Transactional associations between classroom engagement and relations with teachers from first through fourth grade

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A B S T R A C T
Using structural equation modeling with a population-based cohort of French-speaking children from Quebec (Canada), prospective associations were made between two previously established factors underlying student performance — classroom engagement and the teacher—student relations. Our results show developmental continuity in classroom engagement and teacher—student relations from grades 1 through 4, beyond the influence of confounding child factors (sex, kindergarten cognitive skills, and second grade achievement) and family factors (such as maternal education). Although they were both relatively stable over time, closer relations with teachers showed comparatively less stability than classroom engagement. That is, classroom engagement showed the most developmental continuity from one grade to the next. Because intervention programs targeting very young children are among the most cost-effective (Heckman, 2006), our findings suggest the benefits of investing in evidence-based programs, in concert with practitioners, to promote positive teacher relations with students and encourage their active classroom participation and involvement.

1. Introduction

From school entry, students are confronted with important cognitive and behavioral challenges. While having to adapt to a group-based social environment, they are asked to make an effort during classroom activities, listen carefully, follow rules, participate, work autonomously, and invest considerable persistence. Children vary in their ability to respond to such expectations (Ladd, Buhs, & Seid, 2000). In turn, the behavioral responses children produce are important as they chart the developmental course toward academic success (Johnson, McGue, & Iacono, 2006; Ladd & Dinella, 2009; Skinner, Kindermann, & Furrer, 2009). For youngsters, engagement is a malleable process that evolves over time and is responsive to the interpersonal transactions in the classroom environment (Simons-Morton & Chen, 2009; Sirin & Rogers-Sirin, 2004). Beyond individual characteristics (Ladd et al., 2000; Pagani, Fitzpatrick, Archambault, & Janosz, 2010), the bond between teacher and student remains a fundamental aspect of the childhood schooling experience. Past research has shown that close and supportive responses from teachers have important implications for learning-related behaviors and achievement in students (Birch & Ladd, 1997; Furrer & Skinner, 2003; Hughes, Luo, Kwok, & Loyd, 2008; Pianta, Steinberg, & Rollins, 1995).

Until recently, there have been few studies that examine the developmental links between student engagement and teacher—student relations in primary school children. A recent study by Hughes et al. (2008) found reciprocal links between teacher—student relations, engagement, and achievement over three consecutive years. Students showing early signs of behavioral disengagement in class were at higher risk of future academic difficulties. Considering that engagement and the quality of relations with teachers are important for the academic dimension of schooling (Hamre & Pianta, 2001; Ladd & Dinella, 2009), research examining the developmental continuity of these factors is now warranted.

1.1. Defining classroom engagement

The concept of student engagement has inspired a number of approaches (Appleton, Christenson, & Furlong, 2008; Finn, 1989; Ladd et al., 2000). Upon conducting an extensive review of the extant literature, Fredricks, Blumenfeld, and Paris (2004) offer three dimensions which help operationalize student engagement. These are behavioral, affective, and cognitive. The affective and cognitive dimensions respectively refer to student feelings, interests, and...
attitudes toward school (Eccles, Wigfield, Harold, & Blumenfeld, 1993; Finn, 1989; Goodenow, 1993) and psychological investment in learning and use of self-regulation strategies (Ablard & Lipschultz, 1998; Connell & Wellborn, 1991; Pintrich & de Groot, 1990; Skinner & Belmont, 1993). The behavioral dimension of engagement refers to behavioral dispositions and conduct when approaching and undertaking school-related tasks (Mcdermott, Mordell, & Stoltzfus, 2001). Such behaviors include compliance to classroom rules and instructions, attention, efforts, and participation in classroom-related activities (Finn, 1989; Fredricks et al., 2004). Although the cognitive and affective dimensions of engagement remain important influences on the academic life-course (Archambault, Janosz, Fallu, & Pagani, 2009), student behavioral engagement is often seen as a reflection of affective and cognitive involvement (Archambault, Janosz, Morizot, & Pagani, 2009; Eccles, 2004; Ladd & Dinella, 2009). Moreover, classroom participation is associated with positive changes in attitudes about school (Ladd & Dinella, 2009). Early signs of classroom effort and participation chart the course toward future academic difficulties (Hughes et al., 2008). Finally, learning-related behaviors are more concrete targets for intervention (Diamond, Barnett, Thomas, & Munro, 2007). Accordingly, many studies have drawn upon behavioral engagement as a key element predicting later academic adjustment.

