Journal of School Psychology 49 (2011) 175–195

Contents lists available at ScienceDirect

Journal of School Psychology

journal homepage: www.elsevier.com/locate/jschpsyc

The role of context in preschool learning: A multilevel examination of the contribution of context-specific problem behaviors and classroom process quality to low-income children's approaches to learning ☆

Ximena Domínguez [a,b,*], Virginia E. Vitiello [c], Janna M. Fuccillo [b], Daryl B. Greenfield [b], Rebecca J. Bulotsky-Shearer [b]

[a] SRI International, United States
[b] University of Miami, United States
[c] University of Virginia, United States

ARTICLE INFO

Article history:
Received 4 March 2009
Received in revised form 24 November 2010
Accepted 27 November 2010

Keywords:
Approaches to learning
Problem behavior
Classroom process quality

ABSTRACT

Research suggests that promoting adaptive approaches to learning early in childhood may help close the gap between advantaged and disadvantaged children. Recent research has identified specific child-level and classroom-level variables that are significantly associated with preschoolers' approaches to learning. However, further research is needed to understand the interactive effects of these variables and determine whether classroom-level variables buffer the detrimental effects of child-level risk variables. Using a largely urban and minority sample ($N = 275$) of preschool children, the present study examined the additive and interactive effects of children's context-specific problem behaviors and classroom process quality dimensions on children's approaches to learning. Teachers rated children's problem behavior and approaches to learning and independent assessors conducted classroom observations to assess process quality. Problem behaviors in structured learning situations and in peer and teacher interactions were found to negatively predict variance in approaches to learning. Classroom process quality domains did not independently predict variance in approaches to learning. Nonetheless, classroom process quality played an important role in these associations; high emotional support buffered the detrimental effects of problem

☆ A special thank you to our collaborators at the Community Action Agency's Head Start/Early Head Start program and the staff members and families who made this study possible.

* Corresponding author. Ximena Dominguez, PhD, SRI International, 333 Ravenswood Avenue, Menlo Park, CA 94025, United States.
E-mail address: ximedominguez@gmail.com (X. Domínguez).

ACTION EDITOR: Christine McWayne.

doi:10.1016/j.jsp.2010.11.002

behavior, whereas high instructional support exacerbated them. The findings of this study have important implications for classroom practices aimed at helping children who exhibit problem behaviors.

1. Introduction

A growing body of research indicates that children from socioeconomically disadvantaged backgrounds are at heightened risk for educational difficulties (e.g., Bornstein & Bradley, 2003; Brooks-Gunn, Duncan, & Aber, 1997). When compared to children from middle- or high-income households, children living in poverty are twice as likely to repeat grades, be suspended from school, and drop out of high school (Brooks-Gunn et al., 1997). Quality early childhood educational experiences, such as those provided by Head Start, have been identified as important protective influences that can mitigate the negative effects of poverty on early learning (U.S. Department of Health and Human Services, 2001). These comprehensive early childhood programs aim to foster children's school readiness in multiple domains including language and literacy, mathematics, science, and approaches to learning (U.S. Department of Health, Human Services, 2002).

The approaches to learning domain, in particular, has received substantial attention over the past years (e.g., Fantuzzo, Perry, & McDermott, 2004; Hyson, 2008; McDermott, Leigh, & Perry, 2002). The term *approaches to learning*, also referred to as *learning behaviors*, is considered an umbrella term encompassing different ways in which children approach or react to learning situations (Hyson, 2008; Kagan, Moore, & Bredekamp, 1995). Although researchers agree that approaches to learning are essential skills children need to engage in classroom learning, it is somewhat unclear which specific behaviors or skills constitute the larger construct (Hyson, 2008). Nonetheless, some of the most commonly researched components of approaches to learning include curiosity, competence motivation, initiative, persistence, problem solving, and cooperation with peers (Barnett, Bauer, Ehrhardt, Lentz, & Stollar, 1996). Early childhood researchers and educators have recently become interested in approaches to learning because (a) they are theoretically considered malleable and believed to be amenable to intervention, and (b) they are viewed as domain general because they facilitate children's learning across a variety of other school readiness domains. In fact, researchers have found that approaches to learning explain a substantial proportion of the variability in academic achievement, after controlling for more stable traits like intelligence (Schaefer & McDermott, 1999).

In sum, research suggests that approaches to learning are teachable skills that connect children to fundamental classroom learning experiences critical to early school success (Kagan et al., 1995). Given their potential contribution across a variety of domains, approaches to learning appear to be an important area for targeting early intervention efforts. Some indeed believe that approaches to learning are an important skill set that can be fostered in programs serving low-income children, such as Head Start, to reduce the achievement gap between advantaged and disadvantaged children (Goodson, 2009). However, little is currently known about how children develop approaches to learning or the factors that may influence their development. Taking a closer look at child-level and classroom-level processes that contribute to the development of adaptive approaches to learning is essential to inform early educational interventions targeting low-income children.

1.1. Ecological systems framework

The ecological systems model (Bronfenbrenner & Morris, 1998) provides a framework for understanding multiple levels of influences on children's approaches to learning by describing how children's development is not only shaped by their individual characteristics but also by the proximal environments in which they develop (e.g., preschool classrooms). Under this model, children's development stems largely from interactions between their individual characteristics and those of the environment (Bronfenbrenner & Morris, 1998). The current study took an ecological approach to understanding approaches to learning during early childhood by examining both the additive and interactive influences of

potential child-level behavioral risk characteristics and potential classroom-level protective factors. The primary aim of this study was to determine, using a multilevel framework, whether problem behavior and classroom quality directly influenced children's approaches to learning. The secondary aim was to examine the interaction between these variables and determine whether high classroom quality had a moderating, or protective, effect on the relation between problem behavior and approaches to learning.

1.2. Classroom problem behavior

Studies with preschool children have reported that rates of problem behavior, such as aggression, hostility, and emotional lability, range from 10% to 22% (e.g., Campbell, 1990). At even greater risk are children living in poverty who are exposed to multiple risk factors that can influence their development, such as family stress and neighborhood violence (Barbarin, 2007; Campbell, Shaw, & Gilliom, 2000; Qi & Kaiser, 2003). Studies examining low-income children's problem behavior have reported prevalence rates as high as 34% (Barbarin, 2007). These high prevalence rates are of considerable concern since substantial evidence links these difficulties to a variety of negative school outcomes.

Developmental psychopathology theory suggests that early adaptation patterns significantly influence children's later development (Cicchetti & Sroufe, 2000). In this perspective, early problems adjusting to the classroom context may place children at risk for future learning difficulties (Lutz, Fantuzzo, & McDermott, 2002; Thompson & Raikes, 2007). This perspective is supported by research linking early problem behavior to negative social and academic outcomes, both early on in childhood and later on in elementary school (Huffman, Mehlinger, & Kerivan, 2000; Pianta & Caldwell, 1990). Children who display problem behavior often exhibit social difficulties, such as insecure attachment to the teacher and problematic peer relationships (Pianta & Caldwell, 1990; Vaughn, Hogan, Lancelotta, Shapiro, & Walker, 1992). Further, they are more likely to exhibit academic difficulties, such as phonological problems (Lonigan et al., 1999), reading delays (McGee, Partridge, Williams, & Silva, 1991), and language deficits (Arnold, 1997; Stevenson, Richman, & Graham, 1985).

In addition to predicting social and academic difficulties, research in Head Start programs suggests that problem behavior may prevent children from successfully engaging in important classroom learning activities. For instance, problem behavior early in the preschool year has been associated with maladaptive approaches to learning (Domínguez Escalón & Greenfield, 2009; Fantuzzo, Bulotsky-Shearer, Fusco, & McWayne, 2005). Fantuzzo et al. (2005) found that aggressive behavior early in the preschool year was associated with lower competence motivation, lower attention/persistence, and more negative attitudes toward learning at the end of the year. Research with elementary-aged children has yielded similar findings. Normandeau and Guay (1998) found that externalizing and internalizing behaviors were negatively associated with children's attention and learning-related skills.

In addition to reporting negative associations between problem behavior and approaches to learning, studies have reported that approaches to learning mediate the relation between problem behavior and academic outcomes (DiPerna, Volpe, & Elliot, 2001; Domínguez Escalón & Greenfield, 2009; McWayne & Cheung, 2009). McWayne and Cheung (2009) tested this mediation model as well as the alternative model in which preschool problem behavior was hypothesized to mediate the influence of approaches to learning on academic outcomes; this alternative hypothesis was not supported. Overall, findings from these studies suggest that early problem behavior negatively influences approaches to learning, while highlighting the important role of approaches to learning as potential mediators of early learning.

Unfortunately, many studies examining the influence of problem behavior have been limited by existing measures that assess traditional types of problem behaviors (i.e., aggressive, inattentive, or shy behaviors) without considering the context in which these problem behaviors occur. In line with the ecological perspective, it is critical to examine children's problem behavior as it occurs in dynamic transaction with the learning or social demands of the classroom. Information regarding children's behavior within specific preschool learning contexts (e.g., structured learning activities and activities with peers) can provide much needed information to guide classroom-based interventions. This information would allow children's needs to be addressed in a contextually and developmentally appropriate manner with the goal of promoting more successful engagement in learning opportunities.

