemeyer, Flannery, & Vazsonyi, 2002; Ryan & Patrick, 2001). To date, the Student–Teacher Relationship Scale (STRS; Pianta, 2001) remains the only self-report measure of teachers’ perception of their relationship with students that has been validated and widely accepted. The STRS is validated for use with students from preschool to Grade 3 (typical ages of these children range from 4 to 8 years); it is a 28-item scale that uses a 5-point Likert-type rating format. Results from exploratory factor analysis have suggested that the STRS is multidimensional and is best represented by three factors that measure three dimensions of the student–teacher relationship: Conflict (12 items), Closeness (11 items), and Dependency (5 items). Conflict items measure the degree to which a teacher perceives his or her relationship with the student as negative and conflictual. Closeness items measure the degree to which a teacher experiences warmth and affection with a particular student. Dependency items measure the degree to which a teacher perceives a particular student to be overly dependent.

In a study with 1,535 students, Pianta (2001) reported Cronbach alphas of .92, .86, .64, and .89 for Conflict, Closeness, Dependency, and Total scale scores for the STRS, respectively. Test–retest reliability estimates obtained with a sample of 72 students for a 4-week period were reported to be .92 for Conflict, .88 for Closeness, .76 for Dependency, and .89 for Total (Pianta). In general, STRS scores have demonstrated evidence of concurrent and predictive validity, as well as discriminant validity (e.g., Hamre & Pianta, 2001; Pianta et al., 1995).

Given the existence of a validated and widely used instrument such as the STRS, why is there a need for a new instrument? In discussing limitations of their study in the context of teacher–student relationships, Saft and Pianta (2001) pointed out that most studies in this area examine very young children; consequently, much less is known about older elementary or middle school-aged children’s relationships with their teachers. Wentzel (1996) suggested that middle school-aged children rely on teachers for emotional support in ways that are different from younger children and that this is a factor that could influence teachers’ perceptions of the quality of these relationships. Adolescents rarely mention
that teachers have an important influence in their lives (Galbo, 1984). Adolescents often rate teachers as providing instrumental help and advice (Lempers & Clark-Lempers, 1992; Reid, Landesman, Treder, & Jaccard, 1989) but only as secondary sources of support relative to parents and peers (Furman & Buhrmester, 1992). Yet, studies of social support provide ample evidence that teacher support is a significant predictor of young adolescents’ motivation, academic achievement, and behavioral adjustment (Alexander, Entwisle, & Kabbani, 2001; Goodenow, 1993; Wentzel, 1997). Of particular importance are two sets of findings. First, although negative peer influence can be strong in the lives of early adolescents, Wentzel (2003) found that peer influence could be superseded with adolescents having positive and supportive relationships with parents and teachers. Second, Wentzel (1998) found perceived support from teachers to be a significant and positive predictor of students’ pursuit of goals to adhere to classroom rules and norms, whereas perceived support from parents and peers was not related to pursuit of these goals. Taken together, research on early adolescents’ relationships with their teachers suggests that teachers can play a critical role in influencing students’ academic and behavioral adjustment.

Studies of teacher–student relationships among middle school children have generally relied on students’ rather than teachers’ perceptions (e.g., Wentzel, 1997, 1998, 2002). Feldman, Wentzel, and Gehring (1989) argued that adolescents’ perceptions of caregivers’ behavior tend to be more powerful predictors of independent assessments of social and emotional outcomes than reports from other informants. However, studies conducted with middle school students have suggested that teachers’ preferences for students might also explain the significant relations between classroom conduct and academic performance (Wentzel, 1993). Teachers’ preferences for students may affect the quality of instruction delivered and hence influence students’ academic and behavioral outcomes. For example, being liked by teachers has been related to students’ pursuit of academic goals and to positive attitudes toward school (Wentzel, 1994; Wentzel & Asher, 1995). Teachers’ preferences and beliefs also have been shown to shape both the quality of interaction with students as well as the quality of their instruction (Perry & Weinstein, 1998; Sweet, Guthrie, & Ng, 1998). There is some indication that student characteristics can influence the nature of teacher–student interactions and thus the quality of instruction received. For example, Brophy and Everson (1981) reported that teachers tend to treat disruptive and irresponsible students more negatively and that these students are more likely to receive less one-on-one instruction than other students. In light of this, even though teacher perceptions of the quality of teacher–student relationships are not typically obtained with older elementary and middle school students, it could nonetheless yield useful information that predicts students’ academic and behavioral outcomes.