The contribution of early behavioral engagement on student academic attainment outcomes is well established (Alexander, Entwisle, & Dauber, 1993; Ladd & Dinella, 2009; McClelland, Morrison, & Holmes, 2000; Skinner, Wellborn, & Connell, 1990; Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). For example, Ladd and Dinella (2009) followed a sample of 383 children from kindergarten to eighth grade and found that children who were cooperatively engaged in the classroom and responded to teacher demands were more likely to show academic gains over time beyond important cognitive, family, and demographic characteristics. Valiente et al. (2008) further showed that classroom participation partially mediated the link between student self-regulation and GPA even after controlling for important confounding variables such as sex, family income, parental education, and prior grades. According to Wentzel (1999), children who are actively engaged are more likely to achieve academically because they seek goals that are valued by members of their school and classroom environment. To the extent that some stability exists in engagement patterns across the primary grades (Ladd & Dinella, 2009), some children may find themselves on a continuous risk trajectory starting in the early grades. Such a trajectory may be influenced by both child characteristics and features of their learning environment. Teachers likely have an important influence on this learning environment given their level of responsibility and pedagogical objectives, in the face of heterogeneous group composition (Hijzen, Boekaerts, & Vedder, 2007).

1.2. Classroom engagement and teacher—student relations

For some authors, classroom engagement can specifically be operationalized by the quality of student involvement with classmates and teachers (Finn, 1989; Ladd et al., 2000; Skinner & Belmont, 1993; Skinner et al., 2008, 1990). For others, the relations studies build with teachers do not serve as an indicator but rather, as a foundation or consequence of classroom engagement (Battistich, Solomon, Watson, & Schaps, 1997; Birch & Ladd, 1997; Marks, 2000; Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). In line with attachment theory perspectives (Bowlby, 1980), building a supportive relationship with a significant caregiver is critical for child development. Parents and teachers are the most important vehicles for socialization and among the most frequently mentioned sources of support during the school age years (Resnick et al., 1997). In classrooms that allows teachers to engage in more individualized teaching (Blatchford, Bassett, & Brown, 2011), the supportive reciprocal relationship teachers develop with their students becomes an important predictor of day-to-day engagement, which enables children to consolidate the emotional security needed to explore their social environment and cope with academic challenges. An observational study by Ponitz, Rimm-Kaufman, Grimm, and Curby (2009) using a sample of 171 kindergarteners found that classroom and teacher—student relationship quality is indirectly associated with children’s reading ability through improvements in classroom engagement. According to their study, when classroom organization and teacher emotional and instructional support are high, children successfully adopt learning-related behaviors which contribute to their academic success. Other research shows that when teachers present themselves as warm, supportive, and responsive to individual needs, students respond with better behavioral engagement in the classroom and achievement (Brophy, 1983; Connell & Wellborn, 1991; Hamre & Pianta, 2001; Hughes et al., 2008; McWilliam, Scarborough, & Kim, 2003; Wentzel, 1999). In some cases, a close and supportive relationship with teachers may even attenuate risks associated with prior underachievement and buffer children against the negative effects of various socio-demographic disadvantages (Resnick et al., 1997), while conversely, negative and controlling teacher behaviors can have a negative influence (Assor, Kaplan, Kanat-Maymon, & Roth, 2005).