To address this need, Bulotsky-Shearer, Fantuzzo, and McDermott (2008) developed a contextually-based teacher rating scale, the Adjustment Scales for Preschool Intervention, that identifies three distinct

and reliable situational dimensions of problem behavior within the preschool classroom: problems in structured learning situations, peer interactions, and teacher interactions. These "context-specific" problem behavior dimensions negatively predicted a comprehensive set of school readiness outcomes, above and beyond traditional ratings of problem behavior (Bulotsky-Shearer et al., 2008). Problem behavior during structured learning situations was the strongest predictor of children's cognitive readiness skills, underscoring the importance of understanding the influence of problem behavior within situations of explicit instruction. Problem behavior in peer interactions was associated with social competencies such as peer play interaction.

The relation between situational problem behavior and approaches to learning, however, has not been examined. This research is needed to understand where in the classroom problem behavior most affects the way children approach learning tasks. Further, additional research is needed to examine potential classroom-level influences that may serve as moderators of this relation; for example, to examine ways in which teacher sensitivity may mitigate or buffer the negative effect of context-specific behavior on approaches to learning. This research would extend our understanding of where and how we must attend to children's early behavioral needs within the preschool classroom.

1.3. Classroom process quality

Classroom quality refers to classroom characteristics associated with children's social/emotional, behavioral, and academic outcomes. Indicators of classroom quality may include policy-regulated variables, such as teacher–child ratio and length of the school day, or may focus on specific teacher behaviors that enhance children's learning (Mashburn et al., 2008). Recently, researchers have increasingly focused on the importance of *process quality*, which refers to interaction patterns between teachers and children that influence school readiness outcomes (Mashburn et al., 2008). Within this framework, high classroom quality is defined in terms of warm, sensitive interactions between teachers and children, the provision of developmentally appropriate activities, and teachers' use of verbal and cognitive stimulation (La Paro, Pianta, & Stuhlman, 2004).

Previous research indicates that classroom quality, and process quality in particular, significantly contributes to preschoolers' school readiness. Warm, responsive, and stimulating classroom environments are associated with improved academic readiness and social competence (e.g., Connor, Son, Hindman, & Morrison, 2005; Mashburn et al., 2008). Children in these high quality environments exhibit more advanced levels of social conversation and cooperation compared to children in lower quality classrooms (Rimm-Kaufman, LaParo, Downer, & Pianta, 2005). Process quality, including teacher sensitivity and "child-centeredness," has also been associated with children's motivation, pride in accomplishments, and committed compliance (Stipek, Feiler, Daniels, & Milburn, 1995; Wachs, Gurkas, & Kontos, 2004).

To date, however, no studies have employed a multilevel framework to examine both the unique and interactive contributions of context-specific problem behavior and classroom process quality to approaches to learning. Classroom quality may be an important protective factor for children exhibiting problem behaviors. Exposure to a warm, supportive, and stimulating classroom environment may buffer the negative effects of problem behaviors on the acquisition of adaptive learning skills. In other words, preschool children's problem behaviors may interfere critically with the development of adaptive approaches to learning; high classroom quality may reduce that negative effect. Understanding these interactive relations is particularly important to inform interventions for children being served in early childhood educational programs.

In summary, three hypotheses were tested. First, it was expected that context-specific problem behaviors would negatively predict children's approaches to learning. Dimensions of context-specific problem behavior were examined as predictors based on research documenting differential findings of these dimensions on cognitive and social outcomes (Bulotsky-Shearer et al., 2008). However, because context-specific problem behavior dimensions have not been examined in relation to approaches to learning specifically, detailed hypotheses regarding differential effects were not posited. Second, it was expected that high classroom quality would positively predict approaches to learning, controlling for the effects of context-specific problem behaviors. Given previously established associations between emotional support and social outcomes, and between instructional support and learning competencies, we hypothesized these dimensions would be significant predictors of approaches to learning (e.g.,

Mashburn et al., 2008). Third, significant interactions between context-specific problem behaviors and classroom quality were expected; in higher quality classrooms children's problem behaviors were expected to have a less negative influence on approaches to learning compared to children in lower quality classrooms. Because interactive effects between classroom quality and context-specific problem behaviors have not been tested previously, more detailed hypotheses regarding interactions with specific types of context-specific problem behaviors were not posited.

2. Method

2.1. Participants

Participants were part of a larger data collection effort conducted in collaboration with the local Head Start program. For this larger project, Head Start centers were chosen randomly from a pool representing the diverse neighborhoods served by an urban Head Start program in the Southeastern United States. The initial pool of centers ($N = 36$) included those that were located within 20 mi of the university's campus and had more than two Head Start classrooms with at least 8 children who turned 4 years of age on or before September 1. A total of 30 classrooms across five centers were randomly selected from the eligible pool of centers and classrooms. Next, children within each classroom were stratified by sex and up to 12 children (6 girls and 6 boys) were randomly chosen from each participating classroom.

One of the classrooms withdrew from the study early in the year after the main teacher left the school. A total of 324 4- and 5-year old children were randomly sampled from the 29 remaining classrooms. A total of 49 of these children were dropped from the study: 28 due to low English proficiency, 13 due to chronic absenteeism, 2 due to lack of parental consent, and the remaining 6 due to other reasons (e.g., transferring to other classrooms). The final sample included 275 children; 51% were girls ($n = 139$), and 49% were boys ($n = 136$). Children's ages at the beginning of the school year ranged from 45 to 59 months ($M = 53.2$, $SD = 3.6$). Fifty-six percent of the children were Hispanic/Latino, 40% were African American/Black, and 4% other were ethnicities. The number of participating children in each classroom ranged from 7 to 12 ($M = 9.48$, $SD = 1.81$). All children met federal criteria for enrollment in Head Start. For the study year, this meant a household income below $20,000 for a family of four (Administration on Children, Youth, and Families, 2006).

Within the 29 participating classrooms, all lead teachers were women. Seventy-two percent of the teachers were Hispanic/Latino, and 28% were African American/Black. Of the 90% of teachers who reported education level, 35% had a Child Development Associate or other associate's degree, 61% had a bachelor's degree, and 4% had a master's degree. Based on 86% of the teachers reporting the number of years they had been a preschool teacher, they averaged about 15 years of experience ($M = 15.2$, $SD = 9.80$).

2.2. Measures

2.2.1. Problem behavior

Children's problem behavior was assessed using the situational dimensions of the Adjustment Scales for Preschool Intervention (ASPI; Bulotsky-Shearer et al., 2008; Lutz et al., 2002). The ASPI is a teacher-completed scale developed and validated for use with low-income preschool populations. This scale consists of 144 items that describe children's behaviors across 22 routine classroom situations. Originally developed to assess types of internalizing and externalizing behavior (e.g., aggressive, oppositional, inattentive, withdrawn, and socially reticent) across the 22 situations (Lutz et al., 2002)[1], three additional situational subscales were developed recently to assess problems within specific classroom contexts

[1] Five ASPI behavioral dimensions have also been established: Aggressive, Oppositional, Inattentive/Hyperactive, Withdrawn/Low Energy and Socially Reticent problem behavior. Each of the five dimensions demonstrated adequate internal consistency, with Cronbach alpha coefficients of .92, .78, .79, .85 and .79, respectively. These dimensions have been well-validated with constructs of interactive peer play, behavior problems, temperament, emotion regulation, and direct observations of classroom behavior problems (Bulotsky-Shearer & Fantuzzo, 2004) and end-of-the-year preschool competencies including interactive peer play, classroom learning competencies, and receptive language skills (Fantuzzo et al., 2003). However, these dimensions were not included in the present analysis because the focus of this study was situational problem behavior.

(Bulotsky-Shearer et al., 2008) The five problem behavior types were derived by subjecting each of the ASPI's 122 negative behavioral items to factor analyses to attain a measure of internalizing or externalizing problem behavior across classroom situations. The situational dimensions were derived by summing the negative items under each of the 22 situations and subjecting these 22 situation raw score totals to exploratory and confirmatory factor analyses to attain latent dimensions that more parsimoniously described the common demand characteristics shared among the ASPI's 22 classroom situations (Bulotsky-Shearer et al., 2008; see Appendix A for the situational dimension factor structure and loadings from the standardization sample of Head Start children). The three situational subscales included the Problems in Structured Learning Situations, Problems in Teacher Interactions, and Problems with Peers scales. Problems in Structured Learning Situations includes seven organized classroom situations where problem behavior occur (e.g., involvement in class activities, taking part in games with others, maintaining companions/friends, paying attention in class, sitting during teacher-directed activities, free play/individual choice, and working with hands/art). Problems in Teacher Interactions includes six situations involving direct contact with teachers (e.g., talking to teacher, answering teacher's questions, greeting teacher, and seeking help from teacher). Problems with Peers includes six peer situations (e.g., getting along with others, telling the truth, and standing in line; Bulotsky-Shearer et al., 2008).

To complete the ASPI, teachers were asked to mark any description that applied to the child within each classroom situation (see Appendix B for ASPI directions and sample item response format). Children's scores were obtained based on the factor structure derived by Bulotsky-Shearer et al. (2008). Each of the negative behavior items under each of the 22 situations were summed to create a score for each child. Then these 22 situations were summed for each situational dimension (i.e., structured learning, teacher, and peer interactions). Raw score totals were then converted to standardized *T* scores based on the standardization sample (Bulotsky-Shearer et al., 2008). Previously, this same procedure was employed by McDermott, Steinberg, and Angelo (2005) who empirically created three situational scales (i.e., academic, teacher, and peer context problems) for elementary school children via exploratory factor analysis of the 29 routine classroom situations of the Adjustment Scales for Children and Adolescents (ASCA; McDermott, 1993).