A review of the literature suggests that a few dimensions in the teacher–student relationship are particularly important as they are related to academic and
behavioral outcomes with older elementary and middle school students. Instrumental help or aid is one such dimension. Students describe teachers who do not care as those who do not provide extra help or advice and encouragement. Teachers who care modeled a caring attitude and showed an interest in interpersonal dealings with their students (Brophy & Evertson, 1978; Wentzel, 1997, 2003). Research has documented that if students developed a sense of relatedness to their teachers, it would translate into pursuing goals valued by teachers, such as to behave appropriately and to learn and achieve (Skinner & Belmont, 1993; Wentzel, 1994). For example, teachers’ reports of involvement with their students had both direct and indirect effects on students’ emotional engagement in class as well as indirect effects on students’ behavioral engagement (Skinner & Belmont).

Having a positive and satisfactory teacher–student relationship is another important dimension that influences students’ academic and behavioral adjustment. Being liked by teachers has been positively linked to students’ school-related adjustment (Wentzel, 1994; Wentzel & Asher, 1995). An extensive literature suggests that teachers prefer students who are cooperative and responsible rather than argumentative and disruptive (e.g., Brophy & Evertson, 1981; Kedar-Voivodas, 1983). In her recent review, Davis (2003) documented that supportive, positive, and satisfactory teacher–student relationships continue to be important and predict positive academic and behavioral outcomes even for middle and high school students.

A third dimension of importance described in the literature is conflict. Conflict, absence of nurturance, and critical and negative feedback adversely affected students’ school adjustment and classroom functioning (Birch & Ladd, 1996; Wentzel, 2002). Students described caring teachers as those who provided constructive rather than harsh and critical feedback, as well as those who possessed adaptive communication styles free from yelling and interrupting (Wentzel, 1997, 2003). Dependency, a dimension Pianta (2001) found to be important for preschool and early elementary school students, may not be as relevant for older elementary and middle school students as early adolescents become increasingly aware of their own volition or sense of autonomy and control (Durkin, 1995).

As reviewed previously, the STRS is appropriate for use with children from preschool to Grade 3. Although no instrument has been validated for use with older elementary and middle school-aged children, teacher–student relationships at upper elementary levels through junior high levels may be important predictors for children and adolescents’ school adjustment (Davis, 2003). In addition, most if not all scales measuring teacher–student relationships, including the STRS, were constructed with sole reliance on the use of exploratory factor analysis (EFA). The EFA approach cannot be used exclusively as a basis for a final determination regarding an underlying construct because the analysis is designed to maximize the amount of variance within the current variable set, and subsequent
analyses with other samples may not reproduce the same factor structures (Gorsuch, 1983; Thompson & Daniel, 1996). Furthermore, in EFA, rival models are not readily tested, but the testing of multiple plausible models is necessary and provides researchers with stronger evidence regarding validity (Thompson, 2004; Thompson & Daniel).

Furthermore, there is a need to develop a shorter scale especially for use with teachers without sacrificing good psychometric properties. There is ample international research suggesting that teacher stress and burnout are widespread and not necessarily restricted to any particular cultural setting (e.g., Dick & Wagner, 2001; Friesen, Prokop, & Sarros, 1988; Hui & Chan, 1996). Consistently, workload has been cited as one of the most stressful aspects for teachers (e.g., Hui & Chan). Understandably, teachers who are busy with myriad tasks and activities likely would not have the time to complete a lengthy questionnaire. Hence, a brief measure assessing teacher perceptions of the quality of teacher–student relationships would be a useful resource.

In this article, I describe the psychometric properties of the Teacher–Student Relationship Inventory (TSRI), a new, brief, self-report measure of the teacher’s perception of the quality of teacher–student interactions. Through independent samples from two studies, I conducted exploratory and confirmatory factor analyses to investigate the factor structure of TSRI scores. I also examined preliminary estimates of reliability, convergent and discriminant validity, and predictive validity for TSRI scores.