Most importantly, the associations between teacher—student relationship and student engagement could also be viewed as transactional (Sameroff & Fiese, 1990; Skinner, Furrer, Marchand, & Kindermann, 2008). This idea implies, on one hand, that students who perceive their teacher as being supportive might be more responsive to academic expectations and demands and tend to be better engaged in classroom-related activities. In support of this view, longitudinal findings indicate that negative changes in Teacher—child relations are associated with a decline in student achievement, even after controlling for important variables such as IQ (Hamre & Pianta, 2001). On the other hand, students who show classroom involvement follow directives and instructions, and work neatly and cooperatively could reinforce positive teacher attitudes and support. That is, student self-regulation in the classroom generates more positive and spontaneous reciprocal responses from teachers, which can ultimately promote their achievement-related outcomes (Koriat, 2012; Rimm-Kaufman et al., 2009).

1.3. Objective and hypotheses

Previous findings suggest that student engagement and relationships with teachers underscore transactional processes which set the stage for short and long-term educational progress. Consistent with this body of work, we used a population-based data set of French-speaking Canadian children from Quebec (Canada) to conduct a more in-depth examination of the links between classroom engagement and teacher—student relations and address their developmental course from first grade through fourth grade. Given the notion of developmental continuity, our initial hypothesis was that first grade classroom engagement would be positively associated with fourth grade engagement (hypothesis 1). Second, we expected that students who share a close relationship with their first grade teacher would also share a close relationship with their fourth grade teacher (hypothesis 2). Third, we anticipated that classroom engagement and close teacher—student relations would covary along the same school year, in first and fourth grade (hypothesis 3). Finally, we expect that these two dimensions would transact over time. That is, classroom engagement in first grade should predict teacher—student close relations in fourth grade (hypothesis 4a) and close teacher—student relations in first grade.
should be positively associated with classroom engagement in fourth grade (hypothesis 4b).

2. Method

2.1. Participants and procedure

The Quebec Longitudinal Study of Child Development (QLSCD) originates from a randomly selected birth cohort born between 1997 and 1998 in the Canadian province of Quebec. The Institut de la Statistique du Québec obtained informed consent from parents at all survey points and coordinated the data collection procedures. The QLSCD comprises an infancy/early childhood phase and a school age phase.

For the infancy/early childhood phase, a stratified sample of 2694 infants (and their families), representing 94.5% of the target population, were first assessed at 5 months. These infants were considered eligible for the longitudinal follow-up from 17 months to 53 months. From those deemed eligible at the 5 month wave, 8 children became ineligible (inconsistencies in documentation) and 689 became untraceable. Thus, 1997 infants were eligible for entry into the longitudinal study from the second wave onward (17 months). From this sampling procedure, 1820 cases were retained with informed consent, evenly represented of girls and boys. Over a third (38%) of this sample was firstborn. Biological parents were present in the household. The average maternal age at birth of the target child was 26.93 years (SD = 8.90), and 13.4% of mothers and 16.9% of fathers did not have a high school diploma.

Child assessments occurred at 5, 17, 29, 41, and 53 months of age using computerized parent interviews, parent questionnaires, individual child assessments, and where appropriate, teacher questionnaires. Mothers were the most common data source for parent questionnaires in 94–99% of cases. For the school-age phase of the QLSCD, children had to be 60-months on September 30 to be eligible for kindergarten entry in fall of 2002. Kindergarten data on individually-assessed school readiness in math and vocabulary knowledge was gathered at home in the spring of 2003 for 1155 kindergarten children (607 girls and 538 boys at 65-months). Ten children were derogated into kindergarten the previous year, resulting in a sample of 1145 kindergarteners available for analysis. By the spring of second grade (2005), all participants were attending French speaking elementary school. The nature of the random sampling from the birth registry to achieve provincial representativeness resulted in no clustering of children in the same schools or with the same teachers during the school age phase.

