



Published in final edited form as:

Early Educ Dev. 2011 ; 22(3): 434–460. doi:10.1080/10409289.2011.578046.

Relations of Children's Effortful Control and Teacher–Child Relationship Quality to School Attitudes in a Low-Income Sample

Kassondra M. Silva,

School of Social and Family Dynamics, Arizona State University

Tracy L. Spinrad,

School of Social and Family Dynamics, Arizona State University

Nancy Eisenberg,

Department of Psychology, Arizona State University

Michael J. Sulik,

Department of Psychology, Arizona State University

Carlos Valiente,

School of Social and Family Dynamics, Arizona State University

Snjezana Huerta,

Department of Psychology, Arizona State University

Alison Edwards,

Department of Psychology, Arizona State University

Natalie D. Eggum,

School of Social and Family Dynamics, Arizona State University

Anne S. Kupfer,

Department of Psychology, Arizona State University

Christopher J. Lonigan,

Department of Psychology, Florida State University

Beth M. Phillips,

Department of Psychology, Florida State University

Shauna B. Wilson,

Department of Psychology, Florida State University

Jeanine Clancy-Menchetti,

Learning Systems Institute, Florida State University

Susan H. Landry,

Department of Pediatrics, University of Texas Health Science Center at Houston

Paul R. Swank,

Department of Pediatrics, University of Texas Health Science Center at Houston

Michael A. Assel,

Department of Pediatrics, University of Texas Health Science Center at Houston

Heather B. Taylor, and

Department of Pediatrics, University of Texas Health Science Center at Houston

School Readiness Consortium

Abstract

Research Findings—The purpose of this study was to examine the relations of children’s effortful control and quality of relationships with teachers to school attitudes longitudinally in an ethnically diverse and economically disadvantaged sample. Data were collected as part of a larger intervention project during mid-fall, winter, and late spring ($n_s = 823, 722, \text{ and } 758$, respectively) for 2 cohorts of 3- to 5-year-olds (collected during 2 different school years). Children’s effortful control was assessed in the fall with parents’ and teachers’ reports and 2 behavioral measures. Teacher–child relationship quality was assessed mid-year with teachers’ reports of closeness and conflict. Attitudes toward school were assessed in late spring using teachers’ and students’ reports of school avoidance and liking. Effortful control, in general, was positively correlated with teacher–child closeness and school liking and negatively correlated with conflict and school avoidance. Using structural equation modeling and controlling for sex and ethnicity, we found that effortful control was positively related to teacher–child relationship quality, which in turn was positively related to school attitudes. Furthermore, the relation of effortful control to school attitudes was mediated by teacher–child relationship quality.

Practice or Policy—Results provide evidence for the importance of relational processes that take place within the classroom context and have implications for teachers and clinicians working to increase school success in ethnic minority and low-income children.

There has been mounting concern that children belonging to socioeconomically disadvantaged families and/or an ethnic minority group are at risk for difficulties with school adjustment (National Education Goals Panel, 1997). Consequently, researchers have sought to understand how best to prepare children, especially high-risk groups, for success in school as they make the transition from preschool to formal schooling. This issue is especially important given that early risk factors such as low income appear to predict academic problems from first grade through high school (Gutman, Sameroff, & Cole, 2003), and the gap in academic outcomes between disadvantaged children and their peers grows during the elementary school years (Children’s Defense Fund, 1993; Entwisle & Alexander, 1992).

Different forms of school engagement have been studied as possible antecedents of academic achievement. A crucial hypothesis posited in the engagement literature is that to fully benefit from education and ultimately be successful, students must be present and actively engage in the classroom (Fredricks, Blumenfeld, & Paris, 2004). Indeed, a large body of work supports the notion that school engagement is an important predictor of school success (Buhs & Ladd, 2001; Ladd, Buhs, & Seid, 2000; Ladd & Dinella, 2009) and that children from low-income families are more likely to exhibit increasing levels of disengagement from school (Finn, 1989; Hauser-Cram, Warfield, Stadler, & Sirin, 2006). In this article, we focus on components of *emotional school engagement*, defined as children’s affective reactions and attitudes toward peers, teachers, academics, and school in general (Fredricks et al., 2004), such as school liking and avoidance. In contrast to behavioral and cognitive forms of engagement, positive school attitudes have been less thoroughly researched, especially in young children. Theoretically speaking, such attitudes are thought to foster students’ connection to the larger school environment, influencing motivation to achieve and increasing their active participation in their education (Fredricks et al., 2004). Conversely, a lack of positive attitudes toward school is believed to predict poor school

adjustment and achievement, especially if such sentiments are experienced early in children's schooling (Alexander & Entwisle, 1988; Ladd, 1996; Ladd et al., 2000).

Current findings suggest that positive attitudes toward school are related to children's higher achievement (Buhs & Ladd, 2001; Ladd, Birch, & Buhs, 1999; Valiente, Lemery-Chalfant, & Castro, 2007; Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). In a sample of kindergartners, Ladd et al. (2000) found evidence that school liking promoted classroom participation and achievement. There was, however, less evidence that the reverse causal relation was true (i.e., that school liking was a consequence of participation and achievement). In addition, Ladd et al. (2000) found that early academic achievement was predicted by school attitudes through increasing participation in the classroom and that these associations remained significant when background variables such as family socioeconomic status and child's mental maturity were included in models. In a slightly older sample, school attitudes (e.g., school liking and avoidance) assessed in Grades 1–3 were predictive of long-term academic achievement. Children who consistently had higher propensities to like, rather than avoid, school exhibited more academic progress through the eighth grade compared to peers who had lower levels of engagement (Ladd & Dinella, 2009). Given the importance of school attitudes for students, the purpose of the present study was to examine the associations of both child characteristics (e.g., effortful control) and contextual factors (e.g., teacher–child relationship quality) with positive feelings toward school in a sample of ethnically diverse, low-income preschoolers aged 3 to 5 years old.

THE RELATIONS OF CHILDREN'S EFFORTFUL CONTROL TO SCHOOL ATTITUDES

In understanding the antecedents of children's social and academic success, developmentalists have considered the role of children's temperamentally based qualities, including regulation. A substantial body of work provides evidence that higher levels of regulation in preschool are related to better academic performance (e.g., Blair & Razza, 2007; McClelland et al., 2007). Less work has explicitly examined the relations of regulation to other constructs that are important to academic success, such as attitudes toward school.

Effortful control, the regulatory aspect of temperament, has been defined as “the efficiency of executive attention, including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors” (Rothbart & Bates, 2006, p. 129). Behavioral measures of effortful control involve skills such as the abilities to focus and shift attention, inhibit or activate a behavior, and delay gratification as well as to execute fine and gross motor control (Kochanska, Murray, & Harlan, 2000; Murray & Kochanska, 2002). Although the subcomponents of effortful control involve different sets of abilities, some researchers have found that the indicators are consistently positively related to one another and generally thought to be indicative of a latent effortful control factor (e.g., Kochanska et al., 2000). In addition, a battery of effortful control tasks measuring a number of aspects of this skill (e.g., slowing down motor behavior, attentional control) exhibited high reliability in a sample of children aged 33 to 42 months (Kochanska & Knaack, 2003). Some questionnaires and behavioral tasks used to assess effortful control likely tap some of these skill sets more than others, but they have been combined as an indicator of effortful control in studies using the same sample of low-income preschoolers in this study (Sulik et al., 2010) as well as in low-risk samples (Kochanska et al., 2000; Spinrad et al., 2007).

