Teacher–child relationship quality and academic achievement of Chinese American children in immigrant families ☆

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ABSTRACT

This study examined the cross-sectional relations between teacher–child relationship quality (TCRQ) and math and reading achievement in a socio-economically diverse sample of Chinese American first- and second-grade children in immigrant families ($N = 207$). Teachers completed a questionnaire measuring TCRQ dimensions including closeness, conflict, and intimacy, and children completed a questionnaire measuring overall TCRQ. Standardized tests were used to assess children's math and reading skills. Analyses were conducted to (a) test the factor structure of measures assessing TCRQ among Chinese American children, (b) examine the associations between teacher- and child-rated TCRQ and children's academic achievement, controlling for demographic characteristics, and (c) examine the potential role of child gender as a moderator in the relations between TCRQ and achievement. Results indicated that teacher-rated TCRQ Warmth was positively associated with Chinese American children's reading achievement. Two child gender-by-TCRQ interactions were found: (a) teacher-rated TCRQ Conflict was negatively associated with girls' (but not boys') math achievement, and (b) child-rated Overall TCRQ was positively associated with boys' (but not girls') reading achievement. These findings highlight the valuable role of TCRQ in the academic success of school-aged children in immigrant families.

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1. Introduction

High quality relationships between children and teachers, defined by high levels of warmth and support and low levels of conflict, have consistently been linked to children's academic achievement and academic engagement (Hamre & Pianta, 2001; Ladd, Birch, & Buhs, 1999). Although the literature has established that teachers' ratings of relationship quality predict children's academic achievement, relatively less is known about the association between child-rated teacher–child relationship quality (henceforth labeled as TCRQ) and elementary school children's academic achievement. Importantly, there is a dearth of literature examining the function of TCRQ in children from Asian American immigrant backgrounds. Using a socio-economically diverse sample of Chinese American school-aged children in immigrant families, the primary aims of the study were to (a) test the factor structure of measures assessing TCRQ among Chinese American children, (b) examine the relations between teacher- and child-rated TCRQ and Chinese American children's performance on standardized tests of reading and math achievement, and (c) test the potential role of child gender as a moderator in the relations between TCRQ and achievement.

1.1. TCRQ and children's academic achievement in the early elementary school years

Developmental theorists posit that the primary school years mark a key period for children's development and achievement (Alexander, Entwisle, Blyth, & McAdoo, 1988). Indeed, formal schooling experiences launch children into achievement trajectories that are highly stable across childhood and adolescence (Entwisle, Alexander, & Olson, 2005). Compared to kindergarten, first grade appears to be a particularly critical developmental stage for children, due to the greater emphasis on emerging literacy and numeracy skills and higher academic expectations (Alexander et al., 1988; Entwisle et al., 2005). These findings underline the importance of examining how early schooling experiences relate to academic adjustment.

Longitudinal research has revealed that children's achievement trajectories are subject to fluctuations and changes in the early school years (Maldonado-Carreño & Votruba-Drzal, 2011). Given the substantial amount of time that children spend in the classroom, often with the same teacher, it is not surprising that TCRQ plays a significant role in elementary school-aged children's adjustment and academic achievement. High TCRQ has the potential to shift the achievement trajectories of children at risk for retention and academic failure (Maldonado-Carreño & Votruba-Drzal, 2011; Pianta & Steinberg, 1992). In understanding the role of TCRQ in children's early achievement, it appears the teacher–child relationship serves a similar function to that of the parent–child relationship (Howes, Hamilton, & Matheson, 1994; Pianta, 1992). Expanding on Ainsworth's theory of attachment (Ainsworth, Blehar, Waters, & Wall, 1978), researchers propose that children who experience high TCRQ utilize teachers as a secure base and a resource for actively exploring the school environment (Howes, Phillipsen, & Peisner-Feinberg, 2000; Hughes, Cavell, & Jackson, 1999). In other words, high TCRQ is expected to encourage students' learning by creating a supportive environment in which children are motivated to actively and appropriately engage in the classroom (Ladd et al., 1999).

Researchers also emphasize the importance of teachers' emotional support in students' engagement and motivation (Crosnoe, Johnson, & Elder, 2004; Hamre & Pianta, 2005). In addition to their instructional support, teachers who are emotionally supportive instill beliefs in children that they play integral and valuable roles in the classroom. These beliefs contribute to children's engagement in academic activities and promote higher levels of achievement over time (Wentzel, 2004). Indeed, the empirical evidence suggests that TCRQ has important implications for children's academic outcomes, particularly for children from higher risk backgrounds. Moreover, the effects of TCRQ on children's academic adjustment may be most significant during the early school grades (Baker, 2006; Wu, Hughes, & Kwok, 2010).

Researchers studying TCRQ have typically conceptualized and assessed TCRQ along different dimensions, including a positive dimension (i.e., closeness or warmth), a conflict dimension, and sometimes, an intimacy or a dependency dimension (Hughes, Gleason, & Zhang, 2005; Pianta, 1992). Empirical support for the multi-dimensional model of TCRQ has been found in ethnically diverse samples of elementary school children (Hughes et al., 2005). In examining TCRQ throughout children's development, investigators have generally found a positive association between high TCRQ (e.g., high warmth and support, low conflict, or both) and children's cognitive abilities and academic adjustment throughout preschool (Howes et al., 1994), elementary school (Birch & Ladd, 1997), and middle school

and high school (Crosnoe et al., 2004; Ryan, Stiller, & Lynch, 1994; Wentzel, 1999). Specifically, teachers' ratings of TCRQ have been positively correlated with children's academic achievement, competent classroom behaviors, and language development (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Pianta, 1999; Pianta & Nimetz, 1991; Pianta & Stuhlman, 2004). Longitudinal studies provided further support that after controlling for children's initial cognitive abilities and demographic factors, TCRQ incrementally predicted future academic outcomes (Hamre & Pianta, 2001; Maldonado-Carreño & Votruba-Drzal, 2011; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008). More recently, researchers have demonstrated that classroom engagement mediated the association between high TCRQ and children's academic achievement (Hughes & Kwok, 2006; O'Connor & McCartney, 2007). That is, high TCRQ was positively associated with students' classroom engagement, which in turn predicted higher academic achievement (Hughes, Luo, Kwok, & Loyd, 2008).

Research examining the stability of TCRQ also highlights the importance of examining teacher–child relationships during the early school years. In a longitudinal study examining TCRQ from kindergarten through the sixth grade, average levels of teacher-reported conflict increased between kindergarten and the fifth grade, with the greatest increases between kindergarten and the first grade (Jerome, Hamre, & Pianta, 2009). Furthermore, as children entered the later elementary school and middle school grades, teacher-rated closeness was lower than in earlier grades (Jerome et al., 2009). These findings suggest that there are significant grade- or age-related changes in TCRQ during the early elementary school years and highlight the importance of understanding the implications of TCRQ for children's academic achievement during this key developmental period.