2.2. Measures

The objectives of this paper are achieved through secondary analysis of already existing population-based data from established instruments that emanate from the National Longitudinal Study of Children and Youth (NLSCY; for details, see: http://www23.statcan.gc.ca/1imidb/p2SV.pl?Function=getSurvey&SDDS=4450&lang=en&db=imdb&adm=8&dis=2).

2.2.1. Kindergarten control variables

Children completed the Number Knowledge Test (NKT, abridged version) and the Peabody Picture Vocabulary Test (PPVT, French adaptation; Dunn, Thériault-Whalen, & Dunn, 1993) with a trained examiner. The NKT adjusted for 5-year-olds measure child knowledge of the (1) number sequence (2) ability to map a sequence to objects using a one to one correspondence (3) cardinal values of numbers; (4) rule relating adjacent cardinal values; and (5) the rule that a successive numbers represents a set composed of a greater quantity of objects (Okamoto & Case, 1996). The PPVT measured receptive vocabulary knowledge. During this test, examiners present 175 vocabulary items in increasing level of difficulty. A French version of the test was standardized by Dunn et al. (1993) and correlates well with other French language vocabulary and intelligence tests (Dunn et al., 1993). Mothers also provided reports of their level of educational attainment in terms of high school completion or not.

2.2.2. Second grade academic achievement control variable

Teachers rated the child’s math and reading achievement by selecting from the following options (a) greatly above the classroom mean; (b) slightly above the classroom mean; (c) at the classroom mean; (d) slightly below the classroom mean; and (e) greatly below the classroom mean. Global Achievement scores were calculated for each child by computing the mean of their math and reading scores. Teacher ratings of achievement have been shown to detect even small changes in academic performance (Paganí, Tremblay, Vitaro, Boulerice, & McDuff, 2001) and to demonstrate as much sensitivity as individual achievement tests (Duncan et al., 2007).

2.2.3. Classroom engagement

In the spring of grades 1 and 4, homeroom teachers reported upon 7 items of classroom engagement (Paganí et al., 2010). Items were rated from 1 (Never) to 5 (Always) and included: Follows directions; Works independently; Listens Attentively; Works neatly and carefully; Puts a lot of effort into work; Participates in class; and Follow rules. Alphas at grade 1 and grade 4 were .93 and .94, respectively.

2.2.4. Teacher–child relations

Teachers also provided reports of their positive and close interactions with the child in grades 1 and 4 using four items emanating from the Student–Teacher Relationship Inventory (Pianta, 1999) are rated from 1 (Definitely does not apply) to 5 (Definitely Applies) and include: I share a close and warm relationship with this child; This child spontaneously shares information about him/herself; It is easy to be in tune with what this child is feeling; and My interactions with this child make me feel effective and confident. Alphas were .78 and .76 in grades 1 and 4, respectively.

2.3. Data analytic strategy

2.3.1. Treatment of missing data

Some children (n = 417; 36.4% of the sample) had incomplete data on one or more variables in first, second, or fourth grade (18.1% of students had missing value in the first grade, 18.5% in the second grade, and 36.2% in the fourth grade). We imputed all missing data and arbitrarily created ten datasets using the NORM multiple imputations program (Schafer, 1999). By drawing values from the
conditional distribution of the variables, NORM uses an iterative method based on EM algorithm to impute missing data, depending on the available and valid observations from the original data set (for technical details, see Schafer, 1999).

### 3.2.2. Testing our hypothesized model

We used Mplus version 5 and implemented a two-step approach to Structural Equation Modeling (SEM; Anderson, Greene, & Loewen, 1988). This approach allowed us to specify and test the adequacy of the proposed model of classroom engagement and teacher—student relations measures prior to testing the full structural model. We used Confirmatory Factor Analysis (CFAs) to calculate one-factor congeneric models of classroom engagement and teacher—student relations at grades 1 and 4. These are models within which a single latent factor is measured by several observed variables. In doing so, we fixed factor loadings arbitrarily at one unit for each first variable. The other factor loadings and the variance of all latent constructs were left to vary. We subsequently examined the fit for each measurement model. Once these were established, we used the latent constructs to analyze our hypothesized model. Because the Quebec Longitudinal Study of Child Development is based on a random sample of a birth cohort, children were geographically dispersed in classrooms and schools across the province, thus precluding the use of multilevel modeling.