The three situational dimensions have been found to be replicable and generalizable to important subgroups of the standardization sample (i.e., across age, sex, and ethnicity). Convergent and divergent validity of the three ASPI situational dimensions have been established with measures of interactive peer play (Fantuzzo, Coolahan, Mendez, McDermott, & Sutton-Smith, 1998) and classroom learning competence (Fantuzzo, Hightower, Grim, & Montes, 2002). Validity coefficients for disconnected and disruptive play outcomes ranged from .59 to .24, for interactive play from −.24 to −.49, and for learning outcomes from −.12 to −.48 (Bulotsky-Shearer et al., 2008). Cronbach's alpha coefficients for the study's sample indicated adequate internal consistency: Problems in Structured Learning Situations had a Cronbach's alpha of .92, Problems in Teacher Interactions had a Cronbach's alpha of .78, and Problems in Peer Interactions had a Cronbach's alpha of .79.

2.2.2. Classroom process quality

Classrooms' quality was assessed using the Classroom Assessment Scoring System (CLASS; La Paro, Pianta, Hamre, & Stuhlman, 2002), which is an observational tool used to assess classroom process quality in preschool. The measure was specifically designed to assess the quality of interactions between teachers and children, based on research showing that these interactions form the basis of children's learning in the classroom context (Rimm-Kaufman et al., 2005). The CLASS assesses four specific domains of classroom quality: (a) Emotional Support, which includes ratings of classroom climate, teacher sensitivity, and recognition of children's interests and autonomy; (b) Classroom Organization, which includes behavior management, provision of appropriate activities and materials, and use of time; (c) Instructional Support, which includes teachers' promotion of higher-order cognitive skills, constructive feedback, and language modeling; and (d) Student Engagement, which refers to the degree of sustained student engagement within the observation period. Observers rate a total of 11 dimensions on a 7-point Likert scale. Detailed descriptions illustrating what constitutes low (1–2), medium (3–5), and high (6–7) scores were provided to guide the scoring of each dimension. Final scores for each dimension were obtained by averaging across observation periods. Domain scores were obtained by averaging the respective dimension scores.

Across six studies used for validation, the CLASS domains showed high internal consistency. For Emotional Support, Cronbach's alphas ranged from .85 to .94; for Classroom Organization, alphas ranged from .76 to .89; and for Instructional Support, alphas ranged from .79 to .90 (La Paro et al., 2002). In the current study, alphas were .91, indicating high internal consistency, for each of the three CLASS domains. Additionally, the validation studies showed that CLASS scores were significantly and positively correlated with two commonly-used observations of preschool classroom quality (La Paro et al., 2002).

2.2.3. Approaches to learning

The Preschool Learning Behavior Scale (PLBS; McDermott, Green, Francis, & Stott, 2000) was used to assess children's approaches to learning. The PLBS is a 29-item teacher-completed rating scale of preschool children's classroom learning behaviors. This measure has been validated for use with Head Start populations and was developed in collaboration with Head Start teachers (Fantuzzo et al., 2004). The scale's dimensions assess children's motivation, initiative, attention, persistence, determination, and general disposition toward learning activities.

To complete the PLBS, teachers were asked to rate each of the items on a three-point Likert scale, indicating whether a certain behavior *most often applies*, *sometimes applies*, or *doesn't apply* to a child. Items for each of the three factors were summed to create subscale scores, which were then aggregated into a total raw score. Total raw scores were then converted into *T* scores ($M = 50$, $SD = 10$) based on the national standardization sample. The total Score was used as the outcome for this study, as the most reliable measure of children's approaches to learning. The Cronbach's alpha coefficient for the total score in the study's sample was .87, indicating adequate internal consistency. Convergent and divergent validity for the PLBS has been established with measures of cognitive ability (Elliott, 1990), receptive and expressive language (Dunn & Dunn, 1997; Gardner, 1990), social skills at school and home (Fantuzzo et al., 1998; Fantuzzo & Hampton, 2000; Gresham & Elliott, 1990), and self-regulation (Block & Block, 1980).

2.3. Procedure

Once approval had been obtained from the University's Institutional Review Board (IRB), the local Head Start partners provided the necessary center-level information. Center directors were initially contacted by the research team and signed consent forms if they agreed to have their center participate in the study. Teachers in participating centers were then contacted by the research team and signed consent forms if they agreed to participate in the study. Consent was also obtained for all children in participating classrooms. The principal investigator of this larger project has long-standing, ongoing, research partnership with the local Head Start program, and parents sign consent forms at the beginning of the school year allowing their children to participate in the research. In addition, prior to the beginning of any specific research project, an information letter describing that specific project is provided to each consenting parent with an option for them to withdraw their child from the specific study.

During the fall semester (approximately one month after the start of the academic year), participating teachers were given packets containing a standardized measure of children's problem behavior for each participating child in their classroom. During the spring semester, participating teachers were given a second packet containing the standardized measure of children's approaches to learning. These packets also contained instructions for filling out each of the rating scales. Teachers were compensated with $10 gift cards after completion of each packet.

During the spring semester, classroom process quality was observed by a team of graduate and undergraduate observers who were trained by an experienced assessor. Training consisted of watching and coding video segments and then comparing trainees' codes to master codes. Observers were trained until they reached 80% reliability within one point of the master codes. Classroom observations of process quality took place during 2-hour observation periods on two mornings, for a total of approximately 4 h of observation per classroom. Observations started as soon as the teacher being observed reported that typical instruction began and ended around lunchtime. Observations were conducted during all activities (e.g., large group, small group, and free time) except outdoor free play and naptime. Each day of observations included approximately four cycles of 20-minute observations followed by 10-minute scoring periods. Cycles were coded if at least 10 min of observation were completed. During observation periods, coders sat in the classroom to observe classroom activities, without disrupting classroom routines.

Observers completed a minimum of six and a maximum of eight cycles across the two observation days. Observers were trained to follow the observation protocol in a standardized manner and to report any deviations from the protocol due to class schedules or observer error. No serious deviations were reported.

Thirteen percent of the observation periods (i.e., 25 observations) were double-coded by pairs of observers to ensure there was no drift in reliability. Ninety-two percent of the double-coded cycles showed greater than 80% agreement within one point, and average agreement was 88%. As recommended by Shrout and Fleiss (1979), intraclass correlational analyses were chosen to calculate inter-rater reliability for each independent pair of raters on the three classroom process quality domains using the SAS INTRACC macro, which calculate reliabilities for intraclass correlations (ICCs; SAS Institute, 1993). Intraclass correlational analyses were chosen because they are sensitive to both the linear relation between the different raters' scores and to differences in absolute level of scores. ICCs detect significant differences in level between raters that can lead to erroneous conclusions about the relation between sets of scores. Analysis revealed three significant reliability coefficients: Emotional Support, ICC = .79 (F [1, 25] = 8.59, p < .001); Classroom Organization, ICC = .77 (F [1, 25] = 7.31, p < .001); and Instructional Support, ICC = .60 (F [1, 25] = 3.75, p < .001).

2.4. Data analytic approach

Given that the children recruited for this study were nested within classrooms, multilevel modeling (MLM) was conducted using HLM6 (Raudenbush, Bryk, Cheong, & Congdon, 2004). First, a fully unconditional model was run in order to determine how much of the variance in approaches to learning was attributable to child-level and classroom-level variation. Next, demographic variables and context-specific problem behaviors scores were entered as predictors of the child-level variance in approaches to learning (Level 1). Then, classroom process quality ratings were examined as predictors of the classroom-level variance (Level 2), controlling for all child-level variables. Both the main effects of process quality and cross-level interactions between context-specific problem behaviors and process quality were examined in the final models. Cross-level interactions were tested separately for each of the problem-specific problem behavior variables to ensure there was adequate power to detect effects. In all models, demographic variables were centered at the grand mean, and variables of interest (for which cross-level interactions were also tested) were centered at their group mean as recommended by Enders and Tofighi (2007).

3. Results

3.1. Descriptive analyses

In order to ensure the data were normally distributed, all variables of interest were examined for outliers, homoscedasticity, and kurtosis. Sixteen percent of the children in the sample exhibited elevated problems in structured learning situations, indexed by scores more than one standard deviation above the mean, whereas 16% and 12% of children, respectively, demonstrated elevated problems in peer interactions and in teacher interactions. No significant differences between boys and girls were found in problems in structured learning situations or in teacher interactions. However, significant differences were found in regards to problems in peer interactions. $t = 2.67$, $p = .01$, and approaches to learning, $t = -2.30$, $p = .02$. As reported by teachers, boys' demonstrated significantly higher problems in peer interactions than girls, whereas girls exhibited higher approaches to learning than boys.

3.2. Bivariate correlations

Age was significantly correlated with approaches to learning, $r = .23$, $p = .01$, but was not correlated with any of the context-specific problem behavior dimensions. Low to moderate correlations were found between context-specific problem behavior dimensions and approaches to learning scores, ranging from −.29 to −.47. Problems in structured learning situations had the strongest association with approaches to learning, $r = -.48$, $p = .01$. The context-specific problem behavior dimensions were moderately correlated with one another, ranging from .45 to .60. Table 1 lists all correlations between child-level measures. Correlations among the three classroom quality domains were high, ranging from .72 to .82.

Table 1
Bivariate correlations between child-level measures.

	1	2	3	4
1. Problems in peer interactions	–	.60**	.45**	−.29**
2. Problems in structured learning		–	.62**	−.48**
3. Problems in teacher interactions			–	−.34***
4. Approaches to learning				–

Note. ** $p<.01$.

3.3. Multilevel modeling results

Results from the fully unconditional model indicated that 10% of the variance in approaches to learning was attributable to between-classroom differences and, therefore, could be modeled with classroom-level predictors. The remaining 90% of the variance was due to variation between children and could be modeled with child-level predictors.