**STUDY 1: EXPLORATORY FACTOR ANALYSIS**

**Method**

The purpose of Study 1 was to generate an initial pool of items for a scale to measure teachers’ perception of the affective quality of their relationship with students from Grade 4 through middle and junior high school, as well as to conduct an exploratory factor analysis to assess the factor structure of the scale items. In addition, I examined initial estimates of internal consistency and convergent and discriminant validity of the TSRI scores.

**Scale Construction**

I initially generated 20 items based on a literature review of existing measures assessing teachers’ perception of the quality of the teacher–student relationship. I generated or drew items from existing scales that involved some aspect of the affective quality of the teacher–student relationship (e.g., Blankemeyer et al., 2002; Hughes et al., 1999; Malecki & Demaray, 2002; Pianta, 2001). Four items were deleted because of redundancy and 2 were reworded to enhance item clar-
ility. Teachers rated the resulting 16-item TSRI on the extent to which they agreed with each statement using a 5-point Likert scale (1 = almost never true, 2 = seldom true, 3 = sometimes true, 4 = often true, and 5 = almost always true).

Participants

Eleven classroom teachers (3 men and 8 women) from a secondary school in Singapore participated in Study 1. These teachers taught the participating students on a daily basis for at least 8 months and provided information for Study 1 about their students using the TSRI. Each teacher provided ratings for an average of 20 students. The teachers’ ages ranged from 26 to 50 years (M = 35.73, SD = 8.83). Teachers’ self-reported ethnic identifications were as follows: 81.8% were Chinese, 9.1% were Indian, and 9.1% were Malay. The number of years of teaching experience these teachers had ranged from 2 to 25 years (M = 10.91, SD = 8.14).

A sample of 227 students (106 boys and 121 girls) from the same secondary school also participated in Study 1. These students were from Grades 7 to 9 and their ages ranged from 12 to 17 years (M = 13.10, SD = 1.32). Self-reported ethnic identifications for the students were as follows: 77.1% were Chinese, 12.8% were Indian, 8.4% were Malay, and 1.7% endorsed Others (i.e., ethnic groups not listed).

Measures

The initial version of the TSRI consisted of 16 items and measured teachers’ perception of the affective quality of their relationship with students. The students completed the short form of the Aggression Questionnaire (AQ), which consisted of 15 items (Buss & Warren, 2000). A total AQ score, which is the sum of all 15 items, can be calculated. Each AQ item describes a characteristic related to aggression. For example, a sample item reads as follows: “I have threatened people I know.” Students were asked to rate the description of the items on a scale from 1 (not at all like me) to 5 (completely like me). Higher total AQ scores reflect relatively higher levels of aggression. In the present study, I obtained a Cronbach alpha of .85 with this sample of AQ scores. The AQ has been used widely in many research studies (e.g., Bernstein & Gesn, 1997; Prochazka & Agren, 2001). In addition, scores from the AQ short form are highly correlated with scores from the original 29-item AQ (Bryant & Smith, 2001).

Procedure

In Singapore, the school principal typically grants permission for conducting research and data collection. I sought and obtained approval to conduct the re-
search investigation at the school prior to data collection. I explained the purpose of the study to the teachers and students and obtained consent to participate in the study from both the teachers and students. Participation was strictly voluntary, and questionnaire responses were kept confidential. I also informed the teachers and students that they could refuse or discontinue participation at any time. All questionnaires were administered in English. No translation is needed as English is the main language of instruction for all schools in Singapore.

**Results**

**Exploratory Factor Analysis**

Prior to conducting exploratory factor analysis, I examined two indicators to determine whether the sample was appropriate for such an analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy index was .89, and Bartlett’s test of sphericity was significant, $\chi^2(91, N = 227) = 3091.59, p < .0001$, indicating that the sample and correlation matrix were appropriate for the analysis. I performed EFA using the principal components analysis extraction method with an oblique promax rotation on the 16-item TSRI. An oblique rotation was used because I expected certain components of the teacher–student relationship to be correlated. The number of factors to retain was based on a combination of methods (e.g., parallel analysis, eigenvalue > 1.0, scree plot) as well as conceptual clarity, interpretability and theoretical salience of the rotated factors, and simple structure. My goal was to have the smallest number of possible factors and for each item to load on only one latent factor. Items should preferably load greater than .40 on the relevant factor and less than .40 on all other factors (Stevens, 1996). Of the 16 items, I dropped 2 items from subsequent analyses because they loaded highly on more than one factor. These procedures resulted in a 14-item instrument that accounted for 82.43% of the variance in TSRI scores.