1.2. Child gender as a potential moderator in the relation between TCRQ and achievement

Teachers' ratings of TCRQ appear to vary by child gender. Specifically, teachers tend to rate their relationships with girls as significantly higher in warmth and closeness than their relationships with boys, and their relationships with boys as significantly higher in conflict than their relationships with girls (Birch & Ladd, 1997; Hamre & Pianta, 2001; Murray & Murray, 2004; O'Connor, 2010). In consideration of these differences and theories of gender socialization and academic risk, researchers have suggested that the association between TCRQ and children's academic outcomes might be moderated by child gender.

Gender socialization theory hypothesizes that teachers' differential treatment of boys and girls may reinforce behaviors in children that reflect traditional relational styles (Koch, 2003). More specifically, girls are socialized to comply and behave responsibly, whereas compliant and responsible boys are regarded as non-masculine (Morris, 2011; Takei, Johnson, & Clark, 1998). As a result, girls are expected to assume the student role, which involves adhering to teachers' directions, paying attention, and completing schoolwork, more readily than boys (Kaufman & Richardson, 1982; Mickelson, 1989, 2003). Based on this theory, a teacher–child relationship that is consistent with gender-based relational styles and traditional gender role expectations should have a stronger impact on the school adjustment of girls compared to boys (Ewing & Taylor, 2009). Consistent with this theory, Baker (2006) found that a close relationship with one's teacher was more strongly related to girls' academic and behavioral outcomes.

A different theory, the academic risk perspective, hypothesized that children who are at higher risk for school failure would have more "to gain, or lose, through their ability to adapt to the social environment of the classroom" (Hamre & Pianta, 2001, p. 627). Based on this perspective, the link between TCRQ and children's academic achievement might be stronger for boys because boys demonstrate higher levels of academic and behavior problems at school entry and are at higher risk for referrals and placements for special education services compared to girls (Cooper & Farran, 1988; Silver, Measelle, Armstrong, & Essex, 2005; Speece & Cooper, 1990; United States Department of Education, 2003).

To date, only a few studies have explicitly tested child gender as a moderator between TCRQ and children's academic outcomes. In a sample of kindergarteners from low-income urban schools, gender was tested as a moderator in the association between TCRQ and early school adjustment, but the moderation was nonsignificant (Murray, Waas, & Murray, 2008). Murray, Waas, et al. (2008) concluded that children from at-risk and low-income samples might benefit from high TCRQ regardless of child gender. Moreover, in a longitudinal study of recently immigrated Latin American youth (ages 9 through 14 during the initial assessment), gender was found to be an important moderator in the relations between perceived school support and youth academic engagement. Specifically, youth-perceived staff support was positively

related to girls' initial engagement levels and positively related to changes in boys' engagement levels over time (Green, Rhodes, Hirsch, Suárez-Orozco, & Camic, 2008). These results suggest that the association between TCRQ and academic achievement might also be moderated by child gender. Furthermore, although overall TCRQ is associated with children's achievement in boys and girls, the unique relations between specific dimensions of TCRQ (e.g., closeness vs. conflict) and specific domains of achievement (e.g., reading vs. math) might vary by child gender. Therefore, more research is needed to examine the potential role of child gender as a moderator in the TCRQ-achievement associations.

1.3. Children's perceptions of TCRQ

TCRQ has primarily been examined from the teacher's perspective, especially when TCRQ was assessed with elementary school-aged children (e.g. Li, Hughes, Kwok, & Hsu, 2012; Saft & Pianta, 2001). Few studies have assessed elementary school-aged children's perceptions of TCRQ, and those that have revealed that teachers and children share little agreement in their reports of TCRQ (Hughes et al., 1999; Li et al., 2012; Murray, Murray, & Waas, 2008). For example, in a sample of second and third grade academically at-risk students (which consisted primarily of Hispanic, Caucasian, and African American students), Li et al. (2012) found that children's ratings of teacher support were not significantly correlated with either teacher or peer reports of teacher support. Yet despite the lack of concordance in perceptions of TCRQ across reporters, children's ratings of teacher support predicted teacher-rated academic engagement, suggesting that children's perceptions of TCRQ play a role in their academic motivation and achievement, at least as perceived by teachers (Li et al., 2012).

Research with older youth in the seventh through twelfth grades also suggests that students' perceptions of TCRQ are valuable predictors of academic achievement (Crosnoe et al., 2004). Of note, this association has also been observed cross-culturally, using Chinese seventh-grade adolescents' (mean age = 12 years) ratings of TCRQ to predict grade point averages (Jia et al., 2009). Thus, despite the minimal concordance between teacher and student reports of TCRQ, these studies outline the importance of assessing TCRQ from both perspectives.

1.4. Relations of TCRQ to achievement in ethnic minority children and children in immigrant families

Examining the association of TCRQ and children's early academic performance is particularly important for children in immigrant families. Given that youth in immigrant families often encounter barriers to education such as low English proficiency, limited parent involvement, and discrimination, teachers may play a particularly important role in promoting youth's academic engagement and achievement (Suárez-Orozco, Suárez-Orozco, & Todorova, 2008). As of 2007, more than one in five children in the United States had at least one immigrant parent (Fortuny, Capps, Simms, & Chaudry, 2009). Census data suggest that the percentage of school-aged children with immigrant parents will increase in the near future (Fortuny et al., 2009). However, much remains unknown about the early academic development of children in immigrant families (Crosnoe & Lopez Turley, 2011). Furthermore, despite the fact that Asian Americans constitute the second largest foreign-born population and are one of the fastest growing populations in the United States (Schmidley, 2001), research on TCRQ in Asian American children, especially those in immigrant families, is almost nonexistent. Contrary to the public image of Asian Americans as "model minorities" who are high-achieving, substantial heterogeneity has been found in the academic performance among Asian Americans (Tran & Birman, 2010). Although researchers have examined how family factors are related to the academic competence of Asian American children (e.g., Fuligni, 1997; Sung & Lee, 2009), there is a dearth of empirical literature examining school and classroom factors, including TCRQ, as predictors of Asian American children's academic achievement (Han, 2008).

To our knowledge, there has been no study examining the link between TCRQ and academic outcomes in samples of Asian American children. However, these relations have been investigated among children and adolescents from other ethnic and immigrant groups. For example, in a study examining children from preschool to the second grade, TCRQ closeness was positively associated with children's achievement across ethnicities. However, associations between TCRQ closeness and language skills were stronger for African American children than European American children (Burchinal et al., 2002). In a study of seventh- to twelfth-grade youth, although student-rated TCRQ was positively associated with academic achievement

for adolescents of all ethnic backgrounds, this link appeared strongest for Hispanic American girls (Crosnoe et al., 2004). Together, these findings highlight the importance of testing the generalizability of the TCRQ-achievement relations found in European American samples to children of ethnic minority and immigrant backgrounds.