3.3.1. Child-level model

Children's demographic characteristics (i.e., age, sex, and ethnic group) and problem behavior scores (i.e., problems in structured learning situations, problems in teacher interaction and problems in peer interaction) were then examined as predictors of approaches to learning. See the final child-level equation tested that follows.

Level 1

$$\begin{aligned} \textit{Approaches to Learning}_{ij} = {} & \beta_{0j} + \beta_{1j}(\textit{Sex}) + \beta_{2j}(\textit{Age}) + \beta_{3j}(\textit{Ethnic Group}) \\ & + \beta_{4j}(\textit{Problems in Structured Learning Situations}) \\ & + \beta_{5j}(\textit{Problems in Teacher Interactions}) \\ & + \beta_{6j}(\textit{Problems in Peer Interactions}) + r_{ij} \end{aligned} \tag{1}$$

Demographic variables were examined as predictors first. As evident in Table 2, sex, $\beta_{1j}=2.56$, $t=3.08$, $p=.003$, and age, $\beta_{2j}=0.31$, $t=2.60$, $p=.01$, were both significant predictors of approaches to learning. Girls were rated by teachers as having more adaptive approaches to learning scores than boys, and older children were rated by teachers as having more adaptive approaches to learning relative to younger children. Ethnic group was not a significant predictor of children's approaches to learning. The demographic variables, as a set, accounted for 11% of the inter-individual variance in approaches to learning. Context-specific problem behaviors were subsequently added as predictors. Problems in structured

Table 2
HLM results for final Level 1 model.

Fixed effects	Coefficient	*df*	*t*-ratio
Intercept (γ_{00})	37.91	24	44.70***
Sex (γ_{10})	1.32	196	1.89*
Age at start (γ_{20})	0.28	196	2.41*
Ethnic group (γ_{30})	−1.06	196	−0.82
Problems in structured learning situations (γ_{40})	−0.28	196	−4.37***
Problems in teacher interactions (γ_{50})	−0.14	196	−2.61*
Problems in peer interaction (γ_{60})	−0.12	196	−2.33
Random Effects	**Variance component**	***df***	χ^2
Intercept (u_{0j})	14.71	24	160.98***
Level-1 effects (r_{ij})	22.41	–	–

Note. * $p<.05$. ** $p<.01$. *** $p<.001$.

Table 3
HLM results for final Level 2 model (cross-level interactions for problems in structured learning situations).

Fixed effects	Coefficient	*df*	*t*-ratio
Intercept (γ_{00})	37.91	21	43.99***
Emotional support (γ_{01})$^{+}$	0.72	21	0.31
Classroom organization (γ_{02})$^{+}$	−0.25	21	−0.10
Instructional support (γ_{03})$^{+}$	−0.27	21	−0.12
Sex (γ_{10})	1.67	190	2.42*
Age at start (γ_{20})	0.21	190	2.16*
Ethnic group (γ_{30})	−1.10	190	−0.82
Problems in structured learning situations (γ_{40})	−0.21	190	−3.08**
Emotional support (γ_{41})^{x}	0.34	190	2.24*
Classroom organization (γ_{42})^{x}	−0.29	190	−1.37
Instructional support (γ_{43})^{x}	−0.17	190	−1.17
Problems in teacher interaction (γ_{50})	−0.16	190	−3.12**
Problems in peer interaction (γ_{60})	−0.12	190	−2.37*
Random Effects	**Variance component**	***df***	**χ^2**
Intercept (u_{0j})	14.78	21	170.37***
Level-1 effects (r_{ij})	20.97	—	—

Note. * $p<.05$. ** $p<.01$. *** $p<.001$.
For fixed effects: $^{+}$ estimates represent Level 2 effects; ^{x} estimates represent cross-level interactions; all other estimates represent Level 1 effects.

learning situations, $\beta_{4j}=-0.28$, $t=-4.37$, $p<.001$; problems in teacher interactions, $\beta_{5j}=-0.14$, $t=-2.61$, $p=.01$; and problems in peer interactions, $\beta_{6j}=-0.12$, $t=-2.33$, $p=.02$, were all negatively associated with children's approaches to learning. The inclusion of the context-specific problem behaviors accounted for an additional 33% of the inter-individual variance in approaches to learning. The effects of the demographic variables and the context-specific problem behaviors did not vary across classrooms and therefore, their respective variance terms were fixed (see Table 2).

Table 4
HLM results for final Level 2 model (cross-level interactions for problems in teacher interactions).

Fixed effects	Coefficient	*df*	*t*-ratio
Intercept (γ_{00})	37.92	21	43.86***
Emotional support (γ_{01})$^{+}$	1.02	21	0.42
Classroom organization (γ_{02})$^{+}$	−0.45	21	−0.17
Instructional support (γ_{03})$^{+}$	−0.26	21	−0.11
Sex (γ_{10})	−1.10	190	1.61
Age at start (γ_{20})	0.19	190	2.00*
Ethnic group (γ_{30})	−1.55	190	−1.16
Problems in structured learning situations (γ_{40})	−0.28	190	−4.62***
Problems in teacher interaction (γ_{50})	−0.15	190	−2.86**
Emotional support (γ_{51})^{x}	0.34	190	2.57**
Classroom organization (γ_{52})^{x}	−0.06	190	−0.33
Instructional support (γ_{53})^{x}	−0.33	190	−2.29*
Problems in peer interaction (γ_{60})	−0.11	190	-2.23*
Random effects	**Variance component**	***df***	**χ^2**
Intercept (u_{0j})	14.99	21	175.89***
Level-1 effects (r_{ij})	20.37	–	–

Note. * $p<.05$. ** $p<.01$. *** $p<.001$.
For fixed effects: $^{+}$ estimates represent Level 2 effects; ^{x} estimates represent cross-level interactions; all other estimates represent Level 1 effects.

Table 5
HLM results for final Level 2 model (cross-level interactions for problems in peer interactions).

Fixed effects	Coefficient	*df*	*t*-ratio
Intercept (γ_{00})	37.91	21	43.98***
Emotional support (γ_{01})$^{+}$	0.77	21	0.32
Classroom organization (γ_{02})$^{+}$	−0.23	21	−0.09
Instructional support (γ_{03})$^{+}$	−0.31	21	−0.14
Sex (γ_{10})	1.40	190	1.96*
Age at start (γ_{20})	0.23	190	2.30*
Ethnic group (γ_{30})	−1.16	190	−0.85
Problems in structured learning situations (γ_{40})	−0.28	190	−4.29***
Problems in teacher interaction (γ_{50})	−0.14	190	−2.66**
Problems in peer interaction (γ_{60})	−0.11	190	−1.85
Emotional support (γ_{61})^{x}	0.03	190	0.19
Classroom organization (γ_{62})^{x}	0.03	190	0.13
Instructional support (γ_{63})^{x}	−0.14	190	−0.09
Random effects	**Variance component**	***df***	χ^2
Intercept (u_{0j})	14.61	21	160.93***
Level-1 effects (r_{ij})	22.13	–	–

Note. * $p<.05$. ** $p<.01$. *** $p<.001$.
For fixed effects: $^{+}$ estimates represent Level 2 effects; ^{x} estimates represent cross-level interactions; all other estimates represent Level 1 effects.

3.3.2. Classroom-level model

Once the child-level model had been specified, classroom quality variables were entered as predictors of the between-classroom variance at Level 2. The three classroom quality domains (i.e., Emotional Support, Classroom Organization, and Instructional Support) were entered as predictors of the intercept (to test the direct effects of classroom quality) and as predictors of the slope associated with each of the

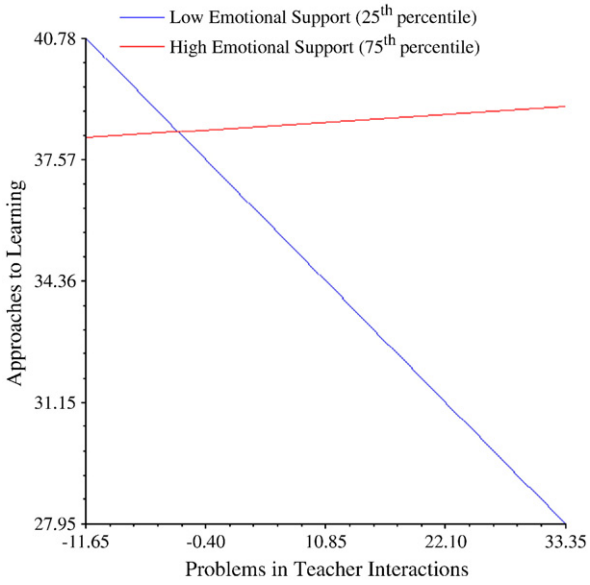

Fig. 1. Plot of cross-level interaction: Problems in Teacher Interaction × Emotional Support. This figure shows the model-estimated interaction effect. For children in highly emotionally supportive classrooms, Problems in Teacher Interaction had no effect on children's approaches to learning. For children in less emotionally supportive classrooms, Problems in Teacher Interaction negatively predicted approaches to learning.

context-specific problem behaviors (to test cross-level interaction effects). See the equations tested that follow. Of note, cross-level interactions were tested separately for each of the problem-specific problem behavior variables (i.e., problems in structured learning situations, problems in teacher interactions, and problems in peer interactions) to ensure there was adequate power to detect effects.