Although there is less research on the relations of effortful control to children's feelings about school, there are conceptual reasons for expecting associations. Effortful control allows for adaptive flexibility in attentional processes and for the regulation of behavioral

reactivity (Rothbart & Bates, 2006). Children who are well regulated are likely more successful at managing and inhibiting inappropriate behaviors and impulses, feel more comfortable interacting with others, and engage in more positive exchanges with teachers and peers. These positive experiences may include receiving praise from teachers and being well liked by peers, which could further serve to increase children's enjoyment of school. Conversely, children who are not able to self-regulate may encounter difficulty in participating in and completing activities and have less opportunity to form supportive networks in the classroom. These difficulties could potentially lead to frustration, peer rejection, and disciplinary action. Indeed, children's low effortful control has been associated with increased levels of victimization (Deater-Deckard, 2001), externalizing behaviors (Brody & Ge, 2001), and low levels of social competence (Eisenberg et al., 2001). Children who experience these outcomes may feel excluded and lonely, which could contribute to negative attitudes toward school. For example, attentional problems were negatively related to children's school liking in kindergarten and first grade (Ladd & Burgess, 2001), whereas effortful control positively predicted school liking in older samples (e.g., 7- to 12-year olds; Valiente et al., 2007). In addition, researchers have demonstrated the importance of effortful control in children's academic competencies (Blair & Razza, 2007; McClelland et al., 2007). Thus, children who have better academic skills may also find school more enjoyable.

Although it is not currently clear whether the relation between effortful control and school attitudes is present in preschool, school attitudes have been shown to be moderately stable from first to third grade (Ladd & Dinella, 2009). Early school attitudes are arguably crucial, as children who started kindergarten with negative feelings about school had lower levels of academic achievement in the fifth grade (Hauser-Cram, Durand, & Warfield, 2007). It is likely that children's earliest attitudes about school are related to later feelings as they continue their education. Thus, it is important to investigate the relations of effortful control with children's attitudes in preschool and, in addition, to examine what role is played by teacher-child relationship quality.

THE RELATIONS OF TEACHER-CHILD RELATIONSHIP QUALITY TO SCHOOL ATTITUDES

Although the evidence suggests that effortful control plays a role in the formation of children's attitudes toward school, contextual factors also may be related to school attitudes. A particularly relevant contextual factor may be the quality of the teacher-child relationship. The quality and nature of children's relationships with their teachers can be highly variable and can be characterized by closeness (e.g., reciprocal support and warmth) or conflict (e.g., overt struggle between child and teacher; Howes & Matheson, 1992; Pianta, Steinberg, & Rollins, 1995). Individual differences in relationship quality may influence the support received by children as they make the transition to school and thus may be related to differences observed in children's attitudes toward school.

The quality of teacher-child relationships has been consistently related to children's functioning across social and academic domains, including academic achievement and motivation, externalizing behaviors, disciplinary problems, and peer relations, across a variety of ages (Birch & Ladd, 1996, 1997; Crosnoe, Johnson, & Elder, 2004; Griggs, Gagnon, Huelsman, Kidder-Ashley, & Ballard, 2009; Hamre & Pianta, 2001; Hughes & Kwok, 2006; Pianta, 1999). However, less work has examined how the quality of teacher-child relationships is related to school attitudes, particularly with young children. As children enter school, teachers become an important resource upon which they can rely as they learn to navigate a new environment. Children who have difficulty making the transition to preschool but are able to form open, close relationships with their teachers may

come to enjoy and like school despite initial challenges. In contrast, children who develop relationships with teachers that are characterized by high conflict and low closeness may be more likely to have poor peer relationships as well. Both these relational risk factors may contribute to feelings of loneliness and contribute to less school liking and more school avoidance.

Although this association has not been thoroughly addressed in preschool-age samples, there is some work demonstrating that the quality of teacher–child relationships is related to school attitudes in older children. For example, Birch and Ladd (1997) found that children who had closer relationships with teachers in kindergarten liked school more, and those children who had more conflictual relationships were reported by teachers to like school less and be more school avoidant. We expected children’s relationships with their preschool teachers to be related to their school attitudes in ways similar to what has been found for older children. In support of this notion, teacher–child closeness and conflict in preschool were found to be significant predictors of teacher-reported classroom adjustment, which included items that assessed children’s attitudes toward school (Garner & Waajid, 2008). Taken together, such findings suggest the importance of examining children’s relationships with teachers when predicting children’s school attitudes in preschool.

THE RELATIONS OF EFFORTFUL CONTROL TO THE TEACHER–CHILD RELATIONSHIP

According to the conceptual model of student–teacher relationships proposed by Pianta (1999), attributes of the individuals who make up a relationship contribute to the quality of the relationship formed. More specifically, dispositional characteristics, particularly regulation, may contribute to how children are viewed by others. Indeed, children’s temperamental qualities, such as attentional and behavioral control, have been related to teachers’ expectations of the students, which influence relationship quality (Keogh, 1982, 1994; Myers & Pianta, 2008). Therefore, effortful control may be associated with school attitudes through children’s relationships with teachers. Given that children high on effortful control are found to be more socially competent and exhibit less behavioral problems (Eisenberg et al., 1997, 2003), it is likely that these children are viewed by teachers as well-behaved, less disruptive, and more ideal students. Teachers’ interactions with these students may unintentionally include behaviors such as rewards and praise. Such exchanges are thought to be more “open” in nature (Keogh, 2003) and to foster more warm, caring relationships with low levels of conflict. Children who lack regulatory abilities may be perceived by teachers as misbehaving intentionally, and this disruptive behavior may result in disciplinary action that leads to negative interactions. In addition, teachers may engage with these children in an entirely instructional way, with less opportunity to facilitate closeness. In fact, effortful control was related to less teacher–child conflict in a sample of low-income preschoolers (Myers & Morris, 2009) as well as to greater teacher–child closeness in first grade (Liew, Chen, & Hughes, 2010; Rudasill & Rimm-Kaufman, 2009). However, the relation of dispositional influences such as children’s effortful control with the quality of the teacher–child relationship has not been well examined in preschool.

THE MEDIATING ROLE OF TEACHER–CHILD RELATIONSHIP QUALITY

There are likely multiple influences that affect how children feel about school. As discussed previously, two of these influences may be children’s effortful control and children’s relationships with teachers. Although research examining these factors during the preschool years is sparse, there is some support for the notion that these factors are related to school attitudes directly and indirectly. In the present study, our first research aim was to examine the direct relations of children’s effortful control to teacher–child relationship quality as well

as relationship quality to school attitudes. Next we examined whether effortful control was indirectly related to school attitudes through teacher–child relationship quality. If such mediation exists, one would expect effortful control to predict more positive teacher–child relationships (e.g., high closeness and low conflict), which in turn may predict more positive school attitudes. We used a longitudinal design over the course of a school year to test this mediational process using an ethnically diverse and low-income preschool sample.

METHOD

Participants

Data were from a large, two-site intervention project designed to examine the impact of a school readiness curriculum on children’s regulation and school-related outcomes. Participants in the present study were 829 children enrolled in 108 preschool classrooms in and surrounding Houston, Texas ($n = 51$ classrooms), and Tallahassee, Florida ($n = 57$ classrooms). Private preschools as well as public Head Start centers participated. A majority of these centers were full-day programs. At least 60% of students in each preschool had to qualify for free or reduced lunch in order to be eligible for the intervention project. Preschools that were eligible in Texas were identified by directors of Head Start schools and independent school districts and by a website for the Florida Department of Children and Families. The sample included all eligible preschools that agreed to participate in the study. Typically only one classroom was selected at each preschool. If more than one classroom met the eligibility requirement, one classroom was chosen for participation based on recommendations from directors and agency leaders. Parents of all children in a classroom were invited to participate. Then 8 to 10 children per classroom ($M = 7.56$) between the ages of 3 and 5, none of whom had any significant visual/auditory impairments or cognitive/language deficits, were randomly selected to participate. There were 3 participating classrooms in Texas and 17 classrooms in Florida with fewer than eight children.

