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Examining Teacher–Child Relationship Quality across Two Countries

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Abstract

The present study examined the quality of teacher–child relationships in a collectivist and individualist country, specifically, Portugal and Belgium. Two relationship dimensions were examined: conflict and closeness. Participants were 158 Portuguese and 197 Belgian children and their teachers. In both countries, teachers completed the Student-Teacher Relationship Scale (STRS; Pianta, 2001). Measurement invariance was tested through Multiple-Group Analysis. The results supported configural and metric invariance across countries, but not full scalar equivalence, suggesting that the STRS is robust across countries. Some associations differed between the samples. Specifically, teachers' perceptions of Closeness were negatively related to Conflict in Belgium, but not in Portugal. Teachers described boys and girls as having similar levels of both Conflict and Closeness in Portugal, while in Belgium girls are likely to have closer relationships with their teachers. Moreover, observed emotional climate was positively associated with Closeness in Belgium (but not Portugal), indicating that Belgian teachers in classrooms with more warm and positive interactions were likely to have closer individual relationships with their students.

Keywords: Teacher–child relationship quality; Cross-cultural comparison; Measurement invariance

Examining Teacher–Child Relationship Quality across Two Countries

Understanding factors associated with children's early behavioral and academic skills is of vital importance to children's later school success. Accumulating evidence points to the relevance of early school experiences for children's development, in particular, the quality of the relationships and interactions that children experience directly within the classroom (Howes et al., 2007). The value of teacher–child relationships for children's cognitive, social, and emotional development has been strongly supported (Doumen et al., 2008; Hamre & Pianta, 2001; Pianta & Stuhlman, 2004). Despite this growing body of research, few studies have attempted to examine the quality of teacher–child relationships across countries. In particular, the most widely used assessment for the quality of relationship between teachers and children (i.e., the Student-Teacher Relationship Scale; STRS; Pianta, 2001) has not been tested for measurement invariance yet, which is nonetheless essential for cross-country comparison studies. The present study examines the quality of teacher–child relationship in two countries, Portugal and Belgium, respectively, a collectivistic and an individualistic one (Hofstede, 2001). Two core relationship dimensions are examined: conflict and closeness.

Teacher–Child Relationships: Dimensions

A well-established body of research has documented the importance of teacher–child relationships for young children's development. Recognizing that the child develops in a relational context, Pianta (1999) has argued that relations are crucial in affording resources and conditions for the child, which can be activated to help him or her to adapt to the demands of a particular situation. Attachment theory has provided the conceptual support for understanding teacher–child relationships in an increasing number

of studies, which suggest that warm, sensitive relationships help the child to feel emotionally secure for learning and to put more effort into school experience (Pianta, 1999). Pianta (2001) developed a standardized instrument to assess teacher–child relationship quality from an attachment perspective, the STRS, which has been widely used in research in preschool and early elementary school children. Researchers have frequently used two dimensions from this instrument, closeness and conflict, to characterize teacher–child relationships. Close relationships are characterized by warmth and open communication between a teacher and a child. Several studies have shown that close relationships are associated with both psychosocial adjustment at school and academic outcomes (Birch & Ladd, 1997; Buyse, Verschueren, Doumen, Van Damme, & Maes, 2008; Hamre & Pianta, 2001). Conflictual teacher–child relationships, in contrast, are characterized by tension and hostility. High levels of conflict have been linked to adjustment difficulties (Birch & Ladd, 1997; Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Doumen et al., 2008; Hamre, Pianta, Downer, & Mashburn, 2008; Pianta & Stuhlman, 2004). Hamre and Pianta (2001), for example, found that relational negativity in kindergarten was significantly associated to behavioral outcomes in middle school. Further, the results from a recent study have shown a transactional sequence in which children’ aggressive behavior led to increases in teacher–child conflict which in turn led to an increase of aggressive behavior (Doumen et al., 2008). Therefore, the relationship between teacher and child appears to be important for child adjustment and success. The STRS includes a third dimension, dependency, that denotes the degree to which a teacher perceives the child as overreliant and possessive. However, as this dimension has received considerably less attention in the teacher–child relationship

literature, mainly due to its low reliability (Doumen et al., 2009; Koomen, Verschueren, van Schooten, Jak, & Pianta, 2012), it was not included in the present study.