The factor pattern and factor structure coefficients are presented in Table 1, along with communalities ($h^2$) of the measured variables. Table 2 presents the TSRI subscale means and standard deviations, as well as Cronbach alpha coefficients. All 14 items had communalities of at least .60 and above. The first factor consisted of 5 items, accounted for 41.72% of the variance, and was labeled Satisfaction. The first factor contained items that measure the degree to which a teacher experiences a positive and satisfactory relationship with a student. The second factor consisted of 5 items, accounted for 29.03% of the variance, and was labeled Instrumental Help. The second factor contained items that reflect the degree to which a teacher perceives a student to be willing to view the teacher as a resource person and to approach the teacher for advice, sympathy, or help. The third factor consisted of 4 items, accounted for 11.68% of the variance, and was labeled Conflict. The third factor contained items that measure the degree to
<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1 Satisfaction</th>
<th>Factor 2 Instrumental Help</th>
<th>Factor 3 Conflict</th>
<th>$h^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I enjoy having this student in my class.</td>
<td>.86</td>
<td>-.03</td>
<td>-.12</td>
<td>-.57</td>
</tr>
<tr>
<td>2. If the student has a problem at home, he/she is likely to ask for my help.</td>
<td>.01</td>
<td>.90</td>
<td>.90</td>
<td>.04</td>
</tr>
<tr>
<td>3. I would describe my relationship with this student as positive.</td>
<td>.95</td>
<td>.07</td>
<td>-.03</td>
<td>.05</td>
</tr>
<tr>
<td>4. This student frustrates me more than most other students in my class.</td>
<td>-.15</td>
<td>-.02</td>
<td>.05</td>
<td>.73</td>
</tr>
<tr>
<td>5. If this student is absent, I will miss him/her.</td>
<td>.93</td>
<td>-.15</td>
<td>-.24</td>
<td>.12</td>
</tr>
<tr>
<td>6. The student shares with me things about his/her personal life.</td>
<td>.01</td>
<td>.91</td>
<td>.91</td>
<td>-.02</td>
</tr>
<tr>
<td>7. I cannot wait for this year to be over so that I will not need to teach this student next year.</td>
<td>.05</td>
<td>-.41</td>
<td>-.11</td>
<td>.92</td>
</tr>
<tr>
<td>8. If this student is absent, I feel relieved.</td>
<td>.19</td>
<td>-.32</td>
<td>.11</td>
<td>.95</td>
</tr>
<tr>
<td>9. If this student needs help, he/she is likely to ask me for help.</td>
<td>-.01</td>
<td>-.12</td>
<td>.90</td>
<td>.04</td>
</tr>
<tr>
<td>10. The student turns to me for a listening ear or for sympathy.</td>
<td>-.06</td>
<td>-.16</td>
<td>.94</td>
<td>.95</td>
</tr>
<tr>
<td>11. If this student is not in my class, I will be able to enjoy my class more.</td>
<td>-.22</td>
<td>-.61</td>
<td>.02</td>
<td>.11</td>
</tr>
<tr>
<td>12. The student depends on me for advice or help.</td>
<td>.05</td>
<td>.93</td>
<td>.92</td>
<td>.03</td>
</tr>
<tr>
<td>13. I am happy with my relationship with this student.</td>
<td>.97</td>
<td>.94</td>
<td>.05</td>
<td>-.05</td>
</tr>
<tr>
<td>14. I like this student.</td>
<td>.87</td>
<td>.93</td>
<td>.04</td>
<td>-.06</td>
</tr>
</tbody>
</table>

Note. Pattern coefficients with values of .40 or greater are in bold type.
TABLE 2. Teacher–Student Relationship Inventory Subscale Means, Standard Deviations, and Cronbach Alpha Coefficients