We first tested a saturated model with all paths between covariates (i.e., sex, maternal education, math and language skills during kindergarten, and second grade achievement) and latent variables in first and fourth grade. Next, because some research finds that boys tend to be less engaged and take more advantage from a positive and warm relationship with teachers (Hamre & Pianta, 2001; Wigfield & Eccles, 2002), yet other researchers find no sex differences in the influence of controlling teacher behaviors on student engagement (Assor et al., 2005), we tested multiple group invariance of the final model for boys and girls to ensure the model is appropriately specified for both genders (Appleton, Christenson, Kim, & Reschly, 2006).

As recommended by Hu and Bentler (1999), we compared different parameters in order to evaluate the CFA and SEM model fit: Comparative Fit Index (CFI); Tucker-Lewis Index (TLI); Root Mean Square Error of Approximation (RMSEA); Standardized Root Mean Residual (SRMR); and the \( \chi^2 \). We chose to rely on the indices that are less sensitive to sample size (TLI, RMSEA, Sharma, Mukherjee, Kumar, & Dillon, 2005). A value of .06 or less for the SRMR (Hu & Bentler, 1999) and of .06 or less for RMSEA are considered an adequate fit (Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996). A value of .95 and above is considered an excellent fit for CFI and TLI. Also, the \( \chi^2 \) should be none significant (Bentler & Bonett, 1980). To compare CFA models with a different number of factors, we also used Akaike Information Criterion (AIC; Akaiche, 1987), Bayesian Information Criterion (BIC; Schwartz, 1978), and Sample-Size Adjusted Bayesian Information Criterion (ABIC; Sclove, 1987). A better fit is indicated when absolute values of these indices become smaller. However, it is preferable to rely on the BIC and ABIC rather than the AIC because they usually select more parsimonious models. Finally, we examined adequacy of factor loadings. Although factor loadings exceeding .40 are considered acceptable (Hair, Anderson, Tatham, & Black, 1998), we chose to adopt a more conservative standard of .50.

### 3. Results

#### 3.1. Measurement model

We first used Confirmatory Factor Analysis (CFAs) to calculate one-factor congeneric models of classroom engagement and student relations at grades 1 and 4. Table 1 reports the fit indices for each model. Overall, this table indicates that each measure of classroom engagement and teacher—student relations shows good modeling of the data. The RMSEA for teacher—student relations in first and fourth grade was slightly above the .06 standard; however, the SRMR, TLI, and CFI reached an ideal fit (Hu & Bentler, 1999; MacCallum et al., 1996). Finally, the \( \chi^2 \) was significant in all models but we decided not to rely on this fit index since it is very sensitive to sample size. We next generated Cronbach’s alpha coefficient to assess the reliability of the classroom engagement and teacher—student relations scales at first and fourth grade. As reported in Table 1, all scales presented good reliability, with alpha coefficient ranging from .76 to .90.

### 3.2. Descriptive statistics and bivariate correlations

We next generated descriptive statistics and correlations for all the variables and scales. Table 2 presents the results of these analyses. As shown, the correlation between classroom engagement in first and fourth grade is large (Pearson \( r = .54 \)); while the correlation between teacher—student relations at the same grades was moderate (Pearson \( r = .24 \)).