Teacher–Child Relationships Across Sociocultural Contexts

While there is a rich literature examining teacher–child relationships, the vast majority of studies has been conducted in Western individualistic countries. The few studies examining the quality of teacher–child relationships in other countries have detected cultural variations that seemed important to understand and address (Beyazkurk & Kesner, 2005; Gregoriadis & Tsigilis, 2008). In one study comparing teachers' perceptions of dimensions of teacher–child relationships in Turkey and USA, results indicated that teachers' ratings of closeness and dependency were significantly higher in Turkey than in the USA (Beyazkurk & Kesner, 2005). The authors attributed those differences to cultural variations in childcare practices, based on evidence suggesting that attachment-related behaviors are interpreted differently across different cultural contexts. Accordingly, the authors noted that in collectivistic societies, such as Turkey, teachers are likely to emphasize the importance of closeness and positivity for all kinds of relationships, whereas in individualistic societies, such as the United States, caregivers may consider close relationships important to the extent they contribute to academic success. Gregoriadis and colleagues (2008) also found differences between Greece and United States in the patterns of associations among the teacher–child relationships dimensions. In Greece, teachers' perceptions of dependency were positively related to closeness and unrelated to conflict, whereas in several American studies higher rates of Dependency were associated with higher rates of Conflict and lower rates of Closeness. These differences were again attributed to variations in the way teachers from the two

cultural backgrounds perceive child behaviors.

The studies mentioned above seem to provide support for the relevance of teacher–child relationships in child development and point to important cultural differences in teachers' perceptions of teacher–child relationships. However, while the STRS is a potentially reliable and valid measure for cross-cultural studies (Gregoriadis et al., 2008), too little attention has been given to measurement invariance in the factor structure of the STRS across different countries and cultures. In most mentioned studies, researchers implicitly assume that the scale measures the same constructs on the same metric across groups, without explicitly testing it. If measurement parameters are not tested for invariance, group differences can be misinterpreted (Chen, 2008). Therefore, measurement invariance is regarded a necessary condition for making meaningful cross-cultural comparisons, warranting more research in this area.

Measurement Invariance: A brief introduction

Specifically, measurement invariance refers to the degree to which measurements conducted under different conditions have identical psychometric properties (Hair, Black, Babin, Anderson, & Tatham, 2006; Meade, Johnson, & Braddy, 2008). It establishes that the constructs assessed across different groups are the same and that the measures are comparable (Chen, 2008). As Millsap and Kwok (2004, p. 93) explained, "a test fulfills *measurement invariance* across populations when individuals who are identical on the construct being measured, but who are from different populations, have the same probability of achieving any given score on the test". Accordingly, the relation between the construct and the observed variables should be the same across groups, even though the distribution of the construct may vary in each group (Collins & Lanza, 2010). Thus,

meaningful comparisons across cultures require equivalence of the underlying measurement model (Steinmetz et al., 2009). There are various degrees of measurement invariance (Chen, 2008). The first level, configural invariance, tests whether the basic model (i.e., number of constructs and items per construct) is equivalent (Cheung & Rensvold, 2000; Hair et al., 2006). The second level, metric invariance, tests whether the strength of the relationships between the underlying construct and its associated items is equivalent (Chen, 2008). When metric invariance holds, the associations between constructs can be compared across groups (Chen, 2008). The third level, scalar invariance, tests whether the intercept terms for each construct are equivalent. When scalar invariance holds, the means of the constructs can be meaningfully compared across groups. Failure to satisfy scalar invariance makes the interpretation of the group differences ambiguous, because of the confounding of real differences on the construct being measured with measurement differences (Millsap & Kwok, 2004). Thus, tests of configural invariance, metric invariance and scalar invariance are critical for the interpretation of the cross-cultural comparisons (Chen, 2008; Hair et al., 2006).

Despite its importance, to date, the STRS has been rarely tested for measurement invariance. There are two recent studies, in which the measurement equivalence of STRS was tested across ethnic groups of children in the United States (Webb & Neuharth-Pritchett, 2010) and across child gender and age in a Dutch sample (Koomen et al., 2012), but none of these studies compare the equivalence of the measure across countries. Apparently further investigation is required to ascertain the equivalence of the STRS across cultures, specifically across individualistic and collectivistic ones.

The Present Study

The current study has two primary purposes: (a) to test for the equivalence of the STRS dimensions closeness and conflict across two countries, Portugal and Belgium; and, based on these findings (b) to explore the potential differential relations between these STRS dimensions, child gender and classroom emotional climate across the two countries. The following research questions are addressed: (a) To what extent does the STRS satisfy criteria of configural, metric, and scalar equivalence across Portugal and Belgium? (b) To what extent are the patterns of associations different between STRS conflict and closeness, child gender and classroom emotional climate across the two countries?

Measurement Invariance. First, we examine the equivalence of measurement of the closeness and conflict subscales using multigroup confirmatory factor analysis across an individualist country, Belgium, and a collectivist one, Portugal. Although both are European countries, there is evidence suggesting differences in their value systems, particularly in regard to individualism-collectivism (Hofstede, 1980, 2001). Collectivist societies, such as Portugal, are more likely to emphasize relatedness, belonging, and the internalization of group norms (Oyserman, Coon, & Kemmelmeier, 2002). In the learning situation, harmony in class and close relationships are considered important, and individual initiatives are more likely to be discouraged to preserve classroom order and to pursue common goals (Hofstede, 1986). By contrast, individualist societies, such as Belgium, seem to value the development of autonomy (Oyserman et al., 2002). In the classroom, individual initiatives and open communication are more likely to be encouraged (Hofstede, 1986), and positive relationships may be emphasized for particular reasons, such as academic success (Beyazkurk & Kesner, 2005). Therefore, because of

the expected differences in cultural norms and values, we hypothesized that teachers in Portugal would report closer and less conflicted relationships than Belgian teachers. More specifically, we expected mean level differences between the two countries, particularly for closeness, but we did not expect that the constructs measured would have distinct meanings for Portuguese and Belgian teachers. By testing for measurement invariance, we attempted to strive for a better understanding of the differences in the quality of teacher–child relationships between cultures and to further contribute to the widespread use of measurement invariance procedures.