<table>
<thead>
<tr>
<th>Subscale</th>
<th>M</th>
<th>SD</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>16.96</td>
<td>4.77</td>
<td>.95</td>
</tr>
<tr>
<td>Instrumental Help</td>
<td>15.02</td>
<td>5.13</td>
<td>.95</td>
</tr>
<tr>
<td>Conflict</td>
<td>8.61</td>
<td>3.89</td>
<td>.88</td>
</tr>
</tbody>
</table>

which a teacher perceives the teacher–student relationship as negative, unpleasant, and conflictual. The percentage of variance explained refers to variance-accounted-for postrotation. These factors capture three different dimensions of the teacher–student relationship and suggest that the TSRI is multidimensional. Structure coefficients (correlations of the measured variables with the extracted factors) are also important aids to interpretation (Courville & Thompson, 2001), especially for correlated factors. I obtained large structure coefficients for all measured variables on all three factors, and these results are consistent with the factor pattern coefficients obtained. As expected, Satisfaction and Conflict scores ($r = -.55, p < .01, d = 1.32$) were moderately negatively correlated with each other, whereas both Instrumental Help and Satisfaction scores ($r = -.12, p > .05, d = .24$) as well as Instrumental Help and Conflict scores ($r = .09, p > .10, d = .18$) were not correlated with each other.

**Internal Consistency**

I computed internal consistency estimates using Cronbach's coefficient alpha for the current sample of secondary school students ($n = 227$). Because only the scores from Satisfaction and Conflict factors were correlated with each other, it does not make theoretical sense to compute a total score for the TSRI. The internal consistency estimates for scores on the three TSRI factors were as follows: Satisfaction (5 items), $\alpha = .95$, Instrumental Help (5 items), $\alpha = .95$, and Conflict (4 items), $\alpha = .88$. These factors tapped into three different dimensions or aspects of the teacher–student relationship.

**Convergent and Discriminant Validity**

The AQ (Buss & Warren, 2000) was used to provide preliminary initial estimates of convergent and discriminant validity for TSRI scores. I expected teachers' perception of conflict in the teacher–student relationship to be aligned closely with students' self-reports of anger and aggression (Birch & Ladd, 1998;
Hughes et al., 1999). Hence, I expected Conflict scores to be positively correlated with AQ scores. I anticipated that the greater the satisfaction perceived by the teacher in the teacher–student relationship, the lower the tendency for anger and aggression to be experienced by the student. Hence, I expected Satisfaction scores to be negatively correlated with AQ scores. On the other hand, the degree to which a teacher perceives a student to be willing to turn to the teacher for advice, sympathy, or help (Instrumental Help) should have little or no relationship with student aggression (Aggression). Put differently, Instrumental Help and Aggression are independent constructs, and I expected scores from the two constructs to be uncorrelated. As predicted, Conflict scores were positively correlated with Aggression scores ($r = .21, p < .01, d = .43$), and Satisfaction scores were negatively correlated with Aggression scores ($r = -.20, p < .01, d = .41$). The magnitude of the correlations was moderate and corresponded to effect sizes in the medium range (Cohen, 1988), suggesting that teachers’ perception of high conflict and low satisfaction in the teacher–student relationship was moderately associated with students’ self-reported aggression. Also as predicted, the results showed that Instrumental Help and Aggression scores were not correlated with each other ($r = .01, p > .10, d = .02$). The magnitude of the correlation and its associated negligible effect size suggest that Instrumental Help and Aggression scores measure distinct constructs (Cohen).

**STUDY 2: CONFIRMATORY FACTOR ANALYSIS**

**Method**

The purpose of Study 2 was to test the factor structure of the scores obtained from the 14-item TSRI in Study 1, with an independent sample, through the use of confirmatory factor analysis (CFA). The Cronbach alpha estimates for the TSRI scores (Satisfaction, Instrumental Help, Conflict) in Study 2 were also calculated. In addition, I assessed predictive validity of TSRI scores on students’ academic achievement.