Data collection took place over a span of 2 years; one cohort was assessed in 2006 and the other in 2007. Different schools participated in each year. Although there were comparable numbers of African American participants across sites, nearly all Euro-American participants were enrolled in Florida preschools, whereas nearly all Hispanic participants were enrolled in Texas preschools. Participants in Texas included 5 Euro-American participants, 182 Hispanic participants, 204 African American participants, and 14 participants classified as “other.” The Florida sample included 207 Euro-American participants, 11 Hispanic participants, 188 African American participants, and 18 participants reported as “other.” The highest level of parental education was reported by the primary caregiver, in most cases the mother, on a 10-point scale: 1 = middle school, 2 = some high school, 3 = high school diploma, 4 = vocational training, 5 = some college, 6 = associate’s degree, 7 = bachelor’s degree, 8 = graduate school but no degree, 9 = master’s degree, 10 = doctorate. The mean level of education at both sites was low, but it was higher in Florida ($M = 4.41$, $SD = 1.74$) than in Texas ($M = 3.66$, $SD = 1.68$), $t(611) = -5.43$, $p < .001$. Although 829 students had data from at least one time point, fewer students were observed at each wave. At Time 1 (T1), data were available for 823 students (404 Texas, 215 girls, M age = 4.66 years, $SD = 0.40$; 419 Florida, 217 girls, M age = 4.57 years, $SD = 0.48$). At Time 2 (T2), there were data for 722 students (393 Texas, 207 girls, M age = 4.80 years, $SD = 0.41$; 329 Florida, 169 girls, M age = 4.69 years, $SD = 0.53$). At Time 3 (T3), there were data for 758 students (386 Texas, 205 girls, M age = 5.09 years, $SD = 0.40$; 372 Florida, 195 girls, M age = 5.09 years, $SD = 0.40$). To assess attrition effects, we conducted t tests to investigate differences between students who had data at T1 and either T2 or T3 ($n = 795$) and those with only data at T1 ($n = 34$) on all study variables. There were no differences on T1 variables.

Teachers who participated in this study had an average of 10.27 ($SD = 6.44$) years of preschool teaching experience. Across all sites, 71 lead teachers were African American, 43 were Euro-American, 11 were Hispanic, 2 were of other ethnicities, and 5 did not report ethnicity. Lead teachers also reported their education level. Four lead teachers had graduate-level degrees, 30 had received a 4-year college degree, 56 had received a 2-year college degree, 41 had received high school diplomas, and 1 did not report education level.

Procedure

For this study, 132 teachers completed questionnaires at three time points during the school years of 2006 and 2007: mid-fall, winter, and late spring. In a few cases, there was a change in the lead teacher over the course of the academic year; therefore, there are more teachers than individual classrooms. In addition, 632 (332 Texas) parents completed questionnaires at one time (fall to winter). Behavioral assessments of effortful control were conducted in the preschools by teams of experimenters consisting of both university personnel and staff members drawn from the community who were trained by expert staff. Because of the large percentage of Hispanic children, bilingual experimenters who spoke Spanish were available as needed. Parents reported in the consent packet whether their children had exposure to Spanish. If parents indicated yes, they received a follow-up phone call and were asked about the language spoken at home. Assessments were conducted in Spanish for children whose parents indicated that the child used Spanish more than 50% of the time. At T1, 52% of the Hispanic children ($n = 106$) were assessed fully or partially in Spanish. Instruments were translated and back-translated if used for an assessment conducted in Spanish.

The intervention program involved five conditions. In addition to a control group, there were two treatment groups that received an explicit regulation curriculum with elements targeting socioemotional outcomes, and two treatment groups that received an implicit curriculum that used professional development and general guidance for teachers (Lonigan, Phillips, Clancy-Menchetti, Klein, & Landry, 2009). Because of our focus on socioemotional variables, we combined groups into three categories: control, regulation curriculum, and no regulation curriculum. Because the efficacy of the intervention was not a focus of the current study, we did not examine intervention treatment effects in relation to the outcome variables for this study. Rather, treatment group was considered a control variable and was included only when significant.

In most cases, children were administered the behavioral assessments in one videotaped session and in the same order. For each behavioral assessment, there was a main coder and a reliability coder trained by graduate students (with the input of faculty) who coded data from videotapes. Coders underwent training together until they reached acceptable levels of agreement. Main coders were responsible for coding 100% of the data, and reliability coders scored approximately 25% of the data independently. Reliability was assessed by calculating intraclass correlation coefficients (ICCs) on the overlapping coded data.

Missing Data

To assess whether ethnicity and sex were related to missing data, we conducted three one-factor multivariate analyses of variance (MANOVAs) to predict missingness on the study variables. In the first MANOVA, gender was used as a predictor for the entire sample of missing data. In the next MANOVAs, ethnicity was used as a predictor of missing data in separate runs by site (site differences could be confounded with ethnic differences) of missing data. The MANOVAs for gender and ethnicity in Florida were not significant. The MANOVA for ethnicity in Texas was significant, $F(3, 401) = 2.68, p < .05$. Follow-up analyses showed that African Americans were more likely to be missing parent-reported effortful control data. A follow-up analysis of variance showed that there were no mean-

level differences in parent-rated effortful control across ethnic groups on this measure within Texas, suggesting that ethnicity was not related to the values of the missing data. In addition, children with parental data were compared to children without parental data at T1 on all study variables. There were no significant differences.

Measures

Reported effortful control—At T1 the primary caregiver, usually the mother, and teachers reported on two scales from the Children’s Behavior Questionnaire (Rothbart, Ahadi, Hersey, & Fisher, 2001). Although the Children’s Behavior Questionnaire was created as a parent-report measure of temperament, it has been used with teachers in numerous studies, and good internal consistency has been found using teacher-reported data (Eisenberg, Fabes, Guthrie, & Murphy, 1996; Eisenberg et al., 2001, 2009). In addition, parents’ and teachers’ reports show correlational stability over time (Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999), and teachers’ reports tend to correlate positively with behavioral measures of effortful control (Eisenberg, Fabes, Guthrie, & Reiser, 2000; Eisenberg et al., 2010; Spinrad et al., 2007). Adults responded to a 14-item attention-focusing scale (e.g., “When building or putting something together, becomes very involved in what s/he’s doing, and works for long periods”; teacher $\alpha = .86$, parent $\alpha = .76$) and a 13-item inhibitory control scale (e.g., “Can wait before entering into new activities if s/he is asked to”; teacher $\alpha = .86$, parent $\alpha = .76$). Items were rated on a 7-point scale (1 = *never*, 7 = *always*). The two scales were highly correlated, $r_s(630, 802) = .68$ and $.82$, $p_s < .001$, for mothers and teachers, respectively, and were averaged to create a composite for each reporter.

Observed effortful control—Two tasks were used to assess effortful control. First, the *knock tap* task of executive functioning was used. For this task, the experimenter either tapped the table with an open, flat hand or knocked with a closed fist (Luria, 1966; Perner & Lang, 2000). During the first eight trials, the child was instructed to imitate the experimenter. When the experimenter tapped the child also tapped, and when the experimenter knocked the child also knocked. After the imitation trials, the child was instructed to reverse his or her actions and knock when the experimenter tapped or tap when the experimenter knocked. The proportion of correct trials during the reversed trials was used (ICC = .99).

Second, the *gift wrap* procedure was used (Kochanska et al., 2000). Children were instructed to remain seated, face forward, and not peek while the experimenter noisily wrapped a gift behind the child. A latency to peek score was created by calculating the number of seconds elapsed from when the experimenter finished the instructions and began wrapping the gift to the child’s first attempt to peek or the end of the minute, depending on which came first. Latency scores were divided by 60 to calculate a score representative of the proportion of the 1-min maximum (ICC = .96).