Patterns of associations. After having examined measurement invariance, we compare patterns of associations of conflict and closeness subscales with predictors that have been identified in previous research as important to teacher–child relationship quality, specifically, child gender and classroom level emotional climate. Research documenting associations between the quality of teacher–child relationship and child characteristics has pointed to differences between boys and girls, suggesting that teachers were likely to report closer and less conflicted relationships with girls than with boys (Hamre & Pianta, 2001; Koomen et al., 2012). But, as with most studies on teacher–child relationship, such differences were mainly found in studies conducted in individualist societies and thus it is important to further explore these associations in collectivistic societies as well. In addition to child attributes, the classroom climate can also contribute to the quality of the dyadic teacher–child relationships. Emotional supportive classrooms, which involve warm and respectful interactions in the classroom (Pianta, La Paro, & Hamre, 2008), can facilitate feelings of caring and foster more positive individual teacher–child relationships (Buyse et al., 2008). It has been also shown that classroom

emotional climate can reduce the risk for developing conflictual relationships (Buyse et al., 2008; Hamre & Pianta, 2005). Additionally, the association between the STRS dimensions of closeness and conflict is evaluated. Moderate, negative correlations between conflict and closeness have been reported in some studies (Doumen et al., 2009; Pianta & Stuhlman, 2004) but again these associations have been less explored in collectivistic societies (cf. Gregoriadis et al., 2008). In sum, our study will add to the existing literature by examining these patterns of associations across two countries, hereby disentangling whether possible differences in associations are due to true differences among cultures rather than statistical artifacts (i.e., lack of measurement invariance).

Method

Participants

Participants were 158 Portuguese children and their teachers from 105 first grade classrooms and 197 Belgian children and their teachers from 35 first grade classrooms.

The Portuguese participants (87 boys and 71 girls) were from the Metropolitan Area of Porto and were part of a larger research project aimed at examining the effects of preschool and elementary classrooms on children's social and academic performance (Abreu-Lima, Leal, Cadima, & Gamelas, 2012). Permission to conduct this study was obtained from school principals, teachers, and parents. Children were randomly selected from their preschool classrooms and they were followed as they entered elementary school. Classroom sizes ranged from 10 to 26 ($M = 20.81$, $SD = 3.42$). The number of participating children per class was between 1 and 4 ($Mdn = 1$). Mean age of the children was 6.90 years ($SD = 0.28$) at the beginning of first grade. All parents had the Portuguese

nationality, and the percentages of mothers completing basic education (9 years), secondary school (12 years) and university were, respectively, 59%, 21%, and 21%.

The Belgian participants were also part of a larger longitudinal study in kindergarten and first grade (Buyse, Verschueren, & Doumen, 2011; Doumen et al., 2008). The procedures of this study were approved by the ethical committee of the Catholic University of Leuven, Belgium, and consents from school principals, teachers, and parents were obtained. Mean age of the children (95 boys and 102 girls) was 6.18 years ($SD = 0.29$) at the beginning of first grade. The number of participating children per class ranged between 1 and 10 ($Mdn = 8$), and classroom sizes ranged from 11 to 24 ($M = 18.03$, $SD = 2.95$). For the majority of children, both parents had the Belgian nationality. The percentages of mothers completing basic education (9 years), secondary school (12 years) and university were, respectively 6%, 18%, and 76%.

Both samples were comparable in teachers experience and level of education. The teachers' average years of teaching experience in Portugal and Belgium were respectively, 15.9 and 17.4, ranging from 1 to 37 years in Portugal and from 3 to 35 years in Belgium. Each first grade classroom from both countries had a single, elementary school teacher with a professional certificate in Elementary Education.

The Portuguese participating children were compared with children from the larger study who were not included in the current analyses ($n = 57$, 27%) either because parents could not be contacted again, teachers/parents refused to continue to participate, or teachers did not fill out the questionnaires. The differences were not statistically significant for mother's level of education, $t(196) = -.90$, $p = .369$, gender, $\chi^2(1) = 1.29$, $p = .256$, or preschool vocabulary, $F = 1.66$, $p = .193$, after controlling for child age. In

Belgium, data for 40 children (16%) from the larger study were missing, because of similar reasons. Comparisons of children included and excluded from analyses indicated no differences in mother's level of education, $t(190) = -.66, p = .510$, gender, $\chi^2(1) = 0.04, p = .841$, or preschool vocabulary, $t(229) = -1.86, p = .064$.