Level 1

$$\begin{aligned} \textit{Approaches to Learning}_{ij} = {} & \beta_{0j} + \beta_{1j}(\textit{Sex}) + \beta_{2j}(\textit{Age}) + \beta_{3j}(\textit{Ethnic Group}) \\ & + \beta_{4j}(\textit{Problems in Structured Learning Situations}) \\ & + \beta_{5j}(\textit{Problems in Teacher Interactions}) \\ & + \beta_{6j}(\textit{Problems in Peer Interactions}) + r_{ij} \end{aligned} \tag{2}$$

Level 2

$$\begin{aligned} \beta_{0j} &= \gamma_{00} + \gamma_{01}(\textit{Emotional Support}) + \gamma_{02}(\textit{Classroom Organization}) + \gamma_{03}(\textit{Instructional Support}) + u_{0j} \\ \beta_{1j} &= \gamma_{10} \\ \beta_{2j} &= \gamma_{20} \\ \beta_{3j} &= \gamma_{30} \\ \beta_{4j} &= \gamma_{40} + \gamma_{41}(\textit{Emotional Support}) + \gamma_{42}(\textit{Classroom Organization}) + \gamma_{43}(\textit{Instructional Support}) + u_{4j} \\ \beta_{5j} &= \gamma_{50} + \gamma_{51}(\textit{Emotional Support}) + \gamma_{52}(\textit{Classroom Organization}) + \gamma_{53}(\textit{Instructional Support}) + u_{5j} \\ \beta_{6j} &= \gamma_{60} + \gamma_{61}(\textit{Emotional Support}) + \gamma_{62}(\textit{Classroom Organization}) + \gamma_{63}(\textit{Instructional Support}) + u_{6j} \end{aligned} \tag{3}$$

Refer to Tables 3, 4, and 5 for the results of the three final classroom-level models targeting each of the problem-specific problem behavior variables. As evident in all three tables, classroom quality domains did not predict the intercept, or the mean level, of approaches to learning. As can be noted in Table 4, emotional support, $\gamma_{51} = 0.34$, $t = 2.57$, $p = .01$, and instructional support, $\gamma_{53} = -0.33$, $t = -2.29$, $p = .02$, however, were significant predictors of the slope associated with problems in teacher interactions. As can be noted in Table 3, emotional support, $\gamma_{41} = 0.35$, $t = 2.24$, $p = .03$, was also a significant predictor of the slope

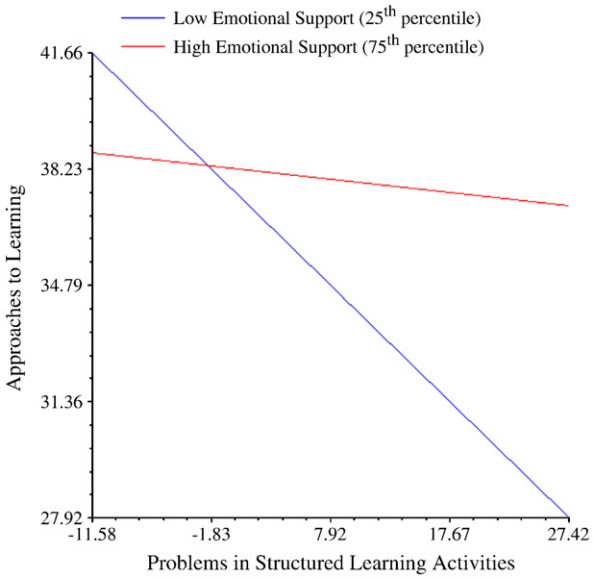

Fig. 2. Plot of cross-level interaction: Problems in Structured Learning Activities × Emotional Support. This figure shows the model-estimated interaction effect. For children in highly emotionally supportive classrooms, Problems in Structured Learning Activities had no effect on children's approaches to learning. For children in less emotionally supportive classrooms, Problems in Structured Learning Activities negatively predicted approaches to learning.

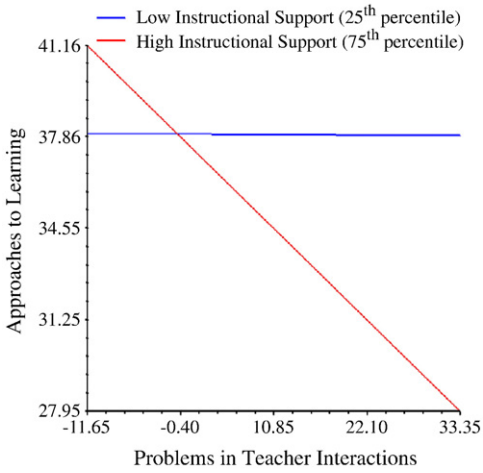

Fig. 3. Plot of cross-level interaction: Problems in Teacher Interaction × Instructional Support. This figure shows the model-estimated interaction effect. For children in classrooms with high instructional support, Problems in Teacher Interaction were associated with lower approaches to learning. For children in classrooms with low emotional support, Problems in Teacher Interaction were associated with higher approaches to learning.

associated with problems in structured learning situations. The positive coefficients associated with the interaction terms of emotional support demonstrate that the relation between problems in teacher interactions (see Fig. 1) and in structured learning situations (see Fig. 2) and approaches to learning were less negative for children in classrooms that provided high emotional support. As evident in Fig. 3, the negative coefficient associated with the significant interaction term of instructional support demonstrates that the relation between problems in teacher interactions and approaches to learning was more negative for children in classrooms that provided high instructional support. These findings indicate that high emotional support buffered the effects of problem behaviors, whereas high instructional support exacerbated the effects.

4. Discussion

The purpose of the present study was to examine, within a multilevel framework, the extent to which context-specific problem behaviors predicted approaches to learning and to determine whether classroom process quality moderated the relation between problem behaviors and approaches to learning. To do so, we collected ecologically and developmentally appropriate teacher reports of children's behaviors within the classroom context and assessed classroom quality based on teacher–child interactions. The findings of our study indicated that context-specific problem behavior negatively predicted approaches to learning. Furthermore, our study identified two classroom process quality domains (i.e., emotional and instructional support) that affected the strength of the association between specific problem behaviors and approaches to learning.

4.1. The effects of context-specific problem behaviors

Problems in structured learning situations were found to be the strongest predictor of approaches to learning difficulties. These findings are consistent with previous studies linking problems in structured learning situations with cognitive and social engagement outcomes (Bulotsky-Shearer et al., 2008). Structured situations involve organized classroom learning experiences, either social or academic, where children have the opportunity to engage in specific learning activities. Given that approaches to learning are conceptualized as mutable skills that can be taught within the classroom (Eccles & Wigfield, 2002; Fantuzzo, Gadsden, & McDermott, 2008; Hyson, 2008), structured learning situations may be key moments to foster and learn these skills. If children display problem behavior within structured learning situations,

such as circle time or small group activities, they might be missing out on opportunities to practice important approaches-to-learning skills such as persistence and cooperation and might have a harder time getting motivated about learning. For example, experience and engagement in manageable tasks has been found to promote self-regulated or motivated learning (Shonkoff & Phillips, 2000), an important aspect of children's approaches to learning. Problem behavior in learning situations may be interfering with crucial opportunities to engage in learning moments that promote important learning skills.

Problem behavior in peer and teacher interactions were also identified as important predictors of approaches to learning difficulties; higher scores in these dimensions were associated with less adaptive approaches to learning scores. These findings are consistent with literature highlighting the importance of positive peer and teacher–child interactions for early learning. In regards to peer interactions, researchers have reported links between problem behavior in peer interactions and disruptive peer play skills (Bulotsky-Shearer et al., 2008). Additionally, findings from two studies conducted with Head Start samples suggest that socially disruptive behavior (e.g., aggressive behavior) is associated with lower attitudes toward learning, an important dimension of approaches to learning (Fantuzzo et al., 2007, 2005).

In regards to teacher interactions, Birch and Ladd (1997) found that teacher–child conflict in kindergarten, as reported by teachers, negatively predicted children's initiative and cooperation—both important components of approaches to learning. Research also indicates that these early interactions may have long-term effects. Hamre and Pianta (2001) reported teacher–child conflict in kindergarten as a negative predictor of children's learning behaviors later in elementary school. The findings of our study are also consistent with research conducted in Head Start centers to examine the predictive ability of the ASPI situational dimensions; such research suggests that problems in teacher interactions differentially affect preschool school readiness outcomes (Bulotsky-Shearer et al., 2008). Bulotsky-Shearer et al. (2008) found no significant associations between problems in teacher interactions and cognitive outcomes. Most of the variance in cognitive outcomes was accounted for by problems in structured learning situation. Problems in teacher interactions, however, were negatively associated with social outcomes, specifically with interactive peer play (Bulotsky-Shearer et al., 2008). As a broad construct, approaches to learning include important social learning skills (e.g., cooperating with peers) as well as more cognitively-focused learning competencies (e.g., persisting in the face of challenge). Teachers give children opportunities to develop social skills related to learning by encouraging sharing, helping children resolve conflicts over materials, and guiding children in group learning activities. Children who have difficulty connecting with adults at the start of the school year may miss these critical teaching moments.

4.2. The effects of classroom process quality

Classroom process quality was not directly related to approaches to learning. Despite the importance of providing all children with the opportunity to engage in a supportive, developmentally appropriate and cognitively stimulating environment, it may be difficult to detect effects of classroom quality on individual child outcomes. In this study, multilevel modeling of teachers' ratings of children's approaches to learning indicated that 73% of variance in this outcome was attributable to child-level differences and only 27% was attributable to classroom-level differences. These results indicate that the majority of the variance in approaches to learning ratings was within classrooms and not across classrooms.