### 3.3. Structural equation model

We then tested our SEM model to verify the prospective links between our measures of classroom engagement and teacher—student relations. Theoretically significant covariates (i.e., sex, maternal education, math or verbal skills in kindergarten) were included in the model. As recommended by MacCallum et al. (1996), the first step involved testing a saturated model which includes all possible paths from the covariates, the observed, and latent factors. The fit indices of this original model were slightly lower than the adequacy standards (CFI = .86, TLI = .84, RMSEA = .073, SRMR = .062). Next, we removed all non-significant paths between the latent construct and retested the model. Fig. 1 illustrates the final model with standardized coefficients for all significant paths. In this model, we allowed correlations between some of the residuals of classroom engagement and teacher—student relations items in first and fourth grade. These correlations of error terms were suggested by the modification indices; two of them were within factor (engagement) correlations\(^3\) and all the others correlations (11) were between test—retest items.\(^4\) The \( \chi^2(319) = 12,186.746 \) was significant. The CFI of .915 and the TLI of .909 were close but did not reach the ideal standard of .95 proposed.

### Table 1

Results of the one-factor congeneric measurement model.

|                | \( \chi^2(\text{df}) \) | RMSEA | SRMR | TLI | CFI | Cronbach
|----------------|------------------------|-------|------|-----|-----|---------
| First grade classroom engagement | 4118.694 (21) | .059 | .029 | .953 | .975 | .903 |
| Fourth grade classroom engagement | 4057.364 (21) | .054 | .022 | .968 | .981 | .894 |
| First grade teacher—student relations | 917.435 (6) | .061 | .017 | .950 | .992 | .779 |
| Fourth grade teacher—student relations | 955.293 (6) | .066 | .010 | .969 | .995 | .762 |

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\(^3\) The within factor correlated residuals were between the following items: Follows directions and Follow rules; Follow directions and Listens attentively.

\(^4\) The model fit without these correlated residuals is almost identical to the original model (CFI = .86, TLI = .84, RMSEA = .073, SRMR = .062).
by Hu and Bentler (1999). However, they were strong enough to suggest that our model fit the data. This goodness of fit was further confirmed by the RMSEA of .058 and the SRMR of .054. Overall, this model explained, 21.9 and 37.1% of classroom engagement at first and fourth grade, and 8.8 and 11.2% of teacher–student relations during the same time points, respectively.

There are a few things to say about the contribution of each control variable above and beyond the others in our structural model. As shown in Table 3, our model shows that girls were more engaged and experienced better relations with teachers, according to first and fourth grade teachers. Moreover, cognitive skills in kindergarten were positively associated with subsequent engagement and closer relations with first grade teachers. Kindergarten skills did predict fourth grade teacher–student relations, but not engagement. The fact that kindergarten skills did not predict fourth grade engagement is probably due to the fact these skills share common variance with second grade achievement which is a better and more proximal predictor of fourth grade engagement and teacher–student relations.

Results of our structural model further indicate that beyond the contribution of our covariates (i.e., sex, maternal education, math and language skills during kindergarten, and second grade achievement), classroom engagement in first and fourth grade shows considerable stability as do teacher–student relations across the same school years. Thus, students who were more engaged and had better relations with their first grade teachers were also more engaged and had better relations with their fourth grade teachers. However, when both variables are compared, the stability of teacher–student relationship was lower than engagement from grade to grade. Fig. 1 shows that classroom engagement and teacher–student relations significantly covaried both in first grade and fourth grade, which suggests that children who are perceived as being more engaged by their teachers are also sharing more positive and warmer relations with them. We finally tested multiple group invariance of the final model for boys and girls. Results showed that relationships between variables in our model were similar for boys and girls ($\Delta \chi^2(19) = 11.571, p > .05$; $\Delta$CFI = .001). This last step indicates that the model is appropriately specified for both genders.

### 4. Discussion

Academic success, as an objective, requires more than cognitive skills. Adequate task-focused classroom behavior has more often than not been neglected in the achievement literature. More importantly, how these transact with the school environment has received even less attention. With this in mind, the goal of the study was to comprehensively evaluate the early classroom experience as a developmental milestone toward future academic success. We evaluated the prospective developmental stability and relations between classroom engagement and teacher–student relations from first through fourth grade. On the whole, our findings provide more insight about the reciprocal and transactional associations between early student participation and relations with teachers in the classroom and their importance in setting the stage for short- and long-term educational progress.