Procedure

Observations of teacher–child interactions in first grade were carried out in September–October in the Belgian sample and in January–March in the Portuguese sample. Observers conducted classroom observations for approximately two–three hours. In both samples, teachers completed the questionnaires on their perceptions of teacher–child relationships for each participating child during the third trimester (April–June).

Measures

Teacher–child relationship quality. Relationships between teachers and children were assessed by means of the conflict and closeness scales of the Student–Teacher Relationship Scale (STRS; Pianta, 2001). The STRS assesses teachers' perceptions of their relationships with individual students. Conflict includes 12 items that describe teacher-perceived negativity and discordance with the child (e.g., "This child and I always seem to be struggling with each other"). Closeness includes 11 items that indicate the perceived warmth and open communication with the child (e.g., "This child openly shares his/her feelings and experiences with me"). Teachers rate each item on a Likert-type scale ranging from 1 (definitely does not apply) to 5 (definitely applies). This report-measure has been widely used and its reliability and validity have been confirmed in different samples (Doumen, Koomen, Buyse, Wouters, & Verschueren, 2012; Koomen et al., 2012). The measure has been shown to have adequate test–retest reliability over a 4-

week interval, with correlations above .75, and high internal consistency for both conflict and closeness scales, with Cronbach's alphas above .85 (Pianta, 2001). The measure has also been associated with current and later academic skills (Hamre & Pianta, 2001), in support of concurrent and predictive validity. For instance, findings from one study showed that STRS predicted academic trajectories in prekindergarten through the elementary grades (Hamre & Pianta, 2001). In addition, higher levels of closeness have shown to be associated with children's academic performance, teacher-rated school liking, and positive adjustment (Arbeau, Coplan & Weeks, 2010; Birch & Ladd, 1997), while higher levels of conflict have shown to be associated with less school liking, more school avoidance and externalizing problem behavior (Birch & Ladd, 1997; Doumen et al., 2008; Pianta & Stuhlman, 2004). The convergent validity of both scales has been recently investigated, with results suggesting positive and statistically significant associations between the STRS closeness and conflict and child-, peer- and observer reports of the same constructs (Doumen et al., 2009; Doumen et al., 2012). In the present study, based on exploratory factor analysis in both samples, 11 Conflict items and 5 Closeness items were retained. Estimates of the internal consistency (Cronbach's α) of each subscale were adequate for both samples, for Conflict, $\alpha = .83-.88$, and Closeness, $\alpha = .77$.

Observed interactions. The quality of interactions between teachers and children were observed with the Classroom Assessment Scoring System (CLASS; La Paro, Pianta, & Stuhlman, 2002; Pianta, La Paro, & Hamre, 2006). The CLASS is an observational measure that assesses the social and emotional climate, as well as the instructional support provided in classrooms. For the purpose of the current study, we used the

Positive Climate dimension. This dimension reflects the overall emotional tone and connection between teachers and students. It reflects the warmth, enthusiasm, enjoyment and respect displayed during the classroom interactions (Pianta et al., 2008). A 7-point Likert scale is used to score each dimension, based on a range of indicators: low (scores 1-2), middle (scores 3-5), and high (scores 6-7). The CLASS has been widely used in the United States as well as in other countries, such as Belgium, Finland, and Portugal (Buyse et al., 2008; Cadima, Leal, & Burchinal, 2010; Pakarinen et al., 2010). CLASS dimensions have been shown to provide a reliable, valid assessment of effective teacher–child interactions (Cadima et al., 2010; Curby, Rimm-Kaufman, & Ponitz, 2009; Hamre & Pianta, 2005; NICHD ECCRN, 2002, 2003). In terms of reliability, adequate interrater agreement and high internal consistency have been reported (Pianta et al., 2008).

Specifically, data collectors' mean weighted kappa has been reported as above 0.60 (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Pianta et al., 2005), and Cronbach's alphas across cycles as above .79 (Pianta et al., 2008). In addition, scores on the CLASS have shown to be relatively stable from fall to spring (Pianta et al., 2008). Criterion and predictive validity for the CLASS also has been demonstrated, with associations between the CLASS and other measures of classroom quality (Pianta et al., 2005), and associations with social and academic skills (Cadima et al., 2010; Mashburn et al., 2008). For instance, classrooms with higher scores on CLASS had also higher scores on the Early Childhood Environment Rating Scale (ECERS–R), the most commonly used measure of quality in early childhood (Pianta et al., 2005). In one study examining associations between the CLASS and children's skills, the results showed positive associations between CLASS instructional interactions and children's