Teacher–child relationship—At T2, the quality of the teacher–child relationship was assessed using the Student–Teacher Relationship Scale (Pianta, 2001). Because of time constraints and the large number of participants, a shortened version of the original 28-item Student–Teacher Relationship Scale was used. The shortened version has been used in other large-scale investigations such as the National Institute of Child Health and Human Development Study of Early Child Care (see Pianta & Stuhlman, 2004). This measure was designed to assess teachers’ perceptions of their relationships with students. Teachers rated how accurately each statement described their relationship with a specific child (1 = *definitely does not apply*, 5 = *definitely applies*). Scores for two subscales were created: an 8-item (the original scale includes 11 items) closeness scale (e.g., “I share an affectionate,

warm relationship with this child”; $\alpha = .80$) and a 7-item (the original scale includes 12 items) conflict scale (e.g., “This child and I always seem to be struggling with each other”; $\alpha = .87$). Higher scores on the closeness subscale and lower scores on the conflict subscale indicate more positive teacher–child relationship quality.

School attitudes—At T3, teachers and students reported on children’s liking and avoidance of school on the School Liking and Avoidance Questionnaire (Ladd & Price, 1987). Teacher rated items on a 5-point Likert-type scale (1 = *almost never*, 5 = *almost always*; e.g., “Makes up reasons to go home from school”). Two subscale scores were created: a 6-item school avoidance scale ($\alpha = .85$) and a 7-item school liking scale ($\alpha = .88$). A child-report version of this measure has been used with young children soon after entering kindergarten and has demonstrated good reliability and convergent validity (Ladd et al., 2000). Students rated items that were read by an experimenter. Students were instructed to answer questions with “no,” “sometimes,” or “yes” (1 = *no*, 2 = *sometimes*, 3 = *yes*). Practice items were used until it was clear the child understood how to use the answers correctly. The school avoidance subscale for students consisted of five items (e.g., “Do you ask your Mommy or Daddy to let you stay home from school?”; $\alpha = .63$), and the school liking subscale consisted of nine items (e.g., “Are you happy when you’re at school?”; $\alpha = .84$). For both teachers and students, average school avoidance scores were subtracted from average school liking scores to create one difference score for each reporter, such that higher scores reflect more positive attitudes toward school. Teacher- and student-reported school attitude scores were positively correlated, $r(827) = .61, p < .001$.

RESULTS

Descriptive statistics are presented in Table 1. In tests of sex differences, parents and teachers rated girls higher than boys on effortful control, and girls scored higher than boys on effortful control during the observed gift wrap task. In addition, teachers reported more closeness, less conflict, and greater school liking for girls than for boys (see Table 1).

Analyses of variance were also conducted to examine ethnic differences among Euro-Americans (EA), African Americans (AA), and Hispanics using Tukey adjustment post hoc tests to ensure that a .05 Type I error rate was maintained. There were significant differences on T1 teacher-reported effortful control, $F(2, 772) = 3.04, p < .05$. Teachers reported that Hispanic students had higher levels of effortful control ($M = 4.63$) than did AA students ($M = 4.42$). EA students did not differ from the other groups ($M = 4.51$). On the behavioral measures, EA students had higher scores on the gift wrap task ($M = 0.70$) compared to Hispanics ($M = 0.51$) and AA students ($M = 0.52$), $F(2, 758) = 17.55, p < .001$. Teachers reported more closeness with EA students ($M = 4.46$) than AA students ($M = 4.31$), $F(2, 693) = 4.86, p < .01$. Teachers’ reports of closeness with Hispanic students did not differ from those for other groups ($M = 4.41$). Teachers reported less conflict with Hispanic students ($M = 1.57$) than EA students ($M = 1.81$) and AA students ($M = 1.94$), $F(2, 691) = 12.37, p < .001$. EA students reported less school liking at T3 ($M = 2.44$) than Hispanic students ($M = 2.58$) and AA students ($M = 2.55$), $F(2, 707) = 3.70, p < .05$. EA students reported less school avoidance at T3 ($M = 2.35$) than Hispanic students ($M = 2.54$) and AA students ($M = 2.42$), $F(2, 707) = 6.19, p < .01$. Based on these findings, we controlled for sex and ethnicity in structural equation models.

Relations Within Constructs

Correlations among the study variables are presented in Table 2. Teachers’ and parents’ reports of effortful control were positively related to each other and to observed measures of effortful control. Teacher-reported conflict was negatively correlated with closeness. School

avoidance and liking were significantly negatively correlated with each other within reporters. In addition, teachers' reports of school avoidance and liking were significantly correlated in the expected directions with students' reports. These patterns of correlations suggested that latent constructs could be created in structural equation modeling.

Relations Across Constructs

Reported effortful control was positively related to teacher–child closeness and school liking and negatively related to conflict and teacher-reported school avoidance (see Table 2). Parent-reported effortful control was marginally negatively related to student-reported avoidance. Teacher-reported effortful control was not related to students' reports of avoidance. Closeness was significantly related to teacher-reported avoidance and liking and marginally correlated with student-reported liking and avoidance in the expected directions. Conflict was negatively related to teacher- and student-reported school liking, positively related to teacher-reported school avoidance, and marginally positively related to student-reported school avoidance.

Measurement Model

Before testing structural equation models, we computed a measurement model using confirmatory factor analysis to test whether latent variables could be created and observed variables related to one another in expected ways. All models, including confirmatory factor analysis, used standard errors and fit statistics that accounted for the nested data structure (MacKinnon, 2008). The measurement model included eight measured variables on three latent constructs: effortful control, teacher–child relationship quality, and school attitudes. There were four indicators for effortful control: both parent- and teacher-reported effortful control composites (an average of attention focusing and inhibitory control), proportion of correct responses during the knock tap task, and latency to peek during the gift wrap task (in seconds). Teacher-reported closeness and conflict were indicators of teacher–child relationship quality. The two indicators of school attitudes were teacher- and student-reported positive school attitudes. We allowed latent factors and errors of study variables to covary as indicated by modification indices. In order to account for missing data, we tested models using Mplus Version 5.2 (Muthén & Muthén, 2007), which uses full information maximum likelihood estimation. This method produces unbiased parameter estimates when data are missing at random (Schafer & Graham, 2002). Because the significance of the chi-square statistic is affected by sample size (Hu & Bentler, 1999; Kline, 1998), model fit was assessed using three alternative fit indices: the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). CFI values greater than .90 and SRMR values less than .08 indicate an adequate fit (Kelloway, 1998). Values less than .05 for the RMSEA indicate a good fit, and values between .05 and .08 are considered acceptable (Browne & Cudeck, 1993).

The measurement model initially had adequate fit: CFI = .95, RMSEA = .04 (90% confidence interval [CI] = .02, .06), SRMR = .03. Modification indices, however, showed that the model fit could be improved by estimating a covariance between the error terms of observed effortful control on the knock tap task and the gift wrap task. The revised model had a good fit to the data: CFI = 1.00, RMSEA = .000 (90% CI = .00, .03), SRMR = .02. Model-estimated loadings of all indicator variables were significant in the expected directions. Relations among the latent constructs were in the expected directions. T1 effortful control was positively correlated with T2 teacher–child relationship quality ($r = .73, p < .001$) and positively correlated with T3 positive school attitudes ($r = .65, p < .001$). Teacher–child relationship quality at T2 was also positively related to school positive school attitudes ($r = .80, p < .001$).

Structural Equation Model

After assessing the measurement model, we added paths among the latent factors in order to address the proposed research questions, and standard errors and fit statistics adjusted for nested data were used. The model included direct paths from T1 effortful control to T2 teacher–child relationship quality and from T2 teacher–child relationship to T3 school attitudes. The same covariance between errors that were estimated in the measurement model were estimated in the structural model. Sex and ethnicity were included as covariates in the model. Ethnicity was dummy coded, with EA status as the reference group. Intervention status was also included as a covariate with direct paths to each factor estimated.