First graders who participated in class, listened carefully and followed directions, and persisted and completed their work autonomously were more likely to remain more actively engaged in fourth grade (hypothesis 1). This developmental continuity, observed in previous work (Hughes et al., 2008), is above and beyond the influence of pre-existing and concurrent predictors of achievement. Nevertheless, the stability of engagement patterns over the elementary school grades were relatively moderate. This corroborates previous findings (Ladd & Dinella, 2009). While stability is positive for children and particularly for girls who enter school cognitively skilled with well-adjusted socio-emotional atti-

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**Table 2**

<table>
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<th>Variables</th>
<th>1</th>
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Note. *p < .05; ***p < .001.
students seems to positively nourish children’s behavioral and emotional adaptation in the classroom during the same school year.

A warm teacher—student relationship in first grade also forecasts fourth grade engagement over and above the contribution of kindergarten skills and second grade achievement (hypothesis 4a). This finding is certainly among the strongest argument we can give to highlight the significance of this specific (and malleable) adult—child bond for students. As reported previously, when students develop a warm and close connection with their teacher, they are more inclined to subsequently respond positively to curricular expectations and demands (Brophy, 1983; Furrer & Skinner, 2003). All the same, the new finding here is that all children can benefit from this positive relationship, independently of their cognitive skills or early engagement behaviors. As many authors highlight the long-term academic impact of beginning school unprepared (Duncan et al., 2007), this finding suggests that positive interactions with teachers can act as a buffer against early childhood vulnerabilities.

Finally, our results showed that children’s engagement patterns did not forecast Teacher—child relations in fourth grade (hypothesis 4b). This finding was quite surprising. It suggests that although some children experience early difficulties to actively participate and respond to teacher expectations and demands, this situation do not seem to affect their potential to subsequently develop a warm and positive affiliation with another teacher in later years. Each Teacher—child relationship is unique. Fortunately, the nature of this affiliation seems to be quite independent of children previous classroom experience. This represents good news for some children who, for different reasons, begin their formal schooling with developmental immaturity limiting their ability to invest classroom activities properly and strive to meet teacher expectations. Over time, they will meet different teachers with whom they still can share their experience with, which will in turn favor their engagement.

Although this study established the relevance of a positive teacher—student relationship for boys as for girls, for intervention, trying to change the relationship a teacher shares with each student will be more challenging than attempting to alter student engagement. Teacher—child relations are influenced by the dynamic set of interactions that occur in the classroom context, some of which are attributable to student traits. Nevertheless, teachers are the adults and professionals. Their professional demeanor can be modified, if they are driven enough to alter specific interactions as though they are strategic changes in the learning environment. With an understanding of the impact of their influence and strategic support, teachers can establish a sensitive and responsive environment that promotes active classroom participation and involvement by students. In line with attachment theory (Bowlby, 1980), encouraging teachers to take time to exchange with their students, to express appreciation of these exchanges, and to be concerned about

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**Table 3**

Prospective associations between covariates and latent variables in the structural equation model.

<table>
<thead>
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<th>Fourth grade</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Classroom engagement</td>
<td>Teacher—student relations</td>
</tr>
<tr>
<td>Maternal education</td>
<td>–.02</td>
<td>–.05</td>
</tr>
<tr>
<td>Sex (girl)</td>
<td>0.23</td>
<td>0.14</td>
</tr>
<tr>
<td>PPVT (kindergarten)</td>
<td>0.18</td>
<td>0.16</td>
</tr>
<tr>
<td>NKT (kindergarten)</td>
<td>0.29</td>
<td>0.17</td>
</tr>
<tr>
<td>Achievement (2nd grade)</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Note.Bold characters are significant at \( p < .05 \).
the way their students feel will provide a more positive and secure classroom experience that promotes learning-related behaviors and achievement (Howes, Phillipsen, & Peisner-Feinberg, 2000). As role models, their behavioral responses to emotional arousal, noncompliance, and turbulence in the classroom can promote better self-regulation in children (Kochanska, Murray, & Harlan, 2000).