academic and language skills and between CLASS emotional interactions and social skills, even after adjusting for a variety of covariates, including maternal education, ethnicity, and gender (Mashburn et al., 2008). The Portuguese observers participated in training sessions in 2006 based on the authors' instructions; in the first sessions, participants observed videos provided by the authors and discussed the ratings using the manual. A series of five video sessions were then conducted to reach a minimum inter-rater agreement of 80%, which was met by all four observers. In Belgium, for initial training, the two observers consulted the authors of the CLASS and carefully read the manual that contained extensive descriptions of indicators for each rating. For classroom observations conducted one year before the data collection of this study a good inter-rater agreement ($ICC = .93$) was reached. During data collection, to establish interrater agreement, teacher–child interactions were evaluated independently by two observers in 33 classrooms (31%) in Portugal and 7 classrooms (20%) in Belgium. The single measure intra-class correlations were .91 and .70, respectively, in Portugal and Belgium. On average, 100% of data collector responses were exactly or within one scale-point in both Portugal and Belgium.

Statistical analyses

We initially conducted separate confirmatory factor analysis (CFA) for each group. This allowed us to examine the a priori factor structure of each instrument for each country. We then tested for measurement invariance through Multiple Group Confirmatory Factor Analysis using the Mplus program, version 5.2 (Muthén & Muthén, 1998-2008). This has been the most common technique for testing measurement invariance (Chen, 2008; Meade et al., 2008; Millsap & Kwok, 2004). Specifically, a

series of increasingly more restrictive confirmatory factor analysis models are performed in which constraints to various model parameters are added and the decrease in model fit is sequentially compared. We followed the procedure described by Hair et al. (2006) and Muthén and Muthén (1998-2008) and performed CFA models in three steps:

Step 1: Configural invariance. In the first step, the factor loadings, intercepts and residual variances were allowed to differ by group. In this model, we were testing the configural invariance assumption, which holds when the basic model structure (i.e., same number of constructs and items) is equivalent across groups. This model provides the basis for the next models and thus it is a critical step (Hair et al., 2006)

Step 2: Metric invariance. In the second step, factors loadings were constrained to be equal across groups, while intercepts and residual variances were kept free. This model is more restrictive than the baseline model and tests for metric invariance. When metric invariance holds, the relationship between latent scores and observed scores is invariant across groups and therefore the scores on the observed items can be meaningfully compared across groups (Hair et al., 2006).

Step 3: Scalar invariance. In the last step, the intercepts of the observed items were constrained to be equal across groups. This model, more restrictive than the previous models, tests for scalar invariance that indicates whether the mean of each construct has the same meaning between the groups (Hair et al., 2006). Some authors have argued, though, that full measurement invariance can be too strict (Millsap & Kwok, 2004; Steinmetz et al., 2009). For example, Millsap and Kwok (2004) have proposed partial scalar invariance as the necessary condition to

compare latent means, in which some intercepts or loadings are invariant across groups but scalar invariance does not fully hold. Hence, if the scalar invariance does not hold, modification indices can be used to identify which model parameters can be set free.

Considering the number of items in the questionnaire and the limited sample size, we used parcels as indicators of each latent variable. According to Coffman and MacCallum (2005) this option offers several advantages because the number of parameters in the model is reduced, which more likely leads to less biased parameter estimates achieving proper model solutions. In addition, the use of parcels reduces the influence of idiosyncratic features of the items (Bandalos & Finney, 2001), and they are likely to have greater reliability and higher communality. In this study, each latent variable was represented by three parcels, each containing one to three items. The items were randomly assigned to the parcels (the first item to the first parcel, the second item to the second parcel, the third item to the third parcel, the fourth item to the first parcel, and so on).

The overall model fit was assessed using the following goodness-of-fit indices: the chi-square statistic, the Root Mean Square Error of Approximation (RMSEA), the Comparative Fix Index (CFI), the Tucker–Lewis Index (TLI) and Standardized Root Mean Square Residual (SRMR). Values lower than .05 for RMSEA, greater than .95 for TLI and CFI, and lower than .08 for SRMR indicate good model fit (Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996). A RMSEA value between .05 and .08 indicates fair fit and between .08 and .10 indicates mediocre fit according to this index (MacCallum et al., 1996). The decrease of model fit was tested with the chi-square

difference test. We used Satorra and Bentler's (2001) scaled chi-square difference test.

We computed a scaling correction factor to improve the chi-square approximation in nested models that is available at the following Web site:

www.statmodel.com/chidiff.html. In addition, because differences in chi-square are dependent on sample size and it has been recommended to use alternative fit indices (Cheung & Rensvold, 2002), we computed differences in CFI. Following the recommendations of Cheung and Rensvold (2002), we used a cutoff value of .01.

To address nesting of children in classrooms and prevent biased estimates due to the multi-level data structure, the models were estimated using the special feature for complex survey data available in the Mplus software. This procedure corrects the standard errors taking into account non-independence of observations, without explicit modeling of classroom-level variability (Muthén & Muthén, 1998-2008). Missing data were handled using full information maximum likelihood estimation (FIML) to prevent sample size reduction and subsequent loss of statistical power (Enders, 2001). Finally, we examined the associations between the latent factors of Closeness and Conflict and child and classroom variables, using the complex procedure to correct the nested structure of the data. The decision to use the complex procedure rather than specifying a two-level model was based on the group level size for the Belgian sample.