Due to the rapid growth of the Asian American population, research on TCRQ in Asian American children is a high priority. Accounting for 23% of the Asian American population, Chinese Americans comprise the largest Asian American group in the United States (United States Census Bureau, 2005). Despite vast differences in the family structure, socioeconomic status (SES), beliefs, and practices within this group, Chinese Americans share some cultural characteristics, including their high value of education and high regard for teachers. In the traditional Chinese society, teachers are viewed as one of the most salient influences in a child's life (Stevenson & Stigler, 1992). In addition to transmitting information, teachers are responsible for promoting moral and ethical views in their students (Altbach, 1991). Furthermore, among families in China, teachers are believed to be "better suited" than parents for socializing children, due to concerns that the one-child policy might contribute to parents spoiling a generation of only children (Tobin, Wu, & Davidson, 1989). As a result, Chinese parents hold teachers in high regard and children are raised to obey and respect their teachers unequivocally. Given the traditional Chinese culture's conceptualization of the teacher as a model of morality and a means of socialization, one would expect that the positive association between TCRQ and children's achievement could be generalized to Chinese American children. Yet, it is important to evaluate this assumption with empirical data. Moreover, research on TCRQ and its relations to academic achievement among Chinese or Asian American children can inform the development of culturally-sensitive school-based interventions aimed at improving TCRQ and promoting academic success in this growing population.

1.5. The present study

To build on the current state of the literature, we investigated the role of teachers' and children's ratings of TCRQ in predicting the academic achievement of a socio-economically diverse sample of Chinese American children from immigrant families. To reduce shared method effects, children's reading and math achievement were measured using standardized achievement tests. Confirmatory factor analysis was conducted to examine the factor structure of teacher- and child-rated measures of TCRQ in our Chinese American sample because the instruments assessing TCRQ have not been extensively used with Asian American children in immigrant families. Our main data analyses focused on examining the unique relations of TCRQ to children's academic achievement, controlling for demographic characteristics. Based on prior theories that dimensions of TCRQ might relate differentially to children's outcomes depending on child gender (Baker, 2006; Ewing & Taylor, 2009; Hamre & Pianta, 2001), child gender was tested as a moderator in the association between TCRQ and achievement. Given that our sample size is relatively small for detecting interaction effects in multiple regressions (Aiken & West, 1991), we increased the alpha error rate to .10 to boost the statistical power for testing interactions (Cohen, 1988). We performed separate analyses for math and reading achievement because previous research suggests that the association between TCRQ and children's academic achievement might differ by domain of achievement (Hughes et al., 2008; Pianta et al., 2008).

2. Method

2.1. Participants

2.1.1. Child characteristics

The sample was drawn from a longitudinal study focusing on the psychological adjustment and academic achievement of Chinese American children in immigrant families. From the original sample of 258 children, 48 children did not have teacher data (i.e., their current or previous teachers did not return the teacher questionnaires), and 3 children were excluded because they were in the third grade at the time of the assessment. The 207 children (80.2%) included in the sample were compared to the 51 children who participated in the larger study and were excluded from the present analyses. The two groups did not

differ on any key child demographic characteristics (i.e., age, gender, grade, and generation status) or family demographic characteristics (i.e., parental education and family income).

In the present sample, the mean age was 7.41 years ($SD = 0.69$, range $= 5.81$ to 9.14 years) and about half of the children ($n = 104$, 50.2%) were girls. Students were in the first ($n = 95$, 45.9%) or second ($n = 112$, 54.1%) grades. A total of 44 (21.3%) children were born outside of the United States (first-generation), and 163 (78.7%) children were born in the United States and had at least one parent born outside of the United States (second-generation). A small number ($n = 18$, 8.7%) of children's current classroom teachers were unable to return the questionnaire or declined to participate. For these cases, data were collected from the children's previous teachers.

2.1.2. Family characteristics

The majority of parents in the present sample were born outside of the United States, with 76.3% of mothers born in mainland China, 10.1% in Hong Kong, 2.4% in Taiwan, 10.1% in "Other," and 1.0% in the United States. Similarly, the majority of fathers were born outside of the United States, with 67.8% of fathers born in mainland China, 9.3% in Hong Kong, 2.4% in Taiwan, 17.1% in "Other," and 3.4% in the United States. In this sample, 92.8% of parents were either married to or living with a partner; the remainder were single (never married), widowed, divorced, or separated. In terms of parent employment, 87.2% of fathers and 59.6% of mothers reported full-time employment, 3.2% of fathers and 13.5% of mothers reported part-time employment, and 9.6% of fathers and 26.9% of mothers were unemployed or described themselves as homemakers. When asked to report their ability to speak English on a parent questionnaire, 16% percent of parents rated their ability as "good" or "very good," whereas 84% of parents rated their English speaking as "average," "poor," or "extremely poor."

Based on previous research suggesting that parental educational attainment and family income are important indicators of household SES, indicators used to assess family SES in the present study included parents' highest education level attained and the family's estimated per capita income (Shavers, 2007). We computed a composite family SES index by averaging maternal and paternal education levels and then averaging the standardized scores of parental education and per capita income. Families' per capita income was calculated by dividing the total family income for the past year by the number of individuals living in the household (Datta & Meerman, 1980). In this sample, parents' highest levels of education were slightly higher than a high school education with means of 13.10 years ($SD = 3.11$) for fathers and 13.21 years ($SD = 2.50$) for mothers. Families' estimated per capita income for the past year ranged from $625 to $50,000 ($M = \$11,948.96$, $SD = \$8,474.61$). Although not included as an indicator of SES in the data analyses, 57.8% of children in the present sample were eligible for free or reduced school lunches.

2.2. Measures

2.2.1. Teacher-rated TCRQ

The Teacher Relationship Inventory (TRI; Hughes, Cavell, & Willson, 2001) is a 22-item questionnaire measuring a teacher's perceptions of relationship quality with a particular student. It was developed from the Network of Relationships Inventory (Buhrmester & Furman, 1987). The measure has three subscales: (a) Warmth (13 items, e.g., "I find I am able to nurture this child"), (b) Intimacy (3 items, e.g., "This child shares his or her secrets and private feelings with me"), and (c) Conflict (6 items, e.g., "This child and I often argue with each other"). Teachers rate the items using a Likert-type scale ranging from (1) *not true at all* to (5) *very true*.

Previous research suggested that the three-factor model reflecting the three subscales provided a good fit (Hughes et al., 2005). However, because confirmatory factor analysis of the TRI has not been conducted using an Asian American sample, Mplus 5.2 software (Muthen & Muthen, 1998–2006) was used to test whether the three-factor structure fits well with the current sample. Maximum-likelihood estimation procedures were used. The cutoff criteria from Hu and Bentler (1999) were used to determine a relatively good fit with the data and hypothesized model. These criteria were a comparative fit index (CFI) $\geq .95$, a standardized root-mean-square residual (SRMR) $\leq .08$, and a root mean square error of approximation (RMSEA) $\leq .06$.