The lack of significant direct effects in this study may have also been due to the restricted range of classroom process quality in this sample. Rather than having a range of 6 (the maximum range possible since scores can range from 1 to 7) on each dimension, the ranges in the current study were 3.0 (from 3.53 to 6.54) for Emotional Support, 2.9 (from 3.05 to 5.92) for Classroom Organization, and 2.3 (from 1.74 to 4.07) for Instructional Support. Furthermore, standard deviations for the current sample were relatively small, indicating that scores were clustered around the mean. Because domain scores were aggregated across multiple observation cycles, the low variability may represent a degree of regression toward the mean. The findings of the current study are similar to those reported in the CLASS technical manual, which reports restricted ranges when scores on individual items are aggregated across cycles (La Paro et al., 2002).

Classroom process quality ratings using the CLASS represent the average quality of interactions experienced by the class as a whole. Although many children attend the same classroom and interact with the same teacher, classroom quality effects may vary as a function of individual child characteristics (Hamre & Pianta, 2005; Peisner-Feinberg & Burchinal, 1997). These person-by-context interactions may largely determine how children interpret and respond to interactions that take place in the classroom and may be masked, even with a

large sample, when each child is assigned a score representing the average class quality. These interactions can also potentially explain why even larger-scale studies have failed to find main effects of classroom process quality on child outcomes (Hamre & Pianta, 2005).

Direct effects of classroom process quality may only be detectable for children who are most sensitive to variation in this context. In the aforementioned study, the effects of classroom process quality were manifested only in the context of risk (Hamre & Pianta, 2005). Children who were at risk based on functional indicators, such as attention, externalizing behavior, social skills, and academic competence, benefited significantly from high emotional support; children at risk based on low maternal education benefited significantly from high instructional support. Similarly, in the current study, children exhibiting problem behavior in teacher interactions were most sensitive to variation in classroom process quality.

4.3. Interactions between context-specific behavior problems and classroom process quality

Even though there were no main effects of classroom quality on approaches to learning, certain classroom quality domains played an important role by moderating the association between problem behaviors and approaches to learning. Emotional support was found to be an important protective factor; high emotional support mitigated the negative effect of problems in teacher interactions and problems in structured learning situations. When teachers rated children as having problems interacting with them or engaging in structured activities early in the school year but provided an emotionally supportive learning environment throughout the year, problem behavior did not negatively predict approaches to learning later in the year. On the other hand, if teachers rated children as having problems interacting with them or engaging in structured activities but failed to provide an emotionally supportive learning environment throughout the year, problem behavior significantly predicted approaches to learning.

There are several potential explanations for such findings. One possible explanation could be that emotionally supportive environments decrease problem behavior (throughout the year), thus allowing children to acquire the necessary learning skills for school success. In fact, researchers have reported significantly fewer instances of child noncompliance in high quality classrooms (Rimm-Kaufman et al., 2005). Teachers' emotional support, in particular, has been associated with lower levels of problem behavior (Howes et al., 2008; Mashburn et al., 2008). Our study, however, did not assess problem behavior later in the year, so this interpretation may require further examination of these associations. Another possible explanation may be that emotionally supportive teachers do not allow conflict with a child to influence their perceptions of a child's learning behaviors. Further examination of how classroom quality is related to teacher perceptions of children is also warranted.

Contrary to what was initially hypothesized, instructional support exacerbated, rather than mitigated, the negative effects of problems in teacher interactions. In other words, problems in teacher interactions were more strongly (and negatively) predictive of approaches to learning in classrooms providing high instructional support than in those providing less instructional support. In a sense, these findings contradict previous literature on instructional support within the classroom context. Instructionally supportive environments have been associated with improved academic skills (Howes et al., 2008). However, it is important to note that this specific classroom quality dimension has not been found to relate to social and emotional school readiness. Howes et al. (2008), for example, did not find significant associations between instructional climate and social competence or problem behavior.

One possible explanation for such a finding is that teachers who provided more instructional demand were less tolerant of misbehavior and may, as a result, have perceived and rated children more negatively. This explanation, however, is not likely in this sample; classroom ratings of instructional support were not associated with higher ratings or higher percentage of children with problem behavior. An alternate explanation may be that high instructional support might actually be detrimental for children who exhibit certain problem behavior. Children who are rated as having problems interacting with teachers may need interventions that their address emotional and behavioral difficulties first, before they can benefit from very cognitively-stimulating or challenging learning environments.

This latter interpretation highlights the importance of differentiated instruction within the preschool classroom. Within the field of early childhood education, there has been an increasing focus on differentiated instruction given the reality faced by most teachers in the country—the substantial increase in degree of diversity in classrooms due to both fluctuations in demographics and strong movements

supporting inclusion and mainstreaming. This increased diversity requires teachers to assess and attend to substantial variability in students' school readiness and learning styles. Differentiation requires teachers to proactively modify teaching strategies, methods, and activities in order to address the diverse needs of their students (Bearne, 1996). In regards to our study's findings, differentiation would involve addressing children's individual differences in social and emotional school readiness. Children that have problems interacting with teachers might need to overcome such problems before they can benefit from high quality instructional strategies that focus on higher-order thinking and more complex cognitive stimulation.

4.4. The role of demographic covariates

Ethnic group was not a significant predictor of approaches to learning; African American/Black and Hispanic/Latino children did not differ in regards to teachers' ratings of approaches to learning. Significant differences, however, were indeed observed in regards to children's sex and age. Sex was a significant predictor of approaches to learning, with teachers rating girls significantly higher than boys. This finding is consistent with increasing evidence of sex differences with regard to approaches to learning early in childhood. Ready, LoGerfo, Burkman, and Lee (2005) reported similar findings in a longitudinal study using a national early childhood dataset. According to the researchers, girls' advantage in approaches to learning explained their superiority in kindergarten literacy outcomes. Similar findings have also been reported in studies with low-income, urban Head Start samples. McWayne, Fantuzzo, and McDermott (2004), for example, reported significant sex differences in Head Start children's attention skills, with girls exhibiting more adaptive skills than boys. Similarly, recent findings indicate a significant sex difference in Head Start, with girls obtaining higher global learning behaviors scores relative to boys (Domínguez Escalón & Greenfield, 2009).

Age also explained a significant amount of variance in teacher ratings of children's approaches to learning, with older children receiving higher ratings than younger children. McWayne et al. (2004) reported similar age differences in Head Start children's learning behaviors, with older preschoolers exhibiting more adaptive skills than younger preschoolers. These findings suggest a developmental progression for specific approaches to learning. Wigfield, Eccles, Schifele, Roeser, and Davis-Kean (2006), for example, described the development of achievement or competence motivation. They documented that prior to 2 years of age, children tend to be unconcerned about what others think, but that later on, around age 3, they start to react to failure by showing negative emotions toward adults. Similarly, researchers have also documented developmental changes in attention and persistence. Even though attention and persistence have been found to develop rapidly during the first years of life (Posner & Rothbart, 1998), research indicates that they continue to develop in later childhood (Jones, Rothbart, & Posner, 2003). Inhibitory control, which is very much needed to persist at learning tasks, has also been shown to improve significantly during early and middle childhood (Jones et al., 2003; Williams, Ponesse, Schachar, Logan, & Tannock, 1999).

4.5. Limitations and directions for future research

Although incorporating multiple methods across multiple time points, this study is limited by the use of teacher report to assess both problem behavior and approaches to learning. We specifically selected ecological teacher rating scales that were validated for use with low-income preschool populations (Rogers, 1998; Administration on Children, Youth, and Families, 2006) based on research that indicates that teachers are the most appropriate and efficient source for accurate, summative observations of children's *classroom* behavior (McDermott, 1986). However, it is important to acknowledge that the effects observed between problem behavior and approaches to learning may in part be due to shared method variance. In addition, there is potentially some overlap between the items in these measures. For example, the problems in structured learning situations rating may be capturing a few of the behaviors embedded in the approaches to learning rating (e.g., paying attention in class or sitting during teacher-directed activities). Future studies would benefit from the use of observational measures of children's context-specific problem behaviors and approaches to learning to replicate or disconfirm these associations.

It is also important to acknowledge that our model assumed a predictive relation between problem behavior and approaches to learning, but further evidence is needed to support this relation. Examination of how problem behaviors influence changes in approaches to learning is warranted. A recent study found a significant link between internalizing behaviors and change in approaches to learning over time (Domínguez, Vitiello,

Maier, & Greenfield, 2010). Future studies should examine whether and how context-specific problem behaviors influence longitudinal change in approaches to learning. Also, developmental theory highlights the dynamic interactions that occur across multiple domains of school readiness (Snow, 2007); however, the temporal structure of our data did not allow us to examine an alternate hypotheses (e.g., the influence of approaches to learning on behavior problems) or potential bidirectional influences between problem behavior and approaches to learning. Future examination of these effects would be beneficial. In addition, our study did not include nor examine the effects of family and home variables. Future studies should consider the home context given its important influence on children's development. Variability in children's approaches to learning could be attributable to parents' beliefs and practices. Understanding, for example, what adaptive learning skills are at home and how these are fostered by parents would be important issues to address.

Finally, in line with other national studies of classroom process quality (Pianta, Cox, & Snow, 2007), our findings indicate that most classroom quality ratings (especially for instructional support and classroom organization) tended to be low to moderate overall. In order to comprehensively understand the effects of these domains, it is important for future studies to confirm or expand these findings using samples that include a greater range of classroom process quality. Similarly, these findings also need to be replicated with other samples. The sample used in this study was urban and included mostly minority children. Samples that include other ethnic groups and/or rural populations should also be examined. The generalizability of the study is also limited by the fact that no information was available on children who did not consent to participate or dropped out of the study.