Results

Measurement Invariance

Confirmatory Factor Analyses were performed separately for each country. The fit indices indicate the models provide a good fit to the Portuguese sample $\chi^2(8) = 6.06, p$

= .641, CFI = 1.0, TLI = 1.0, RMSEA = .00, SRMR = .042 and to the Belgian sample χ^2 (8) = 14.29, p = .075, CFI = .982, TLI = .967, RMSEA = .063, SRMR = .058.

INSERT TABLE 1 HERE

Step 1: Configural invariance. The baseline multiple-group model in which the factor structure was constrained to be equal across the groups was tested. Table 1 presents the various fit indices for the confirmatory factor analyses. The fit indices were acceptable, indicating an appropriate model fit: χ^2 (18) = 39.81, p = .003; CFI = .972; TLI = .953, RMSEA = .083, SRMR = .076. This indicated that configural invariance held and provide support that the pattern of parameters in the model was identical for the two groups. This model served as a comparison for further, more restrictive models.

Step 2: Metric invariance. Next, factor loadings were constrained to be equal across groups, and factor means were fixed at zero. There was a non-statistically significant decrease in model fit from the baseline model, adjusted $\Delta\chi^2$ (6) = 10.03, p = .123, Δ CFI = .003 and therefore, metric invariance was supported.

Step 3: Scalar invariance. Next, the intercepts were constrained to be equal. The fit indices obtained were χ^2 (26) = 100.08, p < .001, CFI = .904, TLI = .889, RMSEA = .127, SRMR = .196 which indicated a unsatisfactory model fit. Moreover, the difference in chi-square between the model and the previous one was statistically significant, $\Delta\chi^2$ (2) = 157.95, p < .001, and the value of Δ CFI = .065 unacceptable. Scalar invariance was therefore not supported. Inspection of the modification indices indicated differences in the intercepts in two parcels for Closeness. Given the same level of Closeness, Portuguese children received a higher score on some items, and the Belgian children on others. Releasing these items' intercept constraints led to a substantial improvement in fit

as compared to the full scalar invariance model, $\chi^2 (24) = 46.26, p = .004$, CFI = .971, TLI = .964, RMSEA = .072, SRMR = .165. The difference in chi-square between this model and the metric invariance model was not statistically significant, $\Delta\chi^2 (6) = 8.65, p = .194$, $\Delta\text{CFI} = .001$, and thus, partial scalar invariance was supported. Releasing these two intercept constraints did not affect substantive conclusions about latent mean differences. The factor mean difference for Closeness was statistically significant, .62, $p = .002$ (compared to .39, $p = .051$ in the more constraint model), indicating a higher factor mean in Belgium than in Portugal. For Conflict, no items with non-invariance were found, and the mean difference for this factor was not statistically different, .22, $p = .173$ (compared to .21, $p = .174$ in the more constraint model). In sum, results partly supported scalar invariance.

Patterns of associations

Next, we computed a set of models examining the associations between the latent factors of teacher-child relationship quality, child gender, and Positive Climate.

Preliminary analyses had shown that there were statistically significant differences in class size between Portuguese and Belgian classrooms, $t (138) = 2.44, p = .016$.

Portuguese classrooms were more likely to have more children than Belgian classrooms.

There were also statistically significant differences in the level of education between mothers in Portugal and Belgium, $\chi^2 (3) = 120.55, p < .001$. Therefore, we controlled for those variables in the analyses.

INSERT TABLE 2 HERE

The summary of the results from the models is presented in Table 2. The results suggested a distinct pattern of associations for Portugal and Belgium. In the Portuguese

sample, teachers' perceptions of Conflict were not related to Closeness, $B = -0.21$, $SE = 0.18$, $p = .249$, whereas in Belgium, these two constructs were negatively related, $B = -0.29$, $SE = 0.09$, $p = .001$. In Portugal, teachers' ratings of conflict were not statistically significantly related to any child or classroom variables. Children who had closer relationships with their teachers, however, tended to be in smaller classrooms.

In Belgium, teachers described their relationships with girls as closer than with boys. Regarding classroom variables, Positive Climate was positively correlated to Closeness in Belgium, suggesting that teachers who create a context with higher levels of warmth and respect tend to perceive closer teacher–child relationships in Belgium.

In summary, the results revealed that in Portugal, boys and girls were reported to have similar levels of both conflict and closeness. In contrast, Belgian girls were reported to have higher levels of closeness. Interestingly, class size was negatively related to teacher-perceived closeness in Portugal. This association was not found in Belgium. Regarding the classroom emotional climate, positive teacher–child interactions were associated with higher teacher ratings of closeness in Belgium.