**Participants**

Nineteen classroom teachers (5 men and 14 women) from an elementary school in Singapore participated in Study 2. These teachers taught the participating students on a daily basis for at least 8 months and provided information for Study 2 about the students using the TSRI. Each teacher provided ratings for an average of 22 students. The teachers’ ages ranged from 25 to 51 years ($M = 36.11, SD = 7.51$). Teachers’ self-reported ethnic identifications were as follows: 78.9% were Chinese, 5.3% were Indian, and 15.8% were Malay. The number of years of teaching experience these teachers had ranged from 2 to 26 years ($M = 65$.)
10.32, $SD = 6.97$). A total of 428 students (206 boys and 222 girls) from the same elementary school also participated in Study 2. The sample consisted of students from Grades 4 to 6 and students’ ages ranged from 9 to 13 years ($M = 10.63$, $SD = 0.65$). Self-reported ethnic identifications for the sample were as follows: 80.8% were Chinese, 8.9% were Indian, 8.9% were Malay, and 1.4% endorsed Others (i.e., other ethnic groups not listed).

**Measures**

The 14-item TSRI was found in Study 1 to have three scales, Satisfaction (5 items, $\alpha = .95$), Instrumental Help (5 items, $\alpha = .95$), and Conflict (4 items, $\alpha = .88$). In Study 2, only the TSRI was administered.

I measured academic achievement using students’ end-of-year cumulative scores, based on an average of their scores in English, mathematics, and science. Scores for each subject ranged from 0 to 100. An average score of the three subjects was obtained as an index of academic achievement. Of the 428 students who participated in Study 2, academic achievement data were available for only 266 students.

**Results**

**Confirmatory Factor Analysis**

I used CFA to test the stability of the three-factor 14-item TSRI ($N = 428$) using EQS Version 6.1 (Bentler, 2004). The hypothesized three-factor model identified via EFA in Study 1 consisted of three first-order latent variables representing the following three scales: Satisfaction (5 indicators), Instrumental Help (5 indicators), and Conflict (4 indicators). In the analysis, I fixed the first of each set of regression paths associated with the factors to 1.0 and constrained each item (measured variable) to load on only one factor. Put differently, the Satisfaction items would have zero loading on the Instrumental Help and Conflict factors, the Instrumental Help items would have zero loading on the Satisfaction and Conflict factors, and, finally, the Conflict items would have zero loading on the Satisfaction and Instrumental Help factors. In addition, correlated errors and other post hoc model respecification were not permitted. I compared the hypothesized three-factor model against a competing one-factor model and a competing two-factor model. The competing one-factor model had all 14 items loading on a single factor. The competing two-factor model was obtained by collapsing the first two TSRI factors, producing a model with a factor representing the positive aspects (Satisfaction/Instrumental Help: 10 items) of teacher–student interactions and another factor representing the negative aspects (Conflict: 4 items) of teacher–student interactions.
I examined multiple fit indices provided by EQS to provide an evaluation of model fit for the hypothesized and competing models. I report the Satorra-Bentler rescaled \( \chi^2 \) (SB\( \chi^2 \); Satorra & Bentler, 1988) because analysis revealed that the data violated the multivariate normality assumption; therefore, I employed robust maximum likelihood estimation in CFA to correct for this violation. I expected nonnormality of the data as previous research in this area also has reported, for example, a general tendency for teachers to view the teacher–student relationship positively (e.g., Pianta, 2001). The SB\( \chi^2 \) has been found to perform consistently well across small, moderate, and large sample sizes; therefore, researchers have recommended its use for nonnormal multivariate data (Curran, West, & Finch, 1996; Hu, Bentler, & Kano, 1992). Other fit indices that were used to assess the adequacy of model fit included the comparative fit index (CFI), the incremental fit index (IFI), and the root mean square error of approximation (RMSEA) and its confidence intervals. For the CFI and IFI, values above .90 and .95 are taken to reflect acceptable and excellent fit to the data, respectively (Hu & Bentler, 1999). RMSEA values of less than .06 indicate a good fit, and values as high as .08 indicate a reasonable fit (Hu & Bentler). Final assessment of fit for all models was based on SB\( \chi^2 \) and its related robust fit indices (CFI, IFI, and RMSEA), but for the sake of completeness, I will also report the uncorrected \( \chi^2 \) statistic.