Beyond the promotion of Teacher–child relations, encouraging children’s active classroom participation and involvement may be a more productive focus of intervention for boys and girls who present early difficulties. Engagement skills may be related to academic adjustment because they facilitate adaptation to the academic and social demands of the early school environment (Birch & Ladd, 1997). As an individual factor, classroom engagement is also more enduring and less dependent on the changes children experience from one classroom to another. By bringing student to be attentive, to participate, and work autonomously, teachers and school practitioners promote their prospective achievement and engagement which in turn, contribute to strengthen the links student will eventually share with other teachers. They are also likely to reflect underlying individual differences in self-regulation skills which play an important role in helping individuals adjust to novel challenges. Given the notion of heterotypic continuity, early individual differences in attention control and temperament are likely to manifest themselves as greater task-orientation and classroom engagement by the time children enter school (Putnam, Rothbart, & Gartstein, 2008; Rothbart & Bates, 2006). Furthermore, initial differences in cognitive control can help children develop the ability to mobilize attention in the service of emotional regulation, which in turn can be beneficial for sustaining concentration in stressful or frustrating situations. Better emotional regulation can also facilitate positive social interactions (Rothbart & Bates, 2006). Unfortunately, the attention, working memory, and inhibitory control skills that are important to promote child engagement in learning are rarely taught in primary school (Diamond et al., 2007). Early intervention aimed at improving these skills, by scaffolding inhibitory control, and facilitating more rewarding academic experiences in order to stimulate child classroom active participation are thus imperatively needed (Gormley & Gayer, 2008; Lillard & Else-Quest, 2006). An important investment would be to train kindergarten and primary school teachers in cognitive control interventions for children with programs that promote a sensitive and responsive classroom environment and reinforce guided exploration, collaborative learning, planning, and problem solving for optimal development (Bierman, Nix, Greenberg, Domitrovich, & Blair, 2008; Diamond et al., 2007).

This study is not without limits. First, our measures of behavioral engagement and teacher–student relations were solely based on teacher reports at different grades which could have introduced a bias in our data, especially for measuring student engagement. Nevertheless, the finding that first grade teacher assessments were associated with fourth grade teacher assessments supports the validity of our measures. Second, this study only considers the prospective associations between teacher–student relations and the behavioral dimension of engagement. In order to better orient our findings present important conceptual implications for the study of classroom engagement. Behavioral engagement bears insights into children’s attentive and affective control. Furthermore, it represents an observable facet of classroom adjustment which can be easily assessed by teachers and practitioners. Promoting engagement promises improvements in child academic adjustment regardless of previous experience and individual strengths and weaknesses. Nonetheless, assessing the behavioral facet of engagement may not be sufficient. It needs to be complemented by information about children’s emotional and cognitive engagement. By looking at the relations students share with teachers, this study highlighted the relevance of examining the proximal influence of children’s affective state on their achievement-related behaviors in the classroom. In any case, it would be important for research to assess how teachers’ practices and relations with students more directly influence children long-term affective and cognitive engagement in the classroom. That is, whether or not it influences their value and interest in different subject matter, or whether or not it contributes to the development of effective cognitive strategy to monitor learning. Additionally, it would also be interesting to look at how other sets of interactions students have in their classroom environment, such as the relations they share with peers, could promote their active participation and cooperative work. Finally, because intervention programs targeting very young children are among the most cost-effective (Heckman, 2006), our findings suggest the benefits of investing financial resources so researchers, in concert with practitioners, may develop and validate screening tools to detect the early signs of less than optimal classroom engagement.

References