Discussion

In this study, we intended to test measurement invariance of the STRS across two countries. We examined three degrees of measurement equivalence, configural, metric and scalar, fitting a series of sequential measurement models, via multiple group CFA methods. The analyses revealed configural and metric invariance of the two dimensions examined, Conflict and Closeness. Therefore, the STRS satisfied two important requirements for making cross-country comparisons. To our knowledge, this is the first study to examine the equivalence of STRS across two different countries.

Specifically, our findings supported the first level of invariance, configural invariance, by showing that a two-factor model fitted well both groups. The STRS appears to measure comparable constructs across countries, as the number of factors underlying the scale is equal in both countries. STRS also met the criteria for metric invariance. The pattern of factor loadings was equal across countries and, as a result, the observed associations were on comparable units of measurement, allowing for examination of the correlations between STRS dimensions and other relevant child and classroom variables. In other words, the STRS seems to measure the same constructs on the same metric across countries.

Full scalar invariance was not supported, though, as indicated by the statistically significant decrement in model fit under the assumption of intercept equivalence across countries. Further analyses showed that some item intercepts were non-invariant for closeness. The effects of non-invariance on this dimension were countervailing to some extent, with some items with higher intercepts in Portugal and others in Belgium. Nevertheless, the latent mean difference was statistically significant, suggesting that Belgian teachers reported higher closeness in their relationships with children than Portuguese teachers, which was contrary to our initial expectations.

Possible explanations for these findings are the considerable differences both in the maternal level of education and in class size between Portugal and Belgium. Research has indicated associations between family background variables and relationship quality, namely between higher maternal education and closer teacher–child relationships (Ladd, Birch, & Buhs, 1999; Peisner-Feinberg et al., 2001). In this study, mothers' education was higher in Belgium, which may explain the higher levels found for Closeness. A second

possible reason might be related to class size. Previous research has shown associations between Closeness and class size. For example, in a large scale study conducted in the USA, teachers in smaller classes (up to a point near 20) tended to perceive significantly more closeness in their relationships with individual children than in larger classes (NICHD ECCRN, 2004). In the present study, there was a noteworthy difference in class size between the Portuguese classrooms and the Belgian ones, which can therefore explain the unexpected difference for closeness means. To further clarify these results, follow-up analyses estimating the latent factor mean difference for closeness were conducted using maternal education and class size as covariates. Results revealed that the mean difference was no longer statistically significantly different, $-1.95, p = .14$, providing support for these hypotheses.

For conflict, the item intercepts were invariant across Portugal and Belgium and, therefore, we did not find differences that would consistently favor one group over the other. Hence, violation of full scalar invariance may not have severe consequences for cross-country comparison. Further research with larger and more comparable samples will be crucial to determine whether mean levels of closeness and conflict can be compared reliably across countries.

Because metric invariance of the STRS was established, it was possible to meaningfully examine the relations between STRS dimensions and other variables. The results indicated that conflict and closeness were not related to each other in Portugal, but in contrast, these two relational dimensions were negatively related in Belgium. Moreover, child gender was not associated with either relational dimension in Portugal, while in Belgium, teachers described girls as having closer relationships with them.

These findings can be interpreted in light of previous research findings examining the quality of caregiver-child relationships in different cultures (Beyazkurk & Kesner, 2005; Gregoriadis & Tsigilis, 2008). The attachment literature indicates that attachment relationships are likely to be established in any culture, but the behaviors that caregivers consider adaptive may differ, depending on the culture in which children are (van IJzendoorn & Sagi-Schwartz, 2008). There are, therefore, potential cross-cultural variations in the interpretation of attachment-related behaviors (Thompson, 2008). Our findings might be interpreted as suggesting that Portuguese and Belgian teachers perceive closeness-related behaviors differently. It seems that in Portugal, the degree of closeness is not affected either by the levels of conflict present or by the child gender. The lack of association between conflict and closeness suggests that Portuguese teachers do not perceive that higher levels of relationship conflict prevent them from establishing close relationships. Similarly, regardless of child gender, Portuguese teachers perceive their relationships as warm and close. Therefore, we can speculate that Portuguese teachers find it desirable to unconditionally accept all children, irrespective of the child's behavior or characteristics. Similarly, Gregoriadis and Tsigilis (2008), in a study examining teacher–child relationships in Greece, also a collectivistic society, pointed out that the belief that all children should be unconditionally loved could explain why teachers did not perceive children's dependent-related behaviors as negative ones. It is also worth to note that in Portugal, as in other collectivist countries such as Turkey (Beyazkurk & Kesner, 2005), the same teacher stays with the group of children for four years (starting in Grade 1). This can contribute to teachers' effort to establish uniformly warm and close relationships with every child, as opposed to Belgium, in which children meet a new

teacher every school year.