This model had an adequate fit to the data: CFI = .93, RMSEA = .03 (90% CI = .02, .04), SRMR = .04. Model-estimated loadings of the indicator variables displayed in Table 3 were significant in the expected directions. As shown in Figure 1, the significant negative path from child sex to effortful control indicated that boys had lower levels of effortful control at T1. Based on the significant paths from the ethnicity variables to the latent constructs, Hispanic students had more positive relationships with teachers than EA students. Intervention status was not related to any of the latent constructs. Results from the structural equation model were consistent with our hypotheses: Effortful control was positively related to more positive teacher–child relationship quality, and teacher–child relationship quality was related to more positive school attitudes. A formal test of mediation was conducted with the CI method to address the nonnormal distribution of the indirect effects (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). A CI that does not include zero indicates significant mediation. The 95% CI based on unstandardized estimates was .11 and .90, providing evidence that teacher–child relationship quality significantly mediated the association between effortful control and children’s negative school attitudes.

DISCUSSION

Researchers have argued that children’s attitudes toward school, a component of emotional engagement in school, are an important antecedent of children’s academic achievement (Fredricks et al., 2004). Thus, researchers have sought to identify which factors, both dispositional and contextual, facilitate children’s positive feelings about school. A lack of positive attitudes toward school early in education may be especially problematic for children already at risk for low school success. Relatively few studies have examined predictors of school attitudes in preschool, especially in children from low-income and ethnic minority families. In addition, there has been little work on the mechanisms by which effortful control may influence school attitudes. Our findings provide evidence that the relation between effortful control and children’s school attitudes is mediated by the quality of the teacher–child relationship, even after the nested structure of the data is accounted for and the effects of sex, ethnicity, and intervention status are controlled.

The results of this study provide support for the fact that child characteristics predict the quality of children’s relationships with their teachers (Myers & Pianta, 2008; Pianta, 1999). Children who had higher levels of effortful control developed closer, less conflictual relationships with their teachers. These findings are consistent with research that has investigated direct relations among these constructs in older children (Birch & Ladd, 1997). It is thought that children with high effortful control are better able to attend to tasks and follow directions than their less regulated peers—behaviors that are of high priority to teachers in the preschool classroom. Thus, it is likely that well-regulated children are viewed positively and engage in pleasant interactions with teachers. Teachers are also more likely to offer encouraging feedback to, and engage in more positive interaction time with, well-regulated children; such exchanges afford more opportunities to form a warm, supportive

teacher–child relationship and decrease the likelihood of conflict. Less-regulated children potentially engage with teachers mainly for disciplinary reasons, are singled out for poor behavior, or interact for purely instructional reasons, leading to relationships characterized by conflict and less closeness.

The findings also provide support for the notion that teacher–child relationship quality predicts school attitudes in preschool. Within the contexts of high-quality relationships, children likely feel more confident in their abilities to do well in school, increasing their motivation to participate in activities and contributing to positive school attitudes. Children who experience low-quality relationships with important school figures such as teachers may develop lower levels of school liking and higher levels of school avoidance because school is perceived to be an aversive, unsupportive environment.

In this study, effortful control measured at the beginning of the school year longitudinally predicted attitudes toward school at the end of the school year. Well-regulated children likely have the attentional skills and behavioral control to participate in and stay focused on classroom activities (Coplan, Barber, & Lagacé-Séguin, 1999) as well as to interact competently with peers (Fabes, Hanish, Martin, & Eisenberg, 2002). Such experiences likely contribute to the formation of children’s positive perceptions of school as an enjoyable environment. In contrast, children low in effortful control may have difficulty regulating behavior and may be at risk for poor peer relationships (Deater-Deckard, 2001). These less socially competent children may develop the perception of school as a frustrating, hostile, and lonely place, a perception that inhibits the formation of positive school attitudes. Findings from our study further add to the literature by providing evidence that effortful control is associated with affective processes such as sentiments toward school in preschool, as well as academic competence (Fabes, Martin, Hanish, Anders, & Madden-Derdich, 2003; Valiente et al., 2007).

Although direct relations of effortful control and teacher–child relationship quality to school attitudes were examined, another goal of this study was to determine whether teacher–child relationship quality serves as a mediator of this relation and to begin to elucidate the mechanisms by which children’s effortful control contributes to positive feelings in school. Indeed, we found that teacher–child relationship quality mediated the relation of effortful control to school attitudes. Thus, this study provides evidence that children’s effortful control may be linked to increased school success through children’s social relationships.

There probably are multiple mechanisms by which effortful control influences children’s attitudes toward school. Future research should also investigate other potential mediators. For example, it is likely that children’s social competence also plays an important role in the relations between effortful control and children’s attitudes. Effortful control has been consistently related to higher social competence in young children (Eisenberg et al., 1997, 2000; Spinrad et al., 2007), including popularity (Eisenberg et al., 2003; Spinrad et al., 2006) and low levels of problem behaviors (Kochanska, Barry, Aksan, & Boldt, 2008; Rydell, Berlin, & Bohlin, 2003). Thus, children’s social competence may also mediate the relations between their effortful control and school attitudes and perhaps effortful control and the teacher–child relationship; however, to our knowledge, these relations have not yet been examined.

Although not the main focus of this study, it should be noted that there were sex and ethnic differences for some variables. These differences are consistent with other studies that have demonstrated risk in minority samples (e.g., Aikens, Coleman, & Barbarin, 2008; Loukas & Roalson, 2006). Ethnic differences in regulation may be due in part to ethnic differences in negative emotionality (e.g., Ispa et al., 2004) as well as partially accounted for by

differences in socioeconomic status and the risks associated with such disparities. However, it is also important to note that Sulik et al. (2010), using the same sample, demonstrated measurement equivalence in effortful control across sex and ethnicity. Thus, although some mean differences exist, the constructs appear to function in the same way.

This study has several strengths. Measures of effortful control at T1 and school attitudes at T3 included data from two different reporters (i.e., parents and teachers, and teachers and students) to minimize common source variance. Observational assessments of children's regulation that have been found to be valid and reliable were also used as indicators of effortful control. Furthermore, the sample for this study was ethnically diverse, with large percentages of Hispanic and African American children, which increases the generalizability of our findings. In addition, these relations were tested longitudinally over the course of a school year. Finally, our focus on the mechanisms that underlie the relations between children's regulation and school attitudes in preschool is a strength. Identifying direct as well as indirect relations among factors associated with academic achievement is important, particularly for ethnic minority students, who have a greater likelihood of not graduating from high school (Kaufman, Alt, & Chapman, 2004; U.S. Census Bureau, 2004).

Limitations and Future Directions

Despite these strengths, this study does have limitations. Because of the design of the larger project, measures of all of the variables could not be attained at every wave. Therefore, the stability of all constructs could not be taken into account. In future investigations, it would be useful to test whether these relations remain after the stability of all of the constructs over time is controlled. Work that also examines the transactional nature of these variables will be important. An assumption of transactional models is that development at the individual level is affected by the constant interplay between the individual and context (Sameroff & MacKenzie, 2003; Sutherland & Oswald, 2005). There is preliminary evidence to suggest that there are bidirectional effects between children's behavior and teacher-child relationship quality. Using a longitudinal research design, Doumen and colleagues (2008) found that children's aggression at the beginning of kindergarten predicted more teacher-child conflict during the middle of the school year, which in turn was predictive of more aggression by the end of the school year, even after across- and within-time associations were controlled. Another avenue of research to pursue is examining whether these bidirectional effects are observed for effortful control and teacher-child relationship quality in preschool children.

Although this study used data from three different time points during the school year, work that examines these relations over several years will be important to assess whether children's attitudes in preschool are related to other forms of school engagement and academic achievement in elementary school. Ladd and Dinella (2009) found that engagement, including school liking and avoidance, was moderately rather than highly stable throughout the primary grades and that there was variability in children's consistency in school engagement. Some children had early patterns of school engagement that continued to stabilize over time, whereas other children demonstrated greater levels of variability in school engagement over time. Our findings suggest that children's relationships with teachers may explain why some children experience changes in attitudes toward school over time. Given that school attitudes do change over time for some children, those who are at risk for having stable low school engagement across multiple years may benefit from a warm, close relationship with a teacher, even if this occurs relatively late in the elementary school years.