5. Conclusions

Researchers believe approaches to learning function as keystone variables (Hyson, 2008, p. 27), supporting learning in all other school readiness areas (Barnett et al., 1996; Hyson, 2008). Nonetheless, we know little about child-level, classroom-level, and family-level variables that influence children's development in this important domain. Our study is a preliminary step toward a better understanding of the contribution of multiple levels of influence on teacher ratings of children's approaches to learning.

Our study's findings highlighted important child-level behavioral risk factors that must be attended to in order to successfully teach children important learning skills. In addition, it also identified classroom process quality domains that mitigate and exacerbate the detrimental effects of these child-level risk factors on approaches to learning outcomes. Emotionally supportive classroom environments mitigated the negative effects of problem behavior, potentially supporting the hypothesis that sensitive teaching promotes school readiness. Instructional support, on the other hand, exacerbated the negative effects observed. This finding has important implications for differentiated instruction early in childhood. Our findings suggest that teachers may need to adapt their instructional strategies according to their student's social and emotional school readiness. Recently developed curricular interventions aimed at addressing children's challenging behaviors and promoting children's learning related behaviors have yielded promising findings. These interventions include the Evidence-based Program for the Integration of Curricula (Fantuzzo, Gadsden, McDermott, Fantuzzo, et al., 2010) and the Tools of the Mind curriculum (Bodrova & Leong, 2007). Together, these findings suggest that classroom quality may significantly contribute to children's development of important early learning skills.

Appendix A. Factor structure of the ASPI situational dimensions

	Factor loadings
Problems in structured learning	
Involvement in class activities	.56
Taking part in games with others	.67
Maintaining companions/friends	.47
Paying attention in class	.71
Sitting teacher-directed activities	.74
Free play/individual choice	.74
Working with hands (Art)	.63

(continued on next page)

Appendix A (*continued*)

	Factor loadings
Problems in peer interaction	
Getting along with age mates	.66
Behaving in classroom	.78
Respect for others' belongings	.61
Reaction to correction	.71
Telling the truth	.43
Standing in line	.68
Problems in teacher interaction	
Talking to teacher	.67
General manner with teacher	.68
Answering teacher questions	.60
Greeting teacher	.47
Seeking teacher help	.52
Helping teacher with jobs	.52

Note. Standardized factor loadings for the three-factor model were derived from confirmatory factor analysis for the standardization sample of Head Start children ($N = 3779$). RMSEA = .059, CFI = .88 (Bulotsky-Shearer et al., 2008).

Appendix B. ASPI directions and two sample classroom situations with behavioral descriptions

Directions: After each question, there are several descriptions of behaviors children may display. Fill in the circle beside any description that fits the child's behavior over the past month. For each question, mark as many descriptions as apply to the child. If no descriptions apply, then do not fill in any circles for that question.

B.1. Sample 1: How does this child cope with new learning tasks?

- Has a happy-go-lucky attitude to every problem
- Charges in without taking time to think or follow instructions
- Approaches new tasks with caution, but tries
- Won't even attempt it if he/she senses a difficulty
- Likes the challenge of something difficult
- Cannot work up the energy to face anything new

B.2. Sample 2: How is this child at free play/individual choice?

- Engages in appropriate activities
- Rather loud but not disruptive
- Is too timid to join in
- Disturbs others' fun
- Wants to dominate and have his/her own way
- Starts fights and rough play
- Needs teacher assistance to get involved
- Usually plays by him/herself
- Moves quickly from one activity to another

References

Administration on Children, Youth, and Families (2006). *The 2006 family income guidelines (ACYF-IM-HS-06-02). Information Memorandums—2006*. Washington, D.C: US Department of Health and Human Services.

Arnold, D. H. (1997). Co-occurrence of externalizing behavior problems and emergent academic difficulties in young high-risk boys: A preliminary evaluation of patterns and mechanisms. *Journal of Applied Developmental Psychology*, *18*, 317−330.

Barbarin, O. A. (2007). Mental health screening of preschool children: Validity and reliability of ABLE. *The American Journal of Orthopsychiatry*, *77*, 402−418.

Barnett, D. W., Bauer, A. M., Ehrhardt, K. E., Lentz, F. E., & Stollar, S. A. (1996). Keystones targets for changes: Planning for widespread positive consequences. *School Psychology Quarterly*, *11*, 95—117.
Bearne, E. (Ed.). (1996). *Differentiation and diversity in the primary school*. London: Routledge.
Birch, S. H., & Ladd, G. W. (1997). The teacher–child relationship and children's early school adjustment. *Journal of School Psychology*, *35*, 61—79.
Block, J. H., & Block, J. (1980). The role of ego-control and ego-resiliency in the organization of behavior. In W. A. Collins (Ed.), *Development of cognition, affect, and social relations: The Minnesota Symposia on Child Psychology*, *Vol. 13*. (pp. 39—101). Hillsdale, NJ: Erlbaum.
Bodrova, E., & Leong, D. J. (2007). *Tools of the mind: The Vygotskian approach to early childhood education* (2nd ed.). Upper Saddle River, NJ: Prentice-Hall.
Bornstein, M. H., & Bradley, R. H. (Eds.). (2003). *Socioeconomic status, parenting, and child development*. Mahwah, NJ: Erlbaum.
Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon (Ed.), (5th ed.). *Handbook of child psychology*, *Vol. 1*. (pp. 993—1028). New York, NY: Wiley.
Brooks-Gunn, J., Duncan, G. J., & Aber, J. L. (1997). *Neighborhood poverty: Vol. 1. Context and consequences for children: Vol 2*. New York, NY: Sage.
Bulotsky-Shearer, R. J., & Fantuzzo, J. W. (2004). Adjustment Scales for Preschool Intervention: Extending validity and relevance across multiple perspectives. *Psychology in the Schools*, *41*, 725—736.
Bulotsky-Shearer, R. J., Fantuzzo, J. W., & McDermott, P. A. (2008). An investigation of classroom situational dimensions of emotional and behavioral adjustment and cognitive and social outcomes for Head Start children. *Developmental Psychology*, *44*, 139—154.
Campbell, S. B. (1990). *Behavior problems in preschool children.* New York, NY: Guilford Press.
Campbell, S. B., Shaw, D. S., & Gilliom, M. (2000). Early externalizing behavior problems: Toddlers and preschoolers at risk for later maladjustment. *Development and Psychopathology*, *12*, 467—488.
Cicchetti, D., & Sroufe, L. A. (2000). The past as prologue to the future: The times, they've been a changin'. *Development and Psychopathology*, *12*, 255—264.
Connor, C. M., Son, S. H., Hindman, A. H., & Morrison, F. J. (2005). Teacher qualifications, classroom practices, family characteristics, and preschool experience: Complex effects on first graders' vocabulary and early reading outcomes. *Journal of School Psychology*, *43*, 343—375.
DiPerna, J. C., Volpe, R. J., & Elliot, S. N. (2001). A model of academic enablers and elementary reading/language arts achievement. *School Psychology Review*, *31*, 298—312.
Domínguez Escalón, X., & Greenfield, D. B. (2009). Learning behaviors mediating the effects of behavior problems on academic outcomes. *NHSA Dialog*, *12*, 1—17.
Domínguez, X., Vitiello, V. E., Maier, M. F., & Greenfield, D. B. (2010). A longitudinal examination of young children's learning behavior: Child-level and classroom-level predictors of change throughout the preschool year. *School Psychology Review*, *39*, 29—47.
Dunn, L. M., & Dunn, L. M. (1997). *Peabody Picture Vocabulary Test* (Third ed.). Circle Pines, MN: American Guidance Service.
Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, *53*, 109—132.
Elliott, C. D. (1990). *The Differential Abilities Scale*. San Antonio, TX: The Psychological Corporation.
Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods*, *12*, 121—138.
Fantuzzo, J. W., Bulotsky, R., McDermott, P., Mosca, S., & Mosca, M. N. (2003). A multivariate analysis of emotional and behavioral adjustment and preschool educational outcomes. *School Psychology Review*, *32*(2), 185—203.
Fantuzzo, J. W., Bulotsky-Shearer, R., Frye, D., McDermott, P. A., McWayne, C., & Perlman, S. (2007). Investigation of social, emotional, and behavioral dimensions of school readiness for low-income, urban preschool children. *School Psychology Review*, *36*(1), 44—62.
Fantuzzo, J. W., Bulotsky-Shearer, R., Fusco, R. A., & McWayne, C. (2005). An investigation of reschool classroom behavioral adjustment problems and social–emotional school readiness competencies. *Early Childhood Research Quarterly*, *20*, 259—275.
Fantuzzo, J. W., Coolahan, K., Mendez, J., McDermott, P., & Sutton-Smith, B. (1998). Contextually-relevant validation of peer play constructs with African American Head Start children: Penn Interactive Peer Play Scale. *Early Childhood Research Quarterly*, *13*, 411—431.
Fantuzzo, J. W., Gadsden, V., & McDermott, P. (2008, June). Evidence-Based Program for the Integration of Curricula (EPIC). *Paper presented at the Head Start's Ninth National Research Conference, Washington, D.C.*
Fantuzzo, J., Gadsden, V., & McDermott, P. A. (2010). An integrated curriculum to improve mathematics, language, and literacy for Head Start children. *American Education Research Journal*, *46*, 1—31.
Fantuzzo, J. W., & Hampton, V. R. (2000). Penn Interactive Peer Play Scale: A parent and teacher rating system for young children. In K. Gitlin-Weiner, & A. Sandgrund (Eds.), *Play diagnosis and assessment* (pp. 599—620). (2nd ed.). New York, NY: Wiley.
Fantuzzo, J. W., Hightower, D., Grim, S., & Montes, G. (2002). Generalization of the Child Observation Record: A validity study for diverse samples of urban, low-income preschool children. *Early Childhood Research Quarterly*, *17*, 106—125.
Fantuzzo, J., Perry, M. A., & McDermott, P. (2004). Preschool approaches to learning and their relationship to other relevant classroom competencies for low-income children. *School Psychology Quarterly*, *19*, 212—230.
Gardner, M. F. (1990). *The Expressive One-Word Picture Vocabulary Test—Revised.* Novato, CA: Academic Therapy.
Goodson, B. D. (2009, June). How do we close the gap for at-risk children? *Presentation at the Fourth Annual Institute of Education Sciences Research Conference, Washington, D.C.*
Gresham, F. M., & Elliott, S. N. (1990). *The Social Skills Rating System.* Circle Pines, MN: American Guidance Service.
Hamre, B. K., & Pianta, R. C. (2001). Early teacher–child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*, *72*, 625—638.
Hamre, B. K., & Pianta, R. C. (2005). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development*, *76*, 949—967.
Howes, C., Burchinal, M., Pianta, R. C., Bryant, D., Early, D., Clifford, R., et al. (2008). Ready to learn? Children's pre-academic achievement in pre-kindergarten programs. *Early Childhood Research Quarterly*, *23*, 27—50.
Huffman, L. C., Mehlinger, S. L., & Kerivan, A. S. (2000). *Off to a good start: Research on the risk factors for academic and behavioral problems at the beginning of school.* Washington, D.C.: National Institutes of Mental Health.