In contrast, in Belgium, our findings indicated that teacher–child closeness decreased with increasing conflict. Therefore children with higher levels of relational conflict had lower levels of closeness in relationships with their teachers. Closeness was also related to child gender. These findings are in line with results from other studies in Western, individualistic societies (Hamre & Pianta, 2001; Jerome, Hamre & Pianta, 2009; Koomen et al., 2012). This pattern of associations might be understood as Belgian teachers as perceiving their relationship with each child in a more precise, specific way, rather than unconditionally as the Portuguese teachers. Following Beyazkur and Kesner (2005) it is possible that, in more individualistic societies, positive relationships with children are primarily instrumental and are more conditional on the child’s behavior and characteristics. Relationships are thus perceived within a broader spectrum of aspects that contribute to school success.

Our study results further indicate an association between closeness and class size in Portugal. It is possible that, in line with previous research (NICHD ECCRN, 2004), in larger classes, teachers feel that they have fewer opportunities to know individual children well and to form close relationships with each child. The lack of association between class size and closeness in Belgium may be due to the smaller class sizes and the restricted variation between class sizes found for this country. Additionally, in Belgium, teachers who were observed to create a positive emotional classroom climate tended to report more closeness with children. Results are consistent with previous studies indicating that classrooms characterized by warm and supportive care can foster positive, secure teacher–child relationships (Ahnert et al., 2006; Howes et al., 2007; O'Connor,

2010). Teachers' assessments of their dyadic relationships with children are embedded in their interactions (Pianta, 1999) and thus, important intercorrelations are expected between classroom practices and such relationships. Moreover, it is possible that teachers in classrooms with more positive interactions display a greater appreciation of children's behaviors and have reciprocal, proximal interactions with children (O'Connor, 2010).

It should also be pointed out that more consistent associations of classroom-level variables with closeness, rather than conflict, are consistent with Silver and collaborators' (2005) findings, suggesting that teachers' interpretations of closeness, contrary to conflict, reflect to a greater extent teacher-driven efforts to promote warmth interactions, rather than child-driven effects, such as problem behaviors, which are highly influential for relational conflict.

Overall, results from the current study are in line with previous findings highlighting the importance of the cultural background in understanding the relationships teachers have with children (Beyazkurk & Kesner, 2005; Gregoriadis & Tsigilis, 2008). This study takes a step further by suggesting that teachers' perceptions of closeness and conflict are broadly equivalent across cultures. It is worth to note that societies are becoming increasingly multicultural, which highlights the importance of attending to culture and to cross-cultural variation. Given the role of teacher–child relationships in children's social and cognitive development, the establishment of metric invariance of the widely used STRS across countries can contribute for researchers to more precisely interpret the teacher–child relationship dimensions helping to understand more clearly cultural particularities in each country while making meaningful comparisons across countries.

Limitations and future directions

Several limitations of this study should be noted and more research is needed to better examine cross-cultural differences and consistencies of the STRS. First, the sample size was limited, leading us to use parcels as observed indicators, instead of the items.

Although parcels offer several advantages, we should recognize that its interpretative value is also reduced (Meade & Kroustalis, 2006). Second, both number of clusters and cluster sizes were considerably different between the countries. Research with both larger samples and cluster sizes could provide more information on the level of measurement invariance of the STRS. Third, both Belgian and Portuguese participants were from particular regions of Belgium and Portugal, which restricts generalizability to other regions of the country. It is also important to note that the study's generalizability may be limited to the two countries under study. This study represents a first step to examine the quality of teacher–child relationships cross-culturally; certainly additional studies will be crucial to enhance our understanding of the role of culture on the important relationships children have with their teachers.

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Table 1

Testing for Measurement Invariance in Portuguese and Belgian Classrooms.

	χ^2	df	CFI	TLI	RMSEA	Δ CFI	$\Delta\chi^2$	df	<i>p</i>
Teacher–child relationships									
Baseline Model	39.81	18	.972	.953	.083				
Metric invariance*	48.03	24	.969	.961	.075	.003	10.03	6	.123
Scalar invariance**	100.08	26	.904	.889	.127	.065	157.95	2	.000
Partial Scalar invariance***	46.26	24	.971	.964	.072	.001	8.65	6	.194

Note. CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation

*Factor loadings constrained, intercepts and residual variances free; factor means fixed at zero

** Factor loadings and intercepts constrained, residual variances free; factor means fixed at zero in one group and free in the other

***Some intercepts or some loadings are invariant but others free

Table 2

Summary of Analyses predicting Latent Factors of Conflict and Closeness.

	Portugal				Belgium			
	<i>Conflict</i>		<i>Closeness</i>		<i>Conflict</i>		<i>Closeness</i>	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept	0.00		0.00		0.09		0.23	
Child gender (1= boy)	0.05	0.07	-0.12	0.12	0.14	0.09	-0.25*	0.11
Mothers' educational level	-0.04	0.04	0.04	0.06	-0.09	0.09	0.02	0.14
Class size	0.01	0.01	-0.05*	0.02	-0.00	0.02	0.03	0.03
Positive Climate	0.04	0.05	0.01	0.05	0.05	0.06	0.13*	0.06

* $p \leq .05$