A confirmatory factor analysis was conducted with 202 children who had data on the TRI, and the results indicated that the three-factor model reflecting the subscales provided an adequate fit for the data,

$\chi^2 (df = 191) = 231.156$, $p = .03$, CFI = .985, SRMR = .049, and RMSEA = .032. All of the coefficients from the factors to the designated items were statistically significant and positive; standardized loadings ranged from .41 to .90, further supporting the three-factor structure. Analyses of the correlations between factors indicated statistically significant relations between Intimacy and Warmth ($r = .39$, $p < .001$) and Conflict and Warmth ($r = -.46$, $p < .001$) but a nonsignificant relation between Conflict and Intimacy ($r = -.03$, $p = .66$). Based on the results of the confirmatory factor analysis, composite scores for Warmth, Intimacy, and Conflict were computed by averaging the corresponding item scores. In this sample, internal consistency reliability coefficients (i.e., alpha coefficients) were .94 for Warmth, .85 for Intimacy, and .85 for Conflict.

To examine whether this three-factor model provided a better fit than a single-factor model reflecting overall TCRQ, we also tested a single-factor model in which all 22 items were constrained to load onto one factor. Although the single-factor model provided an adequate fit for the data, the fit indexes were slightly worse when compared to the three-factor model: $\chi^2 (df = 181) = 249.163$, $p < .001$, CFI = .975, SRMR = .068, RMSEA = .043. Given that the two models are not nested, Akaike's Information Criterion (AIC) was used to compare model fits, with a lower AIC indicating better model fit (Bollen, 1989). Based on AIC, the three-factor model (AIC = 9462.323) provided a better fit than the single-factor model (AIC = 9500.330). Moreover, the standardized loadings from the single-factor model were relatively low, especially for items on the Conflict and Intimacy subscales (absolute values ranged from .14 to .50 and .25 to .39, respectively). Based on these analyses and consistent with research that conducted a factor analysis of the TRI with a different sample (e.g., Hughes et al., 2005), the three-factor model best reflected the dimensionality of teacher-reported TCRQ in the present study.

2.2.2. Child-rated TCRQ

Children rated TCRQ with their current classroom teachers using an adapted version (see Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008) of the Student–Teacher Relationship Scale (STRS; Pianta, 2001). The child-rated adapted STRS includes 18 items assessing a child's perceived relationship with his or her teacher and renders only one total score of Overall TCRQ. The adaptation from the original STRS (which is a teacher-rated scale) primarily involved changes in wording that made the items age appropriate for children in early elementary school. For example, "I share an affectionate, warm relationship with this child" was changed to "Does your teacher make you feel happy?" (C. Valiente, personal communication, March 14, 2012). Other sample items from the adapted scale include: "Does your teacher tell you she or he is proud of you?", "Does your teacher listen to what you say if you got into trouble?", and "Does your teacher know you very well?".

The changes in item content by Valiente et al. (2008) appear to have altered the constructs measured by the original STRS. Items on the original STRS were thought to measure multiple factors, including Closeness, Conflict, and Dependency (Pianta, 2001), and the child-rated adapted STRS altered critical features of these original items. For example, "This child and I always seem to be struggling with each other" (an original STRS item reflecting conflict) was changed to "Does your teacher like to be with you" (a child-rated adapted STRS item no longer reflecting conflict). Indeed, reviewing the item content on the child-rated adapted STRS suggests that it only measures the general construct of Overall TCRQ, rather than specific dimensions of quality (i.e., Closeness, Conflict, or Dependency). In an ethnically diverse sample of 7- to 12-year-old children, the child-rated adapted STRS showed satisfactory alpha reliability (.92), and the overall score of TCRQ significantly correlated with children's grade point averages in the expected direction (Swanson, Valiente, & Lemery-Chalfant, in press; Valiente et al., 2008).

Examiners read each item from the child-rated adapted STRS and provided a visual aid indicating the Likert-type scale ranging from (1) *not at all* to (3) *a lot of the time*. Children were asked to point to the scale to indicate the extent to which they agreed with each statement. Children responded to the adapted scale in their preferred language (English, Mandarin Chinese, or Cantonese Chinese). The majority of children in the present sample ($n = 196$, 94.7%) completed the questionnaire in English, whereas a small number of children ($n = 11$, 5.3%) completed the questionnaire in Mandarin Chinese or Cantonese Chinese. Following procedures recommended by Knight, Roosa, and Umaña-Taylor (2009), the Chinese versions of the adapted STRS were translated, back-translated, and pilot-tested by the investigative team.

To assess fit of the hypothesized factor structure of the child-rated adapted STRS with our Chinese American sample, a confirmatory factor analysis was conducted with 206 children who had data on child-reported TCRQ. A single-factor model was tested because all of the items are believed to tap into

the overall quality of a child's perceived teacher–child relationship (C. Valiente, personal communication, March 14, 2012; Valiente et al., 2008). To improve the model fit, the error terms of individual items were allowed to correlate if doing so significantly improved model fit. A significant correlation between two error terms is likely when two items are more similar in meaning or wording than they are to other items (e.g., "Does he or she cheer you up if you feel sad?" and "Does he or she make you feel better if something is bothering you?"). In addition, in preliminary analyses, one item ("Does your teacher like other kids in your class better than you?") did not load significantly onto the factor. Because this item is the only negatively worded item on the measure, it is likely that children had some difficulty responding to negatively worded items. After dropping this item, the single-factor model provided a good fit for the data, χ^2 ($df = 75$) = 89.08, $p = .13$, CFI = .967, SRMR = .045, and RMSEA = .03. All of the coefficients from the factor to the designated items were statistically significant and positive; standardized loadings ranged from .26 to .61. Thus, the single-factor model of the 17-item scale fit well with the present Chinese American sample.

Based on these results, a composite score of child-rated Overall TCRQ was computed by averaging the corresponding item scores. The internal consistency reliability coefficient (i.e., alpha coefficient) for the 17-item scale in the present sample was .82. We also computed a comparable reliability coefficient for the scale with the subsample of children ($n = 11$, 5.3%) who completed the measure in Cantonese Chinese or Mandarin Chinese, and the resulting coefficient was .84. Thus, it is unlikely that the language in which the instrument was administered affected the reliability of scores on the scale. Unfortunately, the sample size was too small to permit assessment of the invariance of the measurement model across forms.

2.2.3. Academic achievement

To assess children's academic skills in math and reading, four subtests from the Woodcock-Johnson III Tests of Achievement III (WJ III; Woodcock, McGrew, & Mather, 2001) were individually administered to children during the laboratory assessment. The Math Calculation Skills cluster was comprised of the Calculation subtest and the Math Fluency subtest. The Calculation subtest required children to solve arithmetic computations of increasing difficulty, and the Math Fluency subtest required children to perform simple calculations within a time limit. The Basic Reading Skills cluster was comprised of the Letter–Word Identification subtest and the Word Attack subtest. The Letter–Word Identification subtest required children to name and read words from a list, and the Word Attack subtest required children to read nonwords. In previous studies, the WJ III has demonstrated good psychometric properties, with reliabilities at .80 or above for the individual subtests (Woodcock et al., 2001), and median cluster reliabilities at .95 and .91 for Basic Reading Skills and Math Calculation Skills, respectively (Schrank, McGrew, & Woodcock, 2001). The WJ III is standardized with a mean score of 100 and a standard deviation of 15. In the present study, the age-standardized scores were used.