Applied Implications

This work has important implications for researchers and policymakers seeking to foster more positive attitudes about school in young children, especially those who are at risk for low academic achievement. Children's regulation and relationships within the classroom play important roles in their formation of attitudes toward school and, thus, their later academic success. Findings from this study suggest that children's attitudes toward school may be improved by focusing on increasing children's self-regulatory abilities and the quality of teacher-child relationships. With increased concerns about children's school readiness there has been a focus on improving academic skills and the quality of teachers' instructional styles. Our findings suggest that children's socioemotional skills also play an important role in children's school adaptations. Consistent with prior research, policymakers and educators should implement training programs that educate teachers about the importance of regulatory skills in preschool and fostering positive relationships with students. Furthermore, teachers should be aware that early conflictual relationships may have long-term consequences for how children feel about school and that conflict may be more likely with some children (e.g., less regulated children). Continued research on the associations of children's regulation, as well as other dispositional characteristics, to relational processes in the classroom context is warranted.

Acknowledgments

This research was supported by a grant to Nancy Eisenberg (principal investigator), Tracy Spinrad, Carlos Valiente, and the School Readiness Consortium from the National Institute of Child Health and Human Development.

References

- Aikens NL, Coleman CP, Barbarin OA. Ethnic differences in the effects of parental depression on preschool children's socioemotional functioning. *Social Development*. 2008; 17:137-160.
- Alexander KL, Entwisle DR. Achievement in the first 2 years of school: Patterns and processes. *Monographs of the Society for Research in Child Development*. 1988; 53(2):157.
- Birch, S.; Ladd, G. *Interpersonal relationships in the school environment and children's early school adjustment: The role of teachers and peers*. New York, NY: Cambridge University Press; 1996.
- Birch SH, Ladd GW. The teacher-child relationship and children's early school adjustment. *Journal of School Psychology*. 1997; 35(1):61-79.
- Blair C, Razza RP. Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development*. 2007; 78:647-663. [PubMed: 17381795]
- Brody GH, Ge X. Linking parenting processes and self-regulation to psychological functioning and alcohol use during early adolescence. *Journal of Family Psychology*. 2001; 15(1):82-94.10.1037/0893-3200.15.1.82 [PubMed: 11322087]
- Browne, MW.; Cudeck, R. *Alternative ways of assessing model fit*. In: Bollen, KA.; Long, SJ., editors. *Testing structural equation models*. Newbury Park, CA: Sage; 1993.
- Buhs ES, Ladd GW. Peer rejection as antecedent of young children's school adjustment: An examination of mediating processes. *Developmental Psychology*. 2001; 37:550-560.10.1037/0012-1649.37.4.550 [PubMed: 11444490]
- Children's Defense Fund. *Progress and peril: Black children in America*. Washington, DC: Author; 1993.
- Coplan RJ, Barber AM, Lagacé-Séguin DG. The role of child temperament as a predictor of early literacy and numeracy skills in preschoolers. *Early Childhood Research Quarterly*. 1999; 14:537-553.10.1016/S0885-2006(99)00025-3
- Crosnoe R, Johnson MK, Elder GH Jr. School size and the interpersonal side of education: An examination of race/ethnicity and organizational context. *Social Science Quarterly*. 2004; 85:1259-1274.10.1111/j.0038-4941.2004.00275.x

- Deater-Deckard K. Annotation: Recent research examining the role of peer relationships in the development of psychopathology. *Journal of Child Psychology and Psychiatry*. 2001; 42:565–579.10.1111/1469-7610.00753 [PubMed: 11464962]
- Doumen S, Verschueren K, Buyse E, Germeijs V, Luyckx K, Soenens B. Reciprocal relations between teacher-child conflict and aggressive behavior in kindergarten: A three-wave longitudinal study. *Journal of Clinical Child and Adolescent Psychology*. 2008; 37:588–599.10.1080/15374410802148079 [PubMed: 18645749]
- Eisenberg N, Fabes RA, Guthrie IK, Murphy BC. The relations and emotionality to problem behavior in elementary school children. *Development and Psychopathology*. 1996; 8(1):141–162.
- Eisenberg N, Fabes RA, Guthrie IK, Reiser M. Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology*. 2000; 78:136–157. [PubMed: 10653511]
- Eisenberg N, Gershoff ET, Fabes RA, Shepard SA, Cumberland AJ, Losoya SH, Murphy BC. Mothers' emotional expressivity and children's behavior problems and social competence: Mediation through children's regulation. *Developmental Psychology*. 2001; 37:475–490.10.1037/0012-1649.37.4.475 [PubMed: 11444484]
- Eisenberg N, Guthrie IK, Fabes RA, Reiser M, Murphy BC, Holgren R, Losoya S. The relations of regulation and emotionality to resiliency and competent social functioning in elementary school children. *Child Development*. 1997; 68:295–311. [PubMed: 9180003]
- Eisenberg N, Valiente C, Fabes RA, Smith CL, Reiser M, Shepard SA, Cumberland AJ. The relations of effortful control and ego control to children's resiliency and social functioning. *Developmental Psychology*. 2003; 39:761–776.10.1037/0012-1649.39.4.761 [PubMed: 12859128]
- Eisenberg N, Valiente C, Spinrad TL, Cumberland A, Liew J, Reiser M, Losoya SH. Longitudinal relations of children's effortful control, impulsivity, and negative emotionality to their externalizing, internalizing, and co-occurring behavior problems. *Developmental Psychology*. 2009; 45:988–1008. [PubMed: 19586175]
- Eisenberg N, Vidmar M, Spinrad TL, Eggum ND, Edwards A, Gaertner B, Kupfer A. Mothers' teaching strategies and children's effortful control: A longitudinal study. *Developmental Psychology*. 2010; 46:1294–1308. [PubMed: 20822239]
- Entwisle D, Alexander K. Summer setback: Race, poverty, school composition, and mathematics achievement in the first two years of school. *American Sociological Review*. 1992; 57:72–84.
- Fabes RA, Hanish LD, Martin CL, Eisenberg N. Young children's negative emotionality and social isolation: A latent growth curve analysis. *Merrill-Palmer Quarterly*. 2002; 48:284–307.10.1353/mpq.2002.0012
- Fabes RA, Martin CL, Hanish LD, Anders MC, Madden-Derdich DA. Early school competence: The roles of sex-segregated play and effortful control. *Developmental Psychology*. 2003; 39:848–858. [PubMed: 12952398]
- Finn JD. Withdrawing from school. *Review of Educational Research*. 1989; 59(2):77–92.
- Fredricks JA, Blumenfeld PC, Paris AH. School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*. 2004; 74(1):59–109.10.3102/00346543074001059
- Garner PW, Waajid B. The associations of emotion knowledge and teacher-child relationships to preschool children's school-related developmental competence. *Journal of Applied Developmental Psychology*. 2008; 29(2):89–100.10.1016/j.appdev.2007.12.001
- Griggs MS, Gagnon SG, Huelsman TJ, Kiddler-Ashley P, Ballard M. Student-teacher relationships matter: Moderating influences between temperament and preschool social competence. *Psychology in the Schools*. 2009; 46:553–567.10.1002/pits.20397
- Gutman LM, Sameroff AJ, Cole R. Academic growth curve trajectories from 1st grade to 12th grade: Effects of multiple social risk factors and preschool child factors. *Developmental Psychology*. 2003; 39:777–790.10.1037/0012-1649.39.4.777 [PubMed: 12859129]
- Hamre B, Pianta R. Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*. 2001; 72:625–638. [PubMed: 11333089]
- Hauser-Cram P, Durand TM, Warfield ME. Early feelings about school and later academic outcomes of children with special needs living in poverty. *Early Childhood Research Quarterly*. 2007; 22(2):161–172.10.1016/j.ecresq.2007.02.001