Hyson, M. (2008). *Enthusiastic and engaged learners: Approaches to learning in the early childhood classroom.* New York, NY: Teachers College Press.
Jones, L. B., Rothbart, M., & Posner, M. I. (2003). Development of executive attention in preschool children. *Developmental Science*, *6*, 498—504.
Kagan, S. L., Moore, E., & Bredekamp, S. (1995). *Reconsidering children's early development and learning: Toward common views and vocabulary.* Washington, DC: National Education Goals Panel.
La Paro, K., Pianta, R. C., Hamre, B., & Stuhlman, M. (2002). *Classroom Assessment Scoring System (CLASS). Pre-K Version.* Charlottesville, VA: University of Virginia.
La Paro, K. M., Pianta, R. C., & Stuhlman, M. (2004). The Classroom Assessment Scoring System: Findings from the prekindergarten year. *Elementary School Journal*, *104*, 409—426.
Lonigan, C. J., Bloomfield, B. G., Anthony, J. L., Bacon, K. D., Phillips, B. M., & Samwel, C. S. (1999). Relations among emergent literacy skills, behavior problems, and social competence in preschool children from low- and middle-income backgrounds. *Topics in Early Childhood Special Education*, *19*, 40—53.
Lutz, M. N., Fantuzzo, J., & McDermott, P. (2002). Multidimensional assessment of emotional and behavioral adjustment problems of low-income preschool children: Development and initial validation. *Early Childhood Research Quarterly*, *17*, 339—355.
Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., et al. (2008). Measures of classroom quality in prekindergarten and children's development of academic, language, and social skills. *Child Development*, *7*, 732—749.
McDermott, P. A. (1986). The observation and classification of exceptional child behavior. In R. T. Brown, & C. R. Reynolds (Eds.), *Psychological perspectives on childhood exceptionality: A handbook* (pp. 136—180). New York, NY: Wiley-Interscience.
McDermott, P. A. (1993). National standardization of uniform multisituational measures of child and adolescent behavior pathology. *Psychological Assessment*, *5*, 413—424.
McDermott, P. A., Green, L. F., Francis, J. M., & Stott, D. H. (2000). *Preschool Learning Behavior Scale.* Philadelphia, PA: Edumetric and Clinical Science.
McDermott, P. A., Leigh, N. M., & Perry, M. A. (2002). Development and validation of the Preschool Learning Behaviors Scale. *Psychology in the Schools*, *39*, 353—365.
McDermott, P. A., Steinberg, C. M., & Angelo, L. E. (2005). Situational specificity makes the difference in assessment of youth behavior disorders. *Psychology in the Schools*, *42*, 121—136.
McGee, R., Partridge, F., Williams, S., & Silva, P. A. (1991). A twelve year follow-up of preschool hyperactive children. *Journal of the American Academy of Child and Adolescent Psychology*, *30*, 224—232.
McWayne, C. M., & Cheung, C. (2009). A Picture of strength: Preschool competencies mediate the effects of early behavior problems on later academic and social adjustment for Head Start children. *Journal of Applied Developmental Psychology*, *30*, 273—285.
McWayne, C. M., Fantuzzo, J. W., & McDermott, P. A. (2004). Preschool competency in context: An investigation of the unique contribution of child competencies to early academic success. *Developmental Psychology*, *40*, 633—645.
Normandeau, S., & Guay, F. (1998). Preschool behavior and first-grade school-achievement: The mediational role of cognitive self-control. *Journal of Educational Psychology*, *90*, 111—121.
Peisner-Feinberg, E. S., & Burchinal, M. R. (1997). Relations between preschool children's child-care experiences and concurrent development: The Cost, Quality, and Outcomes Study. *Merrill–Palmer Quarterly*, *43*, 451—477.
Pianta, R. C., & Caldwell, C. B. (1990). Stability of externalizing symptoms from kindergarten to first grade and factors related to instability. *Development and Psychopathology*, *2*, 247—258.
Pianta, R. C., Cox, M. J., & Snow, K. L. (2007). *School readiness & the transition to kindergarten in the era of accountability.* Baltimore, MD: Paul H. Brookes Publishing Co.
Posner, M. I., & Rothbart, M. K. (1998). Attention, self-regulation and consciousness. *Philosophical Transactions of the Royal Society of London*, *353*, 1915—1927.
Qi, C. H., & Kaiser, A. P. (2003). Behavior problems in preschool children from low income families: Review of the literature. *Topics in Early Childhood Special Education*, *23*, 188—216.
Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., & Congdon, R. (2004). *Hierarchical Linear and Nonlinear Modeling (Version 6.01a) [Computer software].* Lincolnwood, IL: Scientific Software International.
Ready, D. D., LoGerfo, L. F., Burkman, D. T., & Lee, V. E. (2005). Explaining girls' advantage in literacy learning: Do classroom behaviors make a difference? *The Elementary School Journal*, *106*, 21—38.
Rimm-Kaufman, S. E., LaParo, K. M., Downer, J. T., & Pianta, R. C. (2005). The contribution of classroom setting and quality of instruction to children's behavior in the kindergarten classroom. *The Elementary School Journal*, *105*, 377—394.
Rogers, M. R. (1998). Psychoeducational assessment of culturally and linguistically diverse children and youth. In H. B. Vance (Ed.), *Psychological assessment of children: Best practices for school and clinical settings* (pp. 355—384). (2nd ed.). New York, NY: John Wiley & Sons.
SAS Institute (1993). *SAS Procedures Guide.* Cary, NC: SAS Institute.
Schaefer, B. A., & McDermott, P. A. (1999). Learning behavior and intelligence as explanations for children's scholastic achievement. *Journal of School Psychology*, *37*, 299—313.
Shonkoff, J. P., & Phillips, D. (Eds.). (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academy Press.
Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, *86*, 420—428.
Snow, K. L. (2007). Integrative views of the domains of child function: Unifying school readiness. In R. C. Pianta, M. J. Cox, & K. L. Snow (Eds.), *School readiness and the transition to kindergarten in the era of accountability*. Baltimore, MD: Brookes.
Stevenson, J., Richman, N., & Graham, P. (1985). Behavior problems and language abilities at three years and behavioral deviance at eight years. *Journal of Child Psychology and Psychiatry*, *26*, 215—230.
Stipek, D., Feiler, R., Daniels, D., & Milburn, S. (1995). Effects of different instructional approaches on young children's achievement and motivation. *Child Development*, *66*, 209—223.
Thompson, R. A., & Raikes, H. A. (2007). The social and emotional foundations of school readiness. In D. F. Perry, R. K. Kaufman, & J. Knitzer (Eds.), *Social and emotional health in early childhood: Building bridges between services and systems* (pp. 13—36). Baltimore, MD: Brookes.

U.S. Department of Health and Human Services (USDHHS) (2001). *Report of the Surgeon General's Conference on Children's Mental Health: A National Action Agenda.* Washington, DC: U.S. Department of Health and Human Services.
U.S. Department of Health, Human Services (USDHHS) (2002). *Early childhood education and school readiness: Conceptual models, constructs, and measures.* Retrieved January 12, 2009, from. http://www.nichd.nih.gov/publications/pubs/upload/school_readiness.pdf.
Vaughn, S., Hogan, A., Lancelotta, G., Shapiro, S., & Walker, J. (1992). Subgroups of children with severe and mild behavior problems: Social competence and reading achievement. *Journal of Clinical Child Psychology*, *21*, 98—106.
Wachs, T. D., Gurkas, P., & Kontos, S. (2004). Predictors of preschool children's compliance behavior in early childhood classroom settings. *Journal of Applied Developmental Psychology*, *25*, 439—457.
Wigfield, A., Eccles, J. S., Schifele, U., Roeser, R. W., & Davis-Kean, P. (2006). *Development of achievement motivation.* San Diego, CA: Academic Press.
Williams, B. R., Ponesse, J. S., Schachar, R. J., Logan, G. D., & Tannock, R. (1999). Development of inhibitory control across the life span. *Developmental Psychology*, *35*, 205—213.