Given that the Basic Reading Skills cluster was used to measure children's English reading skills, the subtests were administered in English, regardless of the child's preferred language. For the Math Calculation Skills cluster, to ensure equivalence with the English instructions, verbal instructions to subtests (which consisted of a few sentences at the beginning of testing) were translated into Mandarin Chinese or Cantonese Chinese and back-translated into English by bilingual members of the investigative team. When they were asked, the majority of children in the present sample preferred to receive verbal instructions for the Math Calculation Skills cluster subtests in English ($n = 188$, 91.1%), whereas a small number of children preferred to receive the instructions in Mandarin Chinese or Cantonese Chinese ($n = 19$, 8.9%). Children's standardized scores on the Math Calculation cluster did not differ significantly by language of verbal instruction, $Ms = 127.05$ for children who were given the verbal instructions in English and 122.47 for those who were given the instructions in Chinese, $t(df = 207) = 1.15$, $p = .25$. Therefore, the language in which test instructions were administered did not significantly affect children's performance on the math tests.

2.3. Procedure

2.3.1. Recruitment

Chinese American immigrant families were recruited using various recruitment strategies, including (a) on-site recruitment fairs at shopping centers and grocery stores within Asian and Chinese American communities (58.5% of the present sample), (b) distribution of flyers at public and private schools with a

large proportion of Asian American students (21.7%), and (c) referrals from community organizations (e.g., afterschool programs, churches, and nonprofit organizations) serving Chinese Americans (19.8%). On study flyers and at the recruitment fairs, the project was described as a research study examining Chinese American children's psychological adjustment and academic achievement. Interested parents provided staff members with their phone number. Staff members conducted a follow-up pre-screening phone interview to determine eligibility. Eligibility criteria included (a) children were in the first or second grade at the time of screening, (b) children lived with at least one of their biological parents, (c) both biological parents identified as ethnic Chinese, (d) children were either first-generation (i.e., born outside of the United States) or second-generation (born in the United States and had at least one parent born outside of the United States) Chinese American, and (e) parents and children were able to understand and speak English or Chinese (Mandarin or Cantonese). Of the 380 children whose parents expressed an initial interest in the study, 353 were screened, of which 291 were found to be eligible. Of those who met the eligibility criteria, 258 children and their parents completed the assessment. A total of 207 children had teacher-report data, were in first or second grade at the time of assessment, and were included in the present study.

2.3.2. Assessment

Children participated in a 2.5-hour laboratory assessment that included the measures described previously plus additional tasks not included in the present study. Trained bilingual undergraduate students and graduate students conducted assessments in children's preferred language (i.e., English, Mandarin Chinese, or Cantonese Chinese). Before conducting the assessment, examiners discussed the voluntary and confidential nature of the study with parents and children, and parental consent and child assent were obtained. In particular, examiners assured children that their teacher and parent(s) would not have access to their ratings. After completing the assessment, children were given two toys, and parents were paid for their participation. All procedures had been approved by the Institutional Review Board at the authors' institution.

After the laboratory assessment and with parental permission, the research staff contacted children's classroom teachers to ask them to fill out teacher questionnaires by mail. For the majority of children in the sample ($n = 189$, 91.3%), teacher questionnaires were completed by the children's current classroom teachers. For children whose current classroom teachers declined to participate or were unable to return the questionnaires ($n = 18$, 8.7%), teacher data were collected from children's classroom teachers from the previous academic year. A total of 126 teachers from over 80 public and private schools participated in the study. Each teacher rated between 1 and 10 students. However, the majority of teachers ($n = 95$, 75.4%) rated their relationship with a single student. Teachers were paid for participation.

3. Results

Descriptive statistics are presented in Table 1. Using West, Finch, and Curran's (1995) cutoffs of 2 and 7 as indicators of high skewness and high kurtosis, respectively, we found no study variables with significant issues of univariate non-normality.

3.1. Correlation analyses

3.1.1. Correlations between study and demographic variables

A correlation matrix among all study and demographic variables is presented in Table 2. Among the demographic variables, child gender was significantly correlated with the teacher-rated TCRQ Warmth composite score ($r = -.24$, $p < .01$) and the TCRQ Conflict composite score ($r = .27$, $p < .001$). Teachers rated their relationships with girls as higher in Warmth and Intimacy and lower in Conflict compared to their relationships with boys. Children's generation status was unrelated to teachers' and children's reports of TCRQ. However, children's generation status was significantly and positively correlated with children's reading achievement ($r = .19$, $p < .01$), such that second-generation Chinese American children scored higher on reading achievement than first-generation children. Child grade was significantly positively correlated with math achievement ($r = .20$, $p < .01$) and negatively correlated with reading achievement ($r = -.21$, $p < .01$) such that the children in the second grade had higher standardized test

Table 1
Descriptive statistics for predictor and outcome variables for the full sample, girls, and boys.

Variable	Full sample (n = 207)				Girls (n = 104)				Boys (n = 103)			
	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
TCRQ intimacy (T)	2.24	1.00	0.47	−0.81	2.38	1.03	0.24	−1.19	2.10	0.96	0.74	−0.13
TCRQ warmth (T)	4.28	0.70	−1.17	0.67	4.45	0.56	−1.73	3.79	4.11	0.79	−0.74	−0.54
TCRQ conflict (T)	1.48	0.70	1.96	3.65	1.29	0.44	1.97	4.15	1.66	0.85	1.46	1.32
Overall TCRQ (C)	2.26	0.35	−0.34	0.01	2.29	0.34	−0.42	0.16	2.23	0.36	−0.24	−0.04
Math calculation	126.85	15.20	0.49	0.84	125.83	16.05	0.94	1.29	127.89	14.29	−0.09	0.56
Basic reading	114.39	10.39	−0.21	1.20	114.60	10.44	−0.23	1.85	114.19	10.40	−0.20	0.66

Note. SD = standard deviation, TCRQ = teacher–child relationship quality, T = teacher report, C = child report.

Table 2
Zero-order correlations for all study and demographic variables.

	1	2	3	4	5	6	7	8	9	10	11
1. Child gender[a]	–										
2. Generation status[b]	−0.03	–									
3. Grade[c]	−0.13	−0.10	–								
4. Mother's education	−0.05	0.11	−0.16[*]	–							
5. Father's education	−0.02	0.12	−0.10	0.60[***]	–						
6. Per capita income	−0.02	0.21[**]	−0.14[*]	0.57[***]	0.55[***]	–					
7. TCRQ intimacy (T)	−0.14	0.03	0.03	−0.10	−0.03	−0.15[*]	–				
8. TCRQ warmth (T)	−0.24[**]	0.06	0.01	0.000	0.05	0.01	0.39[***]	–			
9. TCRQ conflict (T)	0.27[***]	−0.04	−0.04	0.05	0.03	0.05	−0.03	−0.46[***]	–		
10. Overall TCRQ (C)	−0.08	−0.04	0.003	0.04	0.11	−0.01	0.02	0.12	−0.09	–	
11. Math calculation	0.07	−0.10	0.20[**]	0.04	0.04	−0.01	0.001	0.14[*]	−0.16[*]	0.09	–
12. Basic reading	−0.02	0.19[**]	−0.21[**]	0.26[***]	0.19[*]	0.19[*]	0.05	0.16[*]	−0.04	0.13	0.37[***]

Note. The *ns* for the correlations ranged from 193 to 207. TCRQ = teacher–child relationship quality, T = teacher report, C = child report.
[a] Child gender is coded as 0 = girls, 1 = boys.
[b] Generation status is coded as 0 = 1st generation, 1 = 2nd generation.
[c] Grade is coded as 0 = 1st grade, 1 = 2nd grade.
[*] $p < .05$.
[**] $p < .01$.
[***] $p < .001$.

scores in math achievement and lower standardized scores on reading achievement than children in the first grade.