I conducted a CFA on the scores of the 14-item TSRI. Figure 1 presents the model of the TSRI factor structure. All of the standardized path coefficients were statistically significant and salient (> .40). Results are summarized in Table 3. As expected, the SB\( \chi^2 \) yielded values that were substantially lower than the uncorrected \( \chi^2 \) statistic for all models. The fit indices (SB\( \chi^2/df = 2.19 \); CFI = .96; IFI = .96; RMSEA = .05) suggested that the hypothesized model fit well. In comparison, model fit was poor for both competing models. The results of the CFA provided further preliminary support for the factor structure of the TSRI scores established in Study 1.

### TABLE 3. Summary of Fit Indices From Confirmatory Factor Analyses

<table>
<thead>
<tr>
<th>Model</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>SB( \chi^2 )</th>
<th>CFI</th>
<th>IFI</th>
<th>RMSEA</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesized 3-factor</td>
<td>288.27*</td>
<td>74</td>
<td>161.74*</td>
<td>.96</td>
<td>.96</td>
<td>.05</td>
<td>.04, .06</td>
</tr>
<tr>
<td>Competing 1-factor</td>
<td>2156.06*</td>
<td>77</td>
<td>1179.49*</td>
<td>.48</td>
<td>.49</td>
<td>.18</td>
<td>.17, .19</td>
</tr>
<tr>
<td>Competing 2-factor</td>
<td>1501.30*</td>
<td>76</td>
<td>948.51*</td>
<td>.59</td>
<td>.59</td>
<td>.16</td>
<td>.15, .17</td>
</tr>
</tbody>
</table>

*Note. SB\( \chi^2 \) = Satorra-Bentler rescaled \( \chi^2 \); CFI = comparative fit index; IFI = incremental fit index; RMSEA = root mean square error of approximation; CI = confidence interval for RMSEA.

*\( *p < .01.\)
FIGURE 1. Standardized estimates for the three-factor, 14-item Teacher–Student Relationship Inventory (TSRI). Note. E = error.

**Internal Consistency**

I computed internal consistency estimates using Cronbach’s coefficient alpha for the current sample of elementary school students (N = 428). The internal consistency estimates for the scores on the three TSRI factors were as follows: Satisfaction (5 items), $\alpha = .84$, Instrumental Help (5 items), $\alpha = .94$, and Conflict (4 items), $\alpha = .81$.

**Predictive Validity**

I conducted multiple regression analysis to test whether the three TSRI factors (Satisfaction, Instrumental Help, and Conflict) could predict students’ academic achievement scores. Based on the research literature, positive dimensions (e.g., teacher support) within the teacher–student relationship predicted students’ aca-
academic success, whereas negative dimensions (e.g., negative feedback) within the teacher–student relationship predicted students’ lack of academic success (e.g., Wentzel, 1998, 2002). Hence, I expected both Satisfaction and Instrumental Help to predict students’ academic achievement in a positive direction and Conflict to predict students’ academic achievement in a negative direction. As expected, the three TSRI factors accounted for 23.3% of the variance in students’ academic achievement scores, $F(3, 262) = 26.57, p < .01$. Instrumental Help was a statistically significant positive predictor ($\beta = .49, p < .01$), and Conflict was a statistically significant negative predictor ($\beta = -.16, p < .05$) of students’ academic achievement scores. Satisfaction did not emerge as a statistically significant predictor ($\beta = .02, p > .05$).

**GENERAL DISCUSSION**

The purpose of the present investigation was to construct and validate the scales from a brief self-report inventory to measure teachers’ perceived quality of teacher–student relationships using two samples of Asian students from Grade 4 through Grade 9. Findings from EFA conducted in the first study ($N = 227$) indicated that the TSRI scores have three distinct factors that were labeled Satisfaction, Instrumental Help, and Conflict. This three-factor structure of TSRI scores was confirmed via CFA in the second study ($N = 428$). Multiple fit indices provided support that the hypothesized three-factor model for the TSRI scores had a good fit with the data. Fit indices associated with both the competing one-factor and two-factor models suggested poor fit, thus providing additional support for the three-factor model of TSRI scores. The TSRI scales Satisfaction, Instrumental Help, and Conflict were found to have scores that were internally consistent, and the magnitude of these Cronbach alpha estimates appears adequate for general research purposes (Henson, 2001; Nunnally & Bernstein, 1994).