- Hauser-Cram, P.; Warfield, ME.; Stadler, J.; Sirin, SR. School environments and the diverging pathways of students living in poverty. In: Huston, AC.; Ripke, MN., editors. *Developmental contexts in middle childhood: Bridges to adolescence and adulthood*. New York, NY: Cambridge University Press; 2006. p. 198-216.
- Howes C, Matheson CC. School of the future: Contextual constraints on the concordance of mother-child and teacher-child relationships. *New Directions for Child and Adolescent Development*. 1992; 57:25–90.
- Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*. 1999; 6:1–55.
- Hughes JN, Kwok O. Classroom engagement mediates the effect of teacher-student on elementary students' peer acceptance: A prospective analysis. *Journal of School Psychology*. 2006; 43:465–480. [PubMed: 20431706]
- Ispa JM, Fine MA, Halgunseth LC, Harper S, Robinson J, Boyce L, Brady-Smith C. Maternal intrusiveness, maternal warmth, and mother-toddler relationship outcomes: Variations across low-income ethnic and acculturation groups. *Child Development*. 2004; 75:1613–1631.10.1111/j.1467-8624.2004.00806.x [PubMed: 15566369]
- Kaufman, P.; Alt, MN.; Chapman, CD. *Dropout rates in the United States: 2001* (Publication No. NCES 2005046). Washington, DC: U.S. Government Printing Office; 2004.
- Kelloway, EK. *Using LISREL for structural equation modeling: A researcher's guide*. Thousand Oaks, CA: Sage; 1998.
- Keogh, BK. Children's temperament and teachers' decisions. In: Porter, R.; Collins, GM., editors. *Temperament differences in infants and young children*. London, England: Pitman; 1982. p. 269-285.
- Keogh, BK. Temperament and teachers' views of teachability. In: Carey, WB.; McDevitt, SC., editors. *Prevention and early intervention: Individual differences as risk factors for the mental health of children*. New York, NY: Brunner/Mazel; 1994. p. 246-256.
- Keogh, BK. *Temperament in the classroom: Understanding individual differences*. Baltimore, MD: Brookes; 2003.
- Kline, RB. *The principles and practice of structural equation modeling*. New York, NY: Guilford Press; 1998.
- Kochanska G, Barry RA, Aksan N, Boldt LJ. A developmental model of maternal and child contributions to disruptive conduct: The first six years. *Journal of Child Psychology and Psychiatry*. 2008; 49:1220–1227. [PubMed: 18684154]
- Kochanska G, Knaack A. Effortful control as a personality characteristic of young children: Antecedents, correlates, and consequences. *Journal of Personality*. 2003; 71:1087–1112.10.1111/1467-6494.7106008 [PubMed: 14633059]
- Kochanska G, Murray KT, Harlan ET. Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology*. 2000; 36:220–232. [PubMed: 10749079]
- Ladd, GW. Shifting ecologies during the 5 to 7 year period: Predicting children's adjustment during the transition to grade school. In: Sameroff, AJ.; Haith, MM., editors. *Reason and responsibility: The passage through childhood*. Chicago, IL: University of Chicago Press; 1996. p. 363-386.
- Ladd GW, Birch SH, Buhs ES. Children's social and scholastic lives in kindergarten: Related spheres of influence? *Child Development*. 1999; 70:1373–1400. [PubMed: 10621962]
- Ladd GW, Buhs ES, Seid M. Children's initial sentiments about kindergarten: Is school liking an antecedent of early classroom participation and achievement? *Merrill-Palmer Quarterly*. 2000; 46:255–279.
- Ladd GW, Burgess KB. Do relational risks and protective factors moderate the linkages between childhood aggression and early psychological and school adjustment? *Child Development*. 2001; 72:1579–1601. [PubMed: 11699688]
- Ladd GW, Dinella LM. Continuity and change in early school engagement: Predictive of children's achievement trajectories from first to eighth grade? *Journal of Educational Psychology*. 2009; 101:190–206.10.1037/a0013153

- Ladd GW, Price JM. Predicting children's social and school adjustment following the transition from preschool to kindergarten. *Child Development*. 1987; 58:1168–1189.
- Liew J, Chen Q, Hughes JN. Child effortful control, teacher–student relationships, and achievement in academically at-risk children: Additive and interactive effects. *Early Childhood Research Quarterly*. 2010; 25:51–64.10.1016/j.ecresq.2009.07.005 [PubMed: 20161421]
- Lonigan, C.; Phillips, BM.; Clancy-Menchetti, J.; Klein, AS.; Landry, SH. Effects of a comprehensive preschool curriculum: Overall impacts and relative impacts of explicit versus implicit socio-emotional variations. Paper presented at the 2009 Biennial Meeting of the Society for Research in Child Development; Denver, CO. 2009 Apr.
- Loukas A, Roalson LA. Family environment, effortful control, and adjustment among European American and Latino early adolescents. *Journal of Early Adolescence*. 2006; 26:432–455.
- Luria, A. Higher cortical functions in man. New York, NY: Basic Books; 1966.
- MacKinnon, DP. Introduction to statistical mediation analysis. New York, NY: Taylor & Francis Group; 2008.
- MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*. 2002; 7:83–104. [PubMed: 11928892]
- McClelland MM, Cameron CE, Connor CM, Farris CL, Jewkes AM, Morrison FJ. Links between behavioral regulation and preschoolers' literacy, vocabulary, and math skills. *Developmental Psychology*. 2007; 43:947–959. [PubMed: 17605527]
- Murphy BC, Eisenberg N, Fabes RA, Shepard S, Guthrie IK. Consistency and change in children's emotionality and regulation: A longitudinal study. *Merrill-Palmer Quarterly*. 1999; 46:413–444.
- Murray KT, Kochanska G. Effortful control: Factor structure and relation to externalizing and internalizing behaviors. *Journal of Abnormal Child Psychology*. 2002; 30:503–514.10.1023/A:1019821031523 [PubMed: 12403153]
- Muthén, LK.; Muthén, BO. Mplus user's guide. 5. Los Angeles, CA: Author; 2007.
- Myers SS, Morris AS. Examining associations between effortful control and teacher-child relationships in relation to head start socioemotional adjustment. *Early Education & Development*. 2009; 20:756–774.
- Myers SS, Pianta RC. Developmental commentary: Individual and contextual influences on student-teacher relationships and children's early problem behaviors. *Journal of Clinical Child and Adolescent Psychology*. 2008; 37:600–608. [PubMed: 18645750]
- National Education Goals Panel. Building a nation of learners. Washington, DC: Author; 1997.
- Perner, J.; Lang, B. Theory of mind and executive function: Is there a developmental relationship?. In: Baron-Cohen, S.; Tager-Flusberg, H.; Cohen, DJ., editors. *Understanding other minds: Perspectives from developmental cognitive neuroscience*. 2. New York, NY: Oxford University Press; 2000. p. 150-181.
- Pianta, RC. The emotional bond between children and adults. Washington, DC: American Psychological Association; 1999.
- Pianta, RC. Student-teacher relationship scale. Odessa, FL: Psychological Assessment Resources, Inc; 2001.
- Pianta R, Steinberg MS, Rollins KB. The first two years of school: Teacher-child relationships and deflections in children's classroom adjustment. *Development and Psychopathology*. 1995; 7(2): 295–312.
- Pianta RC, Stuhlman MW. Teacher-child relationships and children's success in the first years of school. *School Psychology Review*. 2004; 33:444–458.
- Rothbart MK, Ahadi SA, Hersey KL, Fisher P. Investigations of temperament at three to seven years: The Children's Behavior Questionnaire. *Child Development*. 2001; 72:1394–1408. [PubMed: 11699677]
- Rothbart, MK.; Bates, JE. Temperament. In: Damon, W.; Eisenberg, N., editors. *Handbook of child psychology: Vol. 3. Social, emotional, and personality development*. 6. New York: Wiley; 2006. p. 105-176.
- Rudasill KM, Rimm-Kaufman SE. Teacher–child relationship quality: The roles of child temperament and teacher–child interactions. *Early Childhood Research Quarterly*. 2009; 24(2):107–120.