With regard to family SES, parental education levels were unrelated to any of the TCRQ variables. However, parental education levels were significantly and positively correlated with children's reading achievement ($rs = .26$ and .19 for maternal and paternal education levels, $ps < .001$ and .05, respectively). Family's per capita income was significantly and negatively correlated with the teacher-rated TCRQ Intimacy composite score, suggesting that teachers perceived more intimate relationships with children from lower income families compared to those from higher income families ($r = −.15$, $p < .05$). Moreover, per capita income was significantly and positively correlated with reading achievement, such that children from higher income families scored higher on reading achievement than children from lower income families ($r = .19$, $p < .05$).

3.1.2. Correlations between TCRQ and achievement

As evident in Table 2, the teacher-rated TCRQ Warmth composite score was significantly and positively correlated with children's math and reading achievement ($rs = .14$ and .16, $ps < 0.05$, respectively), whereas the teacher-rated TCRQ Conflict composite score was significantly and negatively correlated with children's math achievement ($r = −.16$, $p < .05$). There were no statistically significant correlations between the child-rated Overall TCRQ score and children's academic achievement.

3.2. Regression analyses

Children were clustered into classes because some teachers ($n = 31$, 24.6%) completed questionnaires for more than one child. We computed the intraclass correlations (ICCs) for study variables, and the ICCs ranged from .04 to .41 in the present sample. However, all design effects (i.e., [average cluster size $−1] × ICC$) were less than 2. When the design effect is below 2, there is no advantage to using multilevel analyses and no danger of bias from more common statistical procedures (Muthen & Satorra, 1995). Therefore, we tested our hypotheses using Ordinary Least Squares regression analyses.

We examined the unique relations of TCRQ to children's academic achievement, controlling for demographic variables, and tested potential moderation by child gender in the association between TCRQ and academic achievement. A set of hierarchical regression analyses was conducted to predict children's math and reading achievement scores from predictors entered in the following order (1) the covariates, including child gender, grade, generation status, and family SES, (2) the main effects of the TCRQ

variable(s), and (3) the two-way interaction term(s) between TCRQ and child gender. Given that teachers and children rated TCRQ using different measures, and because we were interested in how teacher- and child-perceived TCRQ independently predicts achievement, separate regressions were tested using teachers' ratings (see Table 3) and children's ratings (see Table 4). As recommended by Aiken and West (1991), the continuous predictors were mean-centered prior to computing the interaction terms to minimize multicollinearity and to aid interpretation. Given that our sample size is relatively small for detecting interaction effects in multiple regressions (Aiken & West, 1991), we increased the alpha error rate to .10 to boost the statistical power for testing interactions (Cohen, 1988) and recognize that this increase also leads to an inflated Type I error rate. For all other tests of statistical significance, an alpha of .05 was used.

3.2.1. Teacher's ratings of TCRQ as predictors of achievement (Table 3)

For the regression predicting math achievement, child grade was a significant predictor in Step 1, suggesting that children in the second grade scored higher on math achievement than children in the first grade ($\beta = 0.20$, $p < .01$). At Step 2, none of the teacher-rated TCRQ predictors uniquely predicted math achievement. At Step 3, there was a marginally significant interaction of child gender × TCRQ Conflict composite ($\beta = 0.31$, $p < .10$). Following Aiken and West (1991), simple slope analyses were performed to probe the interaction. As shown in Fig. 1a, the teacher-rated TCRQ Conflict composite score negatively predicted math achievement for girls ($\beta = -0.42$, $p < .05$), but it did not predict math achievement for boys ($\beta = -0.07$, $p = 0.44$).

For the regression predicting reading achievement, at Step 1, child generation status ($\beta = 0.15$, $p < .05$), family SES ($\beta = 0.19$, $p < .01$), and child grade ($\beta = -0.21$, $p < .01$), were statistically significant predictors. Specifically, reading achievement scores were higher for (a) second-generation Chinese American children compared to first-generation children, (b) children from higher SES families compared to children from lower SES families, and (c) first-grade children compared to second-grade children. At Step 2, the teacher-rated TCRQ Warmth composite score uniquely and positively predicted reading achievement ($\beta = 0.17$, $p < .05$). At Step 3, none of the gender × TCRQ interaction terms were statistically significant.

Table 3
Teacher-rated TCRQ as predictors of children's academic achievement.

Predictor	DV: Math Calculation			DV: Basic Reading		
	B	β	$\triangle R^2$	B	β	$\triangle R^2$
Step 1			0.05[a]			0.13[b]
Child gender[c]	2.65	0.09		−0.75	−0.04	
Generation status[d]	−3.47	−0.09		3.74[a]	0.15	
Grade[e]	6.02[f]	0.20		−4.27[f]	−0.21	
Family SES	1.26	0.07		2.35[f]	0.19	
Step 2			0.05[a]			0.02
TCRQ intimacy (T)	−0.38	−0.03		0.03	0.003	
TCRQ warmth (T)	2.70	0.12		2.41[a]	0.17	
TCRQ conflict (T)	−3.39	−0.16		0.40	0.03	
Step 3			0.02			0.01
Intimacy (T) × gender	0.21	0.01		−1.28	−0.09	
Warmth (T) × gender	3.41	0.13		2.58	0.14	
Conflict (T) × gender	7.78[g]	0.31		3.42	0.20	
Total adjusted R²			0.08			0.12
N	199			199		

Note. TCRQ = teacher–child relationship quality, T = teacher report.
[a] $p < .05$.
[b] $p < .001$.
[c] Child gender is coded as 0 = girls, 1 = boys.
[d] Generation status is coded as 0 = 1st generation, 1 = 2nd generation.
[e] Grade is coded as 0 = 1st grade, 1 = 2nd grade.
[f] $p < .01$.
[g] $p < .10$.

Table 4
Child-rated TCRQ as a predictor of children's academic achievement.