Based on limited preliminary evidence, TSRI scores do appear to exhibit reasonable levels of convergent and discriminant validity, as well as predictive validity in the samples examined. Consistent with previous research, Conflict scores were positively associated with and Satisfaction scores were negatively associated with students’ aggression scores, and these effects were moderate in magnitude (Cohen, 1988), providing some evidence for the convergent validity of TSRI scores. Instrumental Help scores and students’ AQ scores were uncorrelated with each other, and the negligible effect size estimate provided some evidence for the discriminant validity of TSRI scores. Also in line with previous research in the domain of teacher–student relationships and their influence on academic outcomes, scores from two of the three TSRI scales, Instrumental Help and Conflict, predicted students’ academic achievement scores. This provided some initial evidence of predictive validity of TSRI scores.

The emergence of three factors is consistent with the current literature on
teacher–student relationships (e.g., Davis, 2003; Skinner & Belmont, 1993; Wentzel & Asher, 1995). Findings from the present study provide additional support that positive teacher–student relationships continue to be influential in predicting older elementary and middle school students’ behavioral and academic outcomes. Having a positive and satisfactory relationship with one’s teacher, and a relationship that is free from conflict and negative exchanges, is associated with lower levels of anger and aggression. Furthermore, willingness to approach the teacher for help and to view the teacher as a resource person is predictive of academic achievement. Absence of conflict and negative interaction within the teacher–student relationship is also predictive of academic success. These three facets of teacher–student relationships contribute to positive school adjustment, which is critical for experiencing school success (Juvonen & Wentzel, 1996).

Whereas teacher–student relationships have previously been conceptualized either as a unidimensional construct (e.g., Blankemeyer et al., 2002) or subsumed under larger scales of social support (e.g., Malecki & Demaray, 2002), the nature and dimensionality of teacher–student interactions have not been empirically investigated until recently with the STRS (Pianta, 2001). Like the STRS, the TSRI has three factors, but it differs from the STRS in important respects. Unlike the STRS, the TSRI was developed for use with older children and early adolescents; therefore, items related to Dependency (e.g., clingy child behaviors) are not relevant for this age group. Also, the present study extends research by using appropriate statistical procedures (both EFA and CFA approaches) for the validation of obtained scores from the TRSI.

Some limitations of the study and directions for future work warrant comment. The initial item pool was generated from a review of existing measures of teacher–student relationships. A limitation of working from existing measures is the possible omission of some important dimensions of the teacher–student relationship. For example, studies with middle school students have demonstrated the importance of teachers’ promotion of mutual respect in the classroom (e.g., Anderman, 2003; Murdock, Anderman, & Hodge, 2000). Specifically, Anderman found that students’ perceptions that their sixth-grade teachers promoted mutual respect among classmates predicted a smaller decline in school belonging over time. Thus, a measure of teacher–student relationships that does not include teachers’ communicated respect for students may miss important information.

Only AQ and academic achievement scores were used to provide initial estimates of convergent and discriminant validity and predictive validity, respectively, for TSRI scores in the present investigation. Clearly, further research on establishing the validity of TSRI scores using a variety of measures (e.g., self-report measures, behavioral measures), as well as including another scale such as the STRS, is still very much needed. The present investigation used two independent Asian school-based samples; therefore, the findings should not be generalized beyond Asian school-based samples until current findings have been
replicated in samples from other settings as well as across nationalities and cultures. Future work could consider examining the cross-cultural validity of the scores from the TSRI using multigroup CFA.

In conclusion, the present investigation has presented initial evidence for the reliability and validity of the obtained scores from the 14-item TSRI. This research has extended research on the measurement of the quality of teacher–student interaction in the literature. There is limited existing literature on teacher–student relationships and their influence on the academic and behavioral adjustment of older children and early adolescents. There is also a need to develop a brief measure that yields scores that are reliable and potentially valid. It is hoped that the brief 14-item TSRI, developed and initially validated for use with children from Grade 4 through middle and junior high school, will facilitate research on building supportive relationships between teachers and students.

REFERENCES