- Rydell AM, Berlin L, Bohlin G. Emotionality, emotion regulation, and adaptation among 5- to 8-year-old children. *Emotion*. 2003; 3:30–47. [PubMed: 12899315]
- Sameroff AJ, MacKenzie MJ. Research strategies for capturing transactional models of development: The limits of the possible. *Development and Psychopathology*. 2003; 15:613–640. [PubMed: 14582934]
- Schafer JL, Graham JW. Missing data: Our view of the state of the art. *Psychological Methods*. 2002; 7:147–177. [PubMed: 12090408]
- Spinrad TL, Eisenberg N, Cumberland A, Fabes RA, Valiente C, Shepard SA, Guthrie IK. Relation of emotion-related regulation to children's social competence: A longitudinal study. *Emotion*. 2006; 6:498–510.10.1037/1528-3542.6.3.498 [PubMed: 16938090]
- Spinrad TL, Eisenberg N, Gaertner B, Popp T, Smith CL, Kupfer A, Hofer C. Relations of maternal socialization and toddlers' effortful control to children's adjustment and social competence. *Developmental Psychology*. 2007; 43:1170–1186. [PubMed: 17723043]
- Sulik MJ, Huerta S, Zerr AA, Eisenberg N, Spinrad TL, Valiente C, Taylor H. The factor structure of effortful control and measurement invariance across ethnicity and sex in a high-risk sample. *Journal of Psychopathology and Behavioral Assessment*. 2010; 32(1):8–22.10.1007/s10862-009-9164-y [PubMed: 20593008]
- Sutherland KS, Oswald DP. The relationship between teacher and student behavior in classrooms for students with emotional and behavioral disorders: Transactional processes. *Journal of Child and Family Studies*. 2005; 14:1–14.
- U.S. Census Bureau. US interim projections by age, sex, race, and Hispanic origin. Washington, DC: U.S. Government Printing Office; 2004.
- Valiente C, Lemery-Chalfant K, Castro KS. Children's effortful control and academic competence: Mediation through school liking. *Merrill-Palmer Quarterly*. 2007; 53(1):1–25.
- Valiente C, Lemery-Chalfant K, Swanson J, Reiser M. Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *Journal of Educational Psychology*. 2008; 100:67–77. [PubMed: 21212831]

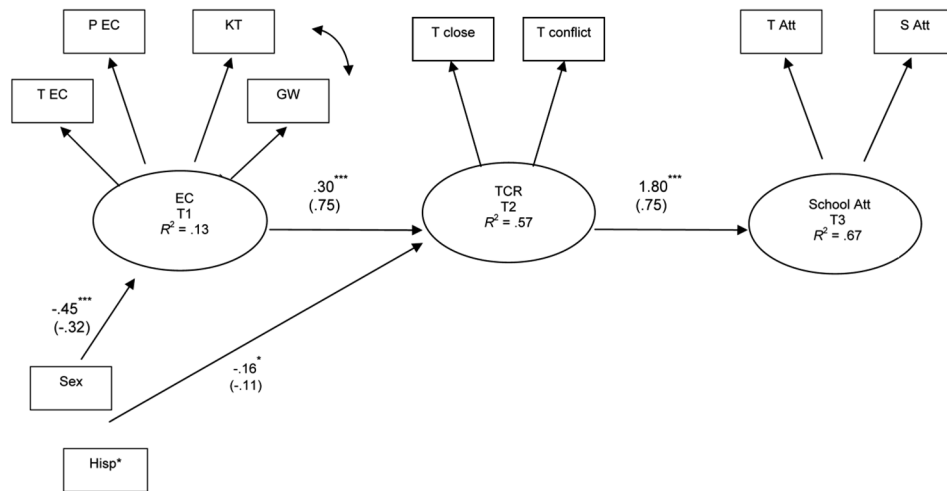


FIGURE 1.

Final SEM model with standardized and unstandardized estimates (in parentheses).

Asterisks indicate that a variable is dummy coded, with Euro-Americans as the reference group for ethnicity. Variables are as follows: Hispanic (Hisp; Hispanic = 1, other ethnicity = 0). Only significant paths are shown. T = teacher; P = parent; EC = effortful control; KT = knock tap proportion correct score; GW = gift wrap latency to peek score; TCR = teacher-child relationship; close = closeness; S = student; Att = attitudes; T1 = Time 1; T2 = Time 2; T3 = Time 3. $*p < .05$. $***p < .001$.

TABLE 1

Means and Standard Deviations for Study Variables

Variable	Total		Boys		Girls	
	M	SD	M	SD	M	SD
Teacher EC	4.49 ^a	.94	4.27	.90	4.69	.92
Parent EC	4.77 ^b	.76	4.61	.74	4.91	.75
Knock tap	0.59	.36	0.56	.36	0.61	.35
Gift wrap	0.57 ^c	.41	0.51	.41	0.63	.41
Teacher closeness	4.38 ^d	.56	4.29	.57	4.45	.54
Teacher conflict	1.81 ^e	.83	1.94	.86	1.70	.78
Teacher avoidance	1.41	.56	1.43	.57	1.40	.55
Student avoidance	2.43	.53	2.47	.51	2.40	.55
Student liking	2.53	.53	2.52	.55	2.55	.52
Teacher liking	4.42 ^f	.61	4.34	.63	4.49	.59

Note. EC = effortful control.

^aSex difference, $t(802) = 6.54, p < .001$.

^bSex difference, $t(630) = 5.06, p < .001$.

^cSex difference, $t(785) = 4.09, p < .001$.

^dSex difference, $t(720) = 3.81, p < .001$.

^eSex difference, $t(692) = 3.88, p < .001$.

^fSex difference, $t(678) = 3.20, p < .01$.

TABLE 2

Correlations Among the Study Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. T effortful control T1	—	.28***	.18***	.28***	.28***	3.44***	3.22***	3.05	.11**	.32***
2. P effortful control T1		—	.11**	.18***	.11**	3.24***	3.18***	3.07 [†]	.11**	.21***
3. Knock rap T1			—	.26***	.05	3.07 [†]	3.08*	3.08*	.01	.09*
4. Gift wrap T1				—	.11**	3.17***	3.09*	3.07 [†]	.06	.12**
5. T closeness T2					—	3.38***	3.14***	3.06 [†]	.06 [†]	.32***
6. T conflict T2						—	.30***	.07 [†]	3.09*	3.41***
7. T school avoidance T3							—	.09*	3.10*	3.75***
8. S school avoidance T3								—	3.19***	3.08*
9. S school liking T3									—	.08*
10. T school liking T3										—

Note. T = teacher report; T1 = Time 1; P = parent report; T2 = Time 2; T3 = Time 3; S = student report.

[†] $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

TABLE 3

Standardized and Unstandardized Loadings for Latent Constructs

Construct	Unstandardized	Standardized
Effortful control, Time 1		
Teacher reported	1.00	.75
Parent reported	0.44***	.40
Knock tap score	0.11***	.22
Gift wrap latency	0.22***	.37
Teacher-child relationship, Time 2		
Teacher-reported closeness	1.00	.50
Teacher-reported conflict	-2.25***	-.76
School avoidance, Time 3		
Teacher-reported attitudes	1.00	.61
Student-reported attitudes	0.24**	.20

**
 $p < .01$.

 $p < .001$.