Predictor	DV: Math Calculation			DV: Basic Reading		
	B	β	$\triangle R^2$	B	β	$\triangle R^2$
Step 1			0.06[a]			0.12[b]
Child gender[c]	2.92	0.10		−0.52	−0.03	
Generation status[d]	−3.49	−0.09		3.50[a]	0.14	
Grade[e]	6.35[f]	0.21		−3.51[a]	−0.17	
Family SES	1.48	0.08		2.56[f]	0.21	
Step 2			0.01			0.02
Overall TCRQ (C)	3.83	0.09		3.65	0.12	
Step 3			0.01			0.01[g]
Overall TCRQ (C) × gender	8.24	0.14		6.87[g]	0.16	
Total adjusted R²			0.05			0.12
N	206			206		

Note: TCRQ = teacher–child relationship quality, C = child report.
[a] $p<.05$.
[b] $p<.001$.
[c] Child gender is coded as 0 = girls, 1 = boys.
[d] Generation status is coded as 0 = 1st generation, 1 = 2nd generation.
[e] Grade is coded as 0 = 1st grade, 1 = 2nd grade.
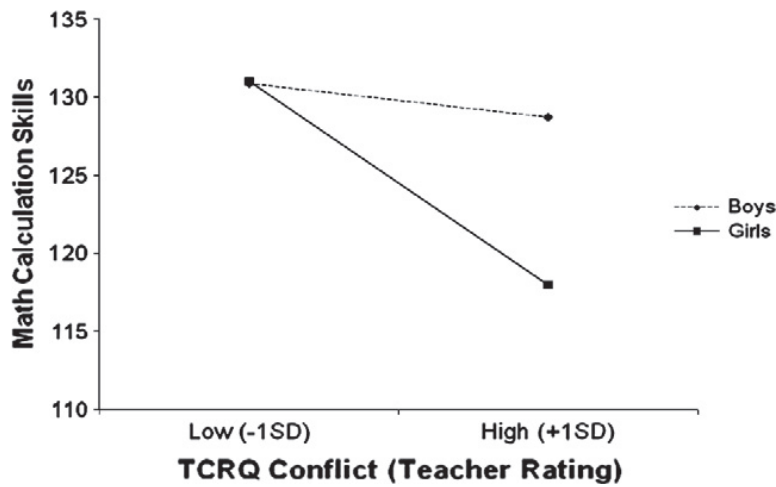[f] $p<.01$.
[g] $p<0.10$.

3.2.2. Children's ratings of overall TCRQ as a predictor of achievement (Table 4)

In the two regressions predicting academic achievement from the child-rated Overall TCRQ score, the effects of the covariates at Step 1 were similar to those reported above for the teacher-rated TCRQ composite scores. For the regression predicting math achievement, child grade was a significant predictor in Step 1, suggesting children in the second grade scored higher on math achievement than children in the first grade ($\beta = 0.21$, $p<.01$). For the regression predicting reading achievement, scores were higher for (a) second-generation Chinese American children compared to first-generation children ($\beta = 0.14$, $p<.05$), (b) children from higher SES families compared to children from lower SES families ($\beta = 0.21$, $p<.01$), and (c) first-grade children compared to second-grade children ($\beta = -0.17$, $p<.05$). At Step 2, the child-rated overall TCRQ score did not significantly predict math achievement or reading achievement. At Step 3, there was a marginally significant interaction of child gender × overall TCRQ for reading achievement ($\beta = 0.16$, $p<.10$). As shown in Fig. 1b, simple slope analyses indicated that the child-rated Overall TCRQ score positively predicted reading achievement for boys ($\beta = 0.23$, $p<.05$), but it did not predict reading achievement for girls ($\beta = 0.001$, $p = .99$).

4. Discussion

To our knowledge, this is the first study to examine the association between TCRQ and academic achievement in Chinese American school-aged children in immigrant families. Confirmatory factor analyses indicated that the three-factor teacher-rated TCRQ measure and the single-factor child-rated TCRQ measure provided a good fit for the patterns of correlations found amongst the items. These findings suggest that the structure of TCRQ in Chinese American children resembles the structure of TCRQ previously observed in samples of children of other ethnicities (Hughes et al., 2005; Valiente et al., 2008). In testing the unique relations of TCRQ to children's achievement, controlling for demographic variables, we found support for both the main effect of TCRQ and the interaction between TCRQ and child gender. First, teacher-rated TCRQ warmth positively predicted children's reading achievement. Second, teacher-rated TCRQ conflict negatively predicted girls' math achievement, whereas it did not predict boys' math achievement. Third, child-rated overall TCRQ positively predicted boys' reading achievement, whereas it did not predict girls' reading achievement. In sum and consistent with previous findings from samples of other ethnic groups, these results suggest that high TCRQ (high warmth and low conflict) is generally associated with higher academic achievement among Chinese American children in immigrant families.
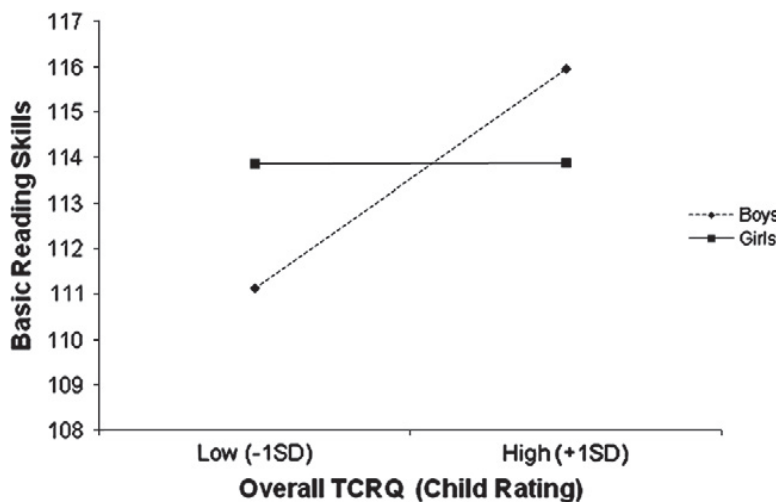
Fig. 1. The interactions between TCRQ and child gender in predicting achievement. TCRQ = teacher–child relationship quality. a) Interaction between Teacher-Rated TCRQ Conflict and Child Gender. b) Interaction between Child-Rated Overall TCRQ and Child Gender.

However, the specific associations between dimensions of TCRQ and achievement in the present sample differed by domain of achievement (math vs. reading), child gender, and reporter of TCRQ.

4.1. Relations between teachers' and children's ratings of TCRQ

We assessed TCRQ from both teachers' and children's perspectives. However, teachers' and children's ratings of TCRQ were not correlated. The lack of a relation between raters of TCRQ is consistent with previous findings with children from the same age range, but different ethnic backgrounds (e.g., Hughes et al., 1999; Li et al., 2012; Murray, Murray, et al., 2008). It is important to note that although we used different measures to assess teacher- and child-rated TCRQ, studies using the same measure of TCRQ also failed to find congruency between teachers' and children's reports (Li et al., 2012). Thus, the lack of concordance in ratings of TCRQ across reporters is unlikely to be fully explained by differences in instruments. The significant correlation between child-rated overall TCRQ and children's reading achievement on standardized tests suggests that it is valuable to assess TCRQ from the child's perspective.

Children who rate overall TCRQ as low may also have reading-related difficulties and require both emotional and instructional support from their teachers. Future research using longitudinal data is necessary to further understand the development-related changes in children's perceptions of TCRQ, the differences in the structure of child- vs. teacher-rated TCRQ, and the prediction of children's academic outcomes from children's ratings of TCRQ.

4.2. Gender as a moderator in the association between TCRQ and academic achievement

The presence of significant main effects of TCRQ and significant TCRQ×gender interactions for academic achievement suggests that both general and gender-specific processes may influence TCRQ. The two TCRQ×gender interactions found in the present sample demonstrated somewhat different patterns. First, the significant child-rated overall TCRQ×gender interaction for reading achievement indicated that boys' (but not girls') perceptions of TCRQ were positively associated with reading achievement. This interaction pattern is consistent with the academic risk perspective (Hamre & Pianta, 2001), which posits that TCRQ is more beneficial for boys compared to girls, given boys' higher risk for academic and behavioral problems at school (Cooper & Farran, 1988; Silver et al., 2005; Speece & Cooper, 1990). However, a similar interaction was nonsignificant for teacher-rated TCRQ warmth and child gender. That is, teacher-rated warmth was positively associated with reading achievement, regardless of child gender. Future replication of these findings with other samples is important for evaluating the academic risk perspective and TCRQ-reading achievement associations across reporters.

It is interesting that the main effect of teacher-rated TCRQ warmth and the interaction between gender and child-rated overall TCRQ were significant for reading achievement but not math achievement. Previous research with dual-language learners demonstrated that children improve faster on math scores than reading scores between kindergarten and fifth grade (Han & Bridglall, 2009), suggesting that dual-language learners face more challenges in reading development than math development. Given that the present sample included children of first-generation Chinese American immigrant parents and only 16% of these parents rated their ability to speak English as "good" or "very good," high TCRQ may be particularly important in supporting the literacy development of these children. The finding that the association between teacher-rated TCRQ warmth and reading achievement did not differ by child gender suggests that warmth is a basic and common element to a positive teacher–child relationship and is therefore beneficial for all children.

Unexpectedly, the TCRQ conflict×gender interaction demonstrated a different pattern: teacher-rated TCRQ conflict was negatively related to girls' (but not boys') math achievement. This finding suggests that having a teacher-child relationship high in conflict may be particularly detrimental for girls' math achievement. Interestingly, there is a growing body of evidence indicating that the math–gender stereotype (i.e., math is associated more with men) negatively influences women's interest in the math domain (see Kiefer & Sekaquaptewa, 2007). Furthermore, *stereotype threat*, or the anxiety that one will confirm a negative stereotype about one's social group, has been empirically shown to negatively affect women's performance in math (Steele, Spencer, & Aronson, 2002). Recently, the math–gender stereotype has been observed among American children as early as the second grade, suggesting that the stereotype is acquired early and may influence children's math self-concepts prior to when actual gender differences in math achievement are observed in development (Cvencek, Meltzoff, & Greenwald, 2011). Perhaps having a teacher-child relationship high in conflict increases girls' vulnerability to the negative effects of stereotype threat on math performance. Future research should investigate the potential mechanisms underlying the link between low TCRQ and low math achievement in girls.

4.3. Findings related to demographic characteristics and child generation status

Given that the present study was based on a sample of children in immigrant families, a few findings on demographic and immigration-related factors are worthy of discussion. First, despite the sample's heterogeneity in family SES and child generation status, these factors were largely unrelated to TCRQ, suggesting that, at least in the early elementary school grades, children's TCRQ does not vary by family SES or generation status. One exception was the negative association between family income and teacher-rated TCRQ intimacy. Perhaps teachers perceived less intimate relationships with children from higher income families because children who have greater academic resources outside of school are less dependent on

teachers within school. Second, compared to children in lower income families, Chinese American children in higher income families scored higher on reading achievement but not math achievement. It is possible that compared to parents with higher levels of education, immigrant parents with lower levels of educational attainment are less able to provide direct assistance in teaching English to their children. Finally, children in the second grade scored higher on age-standardized tests of math achievement and lower on reading achievement than children in the first grade. These grade effects were significant, controlling for family SES. These findings are somewhat consistent with those from a national sample that showed dual-language learners improve faster on math scores than reading scores in elementary school (Han & Bridglall, 2009).

4.4. Study limitations

In interpreting these results, it is important to consider the limitations of the study. First, the cross-sectional design does not allow us to test the direction of relations. Although it is possible that high TCRQ can promote children's academic development, it is also possible that teachers generally feel closer to students who perform competently, thereby reinforcing the child's efforts and facilitating further improvement. At the same time, the child's improvement reinforces the teacher's positive feelings and actions (Pianta, Steinberg, & Rollins, 1995). Thus, the association between TCRQ and children's academic achievement is likely to be bidirectional. Using longitudinal data, future studies could control for baseline levels of academic achievement and TCRQ when examining their prospective relations, which could provide a more stringent test of the directional relations among these constructs than studies using a cross-sectional design.

Second, our measure of child-rated TCRQ only assesses the general construct of overall TCRQ. Future studies should assess children's ratings of other dimensions of TCRQ (i.e., conflict and intimacy) to identify if associations between child-rated TCRQ and academic achievement differ by dimension of TCRQ. Third, a confirmatory factor analysis of the child-rated TCRQ measure also revealed that some items had relatively low loadings (i.e., standardized loadings<.40), which suggests that additional research is needed to improve the psychometric properties of this adapted instrument for children in this age group. Fourth, a small number of children in our sample had previous (rather than current) teachers provide ratings of TCRQ, which is not ideal for examining the concurrent relations between TCRQ and achievement.

Additionally, increasing the alpha error rate to .10 to boost the statistical power for testing interaction effects could have led to an inflated Type I error rate. Future evaluations examining child gender as a moderator between TCRQ-achievement associations should use larger samples of children. Finally, because we only measured basic math calculation and basic reading skills, our findings on TCRQ-achievement associations may not generalize to the prediction of more advanced academic skills, such as math reasoning and reading comprehension. This is another important direction for future research with Asian American school-aged children.

4.5. Study strengths and implications for school psychology practices

The present study has several strengths worth noting, including (a) the use of an ethnically homogeneous sample of Chinese American children with considerable heterogeneity in family SES and generation status, (b) the use of multiple reporters of TCRQ, and (c) the use of standardized achievement tests to assess children's academic achievement.

The number of school-aged children in immigrant families is projected to increase rapidly in the next decade (Passel & Cohn, 2008). The results of this study have several important implications for school psychology practices targeting students in immigrant families, especially those from Chinese American backgrounds. First, although the primary focus of existing school-based interventions and services for children of immigrants is instructional support for English language acquisition (Han & Huang, 2010), the present findings suggest that the affective relationship between teachers and students also plays a valuable role in the academic success among children of immigrants. Thus, school-based interventions and services for children of immigrants should include components that promote a warm teacher-child relationship that is low in conflict, especially for students in low-SES immigrant families. Second, in designing, evaluating, and implementing interventions that target improving TCRQ, it is necessary to consider the potential role of child gender. Third, this study provides evidence that it is useful and important to collect information from both teachers and children when evaluating TCRQ.

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